

Fullam, Jennifer, NMENV

From: Beers, Bob <bbeers@lanl.gov>
Sent: Tuesday, January 7, 2014 2:37 PM
To: Fullam, Jennifer, NMENV
Cc: Saladen, Michael T; Pruett, Jennifer, NMENV
Subject: Comments on DP-1132 Draft Discharge Permit

Hi Jennifer,

Would it be possible for LANS to obtain copies of the public comments submitted to the NMED on draft Discharge Permit DP-1132?

If they are too large to email (or too inconvenient) then I could come by to pick up hard-copies.

I'll be at GWQB tomorrow dropping off a document.

Thanks,

Bob Beers
Los Alamos National Security, LLC
505-667-7969

Fullam, Jennifer, NMENV

From: Pruett, Jennifer, NMENV
Sent: Monday, January 13, 2014 7:19 AM
To: Beers, Bob; Fullam, Jennifer, NMENV
Cc: Saladen, Michael T
Subject: RE: Comments on DP-1132 Draft Discharge Permit

Good morning Bob,

My apologies for my delayed response. I dropped the ball after promising Jenn Fullam I'd reply. We'll need you to send in an IPRA for these documents, then will work with you to get them to you in a way that works for you. We may have some electronically, but others may be hard copy only.

Thanks, and again – I apologize for taking so long to respond.

Thank you for your patience,
JJP

Jennifer J. Pruett
Manager, Pollution Prevention Section
Harold Runnels Bldg.
1190 St. Francis Dr.
P.O. Box 5469
Santa Fe, NM 87502-5469
505-827-0652

From: Beers, Bob [<mailto:bbeers@lanl.gov>]
Sent: Tuesday, January 07, 2014 2:37 PM
To: Fullam, Jennifer, NMENV
Cc: Saladen, Michael T; Pruett, Jennifer, NMENV
Subject: Comments on DP-1132 Draft Discharge Permit

Hi Jennifer,

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Thanks,

Bob Beers
Los Alamos National Security, LLC
505-667-7969

Fullam, Jennifer, NMENV

From: Beers, Bob <bbeers@lanl.gov>
Sent: Wednesday, January 15, 2014 11:55 AM
To: Mascarenas, Melissa, NMENV
Cc: Pruett, Jennifer, NMENV; Saladen, Michael T; Turner, Gene E; Lopez, Lorrie Bonds;
Fullam, Jennifer, NMENV
Subject: Request for Public Records
Attachments: NMED Public Records Request Form_Public Comments_DP1132_LANL.pdf

Dear Ms. Mascareñas,

Please find the attached *Inspection of Public Record Request Form*.

Los Alamos National Security, LLC is requesting copies of all public comments received by the NMED on draft Discharge Permit DP-1132.

Thank you.

Sincerely,

Bob Beers
Los Alamos National Security, LLC
bbeers@lanl.gov
(505) 667-7969




**NEW MEXICO ENVIRONMENT DEPARTMENT
INSPECTION OF PUBLIC RECORD REQUEST FORM**

Please fill out the following information:

1. Date: **1/15/2014**
2. Requestor's Name: **Robert Beers**
3. Requestor's Address: **PO Box 1663, K490, Los Alamos, NM 87545**
4. Phone No.: **(505) 667-7969**
5. Email: **bbeers@lanl.gov**
6. Company Being Represented: **Los Alamos National Security, LLC**
7. Address: **same as above**
8. Document or File being requested to be reviewed or copied (please describe the records in sufficient detail to enable Department personnel to reasonably identify & locate the records:

All public comments received by the NMED on the draft Discharge Permit DP-1132. Public comment period was 9/13/13 to 12/12/13.
9. NMED Bureau where Document/File can be found (if known): **Ground Water Quality Bureau**



Signature

The cost for copying by NMED is as indicated on Attachment A. Please send this request to:

Melissa Y. Mascareñas
Inspection of Public Records Officer
1190 St. Francis Drive, Ste. N-4050
Santa Fe, New Mexico 87505
fax: (505) 827-1628 or
email: melissa.mascarenas@state.nm.us

ATTACHMENT A

A. Copies of Paper Records: The Public Records Custodian may charge reasonable fees for copying public records, payable in advance, and, upon request, shall provide a receipt. NMSA 1978, § 14-2-9.B. Unless a different fee is otherwise prescribed by law or regulation, the following fees apply to producing copies of paper records.

(1) 8 ½" x 11" - \$0.25 per page

B. Audio tape reproduction: \$2.00 per tape if copied by the Department; if the Department does not have the capability to copy the tape with reasonable audio quality, the Department may charge the cost required to have the tape copied by an outside service.

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1. not to make unauthorized copies;
2. not to use the electronic information for any political or commercial purpose unless the purpose and use is approved in writing by the New Mexico Environment Department;
3. not to use the electronic information for solicitation or advertisement when it contains the name, address or telephone number of any person, unless such use is otherwise specifically authorized by law;
4. not to allow access to the electronic information by any other person unless the use is approved in writing by the New Mexico Environment Department; and
5. to pay a royalty or other consideration to the state of New Mexico as may be agreed upon by the New Mexico Environment Department.

If information contained in the electronic format is searched, manipulated, or retrieved or if an electronic copy is made for any private or nonpublic use, a fee shall be charged by the New Mexico Environment Department. NMSA 1978, §14-3-15.1.F.

Except as authorized by law or rule of the State Commission of Public Records, any person who reveals to any unauthorized personal information contained in a computer database or who uses or permits the unauthorized use or access to any computer database is guilty of a misdemeanor, and upon conviction the court shall sentence that person to jail for a definite term not to exceed one year or to payment of a fine not to exceed five thousand dollars (\$5,000) or both. That person shall not be employed by the state for a period of five years after the date of conviction. NMSA 1978, § 14-3-15.1(G).

In order to determine whether the information requested will be used for solicitation, advertisement, political or commercial purpose, please indicate how the information will be used:

Los Alamos National Security, LLC is co-applicant with the U.S. Department of Energy for Discharge Permit DP-1132. Information will be used to assess the public's response to the NMED's draft Discharge Permit DP-1132.

I, **Robert Beers** (print name), have requested information in electronic format from the New Mexico Environment Department, and have read and certify that I comply with the conditions listed above.


Signature

For NMED Use Only

Electronic Information Requested: _____
Format (e.g. database, spreadsheet, map, other) _____
Bureau: _____ Date: _____
Name of Individual Releasing electronic Information: _____



SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

NEW MEXICO
ENVIRONMENT DEPARTMENT

Office of the Secretary

Harold Runnels Building
1190 Saint Francis Dr., Santa Fe, NM 87505
PO Box 5469, Santa Fe, NM 87502-5469
Phone (505) 827-2855 Fax (505) 827-2836
www.nmenv.state.nm.us

Jeffrey M. Kendall, General Counsel



RYAN FLYNN
Cabinet Secretary-Designate
BUTCH TONGATE
Deputy Secretary

January 15, 2014

VIA E-MAIL

Bob Beers
bbeers@lanl.gov

Re: Request to Inspect Public Records

Dear Mr. Beers:

On January 15, 2014 this office received a request for public information. You request information pertaining to: a copy of the Draft Discharge Permit DP-1132. (See attached request).

I forwarded your request to the bureau on January 15, 2014. The bureau will respond by January 30, 2014.

Should you have any questions, please contact the Ground Water Quality Bureau at (505) 827-2919.

Sincerely,

Melissa Y. Mascareñas
New Mexico Environment Department
Department Public Records Custodian

cc: Jerry Schoeppner, Chief, Ground Water Quality Bureau




**NEW MEXICO ENVIRONMENT DEPARTMENT
INSPECTION OF PUBLIC RECORD REQUEST FORM**

Please fill out the following information:

1. Date: **1/15/2014**
2. Requestor's Name: **Robert Beers**
3. Requestor's Address: **PO Box 1663, K490, Los Alamos, NM 87545**
4. Phone No.: **(505) 667-7969**
5. Email: **bbeers@lanl.gov**
6. Company Being Represented: **Los Alamos National Security, LLC**
7. Address: **same as above**
8. Document or File being requested to be reviewed or copied (please describe the records in sufficient detail to enable Department personnel to reasonably identify & locate the records:

All public comments received by the NMED on the draft Discharge Permit DP-1132. Public comment period was 9/13/13 to 12/12/13.

9. NMED Bureau where Document/File can be found (if known): **Ground Water Quality Bureau**



Signature

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**Melissa Y. Mascareñas
Inspection of Public Records Officer
1190 St. Francis Drive, Ste. N-4050
Santa Fe, New Mexico 87505
fax: (505) 827-1628 or
email: melissa.mascarenas@state.nm.us**

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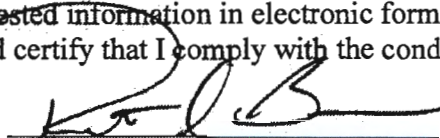
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I, **Robert Beers** (print name), have requested information in electronic format from the New Mexico Environment Department, and have read and certify that I comply with the conditions listed above.



Signature

For NMED Use Only

Electronic Information Requested: _____
Format (e.g. database, spreadsheet, map, other) _____
Bureau: _____ Date: _____
Name of Individual Releasing electronic Information: _____

From: [Fullam, Jennifer, NMENV](#)
To: [Beers, Bob](#)
Cc: [Pruett, Jennifer, NMENV](#); [Saladen, Michael T](#); [Turner, Gene E](#); [Lopez, Lorrie Bonds](#); [Mascarenas, Melissa, NMENV](#)
Subject: RE: Request for Public Records
Date: Thursday, January 16, 2014 9:24:23 AM
Attachments: [DP1132 Comments DOE-LANS 121213.pdf](#)
[DP1132 Comments Nuclear Watch 121213.pdf](#)
[DP1132 Comments Tewa Women and CCW 120613.pdf](#)
[DP1132 Comments Tewa Women and CCW 121213.pdf](#)

Bob,

In response to your request, attached are the comments submitted to NMED regarding the draft Discharge Permit for Los Alamos National Laboratory's Radioactive Liquid Waste Treatment Facility (DP-1132).

Jennifer T. Fullam
Environmental Scientist
Ground Water Quality Bureau
New Mexico Environment Department
505.827.2909
jennifer.fullam@state.nm.us

From: Beers, Bob [<mailto:bbeers@lanl.gov>]
Sent: Wednesday, January 15, 2014 11:55 AM
To: Mascarenas, Melissa, NMENV
Cc: [Pruett, Jennifer, NMENV](#); [Saladen, Michael T](#); [Turner, Gene E](#); [Lopez, Lorrie Bonds](#); [Fullam, Jennifer, NMENV](#)
Subject: Request for Public Records

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Thank you.

Sincerely,

Bob Beers
Los Alamos National Security, LLC
bbeers@lanl.gov
(505) 667-7969

Fullam, Jennifer, NMENV

From: Sandoval, Diana, NMENV
Sent: Thursday, January 16, 2014 10:32 AM
To: Fullam, Jennifer, NMENV
Cc: Pruett, Jennifer, NMENV; Maes, Anna, NMENV
Subject: FW: IPRA-Beers-DP-1132(LANL)
Attachments: NMED Public Records Request Form_Public Comments_DP1132_LANL.pdf; letter001 (3).pdf; memo001 (7).pdf

Jenn, this IPRA from Mr. Beers is regarding DP-1132(LANL)...
~Diana

From: Mascarenas, Melissa, NMENV
Sent: Wednesday, January 15, 2014 1:33 PM
To: Schoeppner, Jerry, NMENV; Sandoval, Diana, NMENV
Subject: FW: Request for Public Records

From: Beers, Bob [<mailto:bbeers@lanl.gov>]
Sent: Wednesday, January 15, 2014 11:55 AM
To: Mascarenas, Melissa, NMENV
Cc: Pruett, Jennifer, NMENV; Saladen, Michael T; Turner, Gene E; Lopez, Lorrie Bonds; Fullam, Jennifer, NMENV
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Los Alamos National Security, LLC
bbeers@lanl.gov
(505) 667-7969




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INSPECTION OF PUBLIC RECORD REQUEST FORM**

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Signature

For NMED Use Only

Electronic Information Requested: _____
Format (e.g. database, spreadsheet, map, other) _____
Bureau: _____ Date: _____
Name of Individual Releasing electronic Information: _____



SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

NEW MEXICO
ENVIRONMENT DEPARTMENT

Office of the Secretary

Harold Runnels Building
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PO Box 5469, Santa Fe, NM 87502-5469
Phone (505) 827-2855 Fax (505) 827-2836
www.nmenv.state.nm.us

Jeffrey M. Kendall, General Counsel



RYAN FLYNN
Cabinet Secretary-Designate
BUTCH TONGATE
Deputy Secretary

January 15, 2014

VIA E-MAIL

Bob Beers
bbeers@lanl.gov

Re: Request to Inspect Public Records

Dear Mr. Beers:

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Sincerely,

Melissa Y. Mascareñas
New Mexico Environment Department
Department Public Records Custodian

cc: Jerry Schoeppner, Chief, Ground Water Quality Bureau



SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

NEW MEXICO
ENVIRONMENT DEPARTMENT

Office of the Secretary

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www.nmenv.state.nm.us

Jeffrey M. Kendall, General Counsel



RYAN FLYNN
Cabinet Secretary-Designate
BUTCH TONGATE
Deputy Secretary

MEMORANDUM

To: Jerry Schoeppner, Chief, Ground Water Quality Bureau
From: Melissa Y. Mascareñas, Department Public Records Custodian *MyA*
Date: January 15, 2014
Subject: Request to Inspect Public Records

We have received a request from **Mr. Bob Beers** asking for information regarding:

SEE ATTACHED REQUEST

The Inspection of Public Records Act requires a response to a requester of public records within fifteen (15) calendar days from receipt of a request. Please respond to the requestor by no later than **January 30, 2014**.

Your response may take several forms:

- a) Provide the requested information; or
- b) Notify the requester of a delay; you must give reasons for the delay and the date when the information will be available; or
- c) Deny the request or part of it; provide the records that can be released and identify the reason(s) for denial of any records; or
- d) Ask for more information or clarification; and
- e) Notify the requester of any mailing or photocopy charges.

A copy of my initial response to this request is attached for your records. **Please provide me with a copy of any responses you make to this request and/or notify me when the records have been made available for inspection.**

JAN 22 2014

BUREAU



Environmental Protection Division
Environmental Compliance Programs (ENV-CP)
 PO Box 1663, K490
 Los Alamos, New Mexico 87545
 (505) 667-0666

National Nuclear Security Administration
Los Alamos Field Office, A316
 3747 West Jemez Road
 Los Alamos, New Mexico, 87545
 (505) 667-5794/Fax (505) 667-5948

Date: **JAN 21 2014**
 Symbol: ENV-DO-14-0010
 LAUR: 14-20008

Mr. Jerry Schoeppner, Chief
 Ground Water Quality Bureau
 New Mexico Environment Department
 Harold Runnels Building, Room N2261
 1190 St. Francis Drive
 P.O. Box 26110
 Santa Fe, NM 87502

Dear Mr. Schoeppner:

Subject: Discharge Plan DP-1132 Quarterly Report, Fourth Quarter 2013, TA-50 Radioactive Liquid Waste Treatment

This letter from the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) is the fourth quarter 2013 Discharge Plan DP-1132 report for the Technical Area (TA)-50 Radioactive Liquid Waste Treatment Facility (RLWTF). Since the first quarter of 1999, DOE/LANS have provided the New Mexico Environment Department (NMED) with voluntary quarterly reports containing analytical results from effluent and groundwater monitoring.

During the fourth quarter of 2013, no effluent was discharged to either the National Pollutant Discharge Elimination System (NPDES) Outfall 051 or to the recently constructed solar evaporative tank system (SET) at Technical Area (TA)-52; all effluent was evaporated on-site at the mechanical evaporator system (MES).

Quarterly Monitoring Results, Mortandad Canyon Alluvial Groundwater Wells

Table 1.0 presents the analytical results from sampling conducted at Mortandad Canyon alluvial wells MCO-4B, MCO-6, and MCO-7 during the fourth quarter of 2013. No samples were collected from alluvial well MCO-3 because the well was damaged beyond repair during a flood event in September 2013. Detailed information on the condition of MCO-3 was submitted to the NMED in December 2013 (ENV-DO-13-0316). Samples from MCO-4B, MCO-6, and MCO-7 were submitted to GEL Laboratories LLC (GEL) for analysis.

All of the analytical results were below the New Mexico Water Quality Control Commission (NMWQCC) 3103 standards for nitrate-nitrogen (NO₃-N), fluoride (F), and total dissolved solids (TDS). Analytical results from the sampling of intermediate and regional aquifer wells in Mortandad Canyon can be accessed online at the Intellus New Mexico environmental monitoring data web site (<http://www.intellusnmdata.com>).

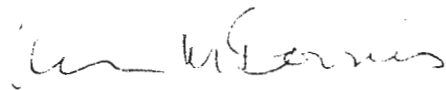
TA-50 RLWTF Effluent Monitoring Results

No final weekly composite (FWC) samples were collected during the fourth quarter of 2013 because no effluent was discharged to Mortandad Canyon.

No final monthly composite (FMC) samples were collected during the fourth quarter of 2013 because no effluent was discharged to Mortandad Canyon.

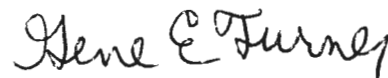
Please contact Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding this report.

Sincerely,



Alison M. Dorries
Division Leader
Environmental Protection Division
Los Alamos National Security LLC

Sincerely,



Gene E. Turner
Environmental Permitting Manager
Environmental Projects Office
Los Alamos Field Office
U.S. Department of Energy

AMD:GET:RSB/lm

Cy: James Hogan, NMED/SWQB, Santa Fe, NM, (E-File)
John E. Kieling, NMED/HWB, Santa Fe, NM, (E-File)
Stephen M. Yanicak, NMED/DOE/OB, (E-File)
Hai Shen, NA-OO-LA, (E-File)
Gene E. Turner, NA-OO-LA, (E-File)
Eric L. Trujillo, LASO-NSM, (E-File)
Carl A. Beard, PADOPS, (E-File)
Michael T. Brandt, ADESH, (E-File)
Alison M. Dorries, ENV-DO, (E-File)
Randal S. Johnson, DSESH-TA55, (E-File)
Stephen G. Cossey, DSESH-TA55, (E-File)
Michael T. Saladen, ENV-CP, (E-File)
Robert S. Beers, ENV-CP, (E-File)
Robert C. Mason, TA55-DO, (E-File)
Leslie K. Sonnenberg, ADNHHO, (E-File)
John C. Del Signore, TA-55 RLW, (E-File)
LASOmailbox@nnsa.doe.gov, w/enc., (E-File)
locatesteam@lanl.gov, w/enc., (E-File)
ENV-CP Correspondence File, w/enc., K490

Discharge Plan DP-1132 Quarterly Report
4th Quarter, 2013

GROUND WATER

JAN 22 2014

BUREAU

Table 1.0. Mortandad Canyon Alluvial Well Sampling, 4th Quarter, 2014.

Sampling Location	Sample Field Prep (F/UF) ¹	Sample Date	Perchlorate (ug/L)	NO ₃ +NO ₂ -N (mg/L)	TKN (mg/L)	NH ₃ -N (mg/L)	TDS (mg/L)	F (mg/L)
MCO-3	F	NA	Damaged ⁴	Damaged ⁴	Damaged ⁴	Damaged ⁴	Damaged ⁴	Damaged ⁴
MCO-4B	F	11/20/2013	16.5	0.46	0.21	0.08	649	0.47
MCO-6	F	11/20/2013	8.63	1.5	0.18	0.06	307	0.80
MCO-7	F	11/21/2013	9.38	3.0	0.17	0.03J ⁵	294	1.1
NM WQCC 3103 Groundwater Standards			NA ²	10 mg/L ³	NA ²	NA ²	1000 mg/L	1.6 mg/L

Notes:

¹F means the sample was filtered. UF means the sample was not filtered.

²NA means that there is no NM WQCC 3103 standard for this analyte.

³The NM WQCC 3103 Groundwater Standard is for NO₃-N.

⁴Damaged means that the well was damaged beyond repair during a flood event in Mortandad Canyon in September 2013.

⁵J flag indicates an estimated detection. The result was greater than the Method Detection Limit (MDL) but less than the Reporting Limit (RL).



SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

NEW MEXICO
ENVIRONMENT DEPARTMENT

Office of the Secretary

Harold Runnels Building
1190 Saint Francis Dr., Santa Fe, NM 87505
PO Box 5469, Santa Fe, NM 87502-5469
Phone (505) 827-2855 Fax (505) 827-2836
www.nmenv.state.nm.us

Jeffrey M. Kendall, General Counsel



RYAN FLYNN
Cabinet Secretary-Designate
BUTCH TONGATE
Deputy Secretary

January 23, 2014

VIA E-MAIL

Jonathan Block
jblock@nmelec.org

Re: Request to Inspect Public Records

Dear Mr. Block:

On January 23, 2014 this office received a request for public information. You request information pertaining to: all comments on the most recent draft of the Radioactive Liquid Waste Treatment Facility for LANL. (See attached request).

I forwarded your request to the bureau on January 23, 2014. The bureau will respond by February 6, 2014.

Should you have any questions, please contact the Ground Water Quality Bureau at (505) 827-2919.

Sincerely,

Melissa Y. Mascareñas
New Mexico Environment Department
Department Public Records Custodian

cc: Jerry Schoeppner, Chief, Ground Water Quality Bureau

Fullam, Jennifer, NMENV

From: Sandoval, Diana, NMENV
Sent: Thursday, January 23, 2014 4:37 PM
To: Fullam, Jennifer, NMENV; Knutson, Gerald, NMENV; Pruett, Jennifer, NMENV
Cc: Maes, Anna, NMENV
Subject: FW: IPRA-Block-Los Alamos(LANL)
Attachments: 20140123 NMELC IPRA to NMED.pdf; letter001 (3).pdf; memo001 (7).pdf

All, this IPRA from Mr. Jon Block (attorney) is concerning Radioactive Liquid Waste Treatment Facility for LANL.

~Diana

-----Original Message-----

From: Mascarenas, Melissa, NMENV
Sent: Thursday, January 23, 2014 4:05 PM
To: Schoeppner, Jerry, NMENV; Sandoval, Diana, NMENV
Subject: FW: IPRA request

-----Original Message-----

From: Jonathan Block [<mailto:jblock@nmelc.org>]
Sent: Thursday, January 23, 2014 1:40 PM
To: Mascarenas, Melissa, NMENV
Cc: Joni Arends
Subject: IPRA request

Hello, Melissa;

Hope 2014 is a great year for you!

Here's an IPRA request to NMED for all comments on the most recent draft of the Radioactive Liquid Waste Treatment Facility for LANL.

Thanks, as always, for your consideration and prompt reply,

Jon

--

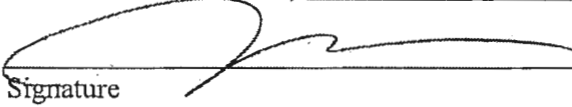
Jon Block
Staff Attorney
New Mexico Environmental Law Center
1405 Luisa Street, Ste. 5
Santa Fe, NM 87505
(505) 989-9022



NEW MEXICO ENVIRONMENT DEPARTMENT
INSPECTION OF PUBLIC RECORD REQUEST FORM

Please fill out the following information:

1. Date: January 23, 2014
2. Requestor's Name: Jon Block, Staff Attorney
3. Requestor's Address: New Mexico Environmental Law Center
1405 Luisa Street, Ste. 5, Santa Fe, NM 87505
4. Phone No.: (505) 989-9022, Ext. 22
5. Email: jblock@nmelc.org
6. Company Being Represented: Concerned Citizens for Nuclear Safety
7. Address: 107 Cienega Street, Santa Fe, NM 87501
8. Document or File being requested to be reviewed or copied (please describe the records in sufficient detail to enable Department personnel to reasonably identify & locate the records:
Please see attached second page for complete description of request.
9. NMED Bureau where Document/File can be found (if known): Ground Water Quality Bureau


Signature

The cost for copying by NMED is as indicated on Attachment A. Please send this request to:

Melissa Y. Mascareñas
Inspection of Public Records Officer
1190 St. Francis Drive, Ste. N-4050
Santa Fe, New Mexico 87505
fax: (505) 827-1628 or
email: melissa.mascareñas@state.nm.us

NMED IPRA FORM PAGE 2 (INSERTED)

RESPONSE TO QUESTION (8)

Please provide all information in the form of documents, memoranda, meeting notes, meeting minutes, calendar and/or log entries or any other type of communication contained on paper, in email, on computers and/or digital storage devices of any kind ("documents" hereinafter) concerning the ground water discharge permit for the radioactive liquid waste treatment facility at the Los Alamos National Laboratory to NMED from all persons, individuals, organizations including, but not limited to, Los Alamos National Laboratory (LANL) (or agent(s) or attorney(s)), Los Alamos National Security, LLC (LANS) (or agent(s) or attorney(s)), the National Nuclear Security Administration (or agent(s) or attorney(s)), the United States Department of Energy (DOE) (or agent(s) or attorney(s)). Sole exceptions to this request: it is not intended to include copies of the two sets of comments on the September 2013 draft RLWTF permit filed by Communities for Clean Water (CCW), Tewa Women United, Honor Our Pueblo Existence, Robert Gilkeson, Amigos Bravos, and Concerned Citizens for Nuclear Safety nor copies of comments to previous drafts of this permit.

For any documents not provided under a claim of privilege, please provide the following information for each document: author(s) (if email, sender(s) and recipients); subject of document (email, memo), date created, specific privilege claimed to justify withholding the document.

If documents can be provided in digital form, that will be acceptable.

Thank you for your prompt attention and compliance with this request.

ATTACHMENT A

A. Copies of Paper Records: The Public Records Custodian may charge reasonable fees for copying public records, payable in advance, and, upon request, shall provide a receipt. NMSA 1978, § 14-2-9.B. Unless a different fee is otherwise prescribed by law or regulation, the following fees apply to producing copies of paper records.

(1) 8 ½" x 11" - \$0.25 per page

B. Audio tape reproduction: \$2.00 per tape if copied by the Department; if the Department does not have the capability to copy the tape with reasonable audio quality, the Department may charge the cost required to have the tape copied by an outside service.

C. Printed Copies of Records from Department Electronic Information Systems: Information contained in an electronic information system shall be disclosed in printed or typed format upon payment of a reasonable fee. NMSA 1978, §14-3-15.1.A. If an Inspection of Public Records Act request requires searching, manipulating, retrieving or reviewing data from an electronic information system, a fee shall be charged for the service. NMSA 1978, §14-3-15.1.F.

1. For requests resulting in less than 100 pages of records, the Department's reasonable fee shall be the copy cost set forth in Section IX.A. If the Department receives multiple requests from the same or related requestors, the Department may aggregate the requests and charge a fee under Section IX.C.2.

2. For requests of 100 or more pages of records, a reasonable fee shall be the actual staff salary multiplied by the staff time taken to complete the request plus the copy cost set forth in Section IX.A. For requests of 100 pages or more from information systems databases, the Department shall provide an estimate to the requestor and may require a down payment of the estimate before beginning to retrieve records. The Department may charge additional down payments as documents are retrieved and produced.

D. Electronic Format of Electronic Information: If an Inspection of Public Records Act request requires searching, manipulating, retrieving or reviewing data from an electronic information system, a fee shall be charged for the service. NMSA 1978, §14-3-15.1.F. The fee to produce information in electronic format is the actual staff salary multiplied by the staff time taken to complete the request.

E. Prints from digital images: 5" x 7" or 8" x 10" - \$15.00 (ea.).

ATTACHMENT B

New Mexico Environment Department Release of Public Information in Electronic Format

In accordance with the Public Records Act, NMSA 1978, Section 14-3-15.1(C), any person requesting of a public record from the New Mexico Environment Department in any electronic medium (e.g., spreadsheets, GIS layers, database extracts) or database agrees:

1. not to make unauthorized copies;
2. not to use the electronic information for any political or commercial purpose unless the purpose and use is approved in writing by the New Mexico Environment Department;
3. not to use the electronic information for solicitation or advertisement when it contains the name, address or telephone number of any person, unless such use is otherwise specifically authorized by law;
4. not to allow access to the electronic information by any other person unless the use is approved in writing by the New Mexico Environment Department; and
5. to pay a royalty or other consideration to the state of New Mexico as may be agreed upon by the New Mexico Environment Department.

If information contained in the electronic format is searched, manipulated, or retrieved or if an electronic copy is made for any private or nonpublic use, a fee shall be charged by the New Mexico Environment Department. NMSA 1978, §14-3-15.1.F.

Except as authorized by law or rule of the State Commission of Public Records, any person who reveals to any unauthorized personal information contained in a computer database or who uses or permits the unauthorized use or access to any computer database is guilty of a misdemeanor, and upon conviction the court shall sentence that person to jail for a definite term not to exceed one year or to payment of a fine not to exceed five thousand dollars (\$5,000) or both. That person shall not be employed by the state for a period of five years after the date of conviction. NMSA 1978, § 14-3-15.1(G).

In order to determine whether the information requested will be used for solicitation, advertisement, political or commercial purpose, please indicate how the information will be used:

Educational purposes related to public participation in the permit
for the Radioactive Liquid Waste Treatment Facility.

I, Jonathan Block (print name), have requested information in electronic format from the New Mexico Environment Department, and have read and certify that I comply with the conditions listed above.


Signature

For NMED Use Only

Electronic Information Requested: _____

Format (e.g. database, spreadsheet, map, other) _____

Bureau: _____

Date: _____

Name of Individual Releasing electronic Information: _____

Fullam, Jennifer, NMENV

From: Beers, Bob <bbeers@lanl.gov>
Sent: Monday, February 03, 2014 3:26 PM
To: Fullam, Jennifer, NMENV
Subject: RE: Request for Public Records

Thank you.

From: Fullam, Jennifer, NMENV [<mailto:Jennifer.Fullam@state.nm.us>]
Sent: Tuesday, January 28, 2014 3:18 PM
To: Beers, Bob
Subject: RE: Request for Public Records

Bob,

Following up from your recent IPRA, I was reviewing the file and forgot NMED had received these comments from the Pueblo of Santa Ana as well (attached).

Jennifer T. Fullam
Environmental Scientist
Ground Water Quality Bureau
New Mexico Environment Department
505.827.2909
jennifer.fullam@state.nm.us

From: Beers, Bob [<mailto:bbeers@lanl.gov>]
Sent: Thursday, January 16, 2014 10:02 AM
To: Fullam, Jennifer, NMENV
Subject: RE: Request for Public Records

Jennifer,

Thanks for the quick turnaround on getting these to us.

I'm surprised there were only 3 (excluding LANL) and none from CCNS??

Bob

From: Fullam, Jennifer, NMENV [<mailto:Jennifer.Fullam@state.nm.us>]
Sent: Thursday, January 16, 2014 9:24 AM
To: Beers, Bob
Cc: Pruett, Jennifer, NMENV; Saladen, Michael T; Turner, Gene E; Lopez, Lorrie Bonds; Mascarenas, Melissa, NMENV
Subject: RE: Request for Public Records

Bob,

In response to your request, attached are the comments submitted to NMED regarding the draft Discharge Permit for Los Alamos National Laboratory's Radioactive Liquid Waste Treatment Facility (DP-1132).

Jennifer T. Fullam
Environmental Scientist

Ground Water Quality Bureau
New Mexico Environment Department
505.827.2909
jennifer.fullam@state.nm.us

From: Beers, Bob [<mailto:bbeers@lanl.gov>]
Sent: Wednesday, January 15, 2014 11:55 AM
To: Mascarenas, Melissa, NMENV
Cc: Pruett, Jennifer, NMENV; Saladen, Michael T; Turner, Gene E; Lopez, Lorrie Bonds; Fullam, Jennifer, NMENV
Subject: Request for Public Records

Dear Ms. Mascareñas,

Please find the attached *Inspection of Public Record Request Form*.

Los Alamos National Security, LLC is requesting copies of all public comments received by the NMED on draft Discharge Permit DP-1132.

Thank you.

Sincerely,

Bob Beers
Los Alamos National Security, LLC
bbeers@lanl.gov
(505) 667-7969

Fullam, Jennifer, NMENV

From: Beers, Bob <bbeers@lanl.gov>
Sent: Monday, February 3, 2014 3:26 PM
To: Fullam, Jennifer, NMENV
Subject: RE: Request for Public Records

Thank you.

From: Fullam, Jennifer, NMENV [mailto:Jennifer.Fullam@state.nm.us]
Sent: Tuesday, January 28, 2014 3:18 PM
To: Beers, Bob
Subject: RE: Request for Public Records

Bob,

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Jennifer T. Fullam
Environmental Scientist
Ground Water Quality Bureau
New Mexico Environment Department
505.827.2909
jennifer.fullam@state.nm.us

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Sent: Thursday, January 16, 2014 10:02 AM
To: Fullam, Jennifer, NMENV
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Subject: RE: Request for Public Records

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Jennifer T. Fullam

Environmental Scientist
Ground Water Quality Bureau
New Mexico Environment Department
505.827.2909
jennifer.fullam@state.nm.us

From: Beers, Bob [<mailto:bbeers@lanl.gov>]
Sent: Wednesday, January 15, 2014 11:55 AM
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Cc: Pruett, Jennifer, NMENV; Saladen, Michael T; Turner, Gene E; Lopez, Lorrie Bonds; Fullam, Jennifer, NMENV
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Sincerely,

Bob Beers
Los Alamos National Security, LLC
bbeers@lanl.gov
(505) 667-7969

Fullam, Jennifer, NMENV

From: Fullam, Jennifer, NMENV
Sent: Thursday, February 6, 2014 10:11 AM
To: Jon Block (jblock@nmelc.org); Joni Arends (jarends@nuclearactive.org)
Cc: Sandoval, Diana, NMENV; Mascarenas, Melissa, NMENV; Schoeppner, Jerry, NMENV; Pruett, Jennifer, NMENV; Hower, Jennifer, NMENV
Subject: FW: IPRA-Block-Los Alamos(LANL)
Attachments: 20140123 NMELC IPRA to NMED.pdf; letter001 (3).pdf

Jon,

This e-mail is in response to your recent IPRA request for documents related to LANL's RLWTF following the public notice of the draft Discharge Permit (DP-1132). These documents can be made available for you to come in and review at the Ground Water Quality Bureau either Monday after 10:30 am (02.10.14) or Thursday (02.13.14) of next week. Please let me know what date and time is most suitable for you. Thank you.

Jennifer T. Fullam
Environmental Scientist
Ground Water Quality Bureau
New Mexico Environment Department
505.827.2909
jennifer.fullam@state.nm.us

-----Original Message-----

From: Jonathan Block [mailto:jblock@nmelc.org]
Sent: Thursday, January 23, 2014 1:40 PM
To: Mascarenas, Melissa, NMENV
Cc: Joni Arends
Subject: IPRA request

Hello, Melissa;

Hope 2014 is a great year for you!

Here's an IPRA request to NMED for all comments on the most recent draft of the Radioactive Liquid Waste Treatment Facility for LANL.

Thanks, as always, for your consideration and prompt reply,

Jon

--
Jon Block
Staff Attorney
New Mexico Environmental Law Center
1405 Luisa Street, Ste. 5
Santa Fe, NM 87505
(505) 989-9022

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4. not to allow access to the electronic information by any other person unless the use is approved in writing by the New Mexico Environment Department; and
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Except as authorized by law or rule of the State Commission of Public Records, any person who reveals to any unauthorized person information contained in a computer database or who uses or permits the unauthorized use or access to any computer database is guilty of a misdemeanor, and upon conviction the court shall sentence that person to jail for a definite term not to exceed one year or to payment of a fine not to exceed five thousand dollars (\$5,000) or both. That person shall not be employed by the state for a period of five years after the date of conviction. NMSA 1978, § 14-3-15.1(G).

In order to determine whether the information requested will be used for solicitation, advertisement, political or commercial purpose, please indicate how the information will be used:

Educational purposes related to public participation in the permit
for the Radioactive Liquid Waste Treatment Facility.

I, Jonathan Block (print name), have requested information in electronic format from the New Mexico Environment Department, and have read and certify that I comply with the conditions listed above.


Signature

For NMED Use Only

Electronic Information Requested: _____
Format (e.g. database, spreadsheet, map, other) _____
Bureau: _____ Date: _____
Name of Individual Releasing electronic Information: _____



SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

NEW MEXICO
ENVIRONMENT DEPARTMENT

Office of the Secretary

Harold Runnels Building
1190 Saint Francis Dr., Santa Fe, NM 87505
PO Box 5469, Santa Fe, NM 87502-5469
Phone (505) 827-2855 Fax (505) 827-2836
www.nmenv.state.nm.us

Jeffrey M. Kendall, General Counsel



RYAN FLYNN
Cabinet Secretary-Designate
BUTCH TONGATE
Deputy Secretary

January 23, 2014

VIA E-MAIL

Jonathan Block
jblock@nmelc.org

Re: Request to Inspect Public Records

Dear Mr. Block:

On January 23, 2014 this office received a request for public information. You request information pertaining to: all comments on the most recent draft of the Radioactive Liquid Waste Treatment Facility for LANL. (See attached request).

I forwarded your request to the bureau on January 23, 2014. The bureau will respond by February 6, 2014.

Should you have any questions, please contact the Ground Water Quality Bureau at (505) 827-2919.

Sincerely,

Melissa Y. Mascareñas
New Mexico Environment Department
Department Public Records Custodian

cc: Jerry Schoeppner, Chief, Ground Water Quality Bureau

Fullam, Jennifer, NMENV

From: Jon Block <jblock@nrmelc.org>
Sent: Friday, February 7, 2014 10:07 AM
To: Fullam, Jennifer, NMENV
Cc: Hower, Jennifer, NMENV; Joni Arends (jarends@nuclearactive.org); Schoeppner, Jerry, NMENV; Pruett, Jennifer, NMENV
Subject: Re: IPRA-Block-Los Alamos(LANL)

Jennifer:

That is very helpful and should move forward this process.
Please do provide them to me and Joni Arends, the group
representative for CCW on the comments provided to your office.

Thanks.

Jon

On 2/7/14, 8:15 AM, Fullam, Jennifer, NMENV wrote:

Jon,

I do have all of the comments submitted on the draft Discharge Permit (DP-1132) in electronic format and could provide them if that would help, so you don't have to try and come in before you are completely well. I could also provide a generic list of the other documents so you can see if they are of interest to you. Please let me know if this would help. Thanks.

Jennifer T. Fullam
Environmental Scientist
Ground Water Quality Bureau
New Mexico Environment Department
505.827.2909
jennifer.fullam@state.nm.us

-----Original Message-----

From: Hower, Jennifer, NMENV
Sent: Thursday, February 06, 2014 3:30 PM
To: Jonathan Block; Fullam, Jennifer, NMENV
Cc: Joni Arends (jarends@nuclearactive.org); Sandoval, Diana, NMENV; Mascarenas, Melissa, NMENV; Schoeppner, Jerry, NMENV; Pruett, Jennifer, NMENV
Subject: RE: IPRA-Block-Los Alamos(LANL)

Oh my gosh, Jon. That's horrible. I hope you feel better soon!

When I checked with Jennifer Fullam a few days ago, they were all hard copy in one of the permit correspondence folders. It would probably be best if you came in and reviewed when you feel up to it.

Jennifer L. Hower
Deputy General Counsel
New Mexico Environment Department

5500 San Antonio Dr. NE
Albuquerque, NM 87109
Office: (505) 222-9550
Cell: (505) 500-7628
Fax: (505) 222-9510

-----Original Message-----

From: Jonathan Block [mailto:jblock@nmelc.org]
Sent: Thursday, February 06, 2014 3:28 PM
To: Fullam, Jennifer, NMENV
Cc: Joni Arends (jarends@nuclearactive.org); Sandoval, Diana, NMENV;
Mascarenas, Melissa, NMENV; Schoeppner, Jerry, NMENV; Pruett, Jennifer,
NMENV; Hower, Jennifer, NMENV
Subject: Re: IPRA-Block-Los Alamos(LANL)

Down with the H1N1. Came on in early AM hours on Wed. Only checking email late each day.
If I am back on Monday I will check in with you re reviewing files. If you have any in digital form, could you send them via email?

Thanks

Jon
Sent from my iPhone

On Feb 6, 2014, at 10:08 AM, "Fullam, Jennifer, NMENV"
Jennifer.Fullam@state.nm.us> wrote:

Jon,

This e-mail is in response to your recent IPRA request for documents related to LANL's RLWTF following the public notice of the draft Discharge Permit (DP-1132). These documents can be made available for you to come in and review at the Ground Water Quality Bureau either Monday after 10:30 am (02.10.14) or Thursday (02.13.14) of next week. Please let me know what date and time is most suitable for you. Thank you.

Jennifer T. Fullam
Environmental Scientist
Ground Water Quality Bureau
New Mexico Environment Department
505.827.2909
jennifer.fullam@state.nm.us

-----Original Message-----

From: Jonathan Block [mailto:jblock@nmelc.org]
Sent: Thursday, January 23, 2014 1:40 PM
To: Mascarenas, Melissa, NMENV
Cc: Joni Arends
Subject: IPRA request

Hello, Melissa;

Hope 2014 is a great year for you!

Here's an IPRA request to NMED for all comments on the most recent draft of the Radioactive Liquid Waste Treatment Facility for LANL.

Thanks, as always, for your consideration and prompt reply,

Jon

--

Jon Block
Staff Attorney
New Mexico Environmental Law Center
1405 Luisa Street, Ste. 5
Santa Fe, NM 87505
(505) 989-9022

<20140123 NMELC IPRA to NMED.pdf>
<letter001 (3).pdf>

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J.M. Block, Staff Attorney
New Mexico Environmental Law Center
1405 Luisa Street, Ste. 5
Santa Fe, NM 87505
(505) 989-9022

Fullam, Jennifer, NMENV

From: Fullam, Jennifer, NMENV
Sent: Friday, February 7, 2014 12:04 PM
To: 'Jon Block'
Cc: Hower, Jennifer, NMENV; Joni Arends (jarends@nuclearactive.org); Schoeppner, Jerry, NMENV; Pruett, Jennifer, NMENV; Mascarenas, Melissa, NMENV; Sandoval, Diana, NMENV
Subject: RE: IPRA-Block-Los Alamos(LANL)
Attachments: DP1132 Comments DOE-LANS 121213.pdf; DP1132 Comments Nuclear Watch 121213.pdf; DP1132 Comments Santa Ana 092713.pdf; DP1132 Comments Tewa Women and CCW 120613.pdf; DP1132 Comments Tewa Women and CCW 121213.pdf

Jon,

Here are the comments, in electronic format, that were submitted to NMED for draft Discharge Permit DP-1132.

Please let me know if this satisfies your IPRA request. Thank you.

Jennifer T. Fullam
Environmental Scientist
Ground Water Quality Bureau
New Mexico Environment Department
505.827.2909
jennifer.fullam@state.nm.us

From: Jon Block [mailto:jblock@nmeic.org]
Sent: Friday, February 07, 2014 10:07 AM
To: Fullam, Jennifer, NMENV
Cc: Hower, Jennifer, NMENV; Joni Arends (jarends@nuclearactive.org); Schoeppner, Jerry, NMENV; Pruett, Jennifer, NMENV
Subject: Re: IPRA-Block-Los Alamos(LANL)

Jennifer:

That is very helpful and should move forward this process.
Please do provide them to me and Joni Arends, the group representative for CCW on the comments provided to your office.

Thanks.

Jon

On 2/7/14, 8:15 AM, Fullam, Jennifer, NMENV wrote:
Jon,

I do have all of the comments submitted on the draft Discharge Permit (DP-1132) in electronic format and could provide them if that would help, so you don't have to try and come in before you are completely well. I could also provide a generic list of the other

documents so you can see if they are of interest to you. Please let me know if this would help. Thanks.

Jennifer T. Fullam
Environmental Scientist
Ground Water Quality Bureau
New Mexico Environment Department
505.827.2909
jennifer.fullam@state.nm.us

-----Original Message-----

From: Hower, Jennifer, NMENV
Sent: Thursday, February 06, 2014 3:30 PM
To: Jonathan Block; Fullam, Jennifer, NMENV
Cc: Joni Arends (jarends@nuclearactive.org); Sandoval, Diana, NMENV; Mascarenas, Melissa, NMENV; Schoeppner, Jerry, NMENV; Pruett, Jennifer, NMENV
Subject: RE: IPRA-Block-Los Alamos(LANL)

Oh my gosh, Jon. That's horrible. I hope you feel better soon!

When I checked with Jennifer Fullam a few days ago, they were all hard copy in one of the permit correspondence folders. It would probably be best if you came in and reviewed when you feel up to it.

Jennifer L. Hower
Deputy General Counsel
New Mexico Environment Department
5500 San Antonio Dr. NE
Albuquerque, NM 87109
Office: (505) 222-9550
Cell: (505) 500-7628
Fax: (505) 222-9510

-----Original Message-----

From: Jonathan Block [<mailto:jblock@nmelc.org>]
Sent: Thursday, February 06, 2014 3:28 PM
To: Fullam, Jennifer, NMENV
Cc: Joni Arends (jarends@nuclearactive.org); Sandoval, Diana, NMENV; Mascarenas, Melissa, NMENV; Schoeppner, Jerry, NMENV; Pruett, Jennifer, NMENV; Hower, Jennifer, NMENV
Subject: Re: IPRA-Block-Los Alamos(LANL)

Down with the H1N1. Came on in early AM hours on Wed. Only checking email late each day.

If I am back on Monday I will check in with you re reviewing files. If you have any in digital form, could you send them via email?

Thanks

Jon
Sent from my iPhone

On Feb 6, 2014, at 10:08 AM, "Fullam, Jennifer, NMENV"
<Jennifer.Fullam@state.nm.us> wrote:

Jon,

This e-mail is in response to your recent IPRA request for documents related to LANL's RLWTF following the public notice of the draft Discharge Permit (DP-1132). These documents can be made available for you to come in and

review at the Ground Water Quality Bureau either Monday after 10:30 am (02.10.14) or Thursday (02.13.14) of next week. Please let me know what date and time is most suitable for you. Thank you.

Jennifer T. Fullam
Environmental Scientist
Ground Water Quality Bureau
New Mexico Environment Department
505.827.2909
jennifer.fullam@state.nm.us

-----Original Message-----

From: Jonathan Block [<mailto:jblock@nmelc.org>]
Sent: Thursday, January 23, 2014 1:40 PM
To: Mascarenas, Melissa, NMENV
Cc: Joni Arends
Subject: IPRA request

Hello, Melissa;

Hope 2014 is a great year for you!

Here's an IPRA request to NMED for all comments on the most recent draft of the Radioactive Liquid Waste Treatment Facility for LANL.

Thanks, as always, for your consideration and prompt reply,

Jon

--

Jon Block
Staff Attorney
New Mexico Environmental Law Center
1405 Luisa Street, Ste. 5
Santa Fe, NM 87505
(505) 989-9022

<20140123 NMELC IPRA to NMED.pdf>
<letter001 (3).pdf>

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J.M. Block, Staff Attorney
New Mexico Environmental Law Center
1405 Luisa Street, Ste. 5
Santa Fe, NM 87505
(505) 989-9022



GROUND WATER

DEC 12 2013

BUREAU

Environmental Protection Division

Environmental Compliance Programs (ENV-CP)

PO Box 1663, K490

Los Alamos, New Mexico 87545

(505) 667-0666

National Nuclear Security Administration

Los Alamos Field Office, A316

3747 West Jemez Road

Los Alamos, New Mexico, 87545

(505) 667-5794/Fax (505) 667-5948

Date: **DEC 12 2013**
Symbol: ENV-DO-13-0326
LAUR: 13-29209

Mr. Jerry Schoeppner, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Dear Mr. Schoeppner:

SUBJECT: REVIEW COMMENTS, DRAFT DISCHARGE PERMIT, DP-1132, RADIOACTIVE LIQUID WASTE TREATMENT FACILITY (RLWTF)

On September 13, 2013, the New Mexico Environment Department (NMED) gave notice that the U.S. Department of Energy and Los Alamos National Security, LLC's (DOE/LANS) application for the above-referenced Ground Water Discharge Permit for the Radioactive Liquid Waste Treatment Facility (RLWTF) had been issued for public comment, and that the draft permit will be available for a 90-day comment period. Enclosure 1 contains the NMED's public notice 2 for Ground Water Discharge Permit DP-1132.

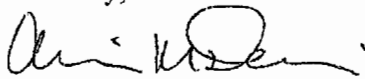
DOE/LANS have reviewed the draft Ground Water Discharge Permit and prepared the enclosed written comments for your consideration.

- Enclosure 2: A master table listing all comments by DOE/LANS on the draft Discharge Permit
- Enclosure 3: General Comments on the draft Discharge Permit
- Enclosure 4: Table A-1, NMED Risk Assessment Guidance for Site Investigations and Remediation
- Enclosure 5: A redline-strikeout of the draft Discharge Permit showing all DOE/LANS comments

The Permittees believe these comments help to clarify the draft Ground Water Discharge Permit, and that proposed alternative text will facilitate final permit issuance. To address significant and outstanding issues stated in the comments, however, the Permittees request that a hearing be scheduled pursuant to NMAC 20.6.2.3108.K. The Permittees are hopeful that their concerns may be resolved in advance of a public hearing, and, if successful, will immediately withdraw the hearing request.

Please contact Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding the enclosed comments.

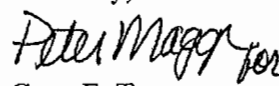
Sincerely,



Alison M. Dorries
Division Leader
Environmental Protection Division
Los Alamos National Security, LLC

AMD:GET:RSB/ms

Sincerely,



Gene E. Turner
Environmental Permitting Manager
Environmental Projects Office
Los Alamos Field Office
Department of Energy

Enclosures:

1. Enclosure 1, NMED's public notice 2 for Ground Water Discharge Permit DP-1132
2. Enclosure 2, a master table listing all comments by DOE/LANS on the draft Discharge Permit
3. Enclosure 3, General Comments on the draft Discharge Permit
4. Enclosure 4, Table A-1 of the NMED Risk Assessment Guidance
5. Enclosure 5, a redline-strikeout of the draft Discharge Permit showing all DOE/LANS comments

Cy: James Hogan, NMED/SWQB, Santa Fe, NM
John E. Kielling, NMED/HWB, Santa Fe, NM
Steven M. Yanicak, NMED/DOE/OB, (E-File)
Hai Shen, NA-OO-LA, (E-File)
Gene E. Turner, NA-OO-LA, (E-File)
Eric L. Trujillo, NA-OO-LA, (E-File)
Carl A. Beard, PADOPS, (E-File)
Michael T. Brandt, ADESH, (E-File)
Alison M. Dorries, ENV-DO, (E-File)
Robert C. Mason, TA55-DO, (E-File)
Leslie K. Sonnenberg, TA-55-RLW, (E-File)
William H. Schwettmann, IPM, (E-File)
John C. Del Signore, TA-55-RLW, (E-File)
Randal S. Johnson, DSEAH-TA55, (E-File)
Stephen G. Cossey, DSESH-TA-55, (E-File)
Michael T. Saladen, ENV-CP, (E-File)
Robert S. Beers, ENV-CP, K490
LASOmailbox@nnsa.doe.gov, (E-File)
locatesteam@lanl.gov, (U1302039), (E-File)
ENV-CP Correspondence File, w/enc., K490

GROUND WATER

DEC 12 2013

BUREAU

ENCLOSURE 1

NMED public notice 2 for Ground Water
Discharge Permit DP-1132

ENV-DO-13-0326

LAUR-13-29209

U1302039

Date: DEC 12 2013

Notice is hereby given pursuant to 20.6.2.3108.H NMAC, the following Ground Water Discharge Permit applications have been proposed for approval. To request additional information or to obtain a copy of a draft permit, contact the Ground Water Quality Bureau in Santa Fe at (505) 827-2900. Draft permits may also be viewed on-line at <http://www.nmenv.state.nm.us/gwb/NMED-GWQB-PublicNotice.htm>

NOTE – If viewing by WEB - Click on facility name to review a copy of the draft permit.

DP #	Facility/Applicant	Closest City	County	Notice	NMED Permit Contact
1132	<u>Los Alamos National Laboratory's Radioactive Liquid Waste Treatment Facility</u> Robert Beers, Point of Contact Los Alamos National Laboratory Environmental Protection Division Water Quality & RCRA Group P.O. Box 1663, Mail Stop K490 Los Alamos, NM 87545	Los Alamos	Los Alamos	Los Alamos National Security, LLC (LANS) and the United States Department of Energy (DOE) propose to treat up to 40,000 gallons per day of low-level radioactive wastewater at Los Alamos National Laboratory's Radioactive Liquid Waste Treatment Facility, and to discharge treated effluent to a mechanical evaporation system, solar evaporation system or to an outfall (Outfall 051 also regulated under a National Pollutant Discharge Elimination System (NPDES) permit issued by the United States Environmental Protection Agency (EPA) pursuant to the federal Clean Water Act section 402, 33 U.S.C. § 1342). Potential contaminants associated with this type of waste stream include nitrogen compounds, metals, organic compounds, and low-level radioactive materials. The Facility is located within Los Alamos National Laboratory, approximately 1.5 miles south of Los Alamos, New Mexico, in Sections 16, 17, 20, 21 and 22, Township 19N, Range 06E, Los Alamos County. Ground water most likely to be affected ranges from depths of approximately one foot to 1,306 feet and has a total dissolved solids concentration ranging from approximately 162 to 255 milligrams per liter. This public notice has been extended to a period of 90 days in which written comments may be submitted to the department and/or a public hearing may be requested in writing.	Jennifer Fullam

Prior to ruling on any proposed Discharge Permit or its modification, the New Mexico Environment Department (NMED) will allow thirty days after the date of publication of this notice to receive written comments and during which time a public hearing may be requested by any interested person, including the applicant. Requests for public hearing shall be in writing and shall set forth the reasons why a hearing should be held. A hearing will be held if NMED determines that there is substantial public interest. Comments or requests for hearing should be submitted to the Ground Water Quality Bureau at PO Box 5469, Santa Fe, NM 87502-5469.

To view this and other public notices issued by the Ground Water Quality Bureau on-line, go to:
<http://www.nmenv.state.nm.us/gwb/NMED-GWQB-PublicNotice.htm>

ENCLOSURE 2

Master table listing all comments by DOE/LANS
on the draft Discharge Permit

ENV-DO-13-0326

LAUR-13-29209

U1302039

Date: DEC 12 2013

No.	Permit Section	Description	Comment	Suggested Text Change
1	I p.4	Acronyms - TRU	<p>The draft Discharge Permit contains the following acronym: <i>TRU – Transuranic waste water</i></p> <p>Not all TRU waste is waste water; TRU waste can also be non-liquid waste. TRU is the acronym adopted by the DOE for <i>transuranic</i>.</p>	<p>DOE/LANS request the following change:</p> <p>ACRONYMS: TRU-Transuranic waste water <u>transuranic</u></p>
2	II.V p.6	Definitions – Secondary containment	See Enclosure 3, General Comment No. 1	<p>DOE/LANS request the following change:</p> <p><i>V. Secondary containment- a constructed unit, independent of the (primary) unit or system designed to convey, store, treat, or dispose of liquids or semi-liquids, that is designed, constructed and operated to prevent any migration of waste streams or accumulated liquid out of the unit or system to the soil, ground water, or surface water at any time. Secondary containment <u>can include, but is not limited to, double-walled pipes, concrete and floors equipped with sumps and alarm systems to detect potential leaks.</u> must be:</i></p> <ul style="list-style-type: none"> • designed, constructed and maintained to surround the primary unit completely; • free of cracks, gaps, or fissures; • constructed of, or lined with, materials that are compatible with the waste streams to be in contact with the unit or system; • placed on a foundation or base capable of withstanding pressure gradients, settling or uplift which may cause failure of the unit or system; • equipped with a leak detection system that is designed and operated so that it will detect the failure of the primary containment structure; • sloped or designed and operated to drain and remove liquids resulting from leaks, spills, or precipitation within a 24 hour time period; and • capable of detecting and collecting releases and accumulated liquids until the collected material can be removed.

25650

No.	Permit Section	Description	Comment	Suggested Text Change
3	II.Z p.7	Definitions- Tank	The definition of tank is incomplete and should include a third category for <i>above-ground</i> tanks. All of the RLWTF's tanks are <i>above-ground</i> tanks with the exception of the SET which is an <i>in-ground</i> tank.	DOE/LANS request the following changes: Z. Tank- <i>a stationary device, designed to contain an accumulation of waste water which is constructed primarily of non-earthen materials (e.g., concrete, steel, plastic) which provide structural support. Tanks can be further identified as either an <u>On ground tank</u> meaning a tank that is situated in such a way that the bottom of the tank is on the same level as the adjacent surrounding surface allowing for visual inspection of the vertical walls but not the external tank bottom, or an In-ground tank meaning a tank constructed or installed so that a portion of the tank wall is situated to any degree within the ground, thereby preventing visual inspection of that portion of the external surface area, <u>or an Above-ground tank meaning a tank that is completely elevated above the adjacent surrounding surface allowing for visual inspection of the vertical walls and the external tank bottom.</u></i>
4	II.AA p.7	Definitions- Total Nitrogen	The term <i>cumulative</i> is undefined and its intended meaning is not clear. Other discharge permits reviewed with a Total Nitrogen limit do not have <i>cumulative</i> in the definition.	DOE/LANS request the following change: AA. Total Nitrogen- <i>The cumulative sum of total Kjeldahl nitrogen (TKN) and nitrate-nitrogen (NO3-N).</i>
5	III, Intro, first para. p.8	Joint and Several Liability LANS and DOE	DOE and LANS are <i>co-permittees</i> and, as such, are jointly and severally responsible for compliance with the Permit. The Permit is not liable to the permittees. Permit Condition No. 55 already addresses joint and several liability. Recommend deleting these terms. The DOE is owner and operator of LANL and the requested revision is consistent the language used in other NMED and EPA permits.	DOE/LANS request the following change: III. Introduction <i>The New Mexico Environment Department (NMED) issues this Discharge Permit (Discharge Permit), DP-1132, jointly and severally liable to the United States Department of Energy (DOE) and to Los Alamos National Security, LLC (LANS) and the United States Department of Energy (DOE) (collectively the Permittees) pursuant to the New Mexico Water Quality Act (WQA), NMSA 1978, §§ 74-6-1 through 74-6-17, and the New Mexico Water Quality Control Commission (WQCC) Regulations, 20.6.2 NMAC.</i>

No.	Permit Section	Description	Comment	Suggested Text Change
6	III, Intro, fifth para p.8	Volume Limitation	<p>The draft Discharge Permit at paragraph 5 states, <i>for the treatment and discharge of up to 40,000 gallons per day (gpd).....</i></p> <p>The RLWTF's Discharge Permit Application (Feb-2012) cited a discharge quantity (Section A-7) of 40,000 gpd. The application did not address treatment limitations. Because the RLWTF is a batch-treat/batch-discharge facility it may be necessary at times to treat more than 40,000 gal per day (in a 24-hr period). See Enclosure 3, General Comment No. 2.</p>	<p>DOE/LANS request the following change:</p> <p>III. Introduction <i>The Facility, as it pertains to conditions within this Discharge Permit (DP-1132), is a wastewater treatment facility that is authorized to for the treatment and discharge of up to 40,000 gallons per day (gpd), is specifically described in Section V(D) of this Discharge Permit and.....</i></p>
7	III, Intro, fifth para p.8	Liquid Waste	<p>Add <i>liquid waste</i> to make this section consistent with the definition of <i>RLWTF: Radioactive Liquid Waste Treatment Facility</i>.</p> <p>Add <i>water</i> to the description of the transuranic waste treatment system to make it explicit that the system treats liquid waste.</p>	<p>DOE/LANS request the following change:</p> <p>III. Introduction <i>".....is specifically described in section V(D) of this Discharge Permit and includes the influent collection system, the low-level radioactive <u>liquid waste</u> treatment system, the transuranic waste <u>water</u> treatment system, the secondary treatment system,...</i></p>
8	V.B p.9	Authorization to Discharge	See Enclosure 3, General Comment No. 2	<p>DOE/LANS request the following change:</p> <p>III. Authorization to Discharge. <i>B. The Permittees are authorized to <u>discharge</u> receive and treat up to 40,000 gpd of low-level and transuranic radioactive industrial waste water using a series of treatment processes as described in Section V(D) of this Discharge Permit in accordance with the Conditions set forth in Section VI of this Discharge Permit.</i></p>
9	V.D p.10	TRU Waste	<p>Suggest revising this permit condition to be consistent with the revised acronym for TRU (<i>transuranic</i>).</p> <p>The last sentence, <i>All wastestreams associated with TRU shall be disposed of at an off-site facility permitted to receive TRU waste</i>, imposes a permit condition regarding where TRU waste streams should be disposed. The management of TRU waste streams will occur under the appropriate regulatory authorities. Further, this requirement is incorrectly located in a section defining the facility.</p>	<p>DOE/LANS request the following change:</p> <p><i>The Transuranic Waste (TRU) <u>Waste Water</u> Treatment System is defined herein as the influent storage tanks for each form of TRU (acidic and caustic) wastestreams, the associated neutralization unit, pressure filters, the final processing tanks, and other associated TRU wastestream conveyance, storage and treatment components at TA-50. All wastestreams associated with TRU shall be disposed of at an off-site facility permitted to receive TRU waste.</i></p>

No.	Permit Section	Description	Comment	Suggested Text Change
10	V.D p.10	SET	The description of the Solar Evaporative Tank System (SET) states <i>that receives treated effluent from the RLW</i> . The SET receives treated effluent from the RLW Treatment System.	DOE/LANS request the following change: <i>The Solar Evaporative Tank System (SET) is defined herein as the single concrete tank unit at TA-52 that receives treated effluent from the RLW Treatment System and the conveyance line from TA-50.</i>
11	All	Electronic Posting	See Enclosure 3, General Comment No.3	DOE/LANS request the addition of the following new permit condition for Section E, General Terms and Conditions: <i>E. 49. Public Involvement - Within six (6) months after the effective date of the Permit, the Permittees shall post the following information on LANL's Electronic Public Reading Room located at http://epr.lanl.gov/oppie/service (or as updated), where information on the Discharge Permit will be made available: (a) the Annual Update (VI.A.1); (b) Notices of Changes (VI.A.2); (c) Water Tightness Testing (VI.A.8); (d) Summary Report for Settled Solids (VI.A.9); (e) Freeboard Proposal and Responses (VI.A.12); (f) Emergency Plan (VI.A.16); (g) Installation of Flow Meters (VI.A.17); (h) Quarterly Monitoring Reports (VI.B.20); (i) Soil Moisture Monitoring System for the SET (VI.B.26); (j) Ground Water Flow (VI.B.27); (k) Final Closure (VI.D.44); (l) Post-Closure (VI.D.45); and (m) Termination of the Discharge Plan (VI.D.46). The Permittees agree to voluntarily provide the above-information, and as such, this permit condition is not subject to civil or criminal fines and penalties associated with permit requirements under Permit Sections 52 and 53.</i>
12	VI.A.1 p.11	Annual Update	The condition requires LANL to produce specific documents annually by February 1 of each year, and to post these documents in LANL's Electronic Reading Room. The draft permit also contains requirements for several other documents – not identified in this section— to be provided annually, by February 1 of each year (and to post in LANL's Electronic Reading Room). To facilitate compliance and ease of implementing the permit, DOE/LANS request that NMED include in the draft permit a new subsection that specifically identifies these documents in one permit condition. Following is suggested language (see redline/strike-out draft permit).	DOE/LANS request the following change: <i>ANNUAL UPDATE</i> <i>c. An associated narrative describing each of the systems and treatment units outlined in the flow chart. This narrative shall include the collection system, primary treatment units, secondary treatment units and any systems used in the disposition of any associated waste streams at the Facility. For each unit or system, the narrative shall include: (1) the identification of the unit or system; (8) the unit or system(s) to which it discharges to; and (9) a summary of maintenance or repairs made during the reporting period.</i> <i>d. The Annual Update shall also include the following documents to be submitted annually by February 1 of each year.</i> <i>• Summary of maintenance and repairs made during the reporting period.</i> <i>• Water Tightness Testing results (VI.A.8)</i> <i>• Settled Solids measurements (VI.A.9)</i> <i>• Ground Water Flow report (VI.A.27)</i>

No.	Permit Section	Description	Comment	Suggested Text Change
13	VI.A.2 p.11	Notification of Changes	<p>The condition requires written notification of changes in the Facility's collection, treatment or disposal systems which are <i>beyond the scope of maintenance and repairs</i>. As drafted it is not clear how to distinguish these types of changes from changes requiring notification under Condition No. 3, <i>Submittal of plans and specifications</i> (VI.A.3). Both permit conditions—No. 2 and No. 3— address <i>process modifications and process changes</i>.</p> <p>DOE/LANS understand that the intent of this permit condition is to capture changes that are (1) not associated with maintenance and repairs, and (2) are not significant changes associated with modifications discussed under VI.A.3. An example of a change under VI.A.2 would be the RLWTF's recent replacement of the aging tubular ultrafilter (TUF) treatment unit with the new microfilter.</p> <p>To avoid confusion, DOE/LANS suggest the following language revisions to clarify the intent of this condition.</p>	<p>DOE/LANS request the following change:</p> <p><i>NOTIFICATION OF CHANGES</i>-The Permittees shall submit to NMED and post on LANL's Electronic Public Reading Room located at http://eprr.lanl.gov/oppie/service (or as updated) a written notification of any changes in the Facility's collection, treatment or disposal systems which are <u>not changes associated with "maintenance and repairs" or significant changes required to meet Permit Section VI.A.3, Submittal of Plans and Specifications.</u> are beyond the scope of maintenance and repair. The notification shall be submitted no less than thirty days prior to the date proposed for implementation.</p>
14	VI.A.2.g p.12	Notification of Changes, Temporal Scope	This condition states in VI.A.2.g, <i>intended temporal scope of process change</i> . The meaning of <i>temporal scope</i> is unclear to DOE/LANS.	<p>DOE/LANS request the following change:</p> <p><i>NOTIFICATION OF CHANGES.</i> g. intended temporal scope <u>duration of process change (e.g., permanent or limited duration); and</u></p>
15	VI.A.2.h p.12	Notification of Changes, Additional Information	<p>This condition states in VI.A.2.h, <i>any additional information required by NMED</i>.</p> <p>This section, VI.A.2 contains a specific list of items, a-g, that the permittee must provide, at a minimum, in their notification to the NMED. Item h is non-specific ("any") and, accordingly, it cannot be comprehensively addressed by the permittee. That is, the permittee cannot satisfy the minimum items required because item h is not defined. Further, the permittees cannot agree to meet a future undefined requirement as this condition proposes.</p>	<p>DOE/LANS request the following change:</p> <p><i>NOTIFICATION OF CHANGES.</i> h- any additional information requested by NMED.</p>

No.	Permit Section	Description	Comment	Suggested Text Change
16	VI.A.3 p.12	Submittal of Plans and Specs	DOE/LANS request that this draft permit condition be modified to distinguish process changes required to meet Conditions VI.A.3 and VI.A.2. The additional language is consistent with the language in other discharge permits as well as NMAC 20.6.2.3107.C. Without this language, it is not clear which changes trigger this permit section or the <i>Notification of Changes</i> under Condition VI.A.2.	DOE/LANS request the following change: <i>SUBMITTAL OF PLANS AND SPECIFICATIONS</i> <i>The Permittees shall not implement any expansion, process modification, or alteration of a system or unit that would result in any significant modification in the discharge of water contaminants or significant modification to changes the intended function, design or capacity for any of the system, units or components of the Facility's collection, treatment or disposal systems without prior written approval by NMED.</i>
17	VI.A.3 p.12	Submittal of Plans and Specs	This section requires NMED approval prior to implementation of specific changes; however, it does not address what would occur if NMED does not approve such a change. The suggested language addresses this issue and is common in other discharge plans and necessary to provide the facility consistent process and procedure.	DOE/LANS request the following change: <i>SUBMITTAL OF PLANS AND SPECIFICATIONS</i> <i>NMED will provide such approval only if it finds that the Permittees have submitted the required elements listed herein in sufficient detail to demonstrate that the unit or system is designed and constructed to minimize the possibility of an unauthorized release of water contaminants which could directly or indirectly impact ground water quality or pose a threat to human health. Should NMED determine that the proposed changes do not conform to activities authorized by this Discharge Permit and/or constitute a modification of the Permittees discharge plan, NMED will inform the Permittees that a Discharge Permit modification is required in order to proceed with the proposed change.</i>
18	VI.A.3.k p.13	Submittal of Plans and Specs	This condition sets forth design specifications for leak detection systems based on NMED's Hazardous Waste regulations under Subpart J (264.193 (c)(3)), which are not a requirement of the NMWQCC Regulations. However, Subpart J explicitly provides that leak detection systems can be designed and operated to detect the failure of either primary or secondary containment, or the presences of any release of any accumulated liquid in secondary containment systems within 24 hrs of the initial release, or at the earliest practicable time of the permittees can demonstrate that the existing detection technologies or site conditions will not allow detection of a release within 24 hrs. DOE/LANS cannot comply with this condition absent the added provision which is critical to address the potential that site conditions or technologies prevent detection of a release within 24 hrs. DOE/LANS would request that the permit be revised to include this additional language to address potential uncertainties with this stringent condition.	DOE/LANS request the following change: <i>SUBMITTAL OF PLANS AND SPECIFICATIONS</i> <i>k. design specifications for leak detection systems associated with systems designed to convey, store, treat, or dispose of liquid or semi-liquid waste streams, which demonstrate the capability of detecting the failure of either primary or secondary containment or the presence of any release of any accumulated liquid in the secondary containment system within 24 hours of initial release; or at the earliest practicable time if the permittees can demonstrate that the existing detection technologies or site conditions will not allow detection of a release within 24 hours.</i> <i>m. design specifications for all units or systems designed to convey, store, treat, or dispose of liquid or semi-liquid waste streams, which demonstrate the ability to remove liquids and semi-liquids from the area of containment within 24 hours of a release; or at the earliest practicable time if the permittees can demonstrate that the existing detection technologies or site conditions will not allow detection of a release within 24 hours.</i>

No.	Permit Section	Description	Comment	Suggested Text Change
19	VI.A.6 p. 14	Signs	<p>This condition establishes signage requirements.</p> <p>DOE/LANS are not opposed to a sign at the main entrance to the to the RLWTF and the SET but questions the need for signs at every other entrance to active portions of the facility given that access to both TA-50 and TA-52 are restricted to LANL badge holders only. Standard sign language at LANL is, <i>Authorized Personnel Only</i> instead of <i>Unauthorized Personnel Prohibited</i>. Also, bilingual signage is not the standard at LANL.</p>	<p>DOE/LANS request the following change:</p> <p><i>SIGNS- The Permittees shall post and maintain signs at each the entrance to the TA-50 RWLTF and the TA-52 SET active portions of the Facility and at other locations, in sufficient numbers to be seen from any approach to the active portions of the Facility stating that Unauthorized Personnel is prohibited access is limited to Authorized Personnel only. All signs shall be posted in English and Spanish and be legible from a distance of at least 25 feet.</i></p>
20	VI.A.8 p.15	Water Tightness Testing	<p>This condition requires a visual and quantitative assessment of the unit or system that does not have "secondary containment" for water tightness.</p> <p>As drafted, below-ground pipelines without secondary containment must be assessed visually under this condition. However, conducting a visual assessment for below-ground pipelines is not possible, and therefore, the permittees suggest that this be limited to an inspection of the ground surface for evidence of a leak. The quantifiable assessment, as proposed, is a technically supportable test used for below-ground pipelines. For example, utilities and other industries use a quantifiable test to ascertain whether below-ground pipes are leaking water or gas. LANL's Master Specification for Testing Piping Systems contains specific procedures and testing specifications for pressure testing—both hydrostatic and pneumatic—all types of pipelines including, but not limited to, potable water, non-potable water, and fire protection water. Testing specifications are adopted from the American Society of Mechanical Engineers (ASME) and the International Association of Plumbing and Mechanical Officials' Uniform Plumbing Code (IAPMO UPC).</p>	<p>DOE/LANS request the following change:</p> <p><i>WATER TIGHTNESS TESTING-Within 540 days following the effective date of this Discharge Permit (by DATE), and every 540 days thereafter, the Permittees shall demonstrate that each unit and system intended to convey, store, treat or dispose of a liquid or semi-liquid waste stream without secondary containment is not leaking and is otherwise fit for use. To make the demonstration, the Permittees shall conduct both a visual test, for those units and systems that are above-ground and visually inspectable, and a quantifiable test.</i></p> <p><i><u>For units and systems that are above-ground and visually inspectable, the visual assessment shall be adequate to detect obvious cracks, leaks, and corrosion or erosion that may lead to cracks and leaks. If necessary, the Permittees shall remove the stored waste from the unit or system to allow the condition of internal surfaces to be assessed.</u></i></p>

No.	Permit Section	Description	Comment	Suggested Text Change
21	VI.A.10 p.17	Facility Inspections	<p>This condition states, <i>The permittees shall inspect for malfunctions, deteriorations, operator errors, and discharges which may be causing, or may lead to, an unauthorized release to the environment or pose a threat to human health.</i></p> <p>The draft Discharge Permit defines in <i>a-d</i> the specific units/systems and their inspection frequency.</p> <p>Inspecting for <i>operator errors</i> is not consistent with the scope of this condition: inspecting units and systems. Identifying operator errors cannot be achieved by inspecting units and systems but through other means.</p> <p>Inspecting units and systems for <i>discharges</i> is not the correct scale; rather, inspections should be directed towards the precursors of discharges: leaks.</p> <p>The requirement to inspect for <i>operator errors</i> and <i>discharges</i> is not common in other discharge permits reviewed, including DP-857.</p>	<p>DOE/LANS request the following changes:</p> <p><i>FACILITY INSPECTIONS</i>-<i>The Permittees shall inspect the Facility for malfunctions, deterioration, and leaks operator errors and discharges which may be causing, or may lead to, an unauthorized release to the environment or pose a threat to human health.</i></p>
22	VI.A.11 p. 18	Maintenance and Repairs	<p>Condition No. 18 requires the submittal of ...<i>a report describing the maintenance and repair activities</i> as part of the quarterly monitoring report.</p> <p>In addition, Condition No. 1 requires the submittal of a <i>summary of maintenance or repairs made during the reporting period</i> in the annual report.</p> <p>The difference between a <i>summary of</i> and a <i>report describing</i> was not identified in the draft Discharge Permit and is not clear to DOE/LANS.</p> <p>DOE/LANS request that the quarterly monitoring report contain a report that both <i>summarizes and describes</i> the maintenance and repairs made during the quarter. The annual report would contain copies of the four quarterly maintenance and repair reports from that calendar year.</p>	<p>DOE/LANS request the following change:</p> <p><i>MAINTENANCE AND REPAIR</i>-<i>The Permittees shall maintain the function and structural integrity of the Facility at all times except during maintenance or repair. . . . The Permittees shall submit to NMED and post on LANL's Electronic Public Reading Room located at http://eprl.lanl.gov/oppie/service (or as updated) a report which summarizes and describes the maintenance and repair activities performed on the Facility as part of the quarterly monitoring reports.</i></p>

No.	Permit Section	Description	Comment	Suggested Text Change												
23	VI.A.13.a Table 1 p.19	Effluent Limits: Outfall 051	<p>In <i>Table 1, Effluent Quality Limits for Discharges to Outfall 051</i>, the limit for perchlorate is 0.011 mg/L.</p> <p>The source of all numeric limits cited in the above-referenced Table 1 is 20.6.2.3103 NMAC with the exception of perchlorate because perchlorate is not a groundwater contaminant regulated under 20.6.2.3103 NMAC. Perchlorate is a listed toxic pollutant without a numeric limit under 20.6.2.7.WW NMAC. NMED does not cite in Condition VI.A.13.a the source of the numeric limit for perchlorate of 0.011 mg/L.</p> <p>Draft Discharge Permit Condition VI.A.13.b states that the numeric limit for toxic pollutants listed in 20.6.2.7.WW NMAC that are not listed in Table 1 shall be the concentration listed in Table A-1 of NMED Risk Assessment Guidance for Site Investigation and Remediation. The perchlorate limit in Table A-1 (2012 edition) is 0.0256 mg/L.</p> <p>The working draft Discharge Permit issued by the NMED for DP-857 contains a perchlorate limit of 0.026 mg/L (26 µg/L). The correct perchlorate limit should be 0.0256 mg/L.</p>	<p>DOE/LANS request the following change:</p> <p><i>Table 1. Effluent Quality Limits for Discharges to Outfall 051</i></p> <table><tr><th>Inorganic Chemicals:</th><th>CAS#</th><th>mg/L</th></tr><tr><td>Nickel (dissolved)</td><td>7440-02-0</td><td>0.2</td></tr><tr><td>Perchlorate (total)</td><td>14797-73-0</td><td>0.011 0.0256</td></tr><tr><td>pH (total)</td><td></td><td>6 – 9</td></tr></table>	Inorganic Chemicals:	CAS#	mg/L	Nickel (dissolved)	7440-02-0	0.2	Perchlorate (total)	14797-73-0	0.011 0.0256	pH (total)		6 – 9
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24	VI.A.13 p.20 VI.A.14 p.21	<p>Effluent Limits: Outfall 051</p> <p>Effluent Limits: MES and SET</p>	<p>The draft Discharge Permit contains a Total Nitrogen limit of 15 mg/L for Outfall 051 and a NO₃-N limit of 10 mg/L for the MES and SET. With its current treatment capability the RLWTF cannot consistently meet the above-referenced nitrogen limits. Meeting these limits will require the installation of new treatment units.</p> <p>In April 2013 DOE/LANS initiated the evaluation and design of treatment equipment that would enable compliance with the draft permit's nitrogen limits. This effort has the remaining steps to complete before the treatment unit(s) is operational: Funding, Procurement, Installation, Operating Procedures, and Startup. These remaining steps will not be complete until September 30, 2015.</p>	<p>DOE/LANS request the following change:</p> <p><u>Until the new treatment unit(s) at the RLWTF are operational on or before September 30, 2015, the following Total Nitrogen effluent limit shall be effective for discharges to Outfall 051:</u></p> <ul style="list-style-type: none">• <u>Daily Maximum:</u> 45 mg/L• <u>Quarterly Average:</u> 15 mg/L <p><u>Until the new treatment unit(s) at the RLWTF are operational on or before September 30, 2015, the following NO₃-N effluent limit shall be effective for discharges to the MES and SET:</u></p> <ul style="list-style-type: none">• <u>Daily Maximum:</u> 30 mg/L• <u>Quarterly Average:</u> 10 mg/L												

No.	Permit Section	Description	Comment	Suggested Text Change												
25	VI.A.13.b p.20	Effluent Limits: Outfall 051	<p>Condition 13b makes a reference to <i>Table A-1 of NMED, Risk Assessment Guidance for Site Investigation and Remediation (most recent edition)</i> but does not provide a copy of Table of A-1.</p> <p>The working Draft Discharge Permit DP-857 contains a table listing all numeric limits for toxic pollutants (20.6.2.7WW NMAC); the draft Discharge Permit for DP-1132 provides no such table.</p> <p>The inclusion in this discharge permit of a similar table listing the numeric limits for toxic pollutants—as was done for Regulation 3103 water contaminants in Table 1—would formally document the limits.</p>	<p>DOE/LANS request the following change:</p> <ul style="list-style-type: none">See Enclosure 4. Add Table 1.1 to Condition No. 13b.												
26	VI.A.14 Table 2 p.20	Effluent Limits: Outfall 051	<p>In <i>Table 2, Effluent Quality Limits for Discharges to MES and SET</i> the limit for perchlorate is 0.011 mg/L (11 µg/L).</p> <p>See Enclosure 2, Page 9, Comment No. 23.</p> <p>The perchlorate limit should be 0.0256 mg/L.</p>	<p>DOE/LANS request the following change:</p> <p><i>Table 2. Effluent Quality Limits for Discharges to the MES and SET</i></p> <table><tr><th>Inorganic Chemicals:</th><th>CAS#</th><th>mg/L</th></tr><tr><td>Nickel (dissolved)</td><td>7440-02-0</td><td>0.2</td></tr><tr><td>Perchlorate (total)</td><td>04797-73-0</td><td>0.011 0.0256</td></tr><tr><td>pH (total)</td><td></td><td>6 – 9</td></tr></table>	Inorganic Chemicals:	CAS#	mg/L	Nickel (dissolved)	7440-02-0	0.2	Perchlorate (total)	04797-73-0	0.011 0.0256	pH (total)		6 – 9
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27	VI.A.15.c p.21	Personnel Qualification	<p>Requirement c of Condition No. 15, <i>Personnel Qualifications</i>, requires operators to be competent in<i>repairing or replacing automatic waste feed cut-off systems</i>....</p> <p>Automatic waste feed cut-off systems (AWFCO) are components of hazardous waste combustors and are not components of the RLWTF treatment system.</p>	<p>DOE/LANS request the following change:</p> <p>PERSONNEL QUALIFICATIONS. e. repairing or replacing automatic waste feed cut-off systems.</p>												

No.	Permit Section	Description	Comment	Suggested Text Change
28	VI.A.16 p.22	Emergency Plan	See Enclosure 3, General Comment No. 4	<p>DOE/LANS request the following change:</p> <p>16. EMERGENCY PLAN The Permittees shall keep an emergency response plan at the Facility at all times. At a minimum, the plan shall include the following:</p> <ul style="list-style-type: none"> a. Actions Facility personnel must take in response to fires, explosions or any unplanned sudden or non sudden release of a water contaminant from the Facility to the environment. b. A spill prevention and response plan to address all unauthorized releases to the environment or those that pose a threat to human health, chronic or acute. c. Communications and collaboration with local, state and federal emergency response personnel. d. Names, addresses and phone numbers for all persons qualified to act as an emergency coordinator. e. A list of all emergency equipment at the Facility that may be utilized in the event of an emergency, its intended function and physical location. f. An evacuation plan for all Facility personnel which describes signals to be used to notify personnel of an evacuation, routes to evacuated the Facility and alternate evacuation routes. <p>The emergency response plan shall be reviewed, and updated as necessary, by the Permittees on no less than an annual basis or in the event the plan fails during an emergency, the Facility changes design, construction, or accessibility, key personnel changes or the list of equipment changes. The Permittees shall submit a written summary of the plan and any amendments to NMED no more than 30 days following finalization of the amended plan. The Permittees' written summary shall be provided to the Los Alamos County Emergency Management Coordinator, Los Alamos Fire Department, Los Alamos County Police, Los Alamos Medical Center, New Mexico's Department of Homeland Security and Emergency Management (DHSEM), Pueblo of San Hdefonso, Pueblo of Santa Clara, Pueblo of Jemez and Pueblo of Cochiti, and shall be posted on LANL's Electronic Public Reading Room located at http://eprr.lanl.gov/oppie/service (or as updated).</p>

No.	Permit Section	Description	Comment	Suggested Text Change
29	VI.A.17 p.22	Installation of Flow Meters	<p>The draft Discharge Permit requires individual flow meters for the Outfall 051 and the SET (17b & 17d).</p> <p>DOE/LANS propose that one meter be shared for discharges to Outfall 051 and the SET. Detailed Operating Procedures would require operators to record in log books the volume discharged to each system. Log books would be available for inspection by NMED.</p>	<p>DOE/LANS request the following change:</p> <p>INSTALLATION OF FLOW METERS-Within 180 days following the effective date of this Discharge Permit, (by DATE), the Permittees shall install the following flow meters:</p> <p>a. One flow meter to be installed on the RLW influent line to the Facility at a location that will capture and measure all influent to the Facility including waste water conveyed to the Facility by alternative methods (e.g. truck).</p> <p>b. One flow meter to be installed on the effluent line to the SET <u>and to Outfall 051</u> at a location that will capture and measure all discharges of treated water to the SET <u>and Outfall 051</u>. Permittees shall record in a discharge log book the volume discharged to each respective location.</p> <p>c. One flow meter to be installed on the effluent line to the MES at a location that will capture and measure all discharges of treated water to the MES.</p> <p>d. One flow meter to be installed on the discharge line to Outfall 051 at a location that will capture and measure all effluent discharged to Outfall 051.</p>
30	VI.A.18 p.23	Calibration of Flow Meters	<p>The draft Discharge Permit contains the following requirement: CALIBRATION OF FLOW METERS-All flow meters shall be capable of having their accuracy ascertained under actual working (field) conditions. Calibrations should only apply to those meters referenced in the Discharge Permit.</p>	<p>DOE/LANS request the following change:</p> <p>CALIBRATION OF FLOW METERS-All flow meters <u>referenced in this Discharge Permit (Condition No. 17)</u> shall be capable of having their accuracy ascertained under actual (field) working conditions.</p>
31	VL.B.28 p.29	Ground Water Monitoring	<p>The draft Discharge Permit requires quarterly sampling at Mortandad Canyon alluvial monitoring well MCO-3.</p> <p>In September 2013 flood flows in Mortandad Canyon destroyed alluvial monitoring well MCO-3; the concrete well pad and well casing were damaged beyond repair. MCO-3 is no longer a functioning monitoring well and should be removed from the ground water monitoring plan.</p> <p>DOE/LANS propose Mortandad Canyon alluvial monitoring well MCO-4B as a replacement to MCO-3. MCO-4B was proposed as an alluvial ground water monitoring well downgradient of NPDES Outfall 051 in the February 2012 Discharge Permit Application. The application's Appendix D provided ground water quality data for MCO-4B and Appendix E provided a well log and construction diagram for MCO-4B.</p>	<p>DOE/LANS request the following change:</p> <p>GROUND WATER MONITORING-The Permittees shall collect ground water samples from the following ground water monitoring wells on a quarterly basis and analyze the samples for TKN, NO₃-N, TDS, Cl, F and perchlorate.</p> <p>a. MCO-4B MCO-3 previously constructed and located in the alluvial aquifer presumed to be hydrologically downgradient of Outfall 051.</p> <p>The Permittees shall collect ground water samples from the following ground water monitoring wells on an annual basis and analyze the samples for all water contaminants listed in 20.6.2.3103 NMAC and all toxic pollutants listed in 20.6.2.7.WW.</p> <p>a. MCO-4B MCO-3 previously constructed and located in the alluvial aquifer presumed to be hydrologically downgradient of Outfall 051.</p>

No.	Permit Section	Description	Comment	Suggested Text Change
32	VI.B.28 p.29	Ground Water Monitoring	<p>The draft Discharge Permit identifies a procedure for collecting ground water samples. Steps <i>b</i> & <i>d</i> are not consistent with LANL's Standard Operating Procedure (SOP) for ground water sampling</p> <p><i>b. Measure the total depth of the monitoring well to the nearest hundredth (0.01) of a foot.</i></p> <p>LANL does not measure the total depth of a well at every sampling event but only when the pump is pulled for maintenance. The referenced wells have dedicated pumps; it is not physically possible to measure the total depth of the well with the pump installed.</p> <p><i>d. Purge three well volumes of water from the monitoring well prior to sampling, using an adequate pumping system.</i></p> <p>LANL does not collect three well (casing) volumes when sampling alluvial wells, only when sampling intermediate and regional wells. Alluvial wells often go dry before three casing volumes can be removed so the well is sampled after one casing volume has been purged and when field parameters are stable.</p>	<p>DOE/LANS request the following change:</p> <p>GROUND WATER MONITORING. <i>Sampling shall be done in accordance with the methods authorized in this Discharge Permit and using the following procedure:</i></p> <p><i>a. Measure the ground-water surface elevation, to the nearest hundredth (0.01) of a foot, from the top of the casing, each time ground water is sampled.</i></p> <p><i>b. Measure the total depth of the monitoring well to the nearest hundredth (0.01) of a foot.</i></p> <p><i>c. Calculate total volume of water within the monitoring well <u>using the most recent total depth measurement.</u></i></p> <p><i>d. For intermediate and regional aquifer wells, purge three well volumes of water from the monitoring well prior to sampling, using an adequate pumping system. <u>For alluvial wells, purge well for a minimum of one well volume and until field parameters stabilize.</u></i></p> <p><i>e. Collect samples from the well using appropriate methods to avoid cross-contamination of the samples and sources.</i></p> <p><i>f. Prepare the Chain-of-Custody, preserve the sample and transport samples in accordance with methods authorized in this Discharge Permit.</i></p> <p><i>g. Samples shall be analyzed by an analytical laboratory using methods authorized in this Discharge Permit.</i></p>
33	VI.C.34 p.34	Effluent Exceedance	<p>Condition No. 34 requires the <i>analysis</i> of a subsequent sample (ie, confirmation sample) within 24 hrs.</p> <p>DOE/LANS cannot collect, ship to our off-site analytical laboratory for analysis, and receive the analytical results within 24-hrs; the quickest analytical turn-around-time (TAT) that can be obtained is 5 days.</p>	<p>DOE/LANS request the following change:</p> <p>EFFLUENT EXCEEDANCE <i>In the event that an analytical result of an effluent sample indicate an exceedance for any of the effluent limits set forth in this Discharge Permit, the Permittees shall <u>collect</u> analyze a subsequent sample for the particular analyte that was in exceedance within 24 hours following receipt of analytical results indicating the exceedance.</i></p>

No.	Permit Section	Description	Comment	Suggested Text Change
34	VLC.34 p.34	Effluent Exceedance	See Enclosure 3, General Comment No. 5	<p>DOE/LANS request the following change:</p> <p><i>EFFLUENT EXCEEDANCE</i>-In the event that analytical result of an effluent sample indicate an exceedance for any of the effluent limits set forth by this Discharge Permit, the Permittees shall analyze a subsequent sample for the particular analyte that was in exceedance within 24 hours following receipt of analytical results indicating the exceedance. In the event the analytical results of the subsequent sample confirm that the maximum limitation has been exceeded (i.e., confirmed exceedance), the Permittees shall take the following actions:</p> <p>Within 24 hours of becoming aware of a confirmed exceedance, the Permittees shall:</p> <ul style="list-style-type: none"> a. cease discharges to the system that limits have been exceeded with the exception of the MES to which a confirmed exceedance shall not require immediate cessation; b. notify the NMED Ground Water Quality Bureau that an effluent limit set forth in this Discharge Permit has been confirmed to be in exceedance; and c. increase the frequency of effluent sampling to adequately establish quality of all discharges by batch.
35	VLD.41 p.40	Cessation of Operation of Specific Units	See Enclosure 3, General Comment No. 6	<p>DOE/LANS request the following change:</p> <p><i>CESSATION OF OPERATION OF SPECIFIC UNITS</i>- Within 60 <u>180</u> days of the effective date of this Discharge Permit (by DATE), the Permittees shall permanently cease operation of the following units:</p> <ul style="list-style-type: none"> a. the 75,000 gallon concrete influent storage tank (75K tank); b. the 100,000 gallon steel influent storage tank (100K tank); c. the two 26,000 gallon concrete clarifiers located within Building 1 of TA-50; d. the two 25,000 gallon concrete effluent storage tanks (WM2-N, WM2-S); and e. the gravity filter located within Building 1 of TA-50. <p>Upon the cessation of operation of these specific units, the Permittees shall implement the requirements for stabilization of the individual units, systems and components in accordance with this Discharge Permit.</p>

No.	Permit Section	Description	Comment	Suggested Text Change
36	VI.D.42 p.41	Stabilization of Individual Units & Systems	<p>The draft Discharge Permit requires <i>within 30 days following completion of all interim measures, actions and controls, the permittees shall submit to NMED for approval a final written report....</i></p> <p>30 days is an insufficient period of time to assemble all of the documentation needed for the final report and obtain all of the required internal technical and management reviews.</p>	<p>DOE/LANS request the following change:</p> <p><i>STABILIZATION OF INDIVIDUAL UNITS AND SYSTEMS</i> Within 90 days from the permanent cessation of operation of a unit or system, the Permittees shall submit to NMED for approval a written work plan for the stabilization of the unit or system for which operation has ceased. The work plan shall identify steps necessary to ensure that the unit or system can no longer receive a discharge and that no further releases of water contaminants occur as a result of the unit or system. At a minimum, the work plan shall include the following:</p> <p>a-g</p> <p>Upon NMED approval of the work plan, the Permittees shall implement the plan according to the approved schedule.</p> <p>Within 30 60 days following the completion of all interim measures, actions and controls, the Permittees shall submit to NMED for approval a final written report on the actions taken to implement the partial closure.</p>
37	VI.D.43 p.41	Final Closure Plan	See Enclosure 3, General Comment No. 7	<p>DOE/LANS request the following change:</p> <p>See Enclosure 5, redline/strikeout of the September 10, 2013, draft Discharge Permit.</p>
38	VI.E.51	Extensions of Time	<p>The draft permit contains several time deadlines for obligations that include submittal of documents and demonstrations (See e.g., draft Permit Condition Nos. 4, 7, 8, 17, 18, 26, 35, 38, 41, 43: construction report, verification of secondary containment, water tightness, installation of flow meters, calibration of flow meters, soil moisture monitoring, closure and final closure plans). Under the draft permit, the failure to meet a deadline is an enforceable non-compliance that is subject to civil penalties.</p> <p>The Permittees request that the final permit include a new condition to address the potential that an obligation under the permit may be delayed for "good cause" and that an extension of time is warranted and necessary. (continued on Page 16)</p>	<p>DOE/LANS request the following new condition be added to the draft Discharge Permit:</p> <p><u>51. EXTENSIONS OF TIME</u></p> <p><u>The Permittees may seek an extension of time in which to perform an obligation under this Permit, for good cause, by sending a written request for extension of time that states the length of the requested extension and describes the basis for the request. The Department will respond in writing to any request for extension within fourteen (14) days following receipt of the request. If the Department denies the request for extension, it will state the reasons for the denial.</u></p>

No.	Permit Section	Description	Comment	Suggested Text Change
38	VI.E.51	Extensions of Time	<p>This mechanism addresses the potential that an obligation may be delayed for "good cause," including natural disasters, weather delays, unanticipated breakage to equipment and other events that cannot be anticipated. As typical of language in other permits, the language requires the Permittees to provide a written request for an extension stating the reasons, and the length of the requested extension, along with a revised schedule if applicable. Further, the "good cause" standard is broad because the circumstances constituting "good cause" are fact-specific and difficult to precisely define. In any event, NMED-GWQB has authority to approve, and if it does not approve must state the reasons for the denial.</p>	

ENCLOSURE 3

General Comments on the draft Discharge Permit

ENV-DO-13-0326

LAUR-13-29209

U1302039

Date: DEC 12 2013

General Comment No. 1. Permit Condition II.V, Page 6 (Definition of Secondary Containment)

This permit condition defines "secondary containment" by incorporating (verbatim) the definition of "secondary containment" as that term is used under the New Mexico Hazardous Waste Regulations (NMAC 20.4.2.1 *et seq.*) and EPA rules under the Resource Conservation and Recovery Act of 1976 ("RCRA", 42 U.S.C. § 6901 *et seq.*) at 40 C.F.R. § 264.193. This proposed condition is inappropriate for at least four reasons. First, the RLWTF is a wastewater treatment unit which is exempt from the requirements of 40 C.F.R. § 264.193 and 20.4.2.1 NMAC. Second, neither the Water Quality Act, NMSA 1978 §§ 74-6-1 to -17 (the "WQA"), nor its implementing regulations authorize imposition of this condition. Third, there is no evidence that the proposed condition satisfies the WQA's mandate that any proposed condition be both reasonable and necessary to ensure compliance with the WQA and applicable regulations considering site-specific conditions. Fourth, the proposed condition is infeasible and economically impractical to the extent that it would require retrofitting an existing facility. The proposed condition should be revised to recognize the existing leak prevention and detection provisions described in the permit application and which conform with NMED's regulations.

First, the proposed condition is inappropriate because the RLWTF is a wastewater treatment unit as defined by 40 C.F.R. § 264.1(g)(6) and is thus exempt from RCRA requirements, including RCRA's definition of "secondary containment." NMED's attempt to impose inapplicable RCRA requirements is not appropriate. To qualify as an exempt wastewater treatment unit, a facility must (1) be a wastewater treatment facility subject to regulation under Clean Water Act (CWA) §§ 402 or 307(b), (2) receive and treat or store an influent wastewater which is hazardous waste as defined in 40 C.F.R. § 261.3, and (3) meet the definition of a "tank" or "tank system" in 40 C.F.R. § 260.10. The RLWTF satisfies each of those conditions. The RLWTF is regulated under CWA § 402 by EPA pursuant to NPDES Permit No. NM0028355, receives and treats a small amount of hazardous wastewater, and constitutes a "tank system" as defined in 40 C.F.R. § 260.10. The NPDES permit for the RLWTF contains water quality standards that are more stringent than drinking water standards under the federal Safe Drinking Water Act. NMED also issued a Section 401 State Certification for that NPDES permit to ensure that the effluent meets state water quality standards. Further, industrial wastewater discharges that are point sources regulated under § 402 of the CWA are excluded from RCRA's definition of "solid waste" under 40 C.F.R. § 261.4(a)(2). EPA exempted wastewater treatment facilities that met RCRA's waste water treatment unit exemption, like RLWTF, to avoid dual regulation of wastewater units regulated under § 402 of the CWA. See Faxback No. 13526 (1993).

Although the RLWTF is exempt from RCRA's secondary containment requirements, the draft permit defines "secondary containment" by incorporating verbatim RCRA rules for "secondary containment" at 40 C.F.R. § 264.193. RCRA contains very prescriptive requirements, which NMED-GWQB is attempting to inject in the draft permit definition, to determine if tank and tank systems meet "secondary containment" requirements. For example, the RCRA secondary containment requirements mandate that "tanks" and "tank systems" are "sloped or designed and operated to drain and remove liquids resulting from leaks, spills, or precipitation within a 24-hour time period; designed to be free of cracks, gaps, or fissures; or designed, constructed and maintained to surround the primary unit completely." Because it

is an exempt wastewater treatment unit, the existing RLWTF was not constructed to meet the RCRA requirements. The facility nonetheless has multiple design features to prevent leaks and to detect and collect releases if they should occur. For instance, RLWTF secondary containments are designed to collect and hold accumulated liquids until the collected liquids can be removed but are not sloped to drain and remove liquids within 24 hours.

NMED's attempt to impose the stringent RCRA standards on an existing, exempt facility ignores that RCRA rules themselves which allow EPA and States to vary these requirements for existing facilities by use of alternative design and operating practices so long as an applicant can demonstrate that secondary containment prevents the migration of hazardous waste or hazardous constituents into the ground water or surface water (See 40 C.F.R. § 264.193(g)). The existing design features of the RLWTF and those described in the discharge permit application adequately ensure that the RLWTF's tanks and tank systems will not leak and are capable of detecting and collecting releases of wastewater and accumulated liquids to prevent migration of constituents to ground or surface water. Accordingly, because the RLWTF is exempt from the RCRA requirements, and because the containment features described in the permit application provide adequate protection, there is no basis for NMED to seek to impose RCRA requirements on the RLWTF under the guise of a different regulatory program.

Second, the WQA and its implementing regulations do not authorize NMED's attempt to engraft RCRA regulatory requirements onto a discharge permit. The NMED-GWQB does not provide a citation to support the incorporation of RCRA's definition of "secondary containment." Instead, the NMED-GWB cites to the more generic provisions of 20.6.2.3106.C and 20.6.2.3107.A which simply authorize conditions addressing "procedures for detecting failure of the discharge system" and "contingency plans to cope with failure of the discharge permit or system." NMED's rules at 20.6.2.3106.C NMAC or 20.6.2.3107.A NMAC do not provide any authority or require that wastewater treatment facilities or any facility regulated under ground water rules (e.g., mining, dairy, industrial wastewater treatment facilities) meet RCRA "secondary containment" with "leak detection systems" as described in RLWTF's draft permit. Instead, those regulations require that tanks and tank systems are water tight, and that a permittee undertake inspection, routine maintenance, and installation of alarm systems to minimize the risk of leaks. These kinds of measures are already incorporated into the design of the RLWTF.

Third, the proposed condition would still need to be revised or eliminated because NMED-GWQB has not, and cannot, satisfy its burden to show that the proposed condition is both reasonable and necessary considering site-specific conditions. Under Section 74-6-5.D of the Water Quality Act, the agency "has the burden of showing that each condition is reasonable and necessary to ensure compliance with the WQA and applicable regulations, considering site-specific conditions." The agency has failed to make such a showing here.

And fourth, the proposed condition is unreasonable given that, as described in the permit application, the existing RLWTF tanks and tank systems are designed to ensure that they are water tight and are equipped with secondary containment-like features that include, among other things, collection systems with double-walled pipes; concrete floors and vaults, with sumps and leak detection sensors; and concrete tanks with liners that are equipped with alarms. The following describes these systems (Supplemental Information, Discharge Permit Application DP-1132, August 2012, Enclosure 3, Table 2.0):

Collection system: Collection system piping is essentially an underground pipeline within a pipeline. Primary piping is six- or eight-inch-diameter polyethylene encased within 10- or 12-inch polyethylene secondary piping. The primary piping transitions to stainless steel in each of the 62 underground vaults, then back to polyethylene. Underground vaults are equipped with leak detection sensors that are linked electronically to the RLWTF control room.

Building 1: The concrete floor at TA-50-001 serves as secondary containment for all of the treatment units, vessels, and process equipment located within the main RLWTF.

WMRM: The Waste Management and Risk Mitigation (WMRM) facility (Building 50-250) houses six influent storage tanks with a capacity of 50,000 gallons each. Influent is received at WMRM by an underground, double-walled pipe. The concrete basement houses the six tanks and acts as secondary containment. A sump located in the floor of the basement is outfitted with a leak detection sensor that is linked electronically to the RLWTF control room.

SET: The Solar Evaporative Tanks (SET) at TA-52 have concrete walls and a double synthetic liner with leak detection sensors located between the primary and secondary liners.

MES: The Mechanical Evaporator System (MES) is located on an asphalt pad outside of TA-50-001. Secondary containment is provided by a hypalon liner over asphalt.

For all these reasons, DOE/LANS do not believe that it is appropriate or technically supportable to include in the final discharge permit language that has been taken directly from the RCRA rules and that are not applicable to RLWTF. DOE/LANS understand that the intent of the proposed language is to ensure that RLWTF's tanks and tank systems will not leak, and are capable of detecting and collecting releases of waste water and accumulated liquids until the collected material can be removed. To address this issue, DOE/LANS have suggested revised language that meets this intent:

II. V. Secondary containment- a constructed unit, independent of the (primary) unit or system designed to convey, store, treat, or dispose of liquids or semi-liquids, that is designed, constructed and operated to prevent any migration of wastewater out of the unit or system to the soil, ground water, or surface water at any time. Secondary containment can include, but is not limited to, double-walled pipes, concrete and floors equipped with sumps and alarms systems to detect potential leaks. must be:

- ~~designed, constructed and maintained to surround the primary unit completely;~~
- ~~free of cracks, gaps, or fissures;~~
- ~~constructed of, or lined with, materials that are compatible with the waste streams to be in contact with the unit or system;~~
- ~~placed on a foundation or base capable of withstanding pressure gradients, settling or uplift which may cause failure of the unit or system;~~
- ~~equipped with a leak detection system that is designed and operated so that it will detect the failure of the primary containment structure;~~
- ~~sloped or designed and operated to drain and remove liquids resulting from leaks, spills, or precipitation within a 24 hour time period; and~~
- ~~capable of detecting and collecting releases and accumulated liquids until the collected material can be removed.~~

General Comment No. 2. Permit Condition V.B, Page 9 (Authorization to Discharge)

Permit condition V.B states that "[p]ermittees are authorized to receive and treat up to 40,000 gallons per day (gpd) of low-level and transuranic radioactive industrial waste water" As drafted, the permit condition purports to limit the ability of RLWTF to receive and treat wastewater to the same volume it will discharge (e.g., 40,000 gpd). For the reasons stated below, DOE/LANS request that the terms "receive and treat" be deleted and revised to state that "[p]ermittees are authorized to discharge up to 40,000 gpd...." (See also specific comment no. 7 related to a volume limitation under permit condition III, Intro., fifth paragraph).

The discharge permit application submitted by DOE/LANS and NMED's standard application form does not request or require any information regarding the volume of water to be received or treated at RLWTF or a wastewater treatment facility. Indeed, NMED's ground water quality rules and the discharge permit application only require the applicant to provide an "*estimated volume of the discharge*" (See 20.6.2.103.A.1 and Part A, page 2 of the application). That is because NMED rules for discharge permits regulate the "discharge" of wastewater and do not regulate the volume received or treated at a wastewater treatment facility. As stated in the discharge permit application, RLWTF is a batch treatment facility and seeks "to discharge" an estimated volume of up to 40,000 gpd of treated effluent.

RLWTF, including the new WMRM tanks, is designed to receive more wastewater than 40,000 gpd. In fact, the six WRWM tanks each hold 50,000 gallons of wastewater and were designed and installed to receive wastewater from emergencies (e.g., fire suppression water). Further, the draft permit application's discharge limitation of 40,000 gpd does not reflect the amount of liquid waste it will treat. As a batch treatment facility, it may be necessary for RLWTF to treat more than 40,000 gpd in a 24-hour period. For these reasons, a volume limitation on receipt and treatment of wastewater will substantially and adversely impact operations and is not authorized by applicable NMED regulations.

DOE/LANS request the following change:

III. Authorization to Discharge.

B. The Permittees are authorized to discharge ~~receive and treat~~ up to 40,000 gpd of low-level and transuranic radioactive industrial waste water using a series of treatment processes as described in Section V(D) of this Discharge Permit in accordance with the Conditions set forth in Section VI of this Discharge Permit.

General Comment No. 3. Permit Condition VI. A.1 (Electronic Posting)

This condition imposes a requirement to post on LANL's Electronic Public Reading room a multitude of documents (approximately 43) as enforceable permit conditions. As an initial matter, NMED has no authority under either the WQA or its implementing regulations to impose such a permit condition. Even if the WQA provided authority to impose such a condition, the condition is unreasonable because, among other reasons, it could subject the permittee to significant fines and penalties (up to \$15,000 per day under Section 74-6-10.C of the WQA, and permit condition No. 52) for failure to post (or timely post) a single document. DOE/LANS also recognize that such a permit requirement is unprecedented under the New Mexico Ground Water Regulations. Although DOE/LANS support public involvement, it cannot agree to undertake new requirements without careful review and consideration of existing resources, cost, and practicality.

DOE/LANS have carefully reviewed the type of documents and assessed existing staff level and functions to determine whether this additional work can be implemented. Some categories of documents require significant resources (in cost and human resources) to post and at this time would be unduly burdensome and difficult to post. It is costly and resource-intensive to ensure correct posting of documents; maintain the electronic reading room, and assure proper oversight of this task. For these reasons, DOE/LANS cannot agree to post all of the documents to the Electronic Public Reading Room. As summarized below, DOE/LANS can agree to voluntarily post those documents on the Electronic Public Reading Room web site that would not impose significant financial burden and cost to implement. Further, DOE/LANS could only agree to post certain documents identified below on the explicit condition that the requirement is voluntary and not subject to civil fines and enforcement at \$15,000 per day for non-compliance.

DOE/LANS also believe it is important and will facilitate implementation and compliance to explicitly identify the specific documents to be produced in one permit condition. For this reason, and as discussed below, DOE/LANS have identified these documents under Section IV.A.1. Further, DOE/LANS will require transitional time to meet internal requirements associated with such a change. For these reasons, DOE/LANS would propose the following new permit condition:

E. 49. PUBLIC INVOLEMENT - Within six (6) months after the effective date of the Permit, the Permittees shall post the following information on LANL's Electronic Public Reading Room located at <http://eprl.lanl.gov/oppie/service> (or as updated), where information on the Discharge Permit will be made available: (a) the Annual Update (VI.A.1); (b) Notices of Changes (VI.A.2); (c) Water Tightness Testing (VI.A.8); (d) Summary Report for Settled Solids (VI.A.9); (e) Freeboard Proposal and Responses (VI.A.12); (f) Emergency Plan (VI.A.16); (g) Installation of Flow Meters (VI.A.17); (h) Quarterly Monitoring Reports (VI.B.20); (i) Soil Moisture Monitoring System for the SET (VI.B.26); (j) Ground Water Flow (VI.B.27); (k) Final Closure (VI.D.44); (l) Post-Closure (VI.D.45); and (m) Termination of the Discharge Plan (VI.D.46). The Permittees agree to voluntarily provide the above-information, and as such, this permit condition is not subject to civil or criminal fines and penalties associated with permit requirements under Permit Sections 52 and 53.

All posting requirements in the draft discharge permit not listed above shall be removed.

General Comment No. 4. Permit Condition VI. A.16, Page 21 (Emergency Plan)

The proposed condition requires DOE/LANS to submit an "Emergency Plan" that addresses "actions" to be taken to respond to fires, explosions or any unplanned or non-sudden release of a water contaminant from the Facility to the environment. In addition, the emergency plan must include a "spill prevention and response plan" to address all authorized releases to the environment" and a host of other requirements. As authority, NMED-GWQB cites 20.6.2.3109.C NMAC. The "Emergency Plan," however, appears to have been lifted directly from RCRA requirements at 40 CFR §264.52, which applies to "Contingency Plans."

DOE/LANS do not believe that NMED-GWQB can appropriately rely on 20.6.2.3109.C to impose RCRA requirements for "Contingency Plans" to a new requirement for an "Emergency Plan." NMED's ground water rules address contingency plan requirements, which the draft Discharge Plan includes: there are numerous and comprehensive permit requirements to address potential contingencies including corrective actions to respond to any unplanned or non-sudden release of a water contaminant from the Facility. These requirements, found in Permit Section C, Contingency Plan, are supported under 20.6.2.3107.C NMAC which provides NMED-GWQB the authority to include in the Discharge Plan "contingency plans to cope with failure of the discharge permit or system." The Emergency Plan, on the other hand, conflicts with and potentially duplicates many of these actions. For these reasons, and as discussed below, DOE/LANS object to the inclusion of this permit condition.

The draft permit at Permit Section C, *Contingency Plan*, contains ten (10) permit conditions related to contingency plan requirements that address corrective actions, corrective action reports, and spills and unauthorized releases from RLWTF. In addition, the draft permit contains permit condition 39, regarding "spills and unauthorized releases," and any failure in the discharge plan not otherwise provided. These requirements are also found in other discharge plans and are supported by NMED's ground water rules at 20.6.2.3109.C NMAC.

NMED's ground water rules, however, do not require a facility seeking a discharge permit to prepare an "Emergency Plan" as described in this permit condition. NMED's rules do not require that an "Emergency Plan" be prepared, distributed within 30-days or distributed to the numerous governmental agencies. DOE/LANS are unaware of another instance where NMED-GWQB has imposed this type of requirement in any other ground water discharge permits.

Further, the Emergency Plan potentially conflicts with or duplicates several permit requirements. For example, the Emergency Plan must address the actions to be taken in response to fires, explosions or any unplanned sudden or non-sudden releases of water contaminates. Permit condition 39, on the other hand, already addresses requirements for "spills and unauthorized releases," which can include "sudden or non-sudden" releases.

For the above reasons, DOE/LANS believe that the Contingency Plan is sufficient, and that this requirement should be deleted in its entirety.

General Comment No. 5. Permit Condition VI. C.34, Page 34 (Effluent Exceedance)

NMED's proposed condition requiring permittees to "cease discharges to the system" within 24 hours of becoming aware of a "confirmed [effluent] exceedance" is unsupported by NMED rules and an unprecedented measure for a single effluent sample exceedance alone. Cessation of discharge by the RLWTF is not commensurate with, or supported by, significant potential for harm to human health and the environment. The proposed condition appears to be based on the misplaced assumption that an effluent sample exceedance automatically equates to a ground water sample exceedance (See 20.6.2.3109.E NMAC). Other discharge permits, however, have not required cessation of operations even based on evidence that a ground water sample exceeded effluent limitations and state ground water quality standards.

Permittees do not believe it is appropriate to impose conditions requiring cessation of operations at RLWTF based on an effluent exceedance. The SET and MES have secondary containment systems designed to prevent the possibility that a potential release enters the environment. These units are required to be inspected and kept in good condition; no wastewater will be discharged to the environment (other than the potential for solar evaporation). For effluent discharged to Outfall 051, ground water monitoring is conducted at three down gradient wells to ensure that ground water standards are met. This is consistent with other facilities and discharge permits.

DOE/LANS propose the following changes:

34. EFFLUENT EXCEEDANCE-*In the event that analytical result of an effluent sample indicate an exceedance for any of the effluent limits set forth by this Discharge Permit, the Permittees shall collect and analyze a subsequent sample for the particular analyte that was in exceedance within 24 hours following receipt of analytical results indicating the exceedance. In the event the analytical results of the subsequent sample confirm that the maximum limitation has been exceeded (i.e., confirmed exceedance), the Permittees shall take the following actions:*

Within 24 hours of becoming aware of a confirmed exceedance, the Permittees shall:

- a. ~~cease discharges to the system that limits have been exceeded with the exception of the MES to which a confirmed exceedance shall not require immediate cessation;~~
- b. *notify the NMED Ground Water Quality Bureau that an effluent limit set forth in this Discharge Permit has been confirmed to be in exceedance; and*
- c. *increase the frequency of effluent sampling to adequately establish quality of all discharges by batch.*

General Comment No. 6. Permit Condition VI. D.41, Page 40 (Cessation of Operation of Specific Units)

The draft discharge Permit requires that, within 60 days of the effective date of the permit, the permittees shall permanently cease operation of the listed units (a-e).

Ceasing operation of the listed units is a phased process consisting of the following steps:

- Management decision to stop using the vessels
- Efforts (proposal development, meetings, funding request) to obtain LANS and DOE concurrence for the project
- Design of facility and process changes. (For example, the need to plug all floor drains, the need to re-plumb sinks in the chemical laboratories, the need to pipe tank overflows to tanks other than the 75K)
- Procurement and installation of modifications (For example, the need to procure and install a microfilter that will replace the gravity filter)
- Implementation of process changes

The effort began in mid-2012. DOE/LANS have reached the final phase of the project, implementation of process changes (last in the bulleted list above). The implementation of process changes is itself a major undertaking, for it requires changing a process that has been used for 50 years, from 1963 to the present. The process will be changed in four increments:

1. Startup of the new microfilter: This treatment step has been designed to replace the filtration presently accomplished by the gravity filter and the pressure filters. Startup activities included the development of operating procedures, operator training, a readiness assessment, closure of findings made by the readiness team, and initial activities (as outlined in a formal Startup Plan).
2. Startup of the WMRM Facility, wherein two of the six influent storage tanks will be used for the daily receipt of LANL radioactive liquid wastes. (The remaining four WMRM influent tanks will be held for emergency use.) Similar startup activities are required: procedures, training, readiness assessment, and startup plan and activities. The goal of this phased step is to shake down procedures and equipment associated with first-ever use of the WMRM Facility.
3. Startup of reaction tanks: Two existing tanks have been converted to chemical reaction tanks for the treatment of low-level influent. These tanks will replace the two clarifiers that have been in service since 1963. This is, perhaps, the most significant of the process changes.
4. Coordinated use of new process equipment: This final step place the low-treatment operation in the full configuration described in the Discharge Permit DP-1132 Application supplement of August 2012. Influent will be received at the WMRM Facility (instead of at the 75K tank), chemical treatment will take place in the two reaction tanks (instead of in the clarifiers), and filtration be accomplished using the microfilter (instead of the gravity filter).

Each step listed above is dependent upon successful conclusion of the previous step. LANL has recently completed the first of the four process changes, and is prepared to startup the WMRM Facility, pending receipt temporary permission from the NMED. The currently drafted deadline of 60 days is not adequate to complete this process; therefore a 180 day deadline is suggested. This time period should start upon NMED's approval of the request by DOE/LANS for temporary permission to operate WMRM.

General Comment No. 7. Permit Condition VI. D.43, Page 41 (Final Closure Plan)

DOE/LANS object to this proposed condition because it imposes requirements that exceed the NMED's statutory authority and that are not reasonable or necessary to ensure compliance with the WQA, considering site-specific conditions.

As an administrative agency, the NMED-GWQB is limited to the power and authority granted by statute. The WQA only authorizes the NMED-GWQB to issue a permit "for the discharge of any water contaminant" with conditions that are both "reasonable and necessary to ensure compliance with the WQA and applicable regulations, considering site-specific conditions." Proposed conditions 43.h and 43.i are beyond the NMED-GWQB's limited authority under the WQA because those conditions purport to regulate DOE/LANS's methods of waste characterization and methods to "remove, transport, recycle or dispose of" wastes generated during closure. Those activities do not pertain to an intention to discharge a contaminant to water and are thus outside the scope of regulation authorized by the WQA. Conditions 43.h and 43.i should be deleted.

Even if proposed conditions 43.h and 43.i were not beyond the NMED-GWQB's statutory authority, those conditions are neither reasonable nor necessary to ensure compliance with the WQA. Requiring the Permittee to describe the methods to be used "to characterize wastes" generated during closure and the methods to be used to "remove, transport, recycle or dispose of" such wastes do not pertain to regulation of water discharges, the sole concern of the WQA.

Similarly, many of the other proposed conditions in VI.A.43 also are unreasonable and are not necessary to ensure compliance with the WQA. Both the 180-day time frame prescribed in the condition for development and submission of the final closure plan and the high level of detail required by the proposed condition are unreasonable and are inconsistent with other discharge permits the agency has issued. In many other discharge permits, the closure plan requirements simply direct that, upon closure, the facility shall (1) remove or plug lines leading to the treatment system so that a discharge can no longer occur, (2) drain and/or evaporate all liquids from all treatment units and dispose of sludge or residue in accordance with all local, state and federal regulations, (3) remove or demolish tanks and re-grade area with clean fill to blend with surface topography and prevent ponding, (4) continue ground water monitoring for two years after closure, and (5) following notification that post-closure monitoring may cease, plug and abandon monitoring wells in accordance with NMED standard conditions. NMED-GWQB has not demonstrated why the substantially more onerous and detailed closure plan requirements proposed in this permit are reasonable and necessary to ensure compliance with the WQA considering site specific conditions. DOE/LANS propose the following Final Closure Plan:

FINAL CLOSURE PLAN**Permanent Facility Closure Conditions**

1. RLWTF: Within 120 days after permanent cessation of discharge to the RLWTF and its collection system (excluding the SET and Outfall 051), the Permittees shall:
 - a) Remove or plug and abandon in place the lines discharging into the RLWTF collection system so that a discharge can no longer occur;

- b) Drain wastewater from the RLWTF collection system and dispose of that wastewater in accordance with applicable local, state, and federal laws; and
- c) Remove solids and sludge from the RLWTF collection system and contain, transport, and/or dispose of that material in accordance with applicable local, state, and federal laws.

Within [insert appropriate number] days after permanent cessation of discharge to the RLWTF and its collection system, the Permittees shall:

- d) Remove, or permanently plug and abandon in place, all collection system lines leading to the RLWTF;
- e) Drain or evaporate any remaining wastewater from the RLWTF, including storage tanks and all other components, and dispose of any drained wastewater in accordance with applicable local, state, and federal laws;
- f) Remove solids and sludge from the RLWTF tanks and components and contain, transport, and/or dispose of such material in accordance with applicable local, state, and federal laws; and
- g) Remove or demolish all RLWTF components, and re-grade the area with suitable fill to blend with surface topography, promote positive drainage, and prevent ponding.

2. SET: Within [insert appropriate number] days after permanent cessation of discharge to the SET, the line leading to the SET shall be plugged so that a discharge can no longer occur and wastewater shall be drained or evaporated from the SET and shall be disposed of in accordance with applicable local, state, and federal laws.

Within [insert appropriate number] days after permanent cessation of discharge to the SET, the Permittees shall submit a solids removal and disposal plan to NMED for approval describing how solids will be removed and disposed of in compliance with applicable local, state, and federal laws. Within [insert appropriate number] days of NMED approval of the solids removal and disposal plan, the Permittees shall begin implementation of that plan.

Within one year after completion of the solids removal and disposal plan requirements, the Permittees shall:

- a) Remove, or permanently plug and abandon in place, all lines leading to and from the SET;
- b) Remove the SET's concrete floor, walls, and liners;
- c) Re-grade the site with suitable fill to blend with surface topography, promote positive drainage and, prevent ponding; and
- d) Submit a closure report to NMED describing the decommissioning and the closure activities, including photographic documentation.

3. NPDES Outfall 051: Within [insert appropriate number] days after permanent cessation of the operation of NPDES Outfall 051, the Permittees shall:

- a) Remove or plug all lines leading to the NPDES Outfall so that a discharge can no longer occur; and
- b) Submit a closure report to NMED describing the NPDES Outfall decommissioning and closure activities, including photographic documentation.

When all closure and post-closure requirements have been completed, the Permittees may submit to NMED a written request for termination of the Discharge Permit.

ENCLOSURE 4

Table A-1 of the NMED Risk
Assessment Guidance

ENV-DO-13-0326

LAUR-13-29209

U1302039

Date: DEC 12 2013

See Enclosure 2, Comment No. 25.

Table 1.1. Effluent Quality Limits for Discharges to Outfall 051

20,627 W/V NMAC Toxic Pollutants	CAS #	Table A-1 NMED Soil Screening Levels, June 2012 (ug/L)
1,1,1-trichloroethane	71-55-6	See Table 1 ¹
1,1,2,2-tetrachloroethane	79-34-5	See Table 1 ¹
1,1,2-trichloroethane	79-00-5	0.42
1,1-dichloroethane	75-34-3	See Table 1 ¹
1,1-dichloroethylene	75-35-4	See Table 1 ¹
1,2,4,5-tetrachlorobenzene	95-94-3	11
1,2-dichloroethane	107-06-2	See Table 1 ¹
1-methylnaphthalene	90-12-0	9.7 ¹
2,4,5-trichlorophenol	95-95-4	3650
2,4,6-trichlorophenol	88-06-2	36.5
2,4,6-trinitrotoluene (TNT)	118-96-7	18.3
2,4-dichlorophenol	120-83-2	110
2,4-dinitro-o-cresol	534-52-1	2.9
2,4-dinitrotoluene (2,4,DNT)	121-14-2	2.2
2,6-dinitrotoluene (2,6,DNT)	606-20-2	36.5
2-methylnaphthalene	91-57-6	27 ¹
3,4-benzofluoranthene	205-99-2	0.30
acrolein	107-02-8	0.04
acrylonitrile	107-13-1	0.45
aldrin	309-00-2	0.04
alpha-HCH	319-84-6	0.11
anthracene	120-12-7	11000
benzene	71-43-2	See Table 1 ¹
benzidine	92-87-5	0.0009
benzo (k) fluoranthene	207-08-9	2.9
benzo-a-pyrene	50-32-8	See Table 1 ¹
beta-HCH	319-85-7	0.37
bis (2-chloroethyl) ether	111-44-4	0.12
bis (2-chloroisopropyl) ether	108-60-1	9.6
bis (chloromethyl) ether	542-88-1	0.0006
bromodichloromethane	75-27-4	1.2
bromomethane	74-83-9	8.7
carbon tetrachloride	56-23-5	See Table 1 ¹
chlordane	57-74-9	1.35
chloroform	67-66-3	See Table 1 ¹
chloromethane	74-87-3	188
cis-1,2-dichloroethylene	156-59-2	73
DDT	50-29-3	2.0
di-2-ethylhexyl phthalate	117-81-7	48
dibutyl phthalate	84-74-2	3650
dichlorobenzene (1,4-)	106-46-7	4.3
dichlorobenzidine	91-94-1	1.5
dichlorodifluoromethane	75-71-8	203
dichloromethane (methylene chloride)	75-09-2	See Table 1 ¹
dichloropropenes (1,3-)	542-75-6	4.3
dieldrin	60-57-1	0.04
diethyl phthalate	84-66-2	29208
dimethyl phthalate	131-11-3	365000
dinitrophenols (2,4-dinitrophenol)	51-28-5	730

20.6.2.7.WW NMAC Toxic Pollutants	CAS #	Table A-1 NMED Soil Screening Levels, June 2012 (ug/L)
diphenylhydrazine	122-66-7	0.84
endosulfan	115-29-7	219
endrin	72-20-8	11
ethylbenzene	100-41-4	See Table 1 ¹
ethylene dibromide (EDB)	106-93-4	See Table 1 ¹
fluoranthene	206-44-0	1460
fluorene	86-73-7	1460
gamma-HCH	58-89-9	0.61
heptachlor	76-44-8	0.15
hexachlorobenzene	118-74-1	0.42
hexachlorobutadiene	87-68-3	8.6
hexachlorocyclopentadiene	77-47-4	219
hexachloroethane	67-72-1	16.8
HMX	2691-41-0	1930
isophorone	78-59-1	707
methyl tertiary butyl ether	1634-04-4	125
monochlorobenzene	108-90-7	91.3
m-xylene	108-38-3	203
naphthalene	91-20-3	1.4
nitrobenzene	98-95-3	1.2
N-nitrosodibutylamine	924-16-3	0.02
N-nitrosodiethylamine	55-18-5	0.001
N-nitrosodimethylamine	62-75-9	0.004
N-nitrosodiphenylamine	86-30-6	137
N-nitrosopyrrolidine	930-55-2	0.32
o-xylene	95-47-6	203
pentachlorobenzene	608-93-5	29.2
pentachlorophenol	87-86-5	1.68
perchlorate	14797-73-0	25.6
phenanthrene	85-01-8	1100
phenol	108-95-2	See Table 1 ¹
polychlorinated biphenyls (PCB's)	1336-36-3	See Table 1 ¹
p-xylene	106-42-3	203
pyrene	129-00-0	1100
RDX	121-82-4	6.1
technical HCH	608-73-1	0.22 ²
tetrachloroethylene	127-18-4	See Table 1 ¹
toluene	108-88-3	See Table 1 ¹
toxaphene	8001-35-2	0.61
trans-1,2-dichloroethylene	156-60-5	107
tribromomethane (bromoform)	75-25-2	85
trichloroethylene	79-01-6	See Table 1 ¹
trichlorofluoromethane	75-69-4	1290
vinyl chloride	75-01-4	See Table 1 ¹
xlenes (total)	1330-20-7	See Table 1 ¹

¹The limits for toxic pollutants listed in in Table 1 of this Discharge Permit are the 20.6.2.3103 NMAC standards for ground water. .

²There is no NMED Tap Water Soil Screening Level in Table A-1 for this toxic pollutant. Instead the EPA Region 6 Tap Water Screening Level has been used.

ENCLOSURE 5

Redline-strikeout of the draft Discharge
Permit showing all DOE/LANS comments

ENV-DO-13-0326

LAUR-13-29209

U1302039

Date: DEC 12 2013

DRAFT GROUND WATER DISCHARGE PERMIT (DP-1132)
RADIOACTIVE LIQUID WASTE TREATMENT FACILITY
LOS ALAMOS NATIONAL LABORATORY

DRAFT

Table of Contents

DRAFT GROUND WATER DISCHARGE PERMIT (DP-1132)	1
I. ACRONYMS:	4
II. DEFINITIONS:	5
III. Introduction	9
IV. Findings	10
V. Authorization to Discharge	10
VI. Conditions	12
A. Operational Plan	12
1. ANNUAL UPDATE	12
2. NOTIFICATION OF CHANGES	13
3. SUBMITTAL OF PLANS AND SPECIFICATIONS	13
4. CONSTRUCTION REPORT	15
5. RESTRICTING ENTRY	16
6. SIGNS	16
7. VERIFICATION OF SECONDARY CONTAINMENT	16
8. WATER TIGHTNESS TESTING	16
9. SETTLED SOLIDS	16
10. FACILITY INSPECTIONS	18
11. MAINTENANCE and REPAIR	19
12. FREEBOARD	20
13. EFFLUENT LIMITS: OUTFALL 051	20
14. EFFLUENT LIMITS: MES and SET	24
15. PERSONNEL QUALIFICATIONS	25
16. EMERGENCY PLAN	26
17. INSTALLATION OF FLOW METERS	26
18. CALIBRATION OF FLOW METERS	27
B. Monitoring and Reporting	28
19. METHODOLOGIES	28
20. MONITORING REPORTS	28
21. INFLUENT VOLUMES RLW	29
22. INFLUENT VOLUMES TRU	29
23. DISCHARGE VOLUMES	29
24. WASTE TRACKING	30
25. EFFLUENT SAMPLING	30
26. SOIL MOISTURE DETECTION SYSTEM FOR THE SET	31
27. GROUND WATER FLOW	32
28. GROUND WATER MONITORING	33
C. Contingency Plans	35
29. CONTAINMENT	35
30. WATER-TIGHTNESS	36
31. SETTLED SOLIDS REMOVAL	33
32. DAMAGE TO STRUCTURAL INTEGRITY	37
33. FREEBOARD EXCEEDANCE	38
34. EFFLUENT EXCEEDANCE	38
35. SOIL MOISTURE DETECTION SYSTEM EXCEEDANCE	39
36. MONITORING WELL LOCATION	40
37. MONITORING WELL CONSTRUCTION	37
38. GROUND WATER EXCEEDANCE	37

39. SPILL OR UNAUTHORIZED RELEASE	39
40. FAILURES IN DISCHARGE PLAN/DISCHARGE PERMIT	44
D. Closure	44
41. CESSATION OF OPERATION OF SPECIFIC UNITS	44
42. STABILIZATION OF INDIVIDUAL UNITS AND SYSTEMS	45
43. FINAL CLOSURE PLAN	47
44. FINAL CLOSURE	48
45. POST-CLOSURE GROUND WATER MONITORING	49
46. TERMINATION	49
E. General Terms and Conditions	50
47. APPROVALS	50
48. RECORD KEEPING	50
49. INSPECTION AND ENTRY	51
50. DUTY TO PROVIDE INFORMATION	52
51. MODIFICATIONS AND AMENDMENTS	52
52. CIVIL PENALTIES	52
53. CRIMINAL PENALTIES	53
54. COMPLIANCE WITH OTHER LAWS	53
55. LIABILITY	53
56. RIGHT TO APPEAL	54
57. TRANSFER OF OWNERSHIP	54
58. PERMIT FEES	54
VII. Permit Term and Signature	54

I. ACRONYMS:

The following acronyms and abbreviations may be used throughout this Discharge Permit:

BOD₅-biochemical oxygen demand (5-day)
CAS-Chemical Abstract Service
CFR-Code of Federal Regulations
Cl- chloride
CQCAP- Construction Quality Control Assurance Plan
DOE-United States Department of Energy
EPA- United States Environmental Protection Agency
gpd-gallons per day
LANL-Los Alamos National Laboratory
LANS- Los Alamos National Security, LLC
MES-Mechanical Evaporator System
Mg/L-milligrams per liter (or parts per million)
NMAC-New Mexico Administrative Code
NMSA-New Mexico Statutes Annotated
NO₃-N-nitrate-nitrogen
NPDES-National Pollutant Discharge Elimination System
PCBs-Polychlorinated Biphenyls
QA/QC-Quality Assurance/Quality Control
RLW-Low-level radioactive waste water
RLWTF-Radioactive Liquid Waste Treatment Facility
SET-Solar Evaporative Tank System
TA-Technical Area
TDS-total dissolved solids
TKN-total Kjeldahl nitrogen
TRU-Transuranic waste water
TSS-total suspended solids
WQA-Water Quality Act
WQCC-Water Quality Control Commission

II. DEFINITIONS:

The following is a list of definitions as they pertain specifically to this Discharge Permit:

- A. Average daily flow-** the rate determined by dividing the total monthly volume by the number of days for the reporting period.
- B. Active portion-** the portion of the Facility where treatment, storage or disposal of waste water occurs or has occurred in the past, including those portions of the Facility which are not in use and have not been closed in accordance with the conditions in this Discharge Permit.
- C. Closure-** to permanently discontinue the use of a unit, system, or component of the Facility (partial) or the entire Facility (final).
- D. Construction Quality Control Assurance Plan-** a written plan of activities necessary to ensure that construction and installation meet design criteria. A CQCAP includes practices and procedures for inspections, testing and evaluations of material and workmanship necessary to verify the quality of the constructed unit or system, and corrective actions to be implemented when necessary.
- E. Discharge-** the intentional or unintentional release of an effluent or leachate which may move directly or indirectly into ground water or be detrimental to human health, animal or plant life, or property, or unreasonably interfere with the public welfare or the use of property.
- F. Effluent-** a liquid waste product resulting from the treatment or partial treatment of an influent waste stream intended to be discharged.
- G. Exfiltration-** the uncontrolled passage or penetration of waste water or sludge from a structural component of a unit or system through defective pipes, pipe joints, connections, cracks, structural failure, or material incompatibility and enters the surrounding environment.
- H. Flow meter-** a quantitative instrument or device that measures, displays, and records the flow of a fluid in a conduit or an open channel.
- I. Freeboard-** the vertical distance between the crest of the embankment and the carrying capacity level of an open tank, impoundment, or other open unit that contains a liquid or semi-liquid.
- J. Impoundment-** a unit which is a natural topographic depression, man-made excavation, or diked area primarily constructed of earthen materials, specifically designed to hold, evaporate or store, an accumulation of liquid or semi-liquid waste.
- K. Industrial waste water-** the liquid wastes from industrial processes or non-household waste water which is generated through activity not solely derived from human excreta, residential sinks, showers, baths, clothes and dish-washing machines; or exceeds the characteristics of a domestic waste as defined in 20.7.3.7.D(6) NMAC; 300 mg/L BOD, 300 mg/L TSS, 80 mg/L total nitrogen or 105 mg/L fats, oils and grease.
- L. Infiltration-** the uncontrolled passage or penetration of liquids or semi-liquids into a unit or system through defective pipes, pipe joints or connections, or manhole walls, cracks, structural failure, or material incompatibility.
- M. Influent collection system-** the infrastructure and associated components (e.g. sumps, pumps) used for the collection and conveyance of waste water from the originator to the Facility's treatment systems.
- N. Influent-** untreated water, waste water or other liquid or semi-liquid flowing into a

reservoir, basin, or treatment plant.

- O. Leak detection system-** a system capable of detecting the failure of either the primary or secondary containment structure or the presence or release of an accumulated liquid in the secondary containment structure. The system must employ operational controls or consist of an interstitial monitoring device designed to detect continuously and automatically the failure of the primary or secondary containment structure or the presence of a release into the secondary containment structure.
- P. Maintenance and repair-** all actions associated with keeping a system or component functioning as designed or restoring a system or component to its intended function. Maintenance and repair does not include alterations to a unit or system which change the intended function or design of the unit or alter the treatment process.
- Q. Maximum daily discharge-** the total daily volume of waste water (expressed in gallons per day) authorized for discharge by a discharge permit.
- R. Open unit or system-** a unit or system designed to store, treat or dispose of liquids, semi-liquids or solids to which the uppermost portion of the unit is exposed.
- S. Outfall-** the point where a treated waste water discharges to waters of the United States, or a tributary to waters of the United States.
- T. Peak instantaneous flow-** the highest design flow rate for a unit or system, expressed in gallons per minute or cubic feet per second.
- U. Record drawings-** the official record of the actual as-built conditions of the completed construction, to be held as the permanent record of each unit and system, which shall comply with the New Mexico Engineering and Surveying Practice Act (Chapter 61, Article 23 NMSA 1978).
- V. Secondary containment-** a constructed unit, independent of the (primary) unit or system designed to convey, store, treat, or dispose of liquids or semi-liquids, that is designed, constructed and operated to prevent any migration of waste streams or accumulated liquid out of the unit or system to the soil, ground water, or surface water at any time. Secondary containment can include, but is not limited to, double-walled pipes, concrete and floors equipped with sumps and alarm systems to detect potential leaks, must be:
- designed, constructed and maintained to surround the primary unit completely;
 - free of cracks, gaps, or fissures;
 - constructed of, or lined with, materials that are compatible with the waste streams to be in contact with the unit or system;
 - placed on a foundation or base capable of withstanding pressure gradients, settling or uplift which may cause failure of the unit or system;
 - equipped with a leak detection system that is designed and operated so that it will detect the failure of the primary containment structure;
 - sloped or designed and operated to drain and remove liquids resulting from leaks, spills, or precipitation within a 24 hour time period; and
 - capable of detecting and collecting releases and accumulated liquids until the collected material can be removed.
- W. Settled solids measurement device-** an apparatus for testing settled solids in a liquid suspension for settling rate, compaction of the settled solids, and the resulting clarity of the liquid.
- X. Sludge or settled solids-** a solid or semisolid residue that results from the treatment

or precipitation of solids from a waste stream, or the accumulation of natural sediment and debris settling in an open unit or system.

Y. Synthetic Liner- a continuous layer of man-made materials, beneath or on the sides of a unit or system, which restricts the downward or lateral escape of effluent or leachate.

Z. Tank- a stationary device, designed to contain an accumulation of waste water which is constructed primarily of non-earthen materials (e.g., concrete, steel, plastic) which provide structural support. Tanks can be further identified as either an **On ground tank** meaning a tank that is situated in such a way that the bottom of the tank is on the same level as the adjacent surrounding surface allowing for visual inspection of the vertical walls but not the external tank bottom, or an **In-ground tank** meaning a tank constructed or installed so that a portion of the tank wall is situated to any degree within the ground, thereby preventing visual inspection of that portion of the external surface area, or an **Above-ground tank** meaning a tank that is completely elevated above the adjacent surrounding surface allowing for visual inspection of the vertical walls and external tank bottom.

AA. Total Nitrogen- The cumulative sum of total Kjeldahl nitrogen (TKN) and nitrate-nitrogen ($\text{NO}_3\text{-N}$).

BB. Total Polychlorinated Biphenyls (PCBs) - the sum of all congeners, sum of all homologs or sum of all aroclors. The total PCB concentration as achieved by summation of the individual and co-eluted compounds.

CC. Toxic Pollutant- a water contaminant or combination of water contaminants in concentration(s) which, upon exposure, ingestion, or assimilation either directly from the environment or indirectly by ingestion through food chains, will unreasonably threaten to injure human health, or the health of animals or plants which are commonly hatched, bred, cultivated or protected for use by man for food or economic benefit; as used in this definition injuries to health include death, histopathologic change, clinical symptoms of disease, behavioral abnormalities, genetic mutation, physiological malfunctions or physical deformations in such organisms or their offspring; in order to be considered a toxic pollutant a contaminant must be one or a combination of the potential toxic pollutants identified in the list in 20.6.2.7.WW NMAC and be at a concentration shown by scientific information currently available to the public to have potential for causing one or more of the effects listed above; any water contaminant or combination of the water contaminants identified in the list in 20.6.2.7.WW NMAC creating a lifetime risk of more than one cancer per 100,000 exposed persons is a toxic pollutant.

DD. Treatment- any method, technique or process that, through chemical biological and mechanical processes, modify waste water characteristics with the objective to neutralize and reduce or remove organic and inorganic water contaminants which if released to the environment could potentially impact ground water quality or pose a threat to human health.

EE. Unauthorized Release or spill- the intentional or unintentional spilling, leaking, pumping, pouring, emitting, emptying, or dumping of oil or other water contaminant not authorized in this Discharge Permit.

FF. Water Contaminant - any substance that could alter if discharged or spilled the physical, chemical, biological or radiological qualities of water; "water contaminant"

does not mean source, special nuclear or by-product material as defined by the Atomic Energy Act of 1954.

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III. Introduction

The New Mexico Environment Department (NMED) issues this Discharge Permit (Discharge Permit), DP-1132, ~~jointly and severally liable to the United States Department of Energy (DOE) and~~ Los Alamos National Security, LLC (LANS) ~~and the United States Department of Energy (DOE)~~ (collectively the Permittees) pursuant to the New Mexico Water Quality Act (WQA), NMSA 1978, §§ 74-6-1 through 74-6-17, and the New Mexico Water Quality Control Commission (WQCC) Regulations, 20.6.2 NMAC.

NMED's purpose in issuing this Discharge Permit, and in imposing the requirements and conditions specified herein, is to control the discharge, and potential release, of water contaminants from Los Alamos National Laboratory's (LANL's) Radioactive Liquid Waste Treatment Facility (Facility) so as to protect public health, ground water for present and potential future use as a domestic water supply or an agricultural water supply, and those segments of surface water gaining from ground water inflow. In issuing this Discharge Permit, NMED has determined that the requirements of 20.6.2.3109.C NMAC have been or will be met.

The application (i.e., discharge plan) consists of the materials submitted by the Permittees on August 19, 1996, an updated application submitted to NMED on February 16, 2012, an amendment to the application submitted to NMED on August 10, 2012, and materials contained in the administrative record prior to issuance of this Discharge Permit.

The Facility is located within Los Alamos National Laboratory, approximately 1.5 miles south of Los Alamos, New Mexico, in Sections 16, 17, 20, 21 and 22, Township 19N, Range 06E, Los Alamos County. Ground water most likely to be affected ranges from depths of approximately one foot to 1,306 feet and has a total dissolved solids concentration ranging from approximately 162 to 255 milligrams per liter.

The Facility, as it pertains to conditions within this Discharge Permit (DP-1132), is a wastewater treatment facility that is authorized to for the treatment and discharge of up to 40,000 gallons per day (gpd), is specifically described in section V(D) of this Discharge Permit and includes the influent collection system, the low-level radioactive liquid waste treatment system, the transuranic waste water treatment system, the secondary treatment system, the Mechanical Evaporator System (MES), the Solar Evaporative Tank System (SET) and an outfall (Outfall 051) also regulated by a National Pollutant Discharge Elimination System (NPDES) permit issued by the United States Environmental Protection Agency (EPA) pursuant to the federal Clean Water Act Section 402, 33 U.S.C. § 1342. The discharge may contain water contaminants with concentrations above the standards of 20.6.2.3103 NMAC and may contain toxic pollutants as defined in 20.6.2.7.WW NMAC.

Pursuant to 20.6.2.3109 NMAC, NMED reserves the right to require a Discharge Permit Modification in the event NMED determines that the requirements of 20.6.2 NMAC are being or may be violated or that the standards of 20.6.2.3103 NMAC are being or may be violated or a toxic pollutant as defined in 20.6.2.7.WW NMAC is present. Such modifications may include, without limitation, the implementation of structural controls,

treatment processes, monitoring criteria, operational processes, changes in discharge activities and the abatement of water pollution and remediation of ground water quality.

Issuance of this Discharge Permit does not relieve the Permittees of the responsibility to comply with the WQA, WQCC Regulations, and all other applicable federal, state, and local laws and regulations.

IV. Findings

In issuing this Discharge Permit, NMED finds:

- A. The Permittees are discharging effluent or leachate from the Facility so that such effluent or leachate may move directly or indirectly into ground water within the meaning of 20.6.2.3104 NMAC.
- B. The Permittees are discharging effluent or leachate from the Facility so that such effluent or leachate may move into ground water of the State of New Mexico which has an existing concentration of 10,000 mg/L or less of total dissolved solids (TDS) within the meaning of 20.6.2.3101.A NMAC.
- C. The discharge from the Facility is within or into a place of withdrawal of ground water for present or reasonably foreseeable future use within the meaning of the WQA, NMSA 1978, § 74-6-5.E.3, and the WQCC Regulations at 20.6.2.3103 NMAC.
- D. The discharge from the Facility to Outfall 051 is subject to the exemption set forth in 20.6.2.3105.F NMAC, to the extent that effluent limitations (not including monitoring requirements) are imposed, unless the NMED Secretary determines that a hazard to public health may result.

V. Authorization to Discharge

- A. Pursuant to 20.6.2.3104 NMAC, it is the responsibility of the Permittees to ensure that discharges authorized by this Discharge Permit are consistent with the terms and conditions herein.
- B. The Permittees are authorized to discharge ~~receive and treat~~ up to 40,000 gpd of low-level and transuranic radioactive industrial waste water using a series of treatment processes as described in Section V(D) of this Discharge Permit in accordance with the Conditions set forth in Section VI of this Discharge Permit.
- C. The Permittees are authorized to discharge up to 40,000 gpd of treated waste water, in accordance with the Conditions set forth in Section VI of this Discharge Permit. Discharges shall be to either the Mechanical Evaporator System (MES), the synthetically lined Solar Evaporative Tank system (SET), or through an outfall (identified as Outfall 051) also regulated by a National Pollutant Discharge Elimination System (NPDES) permit (Permit No. NM0028355) issued by the United States Environmental Protection Agency [20.6.2.3104 NMAC, 20.6.2.3106.C NMAC, 20.6.2.3109.C NMAC].

- D. The Permittees are authorized to use the following defined systems with their associated units for the process of treating and disposing of waste water:

The Influent Collection System is defined herein as all primary and secondary containment lines that convey transuranic or low-level radioactive waste water from Technical Areas TA-03, TA-35, TA-48, TA-50, TA-55, and TA-59 to the Transuranic Waste (TRU) treatment system and the Low-level Radioactive waste water (RLW) treatment system at TA-50. It includes the conveyance lines beginning at the point the pipe emerges from the building or other structure that comprises the site of generation, and extending to the vault immediately upstream of the influent tank at TA-50. It also includes the conveyance of low-level radioactive waste water to the RLW treatment system by truck.

The Low-level Radioactive Waste water (RLW) Treatment System is defined herein as the low-level radioactive waste water influent storage tanks, the associated treatment units (filters, feed tanks, ion exchange columns, reverse osmosis units, etc.) effluent storage tanks, and other associated low-level radioactive waste water components at TA-50. The process by which the individual treatment units within the low-level radioactive treatment system are utilized may, for attaining compliance with the effluent limits set forth in this Discharge Permit, be altered, by-passed, replaced, or removed in accordance with the Conditions set forth in this Discharge Permit. The physical location of each unit and system that conveys, stores, or treats RLW waste streams coming into the low-level radioactive waste water treatment system is within TA-50.

The Transuranic Waste (TRU) Waste Water Treatment System is defined herein as the influent storage tanks for each form of TRU (acidic and caustic) wastestreams, the associated neutralization unit, pressure filters, the final processing tanks, and other associated TRU wastestream conveyance, storage and treatment components at TA-50. ~~All wastestreams associated with TRU shall be disposed of at an off-site facility permitted to receive TRU waste.~~

The Secondary Treatment System is defined herein as the receiving tanks for reverse osmosis concentrate waste water generated through the RLW Treatment System and treated effluent generated from the TRU Treatment System, the treatment process units for secondary reverse osmosis, the rotary vacuum filter, and other associated post-treatment conveyance, storage and treatment components at TA-50 designed to reduce wastestream volumes.

The Mechanical Evaporator System (MES) is defined herein as the units in which treated RLW effluent is disposed of through gas generated mechanical evaporation.

The Solar Evaporative Tank System (SET) is defined herein as the single concrete tank unit at TA-52 that receives treated effluent from the RLW Treatment System, and the conveyance line from TA-50. The SET consists of two cells separated by a single partitioned wall; each cell has a containerized volume of approximately 380,000 gallons. The SET is an unsealed subgrade concrete structure with a single double-lined synthetic liner, and a leak detection system within the synthetic liner.

Outfall 051 is defined herein as the outfall through which treated waste water from the Facility is discharged to Effluent Canyon, which is a tributary to Mortandad

Canyon.
[20.6.2.3104 NMAC, 20.6.2.3106.C NMAC, 20.6.2.3109.C NMAC].

VI. Conditions

NMED issues this Discharge Permit for the discharge of water contaminants subject to the following conditions:

A. Operational Plan

1. **ANNUAL UPDATE**-The Permittees shall submit to NMED and shall post on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated) an updated Facility Process Description annually by February 1 of each year. The annual Facility Process Description shall include the following:
 - a. A schematic of all major structures associated with the Facility, including all influent lines, buildings, exterior tanks, effluent lines, outfalls and discharge locations identified in this Discharge Permit.
 - b. A comprehensive flow chart demonstrating the most current processes in operation for the collection, treatment and disposal of waste water for the Facility. The flow chart shall indicate any processes which have been bypassed, decommissioned, or are no longer used for the collection, treatment or final disposal of the waste water.
 - c. An associated narrative describing each of the systems and treatment units outlined in the flow chart. This narrative shall include the collection system, primary treatment units, secondary treatment units and any systems used in the disposition of any associated waste streams at the Facility. For each unit or system, the narrative shall include:
 - 1) the identification of the unit or system;
 - 2) the physical location;
 - 3) intended function;
 - 4) physical description;
 - 5) operational capacity, if applicable;
 - 6) the date the unit or system was placed in operation;
 - 7) origin of waste streams that the unit or system receives;
 - 8) the unit or system(s) to which it discharges to; and
 - 9) ~~a summary of maintenance or repairs made during the reporting period.~~
 - d. The Annual Update shall also include the following documents to be submitted annually by February 1 of each year.
 - 1) Summary of maintenance and repairs made during the reporting period.
 - 2) Water Tightness Testing results (VI.A.8)
 - 3) Settled Solids measurements (VI.A.9)
 - 4) Ground Water Flow report (VI.A.27)

[20.6.2.3106.C NMAC]

2. **NOTIFICATION OF CHANGES**-The Permittees shall submit to NMED and post on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated) a written notification of any changes in the Facility's collection, treatment or disposal systems which are not changes associated with "maintenance and repairs" or significant changes required to meet Permit Section VI.A.3, Submittal of Plans and Specifications beyond the scope of maintenance and repair. The notification shall be submitted no less than thirty days prior to the date proposed for implementation. The notification shall include, at a minimum, the following items listed herein and others which may be determined to be required by NMED:
- date process change is planned to be implemented;
 - narrative of process change;
 - justification for making the process change;
 - units or components being removed from the process;
 - units or components being incorporated into the process;
 - operational controls implemented for the change in processes;
 - intended duration temporal scope of process change (e.g., permanent or limited duration); and
 - ~~any additional information required by NMED.~~

[20.6.2.3106.C NMAC] .

3. **SUBMITTAL OF PLANS AND SPECIFICATIONS**-The Permittees shall not implement any expansion, process modification, or alteration of a system or unit that would result in any significant modification in the discharge of water contaminants or significant modification to changes the intended function, design or capacity for any of the system, units or components of the Facility's collection, treatment or disposal systems without prior written approval by NMED. Prior to implementing any such changes, the Permittees shall submit to NMED for approval a written proposal, including plans and specifications that describes in detail the proposed changes in the processes or components of the Facility's collection, treatment, or disposal systems. The proposal shall be delivered by certified mail or hand delivery. The Permittees shall not place any waste in a new or changed unit or system unless the Permittees receive prior written approval from NMED. NMED will provide such approval only if it finds that the Permittees have submitted the required elements listed herein in sufficient detail to demonstrate that the unit or system is designed and constructed to minimize the possibility of an unauthorized release of water contaminants which could directly or indirectly impact ground water quality or pose a threat to human health. Should NMED determine that the proposed changes do not conform to activities authorized by this Discharge Permit and/or constitute a modification of the Permittees discharge plan, NMED will inform LANL that a Discharge Permit

modification is required in order to proceed with the proposed change.

The proposal shall include, at a minimum, the following information:

- a. identification of all applicable units and a description of how they will be constructed;
 1. a map, to scale, of the Facility, with the location of the proposed unit relative to other identified structures or systems referenced in this Discharge Permit;
 2. specifications for all new unit and system components (e.g., lift stations, valves, transfer lines, process units and associated details); whether new, retrofitted, or proposed for abandonment. All new system components for the collection, treatment or disposal of waste water at the Facility shall be designed to meet the projected needs of the Facility;
 3. plans and specifications for proposed flow meters that will be used to measure the volume of waste water discharged to or from the unit or system;
 4. demonstration that the proposed unit or system is adequately designed for its intended function;
 5. compatibility of the unit or system's constructed material with the proposed waste stream, including, if applicable, information regarding corrosion protection to ensure that it will maintain its structural integrity and not collapse, rupture or fail;
 6. certification that the foundation, structural support, seams, connections, and pressure controls, if applicable, are adequately designed and the unit or system has sufficient structural strength to convey, store, treat or dispose of the intended waste stream;
 7. certification for all plans and specifications attesting to the capacity of the unit or system including, without limitation, waste water flow data derived using both average daily flow and peak instantaneous flow. Computations should be presented in a tabular form showing depths and velocities at minimum, design average, and peak instantaneous flow for all new system components;
 8. water balance calculations for the capacity and evaporative potential for units which are subject to exposure to the environment and to which precipitation events may impact total capacity of the unit. The unit shall be designed such that two feet of freeboard or an NMED approved alternative is maintained at all times;
 9. design specifications for secondary containment for all units or systems intended to convey, store, treat, or dispose of liquid or semi-liquid waste streams;
 10. design specifications for leak detection systems associated with systems designed to convey, store, treat, or dispose of liquid or

- semi-liquid waste streams, which demonstrate the capability of detecting the failure of either primary or secondary containment or the presence of any release of any accumulated liquid in the secondary containment system within 24 hours of initial release; or at the earliest practicable time if the permittees can demonstrate that the existing detection technologies or site conditions will not allow detection of a release within 24-hours.
11. proposed leakage tests shall be specified for all new unit or system components with direct contact to treated or untreated waste water. This may include appropriate water or low pressure air testing. The use of a camera or other visual methods used for documentation of the inspection, prior to placing the unit or system in service is recommended;
 12. design specifications for all units or systems designed to convey, store, treat, or dispose of liquid or semi-liquid waste streams, which demonstrate the ability to remove liquids and semi-liquids from the area of containment within 24 hours of a release; or at the earliest practicable time if the permittees can demonstrate that the existing detection technologies or site conditions will not allow detection of a release within 24-hours; and
 13. a Construction Quality Control Assurance Plan (CQCAP) assuring that the proposed unit or system will meet or exceed all design criteria and specifications.

Plans and specifications shall comply with the New Mexico Engineering and Surveying Practice Act (Chapter 61, Article 23 NMSA 1978). The Permittees' proposal along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

[20.6.2.1202 NMAG, 20.6.2.3106.C NMAG, 20.6.2.3109.C NMAG, NMSA 1978, §§ 61-23-1 through 61-23-32]

4. **CONSTRUCTION REPORT**-Within 90 days following completion of construction for a unit or system that requires NMED approval, the Permittees shall prepare a final construction report that contains the following:
 - a. A complete copy of record drawings, specifications, final design calculations, addenda, and change orders, as applicable;
 - b. Description of the procedures and results from all inspection and tests that occur before, during, and after construction to ensure that the construction materials and the installed unit or system components meet the design specifications; and
 - c. A complete copy of the Operation and Maintenance Manual specific to the unit or system being constructed.

The Permittees' proposal final construction report along shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://eprl.lanl.gov/oppie/service> (or as updated).

[20.6.2.1202 NMAC, 20.6.2.3109.C NMAC, 20.6.2.3106.C NMAC, 20.6.2.3107.C NMAC, NMSA 1978, §§ 61-23-1 through 61-23-32]

5. **RESTRICTING ENTRY**-The Permittees shall, at all times, prevent the unauthorized entry of persons, wildlife, or livestock into the active portions of this Facility so that physical contact with the waste streams, structures and equipment is restricted. Means to control unauthorized access shall include an artificial or natural barrier which completely surrounds the active portions of the Facility and a means to control entry, at all times, through gates or other entrances to the active portions of the Facility (e.g., locks, surveillance system).

[20.6.2.3109.C NMAC]

6. **SIGNS**-The Permittees shall post and maintain signs at ~~the each~~ entrance to the TA-50 RLWTF and the TA-25 SET active portions of the Facility and at other locations, in sufficient numbers to be seen from any approach to the active portions of the Facility stating that access is limited to Authorized Personnel only. ~~Unauthorized Personnel is prohibited.~~ All signs shall be posted in English and Spanish and be legible from a distance of at least 25 feet.

[20.6.2.3109.C NMAC]

7. **VERIFICATION OF SECONDARY CONTAINMENT**-Within 180 days following the effective date of this Discharge Permit (by DATE), the Permittees shall submit to NMED and post on LANL's Electronic Public Reading Room located at <http://eprl.lanl.gov/oppie/service> (or as updated) verification demonstrating all units and systems intended to convey, store, treat or dispose of liquid or semi-liquid waste streams meet the requirements of secondary containment as defined in this Discharge Permit. Verification must also include certification of an operational leak detection system for the unit or system.

[20.6.2.3106.C NMAC, 20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

8. **WATER TIGHTNESS TESTING**-Within 540 days following the effective date of this Discharge Permit (by DATE), and every 540 days thereafter, the Permittees shall demonstrate that each unit and system intended to convey, store, treat or dispose of a liquid or semi-liquid waste stream without secondary containment is not leaking and is otherwise fit for use. To make

the demonstration, the Permittees shall conduct both a visual test, for those units and systems that are above-ground and visually inspectable, and a quantifiable test.

For units and systems that are above-ground and visually inspectable, The visual assessment shall be adequate to detect obvious cracks, leaks, and corrosion or erosion that may lead to cracks and leaks. If necessary, the Permittees shall remove the stored waste from the unit or system to allow the condition of internal surfaces to be assessed.

The quantifiable assessment for units and systems that are used to store, treat or dispose of liquid or semi-liquid waste streams shall consist of obtaining tank level measurements over at least a 36-hour period during which no liquid or semi-liquid is added to or removed from the unit. The exfiltration or infiltration rate shall not exceed 0.07 gallons per hour per thousand gallons of capacity for the unit or system.

The quantifiable assessment for units and systems designed to convey a liquid or semi-liquid waste stream shall be determined through passive testing for leakage exfiltration and infiltration. The infiltration or exfiltration rate shall not exceed 50 gallons per mile per consecutive 24 hour period for any section of the system. Infiltration and exfiltration tests for conveyance lines shall be conducted as follows:

- a. Prior to testing for infiltration, the conveyance lines shall be isolated and evacuated so that maximum infiltration conditions exist at the time of testing. The Permittees shall measure and document the volume of infiltration entering each section of the conveyance line being tested. The cumulative results for the entire collection system shall not be a satisfactory method for gauging infiltration compliance. Each sewer section between manholes shall not exceed the maximum infiltration rate.
- b. Prior to testing for exfiltration, the conveyance lines shall be isolated and filled with water to a level that produces, at minimum, two feet of hydrologic head above the uppermost point of the section being tested. The cumulative results for the entire collection system shall not be a satisfactory method for gauging exfiltration compliance. Each sewer section between manholes shall not exceed the maximum exfiltration rate.

Demonstration of water tightness shall comply with the New Mexico Engineering and Surveying Practice Act (Chapter 61, Article 23 NMSA 1978). The Permittees shall submit to NMED, and post on LANL's Electronic Public Reading Room located at <http://eprl.lanl.gov/oppie/service> (or as updated), the procedures and findings of the evaluation by February 1 of each year immediately following the date when the water tightness test was performed. In the event that inspection reveals that the criteria for leakage is greater than permissible in this Discharge Permit, the Permittees shall

implement the contingency plan set forth in this Discharge Permit.

[20.6.2.3106.C NMAC, 20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

9. **SETTLED SOLIDS**-The Permittees shall inspect and measure the thickness of the settled solids, on an annual basis for all open units and systems that are designed to store or dispose of a liquid or semi-liquid through evaporation. The Permittees shall measure the thickness of settled solids in accordance with the following procedure:
- The total surface area of the unit or system shall be divided into nine equally sized areas.
 - A settled solids measurement device shall be utilized to obtain one settled solids thickness measurement (to the nearest half-foot) per area.
 - The individual settled solids depths for each of the nine measurement areas shall be averaged.

The Permittees shall record all measurements in an inspection log which must include, at a minimum, the following:

- date and time of the inspection;
- the name of the inspector;
- identification of the unit;
- the location of the unit;
- the estimated total volume of liquid or semi-liquid in the unit or system at the time of inspection;
- the total depth capacity of the unit or system (with respect to freeboard requirements);
- the method used to determine the settled solids depth; and
- The average measured depth of settled solids in the unit.

The Permittees shall not allow settled solids to accumulate in any open unit or system used to convey, store, treat, or dispose of liquid or semi-liquid at a volume greater than one foot. In the event that settled solids volumes exceed the volumes defined in this Discharge Permit or upon implementation of any settled solids removal activity, the Permittees shall implement the contingency plan set forth in this Discharge Permit.

The Permittees shall keep the inspection log on site for a minimum of five years from the date of inspection. The Permittees shall submit a summary report of all settled solids depth results to NMED by February 1 of each year. The Permittees' summary report shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

[20.6.2.3107.A NMAC]

10. **FACILITY INSPECTIONS**-The Permittees shall inspect the Facility for

malfunctions, deterioration, leaks ~~operator errors and discharges~~ which may be causing, or may lead to, an unauthorized release to the environment or pose a threat to human health.

The inspection shall be performed at the frequency prescribed for each unit or system in this Discharge Permit or based on the rate of deterioration of the equipment and the probability of an environmental or human health incident for those units and systems not specifically described herein.

- a. The Permittees shall inspect and test all leak detection systems to ensure performance within manufacturer specifications on a monthly basis.
- b. The Permittees shall inspect all externally observable portions of units and systems conveying, treating or storing liquids, semi-liquids, or solids including any secondary containment areas on a weekly basis. The Permittees shall examine for evidence of deterioration or failure of the units and systems. The visual portions of all synthetic liners used to store or dispose of liquids or semi-liquids shall be inspected for uniformity, damage, imperfections, punctures, blisters, and evidence of seam or joint failure.
- c. The Permittees shall inspect, on a weekly basis through indirect observation, all units and systems conveying, processing, or storing liquids, semi-liquids, or solids that are inaccessible or otherwise cannot be directly observed. The Permittees shall identify the unit or system and note any potential findings which may suggest a breach or failure of containment.
- d. The Permittees shall inspect all open units and systems which contain a liquid or semi-liquid, on each day during which the Facility is in operation, to ensure capacity of the unit or system is not exceeded.

The Permittees shall record all inspections in an inspection log which shall be kept on site for a minimum of five years from the date of inspection. At a minimum, these inspections shall include the date and time of the inspection, the name of the inspector, identification of the unit, the location of the unit, the total volume of liquid or semi-liquid in the unit or system at the time of inspection, a notation of the observations made, and the date and nature of any maintenance and repairs made.

In the event that inspection findings reveal significant damage likely to affect the structural integrity of a unit or system or any of its associated components, or its ability to function as designed, the Permittees shall implement the contingency plan set forth in this Discharge Permit.

[20.6.2.3107.A NMAC]

11. **MAINTENANCE and REPAIR**-The Permittees shall maintain the function and structural integrity of the Facility at all times except during maintenance or repair. All routine maintenance and repair actions shall be

noted in a maintenance log which shall be kept on site for a minimum of five years. Maintenance and repair of a unit or system required due to potential malfunction which could lead to an unauthorized discharge to the environment or pose a threat to human health shall be corrected as soon as possible, but no later than 30 days from the date of the observed malfunction. For good cause, NMED may approve a longer period. The Permittees shall submit to NMED and post on LANL's Electronic Public Reading Room located at <http://eprr.lanl.gov/oppie/service> (or as updated) a report which summarizes and describes the maintenance and repair activities performed on the Facility as part of the quarterly monitoring reports.

In the event that routine maintenance and repair reveal significant damage likely to affect the structural integrity of a unit or system or any of its associated components, or its ability to function as designed, the Permittees shall implement the contingency plan set forth in this Discharge Permit.

[20.6.2.3107.A NMAC]

12. **FREEBOARD**-The Permittees shall maintain two feet of freeboard in all open units and systems that contain a liquid or semi-liquid. If the Permittees determine that two feet of freeboard cannot be maintained, the Permittees shall submit to NMED for approval a written request for alternate freeboard requirements. In the request the Permittees shall, at a minimum, propose freeboard levels that will be maintained and propose demonstrated spill prevention controls and overflow prevention controls that include the prevention of overtopping by wave, wind or precipitation events. The Permittees' proposal along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://eprr.lanl.gov/oppie/service> (or as updated).

In the event that established freeboard is not maintained, the Permittees shall implement the contingency plan set forth in this Discharge Permit.

[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

13. **EFFLUENT LIMITS: OUTFALL 051**-The Permittees shall not discharge treated waste water to Outfall 051 that exceeds the following limits (or is outside the following pH range):

- a. All water contaminants and their associated limits as listed in Table 1.

Table 1. Effluent Quality Limits for Discharges to Outfall 051

Inorganic Chemicals:	CAS#	mg/L
Aluminum (dissolved)	7429-90-5	5.0
Arsenic (dissolved)	7440-38-2	0.1
Barium (dissolved)	7440-39-3	1.0

Organic Chemicals:	CAS#	mg/L
Benzene (total)	71-43-2	0.01
Benzo (a) pyrene (total)	50-32-8	0.0007
Carbon tetrachloride (total)	56-23-5	0.01

Boron (dissolved)	7440-42-8	0.75
Cadmium (dissolved)	7440-43-9	0.01
Chromium (dissolved)	7440-47-3	0.05
Chloride (dissolved)	7647-14-5	250.0
Cobalt (dissolved)	7440-48-4	0.05
Copper (dissolved)	7440-50-8	1.0
Cyanide (dissolved)	57-12-5	0.2
Fluoride (dissolved)	16984-48-8	1.6
Iron (dissolved)	7439-89-6	1.0
Lead (dissolved)	7439-92-1	0.05
Manganese (dissolved)	7439-96-5	0.2
Molybdenum (dissolved)	7439-98-7	1.0
Mercury (total)	92786-62-4	0.002
Nickel (dissolved)	7440-02-0	0.2
Perchlorate (total)	14797-73-0	0.011, 0.0256
pH (total)		6 - 9
Selenium (dissolved)	7782-49-2	0.05
Silver (dissolved)	7440-22-4	0.05
Sulfate (dissolved)		600.0
Total Dissolved Solids (dissolved)		1000.0
Uranium (dissolved)	7440-61-1	0.03
Zinc (dissolved)	9029-97-4	10.0

Radioactivity:	pCi/L
Combined Radium-226 & Radium-228 (total)	30

Chloroform (total)	67-66-3	0.1
1,1-Dichloroethane (total)	75-34-3	0.025
1,2-Dichloroethane (total)	107-06-2	0.01
1-1-Dichloroethylene (total)	75-35-4	0.005
1,1,2,2-Tetrachloroethylene (PCE) (total)	127-18-4	0.02
1,1,2-Trichloroethylene (TCE) (total)	86-42-0	0.1
Ethylbenzene (total)	100-41-4	0.75
Ethylene dibromide (total)	1106-93-4	0.0001
Naphthalene plus monomethylnaphthalenes (total)	91-20-3, 90-12-0, 91-57-6	0.03
Methylene chloride (total)	75-09-2	0.1
Total PCBs (total)		0.001
Phenols (total)	108-95-2	0.005
Toluene (total)	108-88-3	0.75
1,1,1-Trichloroethane (total)	74552-83-3	0.06
1,1,2-Trichloroethane (total)	79-00-5	0.01
1,1,2,2-Tetrachloroethane (total)	79-34-5	0.01
Vinyl Chloride (total)	75-01-4	0.001
Xylenes (total)(total)	108-38-3, 1330-20-7, 95-47-6, 106-42-3	0.62

Nitrogen Compounds:	mg/L
Total Nitrogen (sum of TKN+NO ₃ -N) (total)	15

b. Until the new treatment units at the RLWTF are operational on or before September 30, 2015, the following Total Nitrogen effluent limit shall be effective for discharges to Outfall 051:

- Daily Maximum: 45 mg/L
- Quarterly Average: 15 mg/L

b.c. For any water contaminant that is not listed in Table 1 of this Discharge Permit but is listed as a toxic pollutant in 20.6.2.7.WW NMAC, the limit shall be the concentration listed in Table A-1 of NMED, Risk Assessment

Guidance for Site Investigation and Remediation (most recent edition). For any water contaminant that is not listed in Table 1 of this Discharge Permit or in Table A-1 of the Risk Assessment Guidance, the limit shall be the most recent EPA Regional Screening Level (RSL) for residential tap water. If an RSL is applicable for a carcinogenic water contaminant, the limit shall be adjusted to represent a lifetime risk of no more than one cancer occurrence per 100,000 persons (i.e., a cancer risk of 1×10^{-5}).

Table 1.1. Effluent Quality Limits for Discharges to Outfall 051

20.6.2.7 W/W NMAC Toxic Pollutants	CAS #	Table A-1 NMED Soil Screening Levels Volume I, June 2012 (ug/L)
1,1,1-trichloroethane	71-55-6	See Table 1 ¹
1,1,2,2-tetrachloroethane	79-34-5	See Table 1 ¹
1,1,2-trichloroethane	79-00-5	0.42
1,1-dichloroethane	75-34-3	See Table 1 ¹
1,1-dichloroethylene	75-35-4	See Table 1 ¹
1,2,4,5-tetrachlorobenzene	95-94-3	11
1,2-dichloroethane	107-06-2	See Table 1 ¹
1-methylnaphthalene	90-12-0	9.7 ¹
2,4,5-trichlorophenol	95-95-4	3650
2,4,6-trichlorophenol	88-06-2	36.5
2,4,6-trinitrotoluene (TNT)	118-96-7	18.3
2,4-dichlorophenol	120-83-2	110
2,4-dinitro-o-cresol	534-52-1	2.9
2,4-dinitrotoluene (2,4,DNT)	121-14-2	2.2
2,6-dinitrotoluene (2,6,DNT)	606-20-2	36.5
2-methylnaphthalene	91-57-6	27 ¹
3,4-benzofluoranthene	205-99-2	0.30
acrolein	107-02-8	0.04
acrylonitrile	107-13-1	0.45
aldrin	309-00-2	0.04
alpha-HCH	319-84-6	0.11
anthracene	120-12-7	11000
benzene	71-43-2	See Table 1 ¹
benzidine	92-87-5	0.0009
benzo (k) fluoranthene	207-08-9	2.9
benzo-a-pyrene	50-32-8	See Table 1 ¹
beta-HCH	319-85-7	0.37
bis (2-chloroethyl) ether	111-44-4	0.12
bis (2-chloroisopropyl) ether	108-60-1	9.6
bis (chloromethyl) ether	542-88-1	0.0006
bromodichloromethane	75-27-4	1.2
bromomethane	74-83-9	8.7
carbon tetrachloride	56-23-5	See Table 1 ¹
chlordan	57-74-9	1.35

chloroform	67-66-3	See Table 1 ¹
chloromethane	74-87-3	188
cis-1,2-dichloroethylene	156-59-2	73
DDT	50-29-3	2.0
di-2-ethylhexyl phthalate	117-81-7	48
dibutyl phthalate	84-74-2	3650
dichlorobenzene (1,4-)	106-46-7	4.3
dichlorobenzidine	91-94-1	1.5
dichlorodifluoromethane	75-71-8	203
dichloromethane (methylene chloride)	75-09-2	See Table 1
dichloropropenes (1,3-)	542-75-6	4.3
dieldrin	60-57-1	0.04
diethyl phthalate	84-66-2	29208
dimethyl phthalate	131-11-3	365000
dinitrophenols (2,4-dinitrophenol)	51-28-5	730
diphenylhydrazine	122-66-7	0.84
endosulfan	115-29-7	219
endrin	72-20-8	11
ethylbenzene	100-41-4	See Table 1
ethylene dibromide (EDB)	106-93-4	See Table 1
fluoranthene	206-44-0	1460
fluorene	86-73-7	1460
gamma-HCH	58-89-9	0.61
heptachlor	76-44-8	0.15
hexachlorobenzene	118-74-1	0.42
hexachlorobutadiene	87-68-3	8.6
hexachlorocyclopentadiene	77-47-4	219
hexachloroethane	67-72-1	16.8
HMX	2691-41-0	1930
isophorone	78-59-1	707
methyl tertiary butyl ether	1634-04-4	125
monochlorobenzene	108-90-7	91.3
m-xylene	108-38-3	203
naphthalene	91-20-3	1.4
nitrobenzene	98-95-3	1.2
N-nitrosodibutylamine	924-16-3	0.02
N-nitrosodiethylamine	55-18-5	0.001
N-nitrosodimethylamine	62-75-9	0.004
N-nitrosodiphenylamine	86-30-6	137
N-nitrosopyrrolidine	930-55-2	0.32
o-xylene	95-47-6	203
pentachlorobenzene	608-93-5	29.2
pentachlorophenol	87-86-5	1.68
perchlorate	14797-73-0	25.6
phenanthrene	85-01-8	1100
phenol	108-95-2	See Table 1
polychlorinated biphenyls (PCB's)	1336-36-3	See Table 1
p-xylene	106-42-3	203
pyrene	129-00-0	1100

RDX	121-82-4	6.1
technical HCH	608-73-1	0.22 ¹
tetrachloroethylene	127-18-4	See Table 1
toluene	108-88-3	See Table 1
toxaphene	8001-35-2	0.61
trans-1,2-dichloroethylene	156-60-5	107
tribromomethane (bromoform)	75-25-2	85
trichloroethylene	79-01-6	See Table 1
trichlorofluoromethane	75-69-4	1290
vinyl chloride	75-01-4	See Table 1

¹ The limits for toxic pollutants listed in in Table 1 of this Discharge Permit are the 20.6.2.3103 NMAC standards for ground water.

² There is no NMED Tap Water Soil Screening Level in Table A-1 for this toxic pollutant. Instead the EPA Region 6 Tap Water Screening Level has been used.

In the event that effluent limits are exceeded, the Permittees shall enact the contingency plan set forth in this Discharge Permit. Water contaminants that are subject to effective and enforceable limitations in NPDES Permit No. NM0028355 for discharges to Outfall 051 are exempt from the limits set forth in this Condition.

[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

14. EFFLUENT LIMITS: MES and SET- The Permittees shall not discharge treated waste water to either the MES or SET that exceeds the following limits (or is outside the following pH range):

All water contaminants and their associated limits as listed in Table 2.

Table 2. Effluent Quality Limits for Discharges to the MES and SET

Inorganic Chemicals:	CAS#	mg/L
Aluminum (dissolved)	7429-90-5	5.0
Arsenic (dissolved)	7440-38-2	0.1
Barium (dissolved)	7440-39-3	2.0
Boron (dissolved)	7440-42-8	0.75
Cadmium (dissolved)	7440-43-9	0.01
Chromium (dissolved)	7440-47-3	0.1
Chloride (dissolved)	7647-14-5	250.0
Cobalt (dissolved)	7440-48-4	0.05
Copper (dissolved)	7440-50-8	1.3
Cyanide (dissolved)	57-12-5	0.2
Fluoride (dissolved)	16984-48-8	1.6
Iron (dissolved)	7439-89-6	1.0

Inorganic Chemicals:	CAS#	mg/L
Lead (dissolved)	7439-92-1	0.05
Manganese (dissolved)	7439-96-5	0.2
Molybdenum (dissolved)	7439-98-7	1.0
Mercury (total)	92786-62-4	0.002
Nickel (dissolved)	7440-02-0	0.2
Perchlorate (total)	04797-73-0	0.011 0.0256
pH (total)		6 - 9
Selenium (dissolved)	7782-49-2	0.05
Silver (dissolved)	7440-22-4	0.1
Sulfate (dissolved)		600.0
Total Dissolved Solids (dissolved)		1000.0
Uranium (dissolved)	7440-61-1	0.03
Zinc (dissolved)	9029-97-4	10.0

Radioactivity:	pCi/L
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Nitrogen Compounds:	mg/L
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Combined Radium-226 & Radium-228 (total)	30	NO ₃ -N (dissolved)	10
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a. Until the new treatment units at the RLWTF are operational on or before September 30, 2015, the following NO₃-N effluent limit shall be effective for discharges to the MES and SET:

- Daily Maximum: 30 mg/L
- Quarterly Average: 10 mg/L

In the event that effluent limits are exceeded, the Permittee shall enact the contingency plan set forth in this Discharge Permit.

[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

15. **PERSONNEL QUALIFICATIONS.** Personnel responsible for the operation and maintenance and repair of the Facility shall successfully complete a program of classroom instruction or on-the-job training that provides the skills required to ensure the Facility is operated and maintained in a manner that complies with this Discharge Permit and all applicable local, state and federal laws and regulations. At a minimum, the operators shall be competent in the following:

- a. management procedures for hazardous waste materials;
- b. conducting inspections;
- c. ~~repairing or replacing automatic waste feed cut-off systems;~~
- d. ~~communications or alarm systems;~~
- e. ~~emergency response due to unauthorized releases, fire, explosions, or other potential unauthorized releases from the Facility and threat to human health; and~~
- f. ~~emergency shutdown operations.~~

The operations and maintenance and repair of all or any part of the Facility shall be performed by, or under the direct supervision of, qualified personnel. Facility personnel shall review training and certifications on an annual basis to ensure training and certifications are current with any changes to the Facility's processes.

The Permittees shall maintain the following documents and records at the Facility for current personnel until closure of the Facility:

- a. The job title for each position at the Facility with a narrative of the position responsibilities, reporting hierarchy, requisite skill, education and other qualifications assigned to the position.
- b. The name of the individual who holds each position and all records documenting training and job experience demonstrating the qualifications of that individual to hold the position.

The Permittees shall maintain all documents and records pertaining to the

training of operation and maintenance personnel, including former employees, for a period of five years and shall make such documents and records available to NMED upon request.

[20.6.2.3106.C NMAC, 20.7.4 NMAC]

- 16. EMERGENCY PLAN** The Permittees shall keep an emergency response plan at the Facility at all times. At a minimum, the plan shall include the following:
- a. Actions Facility personnel must take in response to fires, explosions or any unplanned sudden or non sudden release of a water contaminant from the Facility to the environment.
 1. A spill prevention and response plan to address all unauthorized releases to the environment or those that pose a threat to human health, chronic or acute.
 2. Communications and collaboration with local, state and federal emergency response personnel.
 3. Names, addresses and phone numbers for all persons qualified to act as an emergency coordinator.
 4. A list of all emergency equipment at the Facility that may be utilized in the event of an emergency, its intended function and physical location.
 5. An evacuation plan for all Facility personnel which describes signals to be used to notify personnel of an evacuation, routes to evacuated the Facility and alternate evacuation routes.

The emergency response plan shall be reviewed, and updated as necessary, by the Permittees on no less than an annual basis or in the event the plan fails during an emergency, the Facility changes design, construction, or accessibility, key personnel changes or the list of equipment changes. The Permittees shall submit a written summary of the plan and any amendments to NMED no more than 30 days following finalization of the amended plan. The Permittees' written summary shall be provided to the Los Alamos County Emergency Management Coordinator, Los Alamos Fire Department, Los Alamos County Police, Los Alamos Medical Center, New Mexico's Department of Homeland Security and Emergency Management (DHSEM), Pueblo of San Ildefonso, Pueblo of Santa Clara, Pueblo of Jemez and Pueblo of Cochiti, and shall be posted on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppic/service> (or as updated).

[20.6.2.3109.C NMAC]

- 17.16. INSTALLATION OF FLOW METERS** Within 180 days following the effective date of this Discharge Permit, (by DATE), the Permittees shall install the following flow meters:
- a. One flow meter to be installed on the RLW influent line to the Facility at a

- location that will capture and measure all influent to the Facility including waste water conveyed to the Facility by alternative methods (e.g. truck).
- b. One flow meter to be installed on the effluent line to the SET and to outfall 051 at a location that will capture and measure all discharges of treated water to the SET and Outfall 051. Permittees shall record in a discharge log book the volume discharged to each respective location.
 - c. One flow meter to be installed on the effluent line to the MES at a location that will capture and measure all discharges of treated water to the MES.
 - d. ~~One flow meter to be installed on the discharge line to Outfall 051 at a location that will capture and measure all effluent discharges to Outfall 051.~~

Within 60 days following the installation of flow meters, and within 240 days following the effective date of this Discharge Permit (by DATE), the Permittees shall submit to NMED and post on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated) written confirmation of the meter installation, describing the type, calibration, and location of each flow meter. The flow meters shall be operational except during repair or replacement. Should a meter fail, it shall be repaired or replaced as soon as practical, but no later than 30 days from the date of the failure. During repair or replacement, an alternative method for determining the volume of RLW influent and effluent shall be used until the meter is repaired or replaced.

[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

18.17. CALIBRATION OF FLOW METERS-All flow meters referenced in this Discharge Permit (Condition No. 17) shall be capable of having their accuracy ascertained under actual working (field) conditions. A field calibration method shall be developed for each flow meter and that method shall be used to check the accuracy of each respective meter. Field calibrations shall be performed within 180 days following the effective date of this Discharge Permit (by DATE) and, at a minimum, on an annual basis thereafter, and immediately upon repair or replacement of a flow meter.

Flow meters shall be calibrated to within plus or minus 10 percent of actual flow, as measured under field conditions. Field calibrations shall be performed by an individual knowledgeable in flow measurement and in the installation and operation of the particular device in use. A calibration report shall be prepared for each flow meter at the frequency calibration is required.

The flow meter calibration report shall include the following information:

- a. the meter location and identification;
- b. the method of flow meter field calibration employed;

- c. the measured accuracy of each flow meter prior to adjustment indicating the positive or negative offset as a percentage of actual flow as determined by an in-field calibration check;
- d. the measured accuracy of each flow meter following adjustment, if necessary, indicating the positive or negative offset as a percentage of actual flow of the meter; and
- e. any flow meter repairs made during the previous year or during field calibration.

The Permittees shall maintain records of flow meter calibration at a location accessible for review by NMED during Facility inspections.

[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC, 20.6.2.3109.H NMAC]

B. Monitoring and Reporting

19-18. METHODOLOGIES—Unless otherwise approved in writing by NMED, the Permittees shall conduct sampling and analysis in accordance with the most recent edition of the following documents:

- a. American Public Health Association, Standard Methods for the Examination of Water and Waste water;
- b. U.S. Environmental Protection Agency, Methods for Chemical Analysis of Water and Waste;
- c. U.S. Geological Survey, Techniques for Water Resources Investigations of the U.S. Geological Survey;
- d. American Society for Testing and Materials, Annual Book of ASTM Standards, Part 31. Water;
- e. U.S. Geological Survey, et al., National Handbook of Recommended Methods for Water Data Acquisition;
- f. Federal Register, latest methods published for monitoring pursuant to Resource Conservation and Recovery Act regulations; or
- g. Methods of Soil Analysis: Part 1. Physical and Mineralogical Methods; Part 2. Microbiological and Biochemical Properties; Part 3. Chemical Methods, American Society of Agronomy;

[20.6.2.3107.A NMAC, 20.6.2.3107.B NMAC]

20-19. MONITORING REPORTS—The Permittees shall submit monitoring reports to NMED on a quarterly basis and shall post all reports on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated). Quarterly sampling and analysis as required in this Discharge Permit shall be performed within the following periods and reports shall be submitted as described below:

- a. Sampling and analysis completed between January 1 and March 31—report to be submitted to NMED by May 1;
- b. Sampling and analysis completed between April 1 and June 30—report to

- be submitted to NMED by August 1;
- c. Sampling and analysis completed between July 1 and September 30—report to be submitted to NMED by November 1;
 - d. Sampling and analysis completed between October 1 and December 31—report to be submitted to NMED by February 1.

[NMSA 1978, § 74-6-5.D, 20.6.2.3109.B NMAC, 20.6.2.3109.C NMAC, 20.6.2.3107.A NMAC]

21.20. INFLUENT VOLUMES RLW—The Permittees shall measure the volume of all RLW influent waste water being conveyed to the Facility on a daily basis using the flow meter required to be installed by this Discharge Permit.

The total daily and monthly volumes of RLW influent conveyed to the Facility shall be submitted to NMED in the quarterly monitoring reports and posted on LANL's Electronic Public Reading Room located at <http://eprl.lanl.gov/oppie/service> (or as updated).

[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC, 20.6.2.3109.H NMAC]

22.21. INFLUENT VOLUMES TRU—The Permittees shall estimate the volume of TRU influent waste water being conveyed to the Facility using electronic sensors which measure tank levels in both the acid waste and caustic waste influent tanks.

The electronic sensors on these tanks shall be operational except during repair or replacement. Should a sensor used to calculate TRU influent volumes fail, it shall be repaired or replaced as soon as practical, but no later than 30 days from the date of the failure. During repair or replacement, an alternative method for determining the flow of TRU influent shall be used until the defective sensor is repaired or replaced.

Volumes shall be determined by calculation using the head change and tank size. Operators shall record changes in influent tank levels whenever a batch of TRU waste water is conveyed to the Facility. The total daily and monthly volumes of TRU influent received by the Facility shall be submitted to NMED in the quarterly monitoring reports and posted on LANL's Electronic Public Reading Room located at <http://eprl.lanl.gov/oppie/service> (or as updated).

[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC, 20.6.2.3109.H NMAC].

23.22. DISCHARGE VOLUMES—The Permittees shall measure and record the volume of treated waste water discharged to the SET, MES and Outfall 051 on a daily basis. The Permittees shall determine effluent volumes as follows:

- a. Discharge volumes to the SET shall be determined by daily totalized meter readings on the flow meter required in this Discharge Permit, located on the

effluent line to the unit.

- b. Discharge volumes to Outfall 051 shall be determined by daily totalized meter readings on the flow meter required in this Discharge Permit, located on the effluent line to the outfall.
- c. Discharge volumes to the MES shall be determined by daily totalized meter readings on the flow meter required in this Discharge Permit, located on the effluent line to the unit.

The daily and monthly discharge volumes shall be submitted to NMED in the quarterly monitoring reports and posted on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC, 20.6.2.3109.H NMAC]

24.23. WASTE TRACKING-The Permittees shall maintain written or electronic records of all waste streams conveyed to the Facility. At a minimum, the Permittees shall record the following information:

- a. The name of the generator and a unique waste stream identification number.
- b. The time period that the Permittee approves the generator to convey the wastestream to the Facility.
- c. The location where the waste stream was generated.
- d. Estimated volume and duration of the waste stream, including:
 - estimated number of days per year discharge will occur;
 - average daily volume received by the Facility when discharge occurs;
 - maximum daily volume received by the Facility each year when discharge occurs; and
 - estimated total volume discharged to the facility each year.
- e. The waste stream characterization (i.e., analytical data or knowledge of process).
- f. The names of the personnel that approved the receipt of the waste at the Facility (e.g., Waste Certifying official, RCRA Reviewer, and Facility Reviewer).

The Permittees shall maintain all waste tracking records required by this Condition for five years from the date of the final discharge from the generator of that waste stream. The Permittees shall furnish upon request, and make available at all reasonable times for inspection, the waste tracking records required in this Discharge Permit.

[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

25.24. EFFLUENT SAMPLING-The Permittees shall sample and analyze effluent waste streams discharged to Outfall 051, the SET, and the MES.

Treated effluent samples shall be collected once per calendar month for any

month in which a discharge occurs to Outfall 051. The Permittees shall collect a grab sample of treated effluent which shall be analyzed for all water contaminants listed in 20.6.2.3103 NMAC, TKN and all toxic pollutants as defined in 20.6.2.7.WW NMAC.

Treated effluent samples shall be collected once per calendar month for any month in which a discharge occurs to the MES or SET. The Permittees shall collect a grab sample of treated effluent which shall be analyzed for TKN, NO₃-N, TDS, Cl, F and perchlorate.

The Permittees shall collect and analyze effluent samples once per quarter for any quarterly period in which a discharge occurs to the MES or SET. The Permittees shall collect a grab sample of treated effluent which shall be analyzed for all water contaminants listed in 20.6.2.3103 NMAC and all toxic pollutants as defined in 20.6.2.7.WW NMAC.

All samples shall be properly prepared, preserved, transported and analyzed in accordance with the parameters and methods authorized in this Discharge Permit. Analytical results shall be submitted to NMED in the quarterly monitoring reports and posted on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated). For any calendar month during which no discharge occurs, the Permittees shall submit to NMED a report so stating.

[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

26-25 SOIL MOISTURE MONITORING SYTEM FOR THE SET-Within 20 days following the effective date of this Discharge Permit (by DATE), the Permittees shall submit to NMED for approval a proposed workplan, design and schedule for the installation of a moisture monitoring system for the detection of unauthorized releases from the SET. The system shall be designed to detect, at a minimum, absolute variations in volumetric soil moisture content below the SET within a precision of 2%. The Permittees' proposal along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

The Permittees shall install the moisture monitoring boreholes in accordance with the final workplan, design and schedule approved by NMED.

The Permittees shall use neutron moisture probes to log the moisture monitoring boreholes following installation to establish baseline conditions and to develop a calibration data set for the probe and a soil moisture action level, to be approved by NMED, which indicates that moisture is being detected below the SET at levels that are above baseline conditions.

Within 90 days following acceptance of the final construction of the moisture monitoring boreholes by the Permittees, the Permittees shall submit to NMED for approval the following items:

- a. Confirmation that the moisture monitoring borehole installation has been completed.
- b. Record drawings of the final design of the completed installation.
- c. Reports on the baseline moisture condition and neutron probe calibration.
- d. A proposed action level to be used to indicate that elevated moisture has been detected beneath the SET.

Upon approval or approval with conditions by NMED, of the completed installation and soil moisture action level, the Permittees shall perform quarterly soil moisture monitoring in the moisture monitoring boreholes. The Permittees' submittals along with any NMED response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://eprl.lanl.gov/oppie/service> (or as updated).

In the event that the soil moisture content beneath the SET exceeds the NMED approved action level, the Permittees shall enact the contingency plan set forth in this Discharge Permit.

The moisture monitoring boreholes and neutron probes shall be maintained so that the boreholes remain accessible for monitoring and the probe remains operational. Should the system or a component of the system fail, it shall be repaired or replaced as soon as possible, but no later than 90 days from the date of the failure. For good cause, NMED may approve a longer period.

The Permittees shall maintain all documents and records pertaining to the quarterly monitoring events and maintenance or repair of the soil moisture monitoring system for a period of five years and shall make such documents and records available to NMED upon request.

[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

27-26. GROUND WATER FLOW-The Permittees shall submit a ground water flow direction report to NMED on an annual basis. The report shall contain regional, intermediate and alluvial aquifer ground water depth-to-water measurements, existing interconnections with other aquifers (if any are known), a narrative description of the known characteristics of the ground water elevation and flow direction within each aquifer and, to the extent practicable, ground water elevation contour map(s) for the aquifers underlying Sandia, Pajarito, Ten-site and Mortandad Canyons.

The ground water elevation contour maps shall depict the ground water flow direction based on the most recent representative ground water elevation data

from monitoring wells located in the subject areas. Ground water elevations shall be estimated using common interpolation methods to a contour interval approved by NMED and appropriate to the available data. Ground water elevation contour maps shall depict the water table and potentiometric surfaces, ground water flow directions, and the location and name of each monitoring well and discharge location unit associated with this Discharge Permit.

The ground water flow direction report shall be submitted to NMED in the monitoring report due on February 1 of each year and posted on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

[20.6.2.3107.A NMAC, 20.6.2.3109.C]

28.27. GROUND WATER MONITORING-The Permittees shall collect ground water samples from the following ground water monitoring wells on a quarterly basis and analyze the samples for TKN, NO₃-N, TDS, Cl, F and perchlorate.

- a. ~~MCO-4BMCO-3~~ previously constructed and located in the alluvial aquifer presumed to be hydrologically downgradient of Outfall 051.
- b. ~~MCO-7~~ previously constructed and located in the alluvial aquifer presumed to be hydrologically downgradient of Outfall 051.
- c. ~~MCOI-6~~ previously constructed and located in the intermediate aquifer presumed to be hydrologically downgradient of Outfall 051.

The Permittees shall collect ground water samples from the following ground water monitoring wells on an annual basis and analyze the samples for all water contaminants listed in 20.6.2.3103 NMAC and all toxic pollutants listed in 20.6.2.7 WWL.

- a. ~~MCO-4BMCO-3~~ previously constructed and located in the alluvial aquifer presumed to be hydrologically downgradient of Outfall 051.
- b. ~~MCO-7~~ previously constructed and located in the alluvial aquifer presumed to be hydrologically downgradient of Outfall 051.
- c. ~~MCOI-6~~ previously constructed and located in the intermediate aquifer presumed to be hydrologically downgradient of Outfall 051.
- d. ~~R-46~~ previously constructed and located in the regional aquifer, downgradient of the RLWTF.
- e. ~~R-60~~ previously constructed and located in the regional aquifer, downgradient of the RLWTF.

Sampling shall be done in accordance with the methods authorized in this Discharge Permit and using the following procedure:

- a. Measure the ground-water surface elevation, to the nearest hundredth (0.01) of a foot, from the top of the casing, each time ground water is sampled.

- ~~b. Measure the total depth of the monitoring well to the nearest hundredth (0.01) of a foot.~~
- ~~e.b. Calculate total volume of water within the monitoring well using the most recent total depth measurement.~~
- ~~d.c. For intermediate and regional aquifer wells, Ppurge three well volumes of water from the monitoring well prior to sampling, using an adequate pumping system. For alluvial wells, purge well for a minimum of one well volume and until filed parameters stabilize.~~
- ~~e.d. Collect samples from the well using appropriate methods to avoid cross-contamination of the samples and sources.~~
- ~~f.e. Prepare the Chain-of-Custody, preserve the sample and transport samples in accordance with methods authorized in this Discharge Permit.~~
- ~~g.f. Samples shall be analyzed by an analytical laboratory using methods authorized in this Discharge Permit.~~

The Permittees may submit to NMED for approval a written proposed alternate monitoring well sample collection plan that would apply in lieu of this Permit Condition. The Permittees shall provide a justification for all proposed changes. Upon NMED approval or partial approval of such alternate plan, the approved plan or portion thereof shall apply and be fully enforceable in lieu of this Permit Condition. The Permittees' proposal along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

The Permittees shall use sampling and analytical methods that ensure the production of accurate and reliable data indicative of ground water quality in all ground water that may be affected by any discharges from the Facility. The Permittees shall prepare ground water monitoring reports describing, in detail, the sampling and analytical methods used. The ground water monitoring reports shall contain, at minimum, the following information:

- a. date sample was collected;
- b. time sample was collected;
- c. individuals collecting sample;
- d. monitoring well identification;
- e. physical description of monitoring well location;
- f. ground-water surface elevation ;
- g. total depth of the well;
- h. total volume of water in the monitoring well prior to sample collection;
- i. total volume of water purged prior to sample collection;
- j. description of sample methods (i.e., constituent being sampled for, container used, preservation methods);
- k. chain-of custody; and
- l. map, to scale, identifying monitoring wells and their location.

The ground water monitoring report shall be submitted to NMED with the

quarterly monitoring report required in this Discharge Permit and posted on LANL's Electronic Public Reading Room located at <http://eprr.lanl.gov/oppie/service> (or as updated).

[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

C. Contingency Plans

- 29.28. CONTAINMENT**-The Permittees shall institute corrective actions, as necessary, to ensure the protection of ground water and human health. In the event that a unit or system or secondary containment for a unit or system reveals damage that could result in structural failure or a release to the environment, the Permittees shall take the following actions:
- a. The Permittees shall remove the unit or system from service immediately.
 - b. The Permittees shall take immediate, and if necessary temporary, corrective actions to minimize the potential for a release.
 - c. If failure of the unit or system or secondary containment resulted in a release to the environment, the Permittees shall provide NMED oral notification of the release in 20.6.2.1203 NMAC within 24 hours of learning of the release and take subsequent corrective actions as required in this Discharge Permit.
 - d. Within 90 days following identification of the potential failure or release, the Permittees shall submit to NMED for approval a written corrective action report to include, at minimum, the following:
 - 1) Identification of the unit or system, or secondary containment for a unit or system in which the failure was observed.
 - 2) The date and time the failure was observed and the date and time it was estimated to have begun.
 - 3) The potential cause of the failure.
 - 4) For units in which a release occurred to secondary containment but was not released to the environment, the rate at which the release occurred and total volume released to the secondary containment.
 - 5) The characteristics of the waste stream being treated, stored or conveyed by the unit or system, with analytical results from waste stream samples taken with date, time, technical staff collecting the sample and the QA/QC lab report.
 - 6) The corrective actions taken to remediate the failure or release with a timeline of when actions were implemented.
 - 7) Long-term actions, if any, that are proposed to be employed for maintaining the integrity of the secondary containment and the schedule for implementing such actions.
 - 8) Ongoing measures for monitoring, inspecting, and determining structural integrity of the secondary containment.
 - 9) Proposed operation and maintenance and repair protocol, if applicable, to be instated to prevent future failures.

Upon NMED approval of the corrective action report, the Permittees shall implement any approved long-term actions to maintain the integrity of the secondary containment, and any other approved measures or protocols, according to the approved schedule. The Permittees' proposal along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://eprl.lanl.gov/oppie/service> (or as updated).

[20.6.2.3107.A NMAC]

30.29. WATER-TIGHTNESS-In the event that any unit or system does not demonstrate water-tightness in accordance with this Discharge Permit, or should inspection reveal damage to the unit that could result in structural failure, the Permittees shall take the following actions:

- a. If the unit or system failure resulted in an unauthorized release, either through a primary or secondary containment unit or system, the Permittees shall provide NMED oral notification of the release in 20.6.2.1203 NMAC within 24 hours of learning of the release.
 1. If the failed unit or system does not have secondary containment the Permittees shall take the following corrective actions:
 - 1) the Permittees shall remove the unit or system from service immediately; and
 - 2) as soon as possible following the failure of the unit or system, the Permittees shall submit to NMED for approval a written proposal including a schedule for corrective actions to be taken to repair or permanently cease operation of the unit or system.
 2. If the failed primary unit or system has secondary containment, the Permittees shall submit to NMED for approval a written proposal for corrective actions, within 90 days following the failure of the unit or system. The corrective action proposal shall include a schedule for corrective actions to be taken to repair or to permanently cease operation of the unit or system.

If repair or replacement of a unit or system requires construction, the Permittees shall submit plans and specifications to NMED with the proposed corrective actions. The Permittees' proposal shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://eprl.lanl.gov/oppie/service> (or as updated). Plans and specifications shall comply with the New Mexico Engineering and Surveying Practice Act (Chapter 61, Article 23 NMSA 1978).

Upon NMED approval, the Permittees shall implement the approved corrective actions according to the approved schedule. The Permittees shall post NMED's response on LANL's Electronic Public Reading Room located at <http://eprl.lanl.gov/oppie/service> (or as updated).

Prior to placing a repaired or replaced unit or system back into service, the Permittee shall repeat the water-tightness testing in accordance with Condition 8 to verify the effectiveness of the repair or replacement, and submit a report detailing the completion of the corrective actions to NMED. The report shall include the date of the test, the name of the individual that performed the test, written findings, photographic documentation of the unit's interior and water tightness test results. If notified to do so by NMED, the Permittees shall also submit record drawings that include the final, construction details of the unit. Record drawings shall comply with the New Mexico Engineering and Surveying Practice Act (Chapter 61, Article 23 NMSA 1978). The Permittees' submittal shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC]

31-30. SETTLED SOLIDS REMOVAL-In the event the average settled solids accumulation in an open unit or system exceeds one foot, or in the event that the Permittees otherwise plan to initiate removal of settled solids from an open unit or system, the Permittees shall propose a plan for the removal and disposal of the settled solids from the unit or system. Within 120 days following the determination of settled solids depth, and prior to any settled solids removal, the Permittees shall submit to NMED for approval a written settled solids removal and disposal plan. The plan shall include characterization of the settled solids, the estimated volume of settled solids to be removed, a method for removal throughout the unit or system in a manner that is protective of the structural integrity of the unit or system, a schedule for completing the settled solids removal and disposal, and a description of how the settled solids will be contained, transported, and disposed of in accordance with all local, state, and federal laws and regulations. Upon NMED approval, the Permittees shall implement the plan according to the approved schedule. The Permittees' proposal along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC,]

32-31. DAMAGE TO STRUCTURAL INTEGRITY-In the event that an inspection required in this Discharge Permit, or any other observation, reveals significant damage likely to affect the structural integrity of a unit or system or any of its associated components, or its ability to function as designed, the Permittees shall propose the repair or replacement of the treatment system or its associated components. Within 90 days after discovery by the Permittees or following notification from NMED that corrective action is required, the Permittees shall submit to NMED for approval a written corrective action plan that includes a schedule for implementation and completion. Upon NMED

approval, the Permittees shall implement the plan according to the approved schedule. The Permittees shall remedy any deterioration or malfunction of equipment or structures which are discovered during inspection. The Permittees' proposal along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

[20.6.2.3107.A NMAC]

33.32. FREEBOARD EXCEEDANCE-In the event that freeboard, two feet or an NMED approved alternative, is not maintained in an open tank, impoundment or other open unit or system that contains a liquid or semi-liquid, the Permittees shall take immediate corrective actions to restore the required freeboard.

In the event that the required freeboard cannot be restored within a period of 72 hours following discovery, the Permittees shall submit to NMED for approval a proposed corrective action plan to restore the required freeboard within 15 days following the date when exceedance of the required freeboard was initially discovered. The plan shall include a schedule for completion of corrective actions and quantifiable assessments to demonstrate preservation of the required freeboard for a period no less than five years. Upon NMED approval, the Permittees shall implement the corrective action plan according to the approved schedule. The Permittees' proposal along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC]

34.33. EFFLUENT EXCEEDANCE-In the event that analytical result of an effluent sample indicate an exceedance for any of the effluent limits set forth by this Discharge Permit, the Permittees shall collect ~~analyze~~ a subsequent sample for the particular analyte that was in exceedance within 24 hours following receipt of analytical results indicating the exceedance. In the event the analytical results of the subsequent sample confirm that the maximum limitation has been exceeded (i.e., confirmed exceedance), the Permittees shall take the following actions:

Within 24 hours of becoming aware of a confirmed exceedance, the Permittees shall:

- a. ~~cease discharges to the system that limits have been exceeded with the exception of the MES to which a confirmed exceedance shall not require immediate cessation;~~
- b. ~~a.~~ notify the NMED Ground Water Quality Bureau that an effluent limit set forth in this Discharge Permit has been confirmed to be in exceedance; and

- e.b. increase the frequency of effluent sampling to adequately establish quality of all discharges by batch.

Within one week of becoming aware of a confirmed exceedance, the Permittees shall:

- a. submit copies of the analytical results for the initial and subsequent sample confirming the exceedance to NMED;
- b. examine the internal operational procedures, and maintenance and repair logs, required by Condition 11 of this Discharge Permit, for evidence of improper operation or function of the units and systems, and
- c. conduct a physical inspection of the treatment system to detect abnormalities, and correct any abnormalities.

A report detailing the corrections made shall be submitted to NMED within 30 days following correction. The Permittees' report shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

In the event that analytical results from any two independent monthly effluent samples indicate an exceedance of the effluent limits for all discharge systems set forth in this Discharge Permit within any 12-month period, the Permittees shall propose to modify operational procedures or upgrade the treatment process to achieve the effluent limits. Within 90 days of receipt of the second sample analysis in which effluent limits have been exceeded, the Permittees shall submit to NMED for approval a corrective action plan. The plan shall include a schedule for completion of corrective actions. Upon NMED approval, the Permittees shall implement the corrective action plan according to the approved schedule. The Permittees' corrective action plan along with NMED's response shall be posted by the Permittees on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

When analytical results from three consecutive months of effluent sampling do not exceed the maximum limitations set forth by this Discharge Permit, the Permittees are authorized to return to a monthly or quarterly monitoring frequency as required in this Discharge Permit.

[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC, 20.6.2.3107.C NMAC]

§ 34. SOIL MOISTURE DETECTION SYSTEM EXCEEDANCE-In the

event that the soil moisture detection system for the SET detects a soil moisture increase beneath the SET that exceeds the NMED approved action level, the Permittees shall take the following corrective actions:

- a. Notify the NMED Ground Water Quality Bureau within 15 days following the date when the soil moisture was initially discovered to exceed the action level.

- b. Propose the source of the increased soil moisture beneath the SET to NMED within 60 days following the date when the soil moisture was initially discovered to exceed the action level. Include the basis for the determination.

In the event the source of the soil moisture exceedance is demonstrated to be associated with failure of the SET, the Permittees shall cease discharges to the SET and submit a corrective action plan to NMED, for approval, within 120 days following the date when the soil moisture was initially discovered to exceed the action level. At a minimum, the corrective action plan shall include the following:

- a. removal of all standing liquid from one or both basins (as appropriate);
- b. a proposal for repairing or replacing the synthetic liners within the SET, if leakage through the synthetic liners is found to be the source, or for other repairs;
- c. a plan for re-instituting soil moisture monitoring following repairs to the SET to demonstrate that the repairs resolved the source of the increased soil moisture beneath the SET; and
- d. a schedule for implementation of the corrective action plan elements.

In the event the source of the soil moisture exceedance is demonstrated to be associated with an occurrence other than a failure of the SET, the Permittees shall submit a corrective action plan to NMED, for approval, within 120 days following the date when the soil moisture was initially discovered to exceed the action level. The corrective action plan shall include any actions necessary to ensure the soil moisture detection system is operating within its intended function as required by this Discharge Permit including, but not limited to, re-calibration.

Upon NMED approval, or approval with conditions, the Permittees shall implement the corrective action plan according to the approved schedule. The Permittees' corrective action plan along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://eprr.lanl.gov/oppie/service> (or as updated).

[20.6.2.3107.A NMAC, 20.6.2.3109.E NMAC]

36.35. MONITORING WELL LOCATION-In the event that ground water flow information obtained pursuant to this Discharge Permit indicates that a monitoring well is not located hydrologically downgradient of the discharge location it is intended to monitor, NMED may require the Permittees to install a replacement well or wells. Within 30 days following receipt of such notification from NMED, the Permittees shall submit to NMED for approval a well installation work plan, describing each proposed well location, drilling methods and well specifications, and proposing a schedule for construction. Upon NMED approval, the Permittees shall construct the replacement well or

wells according to the approved work plan and schedule. The Permittees' proposal along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

Within 90 days following well completion, the Permittees shall survey the elevation and location of the newly installed replacement monitoring well or wells. Within 120 days following well completion, the Permittees shall submit to NMED and post on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated) construction and lithologic logs, survey data, and a ground water elevation contour map.

Replacement wells shall be located, installed, and completed in accordance with the attachment titled: *Ground Water Discharge Permit Monitoring Well Construction and Abandonment Conditions, Revision 1.1*, March 2011.

[NMSA 1978, § 74-6-5.D, 20.6.2.3109:BNMAC]

37.36. MONITORING WELL CONSTRUCTION In the event that information available to NMED indicates that a well is not constructed in a manner consistent with the *Ground Water Discharge Permit Monitoring Well Construction and Abandonment Guidelines, Revision 1.1*, March 2011; contains insufficient water to effectively monitor ground water quality; or is not completed in a manner that is protective of ground water quality, NMED may require the Permittees to install a replacement well or wells. Within 90 days following receipt of such notification from NMED, the Permittees shall submit to NMED for approval a well installation work plan, describing each proposed well location, drilling methods, well specifications, and proposed schedule for construction. Upon NMED approval, the Permittees shall construct the replacement well or wells according to the approved work plan and schedule. The Permittees' proposal along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

Within 90 days following well completion, the Permittees shall survey the elevation and location of the newly installed replacement monitoring well or wells. Within 120 days of well completion, the Permittees shall submit to NMED and post on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated) construction and lithologic logs, survey data, and a ground water elevation contour map.

Replacement wells shall be located, installed, and completed in accordance with the attachment titled: *Ground Water Discharge Permit Monitoring Well Construction and Abandonment Conditions, Revision 1.1*, March 2011.

Upon completion of the replacement monitoring well, the monitoring well

requiring replacement shall be properly plugged and abandoned. Well plugging, and abandonment and documentation of the abandonment procedures shall be completed in accordance with the *Ground Water Discharge Permit Monitoring Well Construction and Abandonment Conditions, Revision 1.1*, March 2011, and all applicable local, state, and federal laws and regulations. The well abandonment documentation shall be submitted to NMED and posted on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated) within 60 days of completion of well plugging activities.

[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC]

38.37. GROUND WATER EXCEEDANCE- NMED reviews ground water data that is generated by the Permittees from samples collected from the monitoring wells identified in this Discharge Permit and other monitoring wells in the vicinity of the Facility. The Permittees report newly detected ground water quality standard exceedances or the newly detected toxic pollutants (as defined in this Discharge Permit and in 20.6.2.7.WW NMAC) in ground water for the entire Laboratory to NMED. If NMED determines that a ground water quality standard is exceeded or that a toxic pollutant is present in ground water, potentially due to a discharge associated with the Facility or defined systems in this Discharge Permit, the Permittees shall submit a ground water investigation/source control workplan to NMED for approval within 60 days following notification to do so by NMED. The Permittees' workplan along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

At a minimum, the ground water investigation/source control workplan shall include the following elements:

- a. a proposal to investigate the source, nature and extent of the ground water contamination, if unknown, which may utilize existing ground water monitoring wells or may propose the installation of new monitoring wells, as appropriate;
- b. a proposal to mitigate the discharge or mobilization of the water contaminant which might be causing ground water contamination, as appropriate; and
- c. a schedule for implementation of the workplan and submittal of a report to NMED.

Upon NMED approval of the ground water investigation/source control workplan, or approval of the plan with conditions, the Permittees shall implement the workplan and submit a written report to NMED and post on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated) in accordance with the approved schedule.

Should the findings of the ground water investigation reveal that a discharge associated with the Facility or defined systems in this Discharge Permit is a source of the ground water contamination, the Permittees shall abate water pollution pursuant to 20.6.2.4000 through 20.6.2.4115 NMAC, following notification from NMED.

This Permit Condition does not apply to an exceedance of ground water quality standard or the presence of a toxic pollutant in ground water unrelated to a discharge associated with the Facility or defined systems in this Discharge Permit, to the extent that abatement of such ground water contamination is occurring, or will occur, pursuant to and in accordance with the March 1, 2005 Compliance Order on Consent (Consent Order) agreed to by NMED, DOE, and the Regents of the University of California (predecessor to LANS).

[NMSA 1978, § 74-6-5.D, 20.6.2.3109, E NMAC; 20.6.2.3107.A NMAC]

39.38. SPILL OR UNAUTHORIZED RELEASE-In the event that a release not authorized in this Discharge Permit occurs, the Permittees shall take measures to mitigate damage from the unauthorized discharge and initiate the notifications and corrective actions required in 20.6.2.1203 NMAC and summarized below.

Within 24 hours following discovery of the unauthorized discharge, the Permittees shall orally notify NMED and provide the following information:

- a. the name, address, and telephone number of the person or persons in charge of the Facility;
- b. the identity and location of the Facility;
- c. the date, time, location, and duration of the unauthorized discharge;
- d. the source and cause of unauthorized discharge;
- e. a description of the unauthorized discharge, including its estimated chemical composition;
- f. the estimated volume of the unauthorized discharge; and
- g. any actions taken to mitigate immediate damage from the unauthorized discharge.

Within one week following discovery of the unauthorized discharge, the Permittees shall submit written notification to NMED with the information listed above and any pertinent updates.

Within 15 days following discovery of the unauthorized discharge, the Permittees shall submit to NMED for approval a corrective action report and plan describing any corrective actions taken and to be taken to address the unauthorized discharge that includes the following:

- a. a description of proposed actions to mitigate damage from the unauthorized discharge;

- b. a description of proposed actions to prevent future unauthorized discharges of this nature; and
- c. a schedule for completion of proposed actions.

Upon NMED approval of the corrective action report and plan, the Permittees shall implement the approved actions according to the approved schedule. The Permittees' corrective action report and plan along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://eprl.lanl.gov/oppie/service> (or as updated).

In the event that the unauthorized discharge causes or may with reasonable probability cause water pollution in excess of the standards and requirements of 20.6.2.4103 NMAC, and the water pollution will not be abated within 180 days after notice is required to be given pursuant to 20.6.2.1203.A(1) NMAC, the Permittees may be required to abate water pollution pursuant to 20.6.2.4000 through 20.6.2.4115 NMAC.

Nothing in this condition shall be construed as relieving the Permittees of the obligation to comply with all requirements of 20.6.2.1203 NMAC.

[NMSA 1978, § 74-6-5.D, 20.6.2.1203 NMAC, 20.6.2.3109.B NMAC]

40.39. FAILURES IN DISCHARGE PLAN/DISCHARGE PERMIT-In the event that NMED or the Permittees identify any failure of the discharge plan or this Discharge Permit not specifically set forth herein, NMED may require the Permittees to submit for its approval a corrective action plan and a schedule for completion of corrective actions to address the failure. Additionally, NMED may require a Discharge Permit modification to achieve compliance with Part 20.6.2 NMAC. The Permittees' corrective action plan along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://eprl.lanl.gov/oppie/service> (or as updated).

[20.6.2.3107.A NMAC, 20.6.2.3109.E NMAC]

D. Closure

41.40. CESSATION OF OPERATION OF SPECIFIC UNITS- Within 60-180 days of the effective date of this Discharge Permit (by DATE), the Permittees shall permanently cease operation of the following units:

- a. the 75,000 gallon concrete influent storage tank (75K tank);
 - b. the 100,000 gallon steel influent storage tank (100K tank);
 - c. the two 26,000 gallon concrete clarifiers located within Building 1 of TA-50;
 - d. the two 25,000 gallon concrete effluent storage tanks (WM2-N, WM2-S);
- and

- e. the gravity filter located within Building 1 of TA-50.

Upon the cessation of operation of these specific units, the Permittees shall implement the requirements for stabilization of the individual units, systems and components in accordance with this Discharge Permit.

[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC, 20.6.2.3109.E NMAC]

42.41. STABILIZATION OF INDIVIDUAL UNITS AND SYSTEMS -

Within 90 days from the permanent cessation of operation of a unit or system, the Permittees shall submit to NMED for approval a written work plan for the stabilization of the unit or system for which operation has ceased. The work plan shall identify steps necessary to ensure that the unit or system can no longer receive a discharge and that no further releases of water contaminants occur as a result of the unit or system. At a minimum, the work plan shall include the following:

- a. identification of the unit or system in which cessation of use has occurred;
- b. a detailed description of the function of the unit or system;
- c. a detailed description of the historic influent waste streams to the unit or system;
- d. a detailed description of all conveyance lines leading to the unit or system and a description of how the lines will be terminated, plugged, re-routed or bypassed so that a discharge to the unit or system can no longer occur;
- e. identification of those portions of the approved Final Closure Plan required in Condition 42 of this Discharge Permit that will be implemented;
- f. a description of all proposed interim measures, actions and controls that will be implemented until such time of final removal of the unit, system or component to prevent the release of water contaminants into the environment; to prevent water contaminants, including storm water run-on and run-off, from moving into ground water; and to prevent water contaminants from posing a threat to human health; and
- g. a schedule for implementation.

Upon NMED approval of the work plan, the Permittees shall implement the plan according to the approved schedule.

Within ~~60~~30 days following the completion of all interim measures, actions and controls, the Permittees shall submit to NMED for approval a final written report on the actions taken to implement the partial closure. The Permittees' workplan and final written report along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC, 20.6.2.3109.E NMAC]

43.42. FINAL CLOSURE PLAN -**Permanent Facility Closure Conditions**

1. RLWTF: Within 120 days after permanent cessation of discharge to the RLWTF and its collection system (excluding the SET and Outfall 051). The permittees shall:

- a. Remove or plug and abandon in place the lines discharging into the RLWTF collection system so that a discharge can no longer occur;
- b. Drain wastewater from the RLWTF collection system and dispose of that wastewater in accordance with applicable local, state, and federal laws; and
- c. Remove solids and sludge from the RLWTF collection system and contain, transport, and/or dispose of that material in accordance with applicable local, state, and federal laws.

Within [Insert appropriate number] days after permanent cessation of discharge to the RLWTF and its collection system, the Permittees shall:

- d. Remove, or permanently plug and abandon in place, all collection system lines leading to the RLWTF;
- e. Drain or evaporate any remaining wastewater from the RLWTF, including storage tanks and all other components, and dispose of any drained wastewater in accordance with applicable local, state, and federal laws;
- f. Remove solids and sludge from the RLWTF tanks and components and contain, transport, and/or dispose of such material in accordance with applicable local, state, and federal laws; and
- g. Remove or demolish all RLWTF components, and re-grade the area with suitable fill to blend with surface topography, promote positive drainage, and prevent ponding.

2. SET: Within [insert appropriate number] days after permanent cessation of discharge to the SET, the line leading to the SET shall be plugged so that a discharge can no longer occur and wastewater shall be drained or evaporated from the SET and shall be disposed of in accordance with applicable local, state, and federal laws.

Within [insert appropriate number] days after permanent cessation of discharge to the SET, the Permittees shall submit a solids removal and disposal plan to NMED for approval describing how solids will be removed and disposed of in compliance with applicable local, state, and federal laws. Within [insert appropriate number] days of NMED approval of the solids removal and disposal plan, the Permittees shall begin implementation of that plan.

Within one year after completion of the solids removal and disposal plan

requirements, the Permittees shall:

- a. Remove, or permanently plug and abandon in place, all lines leading to and from the SET;
- b. Remove the SET's concrete floor, walls, and liners;
- c. Re-grade the site with suitable fill to blend with surface topography, promote positive drainage and, prevent ponding; and
- d. Submit a closure report to NMED describing the decommissioning and the closure activities, including photographic documentation.

3. NPDES Outfall 051: Within [insert appropriate number] days after permanent cessation of the operation of NPDES Outfall 051, the Permittees shall:

- a. Remove or plug all lines leading to the NPDES Outfall so that a discharge can no longer occur; and
- b. Submit a closure report to NMED describing the NPDES Outfall decommissioning and closure activities, including photographic documentation.

When all closure and post-closure requirements have been completed, the Permittees may submit to NMED a written request for termination of the Discharge Permit.

44. FINAL CLOSURE PLAN—Within 180 days from the effective date of this Discharge Permit (by DATE), the Permittees shall submit to NMED for approval a written closure plan for the Facility. The closure plan shall identify steps necessary to perform final closure of the Facility, including all units and systems at the Facility. At a minimum, the closure plan shall include the following:

- h. A detailed description of how each unit and system at the Facility will be closed.
- i. A detailed description of the actions to be taken to decommission, demolish, and remove each unit, system, and other structure, including any secondary containment system components.
- j. A detailed description of the actions and controls that will be implemented during closure to prevent the release of water contaminants into the environment; to prevent water contaminants, including run-on and run-off, from moving into ground water; and to prevent water contaminants from posing a threat to human health.
- k. A detailed description of the methods to be used for decontamination of the site and decontamination of equipment used during closure.
- l. A detailed description of the actions that will be taken to reclaim the site, including placement of clean fill material and re-grading to blend with surrounding surface topography, minimize run-on and run-off, and prevent ponding of water, and re-vegetation.
- m. A detailed description of all monitoring, maintenance and repair, and

controls that will be implemented after closure, and of all actions that will be taken to minimize the need for post-closure monitoring, maintenance and repair, and controls.

- n. A ground water monitoring plan to detect water contaminants that might move directly or indirectly into ground water after closure, which shall provide for, at a minimum, eight consecutive quarters of ground water monitoring after completion of closure.
- o. A detailed description of the methods that will be used to characterize all wastes generated during closure, including treatment residues, contaminated debris, and contaminated soil, in compliance with all local, state, and federal laws and regulations.
- p. A detailed description of the methods that will be used to remove, transport, treat, recycle, and dispose of all wastes generated during closure in compliance with all local, state, and federal laws and regulations.
- q. A detailed schedule for the closure and removal of each unit and system, which lists each proposed action and the estimated time to complete it.

If the Permittees make any changes to the Facility that would affect the implementation of the approved Closure Plan, the Permittees shall submit to NMED for approval a written notification and an amended Closure Plan. All documents required to be submitted to NMED in this Condition by the Permittees along with NMED's responses shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC, 20.6.2.3109.E NMAC]

45.43. FINAL CLOSURE-Upon cessation of operation of the Facility, the Permittees shall implement the approved Final Closure Plan according to the approved schedule therein.

Once closure begins, and until all closure requirements (excluding post-closure ground water monitoring) are completed, the Permittees shall submit to NMED, with the monitoring reports required in this Discharge Permit, quarterly status reports describing the closure actions taken during the previous reporting period and the actions scheduled for the next reporting period. Within 90 days following the completion of the closure, the Permittees shall submit to NMED for approval a final written report on the actions taken to implement closure. The Permittees' quarterly status reports and final written report, along with NMED's response, shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC, 20.6.2.3109.E NMAC]

46.44. POST-CLOSURE GROUND WATER MONITORING- After closure has been completed and approved by NMED, the Permittees shall continue ground water monitoring of any wells dedicated to the Facility according to the approved Closure Plan to confirm that the standards of 20.6.2.3103 NMAC are not exceeded and toxic pollutants in 20.6.2.7.WW NMAC are not present in ground water. Such monitoring shall continue for a minimum of eight consecutive quarters.

If monitoring results show that a ground water quality standard in 20.6.2.3103 NMAC is exceeded or a toxic pollutant in 20.6.2.7.WW NMAC is present in ground water, the Permittees shall implement the contingency plan set forth in this Discharge Permit.

Upon demonstration confirming ground water quality does not exceed the standards of 20.6.2.3103 NMAC and does not contain a toxic pollutant in 20.6.2.7.WW NMAC, the Permittees may submit a written request to cease ground water monitoring activities. The Permittees' request for cessation of ground water monitoring along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

Following notification from NMED that post-closure monitoring may cease, the Permittees shall plug and abandon the monitoring well in accordance with the *Ground Water Discharge Permit Monitoring Well Construction and Abandonment Conditions, Revision 1.1*, March 2011.

[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC, 20.6.2.3109.F NMAC, 20.6.2.4103.D NMAC]

47.45. TERMINATION- When all closure and post-closure requirements have been met, the Permittees may submit to NMED a written request for termination of the Discharge Permit. The Permittees' request to terminate along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

If the Discharge Permit expires or is terminated for any reason and any standard of 20.6.2.3103 NMAC is or will be exceeded, or a toxic pollutant in 20.6.2.7.WW NMAC is or will be present in ground water, NMED may require the Permittees to submit an abatement plan pursuant to 20.6.2.4104 NMAC.

[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC, 20.6.2.3109.F NMAC, 20.6.2.4103.D NMAC]

E. General Terms and Conditions

48.46. APPROVALS - Upon receipt of a work plan, written proposal, report, or other document subject to NMED approval, NMED will review the document and may either approve the document, approve the document with conditions, or disapprove the document. Upon completing its review, NMED will notify the Permittees in writing of its decision, including the reasons for any conditional approval or disapproval.

[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

49.47. RECORD KEEPING - The Permittees shall maintain a written record of the following information and shall make it available to NMED upon request:

- a. Information and data used to prepare the application for this Discharge Permit.
- b. Records of any releases or discharges not authorized in this Discharge Permit and reports submitted pursuant to 20.6.2.1203 NMAC.
- c. Records, including logs, of the operation and maintenance and repair of all Facility and equipment used to treat, store or dispose of waste water.
- d. Facility record drawings (plans and specifications) showing the actual construction of the Facility and shall comply with the New Mexico Engineering and Surveying Practice Act (Chapter 61, Article 23 NMSA 1978).
- e. Copies of monitoring reports completed and submitted to NMED pursuant to this Discharge Permit.
- f. The volume of waste water or other wastes discharged pursuant to this Discharge Permit.
- g. Ground water quality and waste water quality data collected pursuant to this Discharge Permit.
- h. Copies of construction records (well logs) for all ground water monitoring wells required to be sampled pursuant to this Discharge Permit.
- i. Records of the maintenance and repair, replacement, and calibration of any monitoring equipment or flow measurement devices required by this Discharge Permit.
- j. Data and information related to field measurements, sampling, and analysis conducted pursuant to this Discharge Permit.

With respect to sampling and laboratory analysis, the Permittees shall record and maintain following information and shall make it available to NMED upon request:

- a. The dates, location and times of sampling or field measurements;
- b. The name and job title of the individuals who performed each sample collection or field measurement.
- c. The sample analysis date of each sample.
- d. The name and address of the laboratory, and the name of the signatory authority for the laboratory analysis.

- e. The analytical technique or method used to analyze each sample or collect each field measurement.
- f. The results of each analysis or field measurement, including raw data;
- g. The results of any split, spiked, duplicate or repeat sample.
- h. All laboratory analysis chain-of-custody forms and a description of the quality assurance and quality control procedures used.

The written record shall be maintained by the Permittees at a location accessible during a Facility inspection by NMED for a period of at least five years from the date of application, report, collection or measurement and shall be made available to NMED upon request.

[NMSA 1978, § 74-6-5.D, 20.6.2.3107.D NMAC, 20.6.2.3109.B NMAC]

48. PUBLIC INVOLVEMENT - Within six (6) months after the effective date of the Permit, the Permittees shall post the following information on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated), where information on the Discharge Permit will be made available: (a) the Annual Update (VI.A.1); (b) Notices of Changes (VI.A.2); (c) Water Tightness Testing (VI.A.8); (d) Summary Report for Settled Solids (VI.A.9); (e) Freeboard Proposal and Responses (VI.A.12); (f) Emergency Plan (VI.A.16); (g) Installation of Flow Meters (VI.A.17); (h) Quarterly Monitoring Reports (VI.B.20); (i) Soil Moisture Monitoring System for the SET (VI.B.26); (j) Ground Water Flow (VI.B.27); (k) Final Closure (VI.D.44); (l) Post-Closure (VI.D.45); and (m) Termination of the Discharge Plan (VI.D.46). The Permittees agree to voluntarily provide the above information, and as such, this permit condition is not subject to civil or criminal fines and penalties associated with permit requirements under Permit Sections 52 and 53.

50.49. INSPECTION AND ENTRY - The Permittees shall allow inspection by NMED of the Facility and its operations which are subject to this Discharge Permit and the WQCC regulations. NMED may upon presentation of proper credentials, enter at reasonable times upon or through any premises in which a water contaminant source is located or in which are located any records required to be maintained by regulations of the federal government or the WQCC.

The Permittees shall allow NMED to have access to and reproduce any copy of the records, and to perform assessments, sampling or monitoring during an inspection for the purpose of evaluating compliance with this Discharge Permit and the WQCC regulations.

Nothing in this Discharge Permit shall be construed as limiting in any way the inspection and entry authority of NMED in the WQA, the WQCC Regulations, or any other local, state or federal laws and regulations.

[NMSA 1978, §§ 74-6-9.B and 74-6-9.E, 20.6.2.3107.D NMAC]

51.50. DUTY TO PROVIDE INFORMATION - The Permittees shall, upon NMED's request, allow NMED to inspect and duplicate any and all records required by this Discharge Permit and furnish NMED with copies of such records.

Nothing in this Discharge Permit shall be construed as limiting in any way the authority of NMED to gather information as stipulated in the WQA, the WQCC Regulations, or any other local, state or federal laws and regulations.

[NMSA 1978, §§ 74-6-5.D, 74-6-9.B, and 74-6-9.E, 20.6.2.3107.D NMAC, 20.6.2.3109.B NMAC]

51. EXTENSIONS OF TIME - The Permittees may seek an extension of time in which to perform an obligation under this Permit, for good cause, by sending a written request for extension of time that states the length of the requested extension and describes the basis for the request. The Department will respond in writing to any request for extension within fourteen (14) days following receipt of the request. If the Department denies the request for extension, it will state the reasons for the denial.

52. MODIFICATIONS AND AMENDMENTS - In the event the Permittees propose a change to the Facility or the Facility's discharge that would result in a change in the volume discharged; the location of the discharge; or in the amount or character of water contaminants received, treated or discharged by the Facility, the Permittees shall notify NMED prior to implementing such changes. The Permittees shall obtain written approval (which may require modification of this Discharge Permit) from NMED prior to implementing such changes.

[NMSA 1978, § 74-6-5.D, 20.6.2.3107.C NMAC, 20.6.2.3109.E NMAC,]

53. CIVIL PENALTIES - Any violation of the requirements and conditions of this Discharge Permit, including any failure to allow NMED staff to enter and inspect records or Facility, or any refusal or failure to provide NMED with records or information, may subject the Permittees to a civil enforcement action. Pursuant to WQA 74-6-10(A) and (B), such action may include a compliance order requiring compliance immediately or in a specified time, assessing a civil penalty, modifying or terminating the Discharge Permit, or any combination of the foregoing; or an action in district court seeking injunctive relief, civil penalties, or both. Pursuant to WQA 74-6-10.C and 74-6-10.1, civil penalties of up to \$15,000 per day of noncompliance may be assessed for each violation of the WQA 74-6-5, the WQCC Regulations, or this Discharge Permit, and civil penalties of up to \$10,000 per day of

noncompliance may be assessed for each violation of any other provision of the WQA, or any regulation, standard, or order adopted pursuant to such other provision. In any action to enforce this Discharge Permit, the Permittees waives any objection to the admissibility as evidence of any data generated pursuant to this Discharge Permit.

[NMSA 1978, §§ 74-6-10 and 74-6-10.1]

54. **CRIMINAL PENALTIES** – The WQA provides that no person shall:
- make any false material statement, representation, certification or omission of material fact in an application, record, report, plan or other document filed, submitted or required to be maintained in the WQA;
 - falsify, tamper with or render inaccurate any monitoring device, method or record required to be maintained in the WQA; or
 - fail to monitor, sample or report as required by a permit issued pursuant to a state or federal law or regulation.

Any person who knowingly violates or knowingly causes or allows another person to violate the requirements of this condition is guilty of a fourth degree felony and shall be sentenced in accordance with the provisions of NMSA 1978, § 31-18-15. Any person who is convicted of a second or subsequent violation of the requirements of this condition is guilty of a third degree felony and shall be sentenced in accordance with the provisions of NMSA 1978, § 31-18-15. Any person who knowingly violates the requirements of this condition or knowingly causes another person to violate the requirements of this condition and thereby causes a substantial adverse environmental impact is guilty of a third degree felony and shall be sentenced in accordance with the provisions of NMSA 1978, § 31-18-15. Any person who knowingly violates the requirements of this condition and knows at the time of the violation that he is creating a substantial danger of death or serious bodily injury to any other person is guilty of a second degree felony and shall be sentenced in accordance with the provisions of NMSA 1978, § 31-18-15.

[NMSA 1978, §§ 74-6-10.2.A through 74-6-10.2.F]

55. **COMPLIANCE WITH OTHER LAWS** - Nothing in this Discharge Permit shall be construed in any way as relieving the Permittees of the obligation to comply with all applicable federal, state, and local laws, regulations, permits or orders.

[20.6.2 NMAC]

56. **LIABILITY**- The Permittees shall be jointly and severally liable for all their obligations in this Discharge Permit.

[NMSA 1978, §§ 74-6-5.A and 74-6-10]

57. **RIGHT TO APPEAL** - The Permittees may file a petition for review before the WQCC on this Discharge Permit. Such petition shall be in writing to the WQCC, shall be filed within thirty days of the receipt of this Discharge Permit, and shall include a statement of the issues to be raised and the relief sought. Unless a timely petition for review is made, the decision of NMED shall be final and not subject to judicial review.
[NMSA 1978, § 74-6-5.O]

58. **TRANSFER OF OWNERSHIP**- Prior to the transfer of any ownership, control, or possession of this Facility or any portion thereof, the Permittees shall:

- notify the proposed transferee in writing of the existence of this Discharge Permit;
- include a copy of this Discharge Permit with the notice; and
- deliver or send by certified mail to NMED a copy of the notification and proof that such notification has been received by the proposed transferee.

Until both ownership and possession of the Facility have been transferred to the transferee, the Permittees shall continue to be responsible for any discharge from the Facility.

[20.6.2.3104 NMAC, 20.6.2.3111 NMAC]

59. **PERMIT FEES**- Payment of permit fees is due at the time of Discharge Permit approval. Permit fees shall be paid in a single payment or shall be paid in equal installments on a yearly basis over the term of the Discharge Permit. Payments shall be remitted to NMED no later than 30 days after the Discharge Permit effective date.

Permit fees are associated with issuance of this Discharge Permit. Nothing in this Discharge Permit shall be construed as relieving the Permittees of the obligation to pay all permit fees assessed by NMED. If the Permittees cease discharging at or from the Facility during the term of the Discharge Permit, they shall nevertheless pay all permit fees assessed by NMED. An approved Discharge Permit shall be suspended or terminated if the Permittees fail to remit payment when due.

[20.6.2.3114.F NMAC, NMSA 1978, § 74-6-5.K]

VII. Permit Term and Signature

EFFECTIVE DATE: [effective date]

TERM ENDS: [expiration date]

[20.6.2.3109.H NMAC, NMSA 1978, § 74-6-5.I]

JERRY SCHOEPPNER
Chief, Ground Water Quality Bureau
New Mexico Environment Department

DRAFT



December 12, 2013

Secretary - Designate Ryan Flynn
New Mexico Environment Department
P. O. Box 5469
Santa Fe, NM 87502-5469

Jennifer Fullam
Ground Water Quality Bureau
PO Box 5469,
Santa Fe, NM 87502-5469
(505) 827-2900 (phone)

Via email to: ryan.flynn@state.nm.us and jennifer.fullam@state.nm.us

Re: Draft Discharge Permit, DP-1132, Los Alamos National Laboratory's Radioactive
Liquid Waste Treatment Facility at Technical Area 50

Secretary-Designate Flynn and Jennifer Fullam:

We respectfully submit these comments for the Draft Discharge Permit, DP-1132, Los Alamos National Laboratory's Radioactive Liquid Waste Treatment Facility at Technical Area 50, dated September 13, 2013.

Nuclear Watch New Mexico seeks to promote safety and environmental protection at nuclear facilities; mission diversification away from nuclear weapons programs; greater accountability and cleanup in the nation-wide nuclear weapons complex; and consistent U.S. leadership toward a world free of nuclear weapons.

First, we question exactly what building this permit covers. Exactly what is discharged is dependent on the number and type of buildings that are actually built. Over the years, the Radioactive Liquid Waste Treatment Facility (RLWTF) has been designed as one building and as two separate buildings. Is there a separate Low Level Waste (LLW) Facility and separate Transuranic Liquid Waste (TLW) Facility? Is an existing facility being renovated? What is the timing of the construction of these two buildings? Do the discharges from each building combine somewhere? This Permit must not be released until the final building designs are released. If it is two buildings, does the 40,000 gal per day discharge apply to both as a total? How

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<http://www.facebook.com/NukeWatch.NM>

much is permitted per building per day?

A review is required that the facility is up-to-date with the legal requirement for public review of major federal proposals under the National Environmental Policy Act (NEPA). It has been over 5 years since the last NEPA review of this ever-changing project. NEPA review commonly results in the implementation of actions designed to mitigate potentially harmful environmental effects.

This Permit must not be released until all concerns of the Defense Nuclear Facilities Safety Board are met.

Clarification on what is going where is required. The Permittees are authorized to discharge up to 40,000 gallons per day (gpd) of treated wastewater, in accordance with the Conditions set forth in Section VI of this Discharge Permit. Discharges shall be to either the Mechanical Evaporator System (MES), the synthetically lined Solar Evaporative Tank system (SET), or through an outfall (identified as Outfall 051) also regulated by a National Pollutant Discharge Elimination System (NPDES) permit. What is the logic behind what waste goes where and when? Who decides where the waste goes any particular time? Will 40,000 gpd ever actually be discharged to the outfall? A per gallon per day limit on discharges to the outfall must be imposed.

For many years, the public has been lead to believe that the Lab was heading towards zero discharge from this facility. A full explanation of why this has changed is needed. We request that the outfall be eliminated from the permit. If waste is still allowed to be released through this outfall, public notification must be required each time treated waste is released to Mortandad Canyon.

Mortandad Canyon is severely contaminated, particularly the perched aquifers that are protected by law for all New Mexicans. As a condition of this permit please require that some remediation of Mortandad Canyon be implemented.

Please require the Department of Energy (DOE) and Los Alamos National Laboratory (LANL) to provide the closure and post-closure plans for the Radioactive Liquid Waste Treatment Facility as part of their application for the groundwater discharge permit DP-1132. The draft permit now out for public comment and review allows DOE and LANL to submit the closure plans in 180 days after the issuance of the permit. This places both the public and your agency at a distinct disadvantage. It also substantially increases the cost of the permitting process at a time when state resources are scarce.

It is unclear to us that the wells in section 28., **GROUND WATER MONITORING**, are suitable to monitor outfall 051. For instance, the screen of R-60 is at 1330 feet below ground surface. How can a screen at that depth detect anything released from Outfall 051?

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http://www.facebook.com/NukeWatch.NM

Treated effluent samples for Outfall 051 must be taken for each discharge, not just monthly. Nothing that the Lab does is standard. The types of wastes treated on any given day may be wildly different from the day before.

25. EFFLUENT SAMPLING -The Permittees shall sample and analyze effluent waste streams discharged to Outfall 051, the SET, and the MES.

Treated effluent samples shall be collected once per calendar month for any month in which a discharge occurs to Outfall 051. The Permittees shall collect a grab sample of treated effluent which shall be analyzed for all water contaminants listed in 20.6.2.3103 NMAC, TKN and all toxic pollutants as defined in 20.6.2.7.WW NMAC.

For these reasons and others, we request a public hearing.

These comments and questions respectfully submitted,

Jay Coghlan
Executive Director

Scott Kovac
Operations and Research Director

Nuclear Watch New Mexico
903 W. Alameda #325
Santa Fe, NM, 87501
505.989.7342 office & fax
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PUEBLO OF SANTA ANA

OFFICE OF THE GOVERNOR

GROUND WATER

OCT 01 2013

BUREAU

September 27, 2013

Ms. Jennifer Fullam
NMED – Groundwater Quality Bureau
PO Box 5469
Santa Fe, NM 87502-5469

Re: The Pueblo of Santa Ana's Comments on the Draft Ground Water Discharge Permit (DP-1132) for the Los Alamos National Laboratory Radioactive Liquid Waste Treatment Facility

Dear Ms. Fullam:

The Pueblo of Santa Ana (the Pueblo) appreciates the opportunity to comment on the draft Ground Water Discharge Permit (DP-1132) for the Los Alamos National Laboratory (LANL) Radioactive Liquid Waste Treatment Facility (RLWTF).

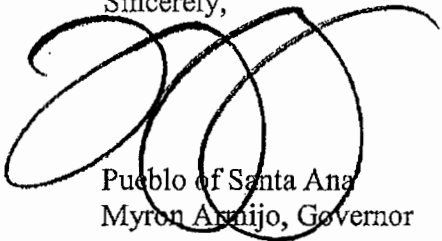
Please note that the Pueblo has developed draft Water Quality Standards and has scheduled a public hearing on these standards as part of the approval process. The Pueblo expects to have these standards approved by the Pueblo by the end of 2013 and by USEPA sometime in 2014. The Pueblo has also applied to the USEPA for Treatment in a manner Similar to a State (TAS).

The Pueblo requests that the permittee provide the required 24-hour oral and subsequent written reports to the Pueblo as well as to the New Mexico Environment Department (NMED) for any violations or contingencies as described in Section C, Contingency Plans. These types of violations represent a human health concern and as a downstream water user the Pueblo requires notification in order to protect the public from these events. In order to expedite the Pueblo's response, the 24-hour notification contact phone number for the Pueblo of Santa Ana is (505) 771-6757. As the permit allows the written reports to be posted electronically, the Pueblo requests that they be notified electronically at Bart.VandenPlas@santaana-nm.gov when these reports are available. This electronic notification applies to all electronic reports that are required by this permit, including those in Section B, Monitoring and Reporting as well as Section C, Contingency Plans.

LANL has reported in "Radioactive Liquid Waste Treatment Facility Discharges in 2011" (the latest discharge report that was available on LANL's website) that all liquid discharges are evaporated. The discharge report did not include any information on the sludge or solids removed from the evaporator. The Pueblo requests that the discharges of the solids and sludge from the evaporator be reported and the Pueblo receive notification of the publication of the discharge reports.

The Pueblo requests written confirmation of NMED's response to these comments. The Pueblo reserves the right to request Tribal Consultation should the NMED decline to adopt any of the requested changes to the draft permit. If you have any questions, please contact Joseph McGinn at (505) 771-6754 or Bart Vanden Plas at (505) 771-6757.

Sincerely,



Pueblo of Santa Ana
Myron Arrijo, Governor

Cc:

Alan Hatch, PSA Department of Natural Resources Director

Joseph McGinn, PSA Water Resources Division Manager

Bart Vanden Plas, PSA Water Quality Scientist

Richard Hughes, Rothstein, Donatelli, Hughes, Dahlstrom, Schoenburg & Bienvenu, 1215
Paseo De Peralta, Santa Fe, NM 87504

Karl Johnson, Luebben Johnson & Barnhouse LLP, 7424 4th St NW, Los Ranchos de
Albuquerque, NM 87107

Honorable Terry L. Aguilar, Governor, Pueblo De San Idefonso, Route 5, Box 315-A, Santa
Fe, NM 87506

Nikole Witt, U.S. EPA Region VI, State/Tribal Programs Section (6WQ-AT), 1445 Ross
Avenue, Suite 1200, Dallas, Texas 75202-2733

Diane Evans, EPA Region VI, State/Tribal Programs Section (6WQ-AT), Tribal Water
Quality Standards Coordinator, 1445 Ross Avenue, Suite 1200, Dallas, Texas 75202-2733

Fullam, Jennifer, NMENV

From: Jonathan Block <jblock@nmelc.org>
Sent: Friday, December 06, 2013 4:02 PM
To: Schoeppner, Jerry, NMENV; Fullam, Jennifer, NMENV
Cc: Brian Shields; Joni Arends; Rhgilkeson@aol.com; Kathy Sanchez; J. G. Sanchez; Rachel Conn; Marian Naranjo
Subject: CCW-TWU-3 INDIVIDUALS-TA-50 RLWTF PERMIT FIRST SET OF COMMENTS AND HEARING REQUEST
Attachments: CCW-TWA-COMMENTERS & HRG REQ RLWTF PERMIT 20131206.pdf

Hello, Jennifer and Jerry:

Attached hereto please find in PDF the above referenced first set of comments and hearing request from Communities for Clean Water, TEWA Women United, Kathy WonPovi Sanchez, J. Gilbert Sanchez, and Robert Gilkeson, Independent Registered Geologist on the TA-50 Radioactive Liquid Waste Treatment Facility at LANL. There is an attached Exhibit 'A' to the comments and hearing request. It is a copy of a letter from Attorney Douglas Meiklejohn to William Olson, Ground Water Quality Bureau Chief, providing comments on behalf of Amigos Bravos (a member of CCW) on the same permit in 2005.

The organizations and individuals plan to file additional comments on or before the close of the comment period on December 12th.

Thank you for you consideration of these comments and hearing request.

Have a good weekend.

Jon

--

Jon Block
Staff Attorney
New Mexico Environmental Law Center
1405 Luisa Street, Ste. 5
Santa Fe, NM 87505
(505) 989-9022



Communities for Clean Water

A Northern New Mexico Network



December 6, 2013

Mr. Jerry Schoeppner, Bureau Chief
Ms. Jennifer Fullam, Environmental Scientist
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 5469
Santa Fe, NM 87502-5469

Via email to: Jerry.Schoeppner@state.nm.us
Jennifer.Fullam@state.nm.us

Re: Comments and Hearing Request of the *Communities for Clean Water*, *Tewa Women United* and three individuals on the proposed permit DP-1132 for the Radioactive Liquid Waste Treatment Facility ("RLWTF") at Los Alamos National Laboratory

Dear Mr. Schoeppner and Ms. Fullam:

Following below are the first set of Comments and the Hearing Request of *Communities for Clean Water* ("CCW"), *Tewa Women United* ("TWU") and individuals *Kathy WanPovi Sanchez*, *J. Gilbert Sanchez* and *Robert H. Gilkeson*, *Independent Registered Geologist*, as referenced above. We will submit a second set of Comments before the close of the public comment period on December 12, 2013.

Our Comments and Hearing Request are introduced by a section entitled "Background Information" which provides a brief description of the history and composition of CCW, TWU, and the individual commenters, so that your agency and the Secretary-Designate understand the basis and existence of the substantial public interest in the RLWTF permit. In the event that final terms of the permit cannot be negotiated by the commenters, your agency and Los Alamos National Laboratory ("LANL"), there is substantial public interest sufficient to warrant a public hearing--and we specifically request that a public hearing be held.

Additionally, we have divided our comments into two other sections: general and specific permit comments. The general comments raise long-standing issues in relation to the issuance of this permit. The specific comments address what we view as necessary, substantive changes in the permit.

I. BACKGROUND INFORMATION

A. Organizations and Persons Commenting and Requesting A Hearing;

1. CCW, Tewa Women United and Kathy WanPovi Sanchez, J. Gilbert Sanchez and Robert H. Gilkeson.

CCW is a network of non-governmental organizations comprised of *Amigos Bravos*, *Concerned Citizens for Nuclear Safety* (CCNS), *Honor Our Pueblo Existence* (H.O.P.E.), *Tewa Women United* and individuals, Kathy WanPovi Sanchez, J. Gilbert Sanchez and Robert H. Gilkeson, Independent Registered Geologist, join CCW in submitting this first set of comments. Collectively, our members live downwind and downstream of LANL and are concerned about the discharge of up to 40,000 gallons per day of effluent from Technical Area 50 ("TA-50") into Mortandad Canyon and the evaporation of radioactive tritium and other pollutants into the atmosphere, the subject of the draft permit. The members of CCW and TWU, along with the individuals, represent a significant number of persons who are interested in the determinations on this permit.

CCW History. After the catastrophic Cerro Grande fire in 2000, Concerned Citizens for Nuclear Safety (CCNS) became alarmed about the transport of toxic materials off the LANL site into the Río Grande watershed. CCNS organized a conference that summer that drew over 450 participants. *Amigos Bravos* joined the effort in 2003, investigating stormwater discharges at LANL. The *Embudo Valley Environmental Monitoring Group*, which investigated downwind LANL impacts to their watershed, began collaborating in 2005. *Honor Our Pueblo Existence* (H.O.P.E.), a Pueblo Nation community-based organization, later joined the effort with a particular concern for the cultural impacts of LANL toxics. These groups formed the core that in early 2006 became *CCW*.

Starting in 2006, *CCW* pursued two independent, but related activities: (a) a campaign to prevent migration of LANL toxics to the Río Grande watershed; and (b) an outreach campaign directed at impacted communities, the media, and public officials. *CCW* began questioning the adequacy of LANL's Environmental Management ("EM"). When it became clear that LANL's EM activities were inadequate and not likely to improve, members of *CCW* joined with other community-based organizations, including *TWU* and individuals, Kathy WanPovi Sanchez and J. Gilbert Sanchez, in March 2008 to file a Clean Water Act citizen complaint against United States Department of Energy ("DOE") and LANL for wide-ranging and chronic stormwater-related violations. Filing the lawsuit won *CCW* an invitation in late 2009 to participate in LANL's first Individual Stormwater Permit ("ISP"), issued by the Environmental Protection Agency ("EPA"). When the draft ISP failed to provide enough assurances, *CCW* filed an administrative appeal with the EPA, which led to another year of negotiations. In 2010, EPA approved what they have said is one of the strongest individual stormwater permits in the country.

With many of the stormwater issues resolved in the ISP, the litigation was settled in April 2011, after two years of negotiation resolved many of the remaining issues, especially providing for greater public input and financial support for technical experts to support that public input.

In order to protect public health, welfare, safety and the environment, the goals of *CCW* are to:

- Create a broad community-based movement.
- Protect precious water resources from contamination now and for the benefit of future generations.
- Hold local, state and federal regulators accountable to use their regulatory and enforcement powers and fulfill their public trust responsibilities.
- Hold LANL and those degrading the environment accountable for water contamination.
- Ensure the highest possible level of clean up at contaminated sites.

Tewa Women United (“TWU”) History. TWU is a collective intertribal women’s voice in the Tewa homelands of Northern New Mexico. The name Tewa Women United comes from the Tewa words *wi don gi mu* which translates to “we are one.”

TWU was started in 1989 as a support group for women concerned with the traumatic effects of colonization leading to issues including alcoholism, suicide, terricide, environmental violence and domestic and sexual violence. In the safe space women created, we transformed and empowered one another through critical analysis and the embracing and re-affirming of our cultural identity.

In 2001 TWU transitioned from an informal, all volunteer group to a formal 501(c)3 non-profit organization.

Tewa Women United was incorporated for educational, social and benevolent purposes, specifically for the ending of all forms of violence against Native Women and girls, Mother Earth and to promote peace in New Mexico.

The Vision of TWU. Sovereignty is living the truth from the heart. TWU’s vision is embodied in the Tewa words *wo watsi* the breath of our work. In other words, our path of life follows us into daily work.

The Mission of TWU. The mission of TWU is to provide safe spaces of Indigenous women to uncover the power, strength and skills they possess to become positive forces for social change in their families and communities.

Kathy Wanpovi Sanchez resides at the Pueblo de San Ildefonso. She is not representing the Pueblo de San Ildefonso in this matter. She is a fourth generation potter of the Julian and Maria Martinez family lineage. She has had direct contact with her great grandmother, Maria. The oral tradition wisdom and life narratives transmitted to her go back a very long, long time. What she refers to as sacred is where Los Alamos National Laboratory is located. It is her ancestral homeland. It is a sacred place that holds the present and ancestral energy of being.

J. Gilbert Sanchez resides at the Pueblo de San Ildefonso. He is a former Governor of the Pueblo. He created the Pueblo's Environmental Protection, Cultural Preservation and Land Management Offices. He served as Director of the Los Alamos Pueblos Project. In this matter, he does not represent the Pueblo de San Ildefonso. He sat on the State and Tribal Working Group at the Department of Energy Secretarial level for 12 years and on the Board of Scientific Counselors as a Community Representative for over 12 years.

Robert H. Gilkeson, Independent Registered Geologist, is a former contractor at LANL, specializing in the Environmental Remediation Programs and Groundwater Protection Programs. He was a research scientist at the University of Illinois for 17 years. Over the past decade, he has provided *pro bono* technical expertise to CCW, TWU and the individuals Kathy WanPovi Sanchez and J. Gilbert Sanchez about the seismic, groundwater protection and waste remediation issues at LANL.

B. The Permit History And Need For Additional Time And Documents.

1. The Permit First Drafted In the 1990s. NMED first released a draft permit for public comment in the mid-1990s. CCNS, through its staffer, Susan Diane, asked for a public hearing. There were delays, until 2005, when NMED released a draft permit for public comment. On August 4, 2005 Amigos Bravos, represented by the New Mexico Environmental Law Center, submitted comments and requested a public hearing. Letter to William C. Olson, NMED, from Attorney Douglas Meiklejohn (August 4, 2005), attached hereto as Exhibit 'A'.

For the third time, the public provides these public comments. We appreciate that NMED provided a 90-day public comment period given the amount of public interest in the RLWTF. We incorporate our previous comments by reference in order to demonstrate the longstanding significant public interest in this permit.

2. Requests for extension of time to submit comments and obtain necessary background documents have been denied. We made a request to NMED for an extension of time to submit these comments due to the October 2013 federal government shutdown, which was denied. Further, we have requested data and documents from the Permittees and the EPA, which responses have been incomplete. Additional effort was required to obtain the needed information in order to provide informed comments to NMED. On November 27, 2013 we filed Freedom of Information Act requests with the DOE and EPA in order to obtain data and additional information from both the DOE/LANL and EPA about tritium emissions from both evaporation units. If there are additional delays in obtaining the data and documents, we request the opportunity to provide additional comments following the completion of the comment period on December 12, 2013. We believe additional time should be provided.

II. GENERAL COMMENTS ON THE PERMIT.

A. Introduction: Acknowledging Our Government's Occupation and Pollution of Sacred Places. We begin by acknowledging the sacred place where the discharges are occurring. LANL is discharging into the ground and making emissions into the air in the Sacred Mountains of the Pueblo Peoples who were told by the U.S. Government that the Pajarito Plateau would be used for a short time and then it would be returned to the People. The Plateau has been used, and projected for use, by the U.S. Government for at least the next 50 years. One hundred and twenty years is not a short amount of time.

1. Section 43. Need for Closure and Post-Closure Plans for TA-50 Now – Not 180 Days Following the Issuance of the Permit. NMED must require the DOE and LANL (the "Permittees") to provide the closure and post-closure plans for the RLWTF as part of their application for groundwater discharge permit DP-1132. See 20.6.2.3107(A)(11) NMAC (closure plan required that will "prevent the exceedance [water quality] standards . . . in ground water or abate such contamination"). The draft permit allows for DOE and LANL to submit the closure plans 180 days following the issuance of the permit. This creates a situation that places both the public and NMED at a distinct disadvantage and creates a substantially increased cost of the permitting process at a time when state resources are scarce. Both the public and the Ground Water Quality Bureau need to see both the plans for operation and closure of the 50-year old facility now in order for the agency to craft an appropriate permit and the public to provide informed public comments. By bifurcating the permitting process from the closure process there will have to be two permit proceedings which will cost NMED and the public time, resources and money. By including the closure and post closure plans with the permit – as required -- both public and agency resources are appropriately conserved and a higher level of informed decision-making can be achieved. That is a benefit to NMED, and the public it serves. Moreover, requiring the closure plan before the time of

permit issuance will also conserve federal tax dollars, as LANL, a federally funded facility, will only have to undergo one ground water permitting process for the RLWTF.

DOE and LANL have already had more than ample time to prepare the closure and post-closure plan for this facility. A draft of discharge permit DP-1132 was issued in 1995 and on June 10, 2005. In response to the draft permits, public comments were submitted that raised the requirement for the inclusion of a closure and post-closure plan. Seventeen years and eight years of notice is more than a reasonable amount of time for LANL to fulfill the legal requirement that it provide its closure and post closure plans with its permit application for the RLWTF.

Please carefully consider this conservative approach to the permitting of TA-50 in which all sides save money and time. The Ground Water Quality Bureau should require DOE/LANL/LANS to submit the closure and post closure plans for agency review now and before issuance of a revised permit.

2. We note that the Outfall 051 discharge pipe is surrounded by the Los Alamos County drinking water wells. NMED states in the draft permit:

The discharge from the Facility is within or into a place of withdrawal of ground water for present or reasonably foreseeable future use within the meaning of the [Water Quality Act], NMSA 1978, § 74-6-5.E.3, and the [Water Quality Control Commission] Regulations at 20.6.2.3103 NMAC. Section IV. Findings, p. 9.

Los Alamos County residents rely upon the regional aquifer for 100 percent of their drinking water. The ground water of TA-50 is a present and future source of drinking water: a place of withdrawal of ground water for present and reasonably foreseeable future use within the meaning of the Water Quality Act, *id.* at , § 74-6-5.E.3 and Water Quality Control Commission Regulations at 20.6.2.3103 NMAC. We have a special concern about protecting the present and future use of the drinking water supply as required by the New Mexico Water Quality Act (WQA) and regulations adopted pursuant to the WQA.

At issue are numerous radioactive and other hazardous contaminants that have been, and continue to be, discharged by LANL into Mortandad Canyon. These pollutants – including known carcinogens – are migrating into the regional aquifer. Besides the detrimental effects of such discharges on human and environment health, it is feared that some of these pollutants will enter the drinking water supply of Los Alamos and communities downstream of LANL.

3. LANL has several reports going back to the 1970s of its studies on the need and efficacy of turning the RLWTF into a "zero discharge" facility.¹ In its application, as well previous studies of the RLWTF, LANL points to the fact that its discharges from the facility are already extremely minimal. Given the data that LANL has provided, it is questionable as to whether this facility should receive an NPDES permit or should be permitted as a RCRA hazardous waste processing facility. NMED in consultation with Region 6 of the EPA should make a determination regarding the correct regulatory fit, given the fact that there are minimal discharges and the facility has the capacity to be a "zero discharge" facility according to the applicant. Were the facility equipped with an emergency storage tank capable of holding a day of maximum capacity discharge plus necessary "freeboard", it would be able to operate without discharging under an NPDES permit.

The draft permit states:

The discharge may contain water contaminants with concentrations above the standards of 20.6.2.3103 NMAC and may contain toxic pollutants as defined in 20.6.2.7 WW NMAC. Section III, page 8.

We fully support NMED having reserved, in the permit, the right to require a Discharge Permit Modification in the event NMED determines that the requirements of 20.6.2 NMAC are being or may be violated or that the standards of 20.6.2.3103 WW NMAC is present. *See id.* Additionally, the permit should reference and provide as an

¹ Collins, K., Rife, J., Rae, S. and Hanson, S., "Los Alamos National Pollution Discharge Elimination System Permit Compliance and Outfall Reduction Strategy," LA-UR-07-8312 (December 20, 2007) ("Collins *et al.*"). See, for example, zero discharge project described at 3-6; description of declining output from facility at 7-16 to 7-17.

Moreover, this is not a new consideration for LANL. The Collins *et al.* report states that, "Zero liquid discharge of effluent was considered in 1977 with the proposed construction of 14 acres of evaporative ponds on Sigma Mesa." *Id.* at 7-17. Furthermore, a "1998 a report entitled *Elimination of Liquid Discharge to the Environment from the TA-50 Radioactive Liquid Waste Treatment Facility* (Moss *et al.*, 1998) again recommended zero discharge of effluent from the TA-50 RLWTF. In 2003, a new working group was formed and completed a second report. These two reports provide the basis for the current Zero Liquid Discharge (ZLD) Project which is scheduled as a design/build project for FY08 or FY09." at 7-17. See also the Collins report recommendations which support the notion that the current facility should, by now, be a zero-discharge facility. Recommendations at 7-17 through 7-20; 8-3 to 8-4, and, at 8-4 to 8-5, see "Recommendations for FY08 Scope to Implement the NPDES Permit Compliance and Outfall Reduction Strategy."

Of course, were LANL to actually implement the recommendations of its scientists and technicians over the last thirty six (36) years, it would be seeking a RCRA permit for the hazardous waste treatment facility rather than relying upon discharging, as needed, its toxic, radioactive wastes into the human and natural environment.

appendix the information LANL provided to EPA concerning air emissions of tritium from the evaporation units. While we recognize that the permitting is being done under the Water Quality Act by the Ground Water Quality Bureau, LANL has long recognized that the use of the evaporation units triggers the need for air quality approvals from EPA and the state of New Mexico.²

III. COMMENTS ADDRESSED TO SPECIFIC PORTIONS OF THE PERMIT.

A. Specific Portions Of The Permit Need To Be Changed.

1. Section I. Acronyms, Definitions and Tables, at page 4.

COMMENT: Reference to and the standard for Total Residual Chlorine (TRC) was removed **is not present in?** from the acronym list, definitions and Tables. TRC should have an effluent limit and be required for sampling, analysis and reporting under this permit.

2. Section II. Definitions, at page 5. COMMENT (1) The definition of 'calibration' should appear in the Definitions section of the permit; (2) "Practice of Engineering" does not appear in the definitions section--unless it is reinstated, the definition of 'Record Drawings' should include the statement that the official record of the actual as-built conditions of the completed construction "are certified and bear the seal and signature of a Professional Engineer licensed to practice engineering in the State of New Mexico."

3. Section II.BB. Definition of Total Polychlorinated Biphenyls (PCBs), at page 7. COMMENT: The EPA stormwater permit for LANL requires that the Permittees use Method 1668 Revision A, or the most current revisions of the Congener Method, for PCB analysis. *See* Part I.C, footnote (*4). This is also a requirement of the industrial surface water NPDES permits. For purposes of analytic consistency, NMED should require the use of Method 1668 Revision A for PCB analyses done under the draft RLWTF permit.

Additionally, the permit should be corrected to reference Method 1668C *Chlorinated*

² *Id.* at 2-9 ("[E]missions from mechanical evaporators and evaporation ponds must be addressed when evaluating options for permit compliance and outfall reduction"); also at 5-1, LANL anticipated that NMED would impose requirements, under its ground water permitting of the evaporation facilities that are more comprehensive than the current permit requirements ("Evaporation basins or tanks may require Groundwater Discharge Permits that specify design items such as liner materials, lining requirements, monitoring, recordkeeping, operation and maintenance requirements, and performance standards") (emphasis added).

Biphenyl Congeners in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS in §IV.B.19.³

4. **Section III. Introduction, at page 8.** COMMENT: The first paragraph should include language that the permit is for operations at Los Alamos National Laboratory (LANL).

5. **Section V.D. Authorization to Discharge, at page 10.** COMMENT: (a) Influent Collection System conveyance lines should be double walled; (b) the type of gas used in the Mechanical Evaporator System should be disclosed in the permit; (c) the Solar Evaporative Tank System should not be a "unsealed subgrade concrete structure" rather is should be sealed, especially considering that the leak detection is a single rather than a double leak detection system.

6. **Section VI.A.3(g) Submittal of Plans and Specifications, at page 13.** COMMENT: The same concern regarding DOE Standard 1020-2012 applies here. The Standard requires that all facilities meet seismic qualification. Given that DOE requirement and that the terminus of the Guaje Mountain Fault is in the area of TA-50/TA-55, the permit should require that the RLWTF be in compliance with all federal regulations, including DOE seismic qualification under Standard 1020-2102.

7. **Section VI.A.3(j). Submittal of Plans and Specifications, at page 13.** COMMENT: This provision, at either j or k, should include requiring installation of a camera as part of the detecting the failure of either primary or secondary containment or the presence of a release.

8. **Section VI.A.6. Signs, at page 14.** COMMENT: *Honor Our Pueblo Existence* requested the provision of warning signs in Tewa in the NMED Hazardous Waste Permit for LANL. See §2.5.1 of the *Hazardous Water Permit*. In this permit, LANL and NMED should be required to contact Santa Clara Pueblo, as well as the other three Accord Pueblos, about what type of signs each Pueblo requires and put those requirements in the permit.

9. **Section VI.A.8. Water Tightness Testing, at page 15.** COMMENT: There is no human health and safety benefit in allowing an infiltration or infiltration rate of up to 50 gallons per mile per consecutive 24-hour period. No regulation allows such an excess amount of leakage and there is no lawful justification for doing so. The permit should be changed to disallow this level of leakage. Moreover, it is inconsistent with the permit requirements at Section 30, Water-Tightness, which require leak testing in every

³ Collins *et al.*, "Los Alamos National Pollution Discharge Elimination System Permit Compliance and Outfall Reduction Strategy," *id.*, acknowledged the need to use (and recommended) this methodology. See 7-20, 7-22.

pipng segment rather than a calculation of the average rate of leakage. A maximum for leakage should be specified "as low as reasonably achievable" (ALARA) with some threshold that will be protective of human health.

10. Section VI.A.9. Settled Solids, at page 16. COMMENT: This section should specify where the settled solids will be measured. It is unclear whether measurements will be taken at the Solar Evaporative Tank (SET) System and/or the Mechanical Evaporator System (MES). The permit should explain the depth of the SETs in "Section V. Authorization to Discharge," at page 9.

11. Section VI.A.10.b. Facility Inspections, at page 17. COMMENT: The term for inspection (weekly, monthly) of "visual portions of all synthetic liners used to store or dispose of liquids or semi-liquids" should be stated in the permit. Moreover, as the terms of inspection are stated for other portions of the facility, it is inconsistent for the permit to fail to specify terms of inspection for all portions of the facility.

12. Table 1. Effluent Quality Limits for Discharges to Outfall 051, at page 19. COMMENT: Effluent limits for perchlorate are nearly three times as high as in the draft 2005 permit and nearly twice the current California standard. The limitations for perchlorate should be about one tenth of those in Table 1. Moreover, in 2006, LANL published a graph in a briefing paper written by the Nuclear Waste and Infrastructure Services Division, Radioactive Liquid Waste Group, "Radioactive Liquid Waste Treatment Facility, Los Alamos National Laboratory, TA-50" (May 17, 2006). The graph shows that, excepting a single spike in a three-month period, perchlorate, close to the end of 2004, had been reduced to near zero. Surely, in 2013, LANL should be able to reduce its perchlorate discharge to at least the California standard, if not to zero.

13. Table 1. Effluent Quality Limits for Discharges to Outfall 051, at page 19. COMMENT: The 2005 draft permit had a permit limit of .00077 mg/L for mercury. The current draft has a limit of .0022 mg/L for mercury. If anything the limit today should be more, not less stringent and protective of occupational and public health and safety than it was eight (8) years ago.

14. Table 1. Effluent Quality Limits for Discharges to Outfall 051, at page 19. COMMENT: The 2005 draft had a zinc effluent limit of 4.37 mg/L. Again, the current revised draft permit has a less protective, less stringent limit set at 10 mg/L. The current limitation should be more protective of occupational and public health and safety than that proposed eight (8) years ago. The limits set in the revised draft permit should be at least as protective as they were before, absent some scientific justification for setting less protective and stringent limits.

15. Table 1. Effluent Quality Limits for Discharges to Outfall 051, at page 20. COMMENT: The limit for "Radioactivity" is higher than parties to the draft

permit wanted in 2005. It is currently set at 30 pCi/L. That limit should be 15 pCi/L. Given the technological advances in remediation technologies since the 2005 draft permit, it is reasonable and achievable--and properly protective of public health and safety--to limit tritium emissions to 15 pCi/L in this permit as part of the radioactivity limits in this permit. The briefing paper cited above also contains a graph showing that LANL, between January 2004 and September 2004 had reduced the amount of radioactive material discharged to the environment to near zero. Surely, in 2013, it is not unreasonable for LANL to accept a limit of 15 pCi/L for Radioactivity.

16. Tables 1 and 2. Effluent Quality Limits for Discharges to Outfall 051 and Effluent Quality Limits for Discharges to the MES and SET, at pages 19-21.

COMMENT: In the 2005 draft permit there was a tritium limit of 20 nCi/L. There is no tritium limit in this current draft permit, despite the fact that Los Alamos National Security, LLC, ("LANS") stated that it was intending to achieve "zero discharge" for tritium. Again, both the goal of "zero discharge" and, in the event that goal is not achieved, a tritium limit of 20 nCi/L should be inserted into the permit in order to be adequately protective of occupational and public health and safety. Tritium evaporation capabilities at LANL have, theoretically, been enhanced as part of the plan to achieve a "zero discharge" RLWTF. For this purpose, LANL now has both a "synthetically lined Solar Evaporative Tank system (SET)" and the Mechanical Evaporator System (MES) at TA-52. Given the additional facility for tritium evaporation, there should be limits in this permit that are consistent with LANL's supplemental treatment equipment for tritium. There should also be a deadline in the permit for the Permittees to achieve "zero discharge" given that LANL has been working on this since the 1970s.⁴

17. Section VI.A.13. Effluent Limits: Outfall 051, at page 20.

COMMENT: There is no justification for the permit providing that "constituents that are subject to effective and enforceable limitations under NPDES Permit NM0028355 for discharges to Outfall 051, that are lower than the effluent limits under this Discharge Permit are exempt." The permit should be consistent with state and federal law in the level of protection of water quality and human health and safety. This requires using language in the permit that specifies the more protective standard (be it state or federal) as the one applying to any and all discharges.

18. Section VI.A.17. Installation of Flow Meters, at page 22.

COMMENT: Considering the public has been waiting for almost two decades for this permit and that LANL has been working on making the existing facility a zero discharge facility since 1977, CCNS requests that the Permittees be required to install the flow meters within 30 days of the effective date of the GWDP. It is outrageous to provide six additional months after the effectiveness date of the permit for the implementation of

⁴ *Supra* note 1 (discussing the history of LANL studies recommending that the RLWTF be a "zero discharge" facility and indicating the capacity to achieve that objective).

flow metering within the RLWTF.

19. Section VI.A.18. Calibration of Flow Meters, at page 23.

COMMENT: The calibration of flow meters should also be done within 30 days of the effective date of the permit as flow meter calibration is not very difficult to perform. Additionally, there is no engineering justification for a calibration rate of plus or minus 10% of actual flow when the standard is plus or minus 5%.

20. Section VI.B. 24.b. Waste Tracking, at page 26. COMMENT:

Regardless of whatever lag time there may be between approval and conveyance of waste to TA-50, it is important to know when the waste stream is conveyed as well as when it was approved. The permit should be changed to clearly state when the waste stream is conveyed as well as when it was approved.

21. Section VI.B.25. Effluent Sampling, at page 26. COMMENT:

The permit should require sampling for PCBs at Outfall 051, the MES and SET in the monthly and quarterly sampling events. See 20.6.2.3103 (A)(15) and 20.6.2.7.WW (39), NMAC (requirements for monitoring and limitations on PCBs in discharges). The type of discharge expected from the MES and SET should be specified so the reason for a quarterly sampling requirement is readily apparent. In addition, there should be a specification of the flow path for such discharges.

22. Section VI.C.29. Containment, at page 30. COMMENT:

The language in the paragraph at the end of this section with respect to "long-term actions" to maintain the integrity of the secondary containment raises concerns. The nature, extent and limitations on what constitutes appropriate actions should be specified in the permit. The permit should require any proposal be noticed to the public for comment as well as the opportunity to request a public meeting; and that any proposal be posted promptly on LANL's Electronic Public Reading Room--not at the end of the process as the permit appears to allow.

23. Section VI.C.32. Damage to Structural Integrity, at page 33.

COMMENT: This section should include a requirement for the Permittees to provide NMED with an oral 24-hour notice about any significant damage to the structural integrity of any unit or system.

24. Section VI.D.41. Cessation of Operation of Specific Units, at page

40. COMMENT: The permit needs to include the workplan for stabilization of five units that are required to be closed within 60 days of the effective date of the permit.

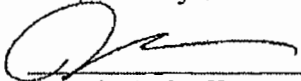
25. Section VI.D.42. Stabilization of Individual Units and Systems, at

page 40. COMMENT: This section should include the pipes that have been used to move waste from TA-50 to the TA-53 evaporation tanks or similar structures.

We plan to submit, as noted above, additional comments supplementing the above as part of our Comments and Request for Public Hearing on the RLWTF permit.

We thank you for your careful consideration of these comments and our request for a hearing on this permit.

Respectfully submitted:



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NEW MEXICO ENVIRONMENTAL LAW CENTER

COPY



August 4, 2005

William C. Olson
Bureau Chief
Ground Water Bureau
New Mexico Environment Department
1190 St Francis Drive
Santa Fe, New Mexico

Hand delivered

Re: Application of the U.S. Department of
Energy and the University of California
for renewal of discharge permit DP-1132
for the Radioactive Liquid Waste Treatment
Facility at Los Alamos National Laboratory

Dear Bill:

I write as counsel for Amigos Bravos to request a public hearing and to comment on the draft discharge permit DP-1132 issued by the Ground Water Bureau of the New Mexico Environment Department on April 11, 2005 and re-issued on June 10, 2005.

Introduction

The Ground Water Bureau ("the Bureau") of the New Mexico Environment Department ("NMED") indicated in its April 11, 2005 notice of issuance, and its June 10, 2005 notice of re-issuance, of the draft of discharge permit DP-1132 that it proposes to issue DP-1132 to the U.S. Department of Energy ("DOE") and the University of California ("the University") for the Los Alamos National Laboratory Radioactive Liquid Waste Treatment Facility at Technical Area 50 ("the Facility") within the Los Alamos National Laboratory ("LANL"). The June tenth re-issuance notice stated that public comments and requests for a public hearing must be submitted on or before August 4, 2005.

This request for a public hearing and these comments are submitted by Amigos Bravos, a non-profit community based organization that is concerned about the impacts of the Facility on ground and surface water in New Mexico. Amigos Bravos appreciates the effort by the Bureau to address the discharges from the Facility. Amigos Bravos also appreciates this opportunity to be involved in the Bureau's consideration of the issues presented by those discharges. This request for a public hearing and these comments are submitted pursuant to the New Mexico Water Quality Act and the New Mexico Water Quality Control Commission Regulations.

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William C. Olson
August 4, 2005
Page 2

Request for public hearing

Amigos Bravos' request for a public hearing should be granted for two reasons. First, there is significant public interest in this proposed discharge permit. Second, there are significant issues that must be addressed before the discharge permit is issued in final form.

The New Mexico Water Quality Act and its implementing regulations provide for public hearings

The New Mexico Water Quality Act, NMSA 1978 §§ 74-6-1 *et seq* ("The Act") provides that the Water Quality Control Commission ("WQCC") shall adopt regulations providing for notice to the public of applications for permits under the Act. NMSA 1978 §74-6-5 F. That section also provides that no ruling on an application for a permit shall be made without opportunity for a public hearing at which all interested persons have the chance to present their views and arguments, and to cross examine witnesses provided by other parties. *Id.*

The Water Quality Control Commission Regulations ("the Regulations") adopted to implement these provisions indicate that the NMED shall conduct a public hearing or meeting if the Secretary determines that there is significant public interest. NMAC §20.6.2.4108.D. There is significant public interest in the proposed discharge permit that is the subject of this proceeding.

This request is made by the board of directors, the staff, and the members of Amigos Bravos, a community based non-profit organization. The mission of Amigos Bravos includes an emphasis on protection of the Rio Grande watershed, and Amigos Bravos has a particular interest in this proceeding. Moreover, Amigos Bravos' extensive membership includes many members who live down stream and down gradient from LANL and who are therefore at risk from contamination discharged by the Facility that is the subject of proposed discharge permit DP-1132.

Amigos Bravos' mission and strategic plan call for addressing contamination from LANL

The mission of Amigos Bravos includes several specific goals. These are: 1) to return New Mexico's rivers and the Rio Grande watershed to drinkable quality wherever possible, and to contact quality everywhere else; 2) to see that natural flows are maintained and where those flows have been disrupted by human intervention, to see that they are

regulated to protect and reclaim the river ecosystem by approximating natural flows, and 3) to preserve and restore the native riparian and riverine biodiversity. Amigos Bravos supports the environmentally sound, sustainable traditional ways of life of indigenous cultures and holds that environmental justice and social justice go hand in hand.

Amigos Bravos' Board of Directors adopted the Amigos Bravos Strategic Plan in July 2003. That Strategic Plan identifies the use of state and federal regulatory processes to stop ground and surface pollution migrating from LANL facilities as a key component of Amigos Bravos' work, particularly the organization's work to protect and restore water quality and quantity in White Rock Canyon.

Amigos Bravos believes that state ground water discharge permits provide the public with a unique opportunity to work with the State, and the polluting facility, to develop the best possible protection for ground water in both the short term and after closeout of the facility. By preventing additional pollution from being released, and by requiring clean up of historic releases, the public's right to clean water will be protected. The proposed issuance of discharge permit DP-1132 to LANL provides Amigos Bravos with an opportunity to serve New Mexico's citizens by protecting the state's future drinking water resources while furthering its mission.

Amigos Bravos' extensive membership includes a substantial number of people who may be affected by contamination from the Facility.

Amigos Bravos' membership of more than 1,600 people reflects the geography of its constituency, with about 80 percent residing in-state. Within New Mexico, a substantial number of the members live in Los Alamos, Santa Fe, and Albuquerque. Because contaminants discharged by the Facility may reach ground water, the Amigos Bravos members who live in Los Alamos are at risk from contamination discharged by that Facility. Since discharges from that Facility also have the potential to reach the Rio Grande, Amigos Bravos members in Santa Fe and Albuquerque are at risk from contamination released by that Facility. There are therefore a substantial number of Amigos Bravos members who may be affected by discharges governed by proposed discharge permit DP-1132.

On the basis of the interests of Amigos Bravos' membership alone, there is significant public interest in the proposed discharge plan DP-1132. Moreover, Amigos Bravos is not the only organization that is requesting a public hearing concerning proposed discharge plan DP-1132. A similar request is being made by Concerned Citizens for Nuclear Safety, a non-profit organization based in Santa Fe that has a long standing interest in the operations of the LANL, and whose request is backed by that group's Board of Directors, Staff, and membership.

William C. Olson
August 4 2005
Page 4

There is therefore significant public interest in the draft DP-1132, and the NNAED Secretary should grant this and other requests for a public hearing.

Comments on the draft DP-1132.

These comments are divided into the following categories. Comments on the impacts of discharges from the Facility, questions about the need to discharge from the Facility and the alternatives to discharging from the Facility, comments on effluent limits, information that is needed in order to evaluate the impacts of the discharges from the Facility, comments concerning the wastes that are taken into and processed in the Facility, joint and several liability among the permittees for obligations under the permit, covenants and questions about the treatment and disposal of non-liquid wastes generated at the facility, comments on the monitoring measures called for by the draft discharge permit, comments concerning the provision of monitoring and other data to members of the public, comments on the proposed closure plan for the Facility, comments on the need for a financial assurance for the discharge permit, comments on the relationship of DP-1132 to the Compliance Order on Consent entered into between the NNAED, the DOE, and the University on March 1, 2005 ("the Compliance Order"), and comments on the retention of records by the permittees.

These comments are not meant to address all issues that exist or may arise with respect to the proposed discharge permit. Amigos Bravo reserves the right to raise other issues in other contexts, including negotiations and a public hearing, concerning the proposed permit.

Discharges from the Facility have the potential to impact ground water and down gradient surface water.

The potential for contaminants from Technical Area 50, where the Facility is located, to reach the Rio Grande was documented by George Rice in *New Mexico's Right to Know: The Potential for Groundwater Contaminants from Los Alamos National Laboratory to Reach the Rio Grande*, Prepared for Concerned Citizens for Nuclear Safety, Second Technical Report, July 2004 ("the Rice Report"). As that report indicates, there are pathways by which the contaminants released from this and other LANL facilities, can travel through ground and surface water between LANL and the Rio Grande. Rice Report, 34-35.

The discharge permit should require that LANL evaluate alternatives to discharges from the Facility.

The Regulations provide that the NMED may require information that may be necessary to demonstrate that a discharge will not result in an exceedence of standards at any place where water may be withdrawn now or in the reasonably foreseeable future. NMAC §20.6.2.3106, C(7). Because contaminants discharged from the Facility may cause such an exceedence of standards in ground or surface water that is down gradient and down stream from the Facility, the proposed discharge plan should require LANL to evaluate whether discharges from the Facility are necessary.

Elimination or minimization of discharges from the Facility could be accomplished through advanced treatment technologies which could render any potential discharges free of contaminants and available for re-use by LANL. Even if an evaluation demonstrates that discharges are necessary, the discharge permit should mandate that LANL recycle water treated in the Facility to the maximum extent possible.

The discharge permit's effluent limits should be revised.

The effluent limit for gross alpha particle activity in the draft discharge permit is 30 pCi/L (draft discharge permit, Introduction), but that is twice the U.S. Environmental Protection Agency's drinking water standard of 15 pCi/L. The discharge permit's limit should be reduced to be consistent with that drinking water standard. In addition, the effluent limit for perchlorate is 4ug/L (*id.*) even though LANL claims that the Facility has reduced perchlorate concentrations to less than 1 ug/L. The discharge permit should reflect the lower concentration that LANL has stated is being achieved. The discharge permit also should set limits on discharges of volatile organic compounds and semi-volatile organic compounds.

The Bureau needs more information before it can properly evaluate discharges from the Facility.

The Bureau does not have adequate information about the impact of past discharges from the Facility on surface and ground water in Mortandad Canyon and further down gradient to be able to determine accurately the effects that discharges from the Facility will have. Studies are needed to determine where discharges from the Facility travel and what their effect is on the existing contamination in the ground water and soil. For these and other reasons, DP-1132 should include flexibility that allows for appropriate modification of the permit as information becomes available, particularly through the investigations called for by the Compliance Order. Any modifications that are proposed should be considered in a process that includes public involvement. See NMAC §20.6.2.3108.A.

William C. Olson
August 4, 2005
Page 6

The Bureau also lacks necessary information about the wastes being treated at the Facility. For example, the Bureau should know whether it would be possible to separate waste that includes radionuclides from waste that does not prior to shipment or transfer of the waste to the Facility. The Bureau also should know whether waste containing radionuclides can be separated from waste that does not contain radionuclides prior to discharge of the waste from the Facility. In addition, the Bureau needs to know the chemistry of each of the effluent streams to be treated. This should include information on total and dissolved concentrations of all constituents regulated by the WQCC. It also should include information on the chemistry of waters that receive discharges from the Facility. If waters at other LANL technical areas receive discharges from the Facility, the Bureau should know the chemistry of those waters as well as their depth.

DP-1132 should set forth requirements concerning the wastes that are transported to the Facility and processed there.

It is appropriate to include in the draft permit the provision that restricts the facilities that may pump liquid waste to TA-50 through the Radioactive Liquid Waste Collection System (RLWCS) via double encased pipe or transport liquid waste to TA-50 by truck. The permit also should specify that any modification of this provision should require approval by the Bureau after a process involving input from the public.

The discharge permit should specify joint and several liability among the permittees.

The proposed discharge permit is addressed to DOE and the University, but it does not indicate which of those entities is responsible for what actions under the permit. In order to make clear that each of the permittees is responsible for everything called for by the permit, it should specify that the two parties are jointly and severally liable for all of the actions to be performed under the permit.

The discharge plan should address the nature, treatment, and disposal of non-liquid wastes that are generated at Facility.

In order to insure that non-liquid wastes that are generated at the Facility do not cause exceedences of standards elsewhere, the discharge permit should specify the treatment process at Technical Area 53 for evaporator distillate and reverse osmosis permeate that do not meet the criteria for discharge to Mortandad Canyon. The permit also should specify whether further treatment is required if these wastes do not meet the criteria for discharge at Technical Area 53, and should indicate where these wastes are treated and disposed.

In addition, the discharge permit should address solids removed from the primary clarifier and TUF unit, which are referred to in Operational Plan Condition No. 3, as well as the management of solids generated by treatment and proposed to be disposed of at Technical Area 54. The discharge permit also should cover containment of these wastes, whether there is a contingency plan for them, and what, if any, risk their storage and disposal pose to ground or surface water. The same considerations should be addressed for evaporator bottoms that are used in connection with Operation Plan Condition No. 3.

The discharge permit also should address those issues for the other wastes described in Operational Plan Condition No. 3. The discharge permit should include management plans and treatment for sludges, scale and other solids generated by treatment processes at Technical Area 50, such as clarifier underflow, filtration wastes, reverse osmosis concentrates, pipe scale, etc. These wastes are likely to include radionuclides, metals and organics removed from treated waste streams, and the discharge permit should provide for their management and disposal so that they do not cause ground water contamination.

The discharge plan should include additional provisions relating to monitoring and reporting.

The draft discharge permit's provisions on Monitoring, Reporting, and Other Requirements mandate monitoring of effluent quality for each effluent batch (Monitoring, Reporting, and Other Requirements, ¶13), but indicates that results must be reported only on a quarterly basis. The discharge permit should be changed to require that any exceedences that are found should be reported immediately.

The Monitoring, Reporting, and Other Requirements portion of the draft discharge permit also calls for monitoring at several specified wells. Monitoring, Reporting, and Other Requirements, ¶14. Two of those monitoring wells, MCOBT-4, 4 and TW-8 are being replaced, however, and the discharge permit should require monitoring at the replacement wells. In addition, several new monitoring wells have been installed in Mortendad Canyon. The permit should require monitoring at those wells also.

The discharge plan should provide for making monitoring and other data available to members of the public in real time.

Several provisions of the draft discharge permit require monitoring and reporting to the NMED. See, e.g., Monitoring, Reporting, and Other Requirements ¶¶9-14 and Contingency Plans ¶¶15-19. The discharge permit should mandate that the results of those and other monitoring and sampling procedures be made available to the members of the public at the time that they are submitted to the NMED. Such results can be made available

William C. Olson
August 4, 2003
Page 8

by electronic mail to members of the public who have requested ongoing information, for other members of the public, results could be posted on a web site.

The discharge plan should provide a more specific closure plan.

The Regulations specifically provide for requirement of closure plans as part of discharge permits, and list several specific items that should be addressed in those plans (NMAC §20-6-2.3107.A(11)). Despite that, the proposed discharge permit's closure plan provides little in the way of details about closure and post-closure activities. Existing contamination in Montezuma Canyon has not been characterized adequately to develop a detailed closure plan that addresses remediation of existing ground water contamination and contaminated soils that could lead to further ground water contamination. For that reason, the discharge permit should include a closure plan that provides for alternative contingency plans to address contamination that is found.

Those alternative contingency plans should take into account that existing ground water contamination has the potential to affect ground water used for drinking water. Those plans also should take into account ground water management, including ground water pumping, treatment and discharge of treated water will most likely be necessary to protect state resources and public health. Because existing soils contamination has the potential to cause additional ground water contamination, those plans also should address remediation of soils, including excavation, treatment and/or location in a suitable repository.

Finally, a cost estimate should be provided based on the tasks included in the closure plan, and a corresponding financial assurance should be required in order to ensure that funds are available for the State of New Mexico to carry out those plans in the event that the permittees fail to carry out the necessary actions.

DP-1132 should require the posting of a financial assurance by LANL.

Because of the need for a closure plan, and because the discharges from the Facility may result in the need for remediation, DP-1132 should require the posting of a financial assurance to cover necessary costs in the event that the permittees are not able to pay for them. The Regulations specifically provide for requiring financial assurances (NMAC §20-6-2.3107.A(11)), and the potential costs involved in reclaiming and remediating contamination caused by the Facility are such that such a requirement is appropriate here. In accordance with financial assurance mechanisms requirements in other contexts, the financial assurance should be in the form of a trust account, a letter of credit, or an insurance policy, and must be payable to the State of New Mexico.

William C. Olson
August 4, 2005
Page 6

The Bureau should connect DP-1132 to the Compliance Order.

The Compliance Order is a comprehensive document calling for investigation of contamination at and around LANL facilities, including this Facility and Mortendad Canyon. Specifically, the Compliance Order calls for LANL to enhance its monitoring program in Mortendad Canyon and to provide NMED with a number of documents and reports regarding ground water in the canyon system. These data and reports may contain new information requiring action in order to protect ground water.

Therefore, in order for DP-1132 to control appropriately the discharge of water contaminants from LANL operations to ground and surface water, the Bureau should tie DP-1132 to the Compliance Order. In other words, the Bureau should include in DP-1132 provisions for taking action based on the results of the investigations mandated by the Compliance Order. DP-1132 also should provide for public involvement in decisions to be made on the basis of Compliance Order investigations results.

The discharge permit should call for the indefinite retention of records generated pursuant to the permit.

The draft discharge permit indicates that records generated pursuant to the permit shall be retained for a period of at least five years. Closure Plan ¶25. Because of the longevity of the contaminants that are in the wastes handled by the Facility, that period is not sufficient. The discharge permit should require that those records be retained indefinitely.

Conclusion

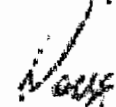
The draft discharge permit should be revised to include the additional requirements discussed above. It also should include provisions to insure that members of the public are kept informed about operations at the Facility.

We would appreciate your confirming that you have received this request for a public hearing and these comments. We also would appreciate hearing from you when the Secretary has determined whether a public hearing will be conducted.

Thank you for your cooperation.

William C. Olson
August 4, 2005
Page 10

Yours truly,


Douglas M. Klejohn
Attorney

Copies to:

Brian Shields
Executive Director
Amigos Bravos

Joni Arends
Executive Director
Concerned Citizens for Nuclear Safety



Communities for Clean Water

A Northern New Mexico Network



December 12, 2013

Mr. Jerry Schoeppner, Bureau Chief
Ms. Jennifer Fullam, Environmental Scientist
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 5469
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Via email to: Jerry.Schoeppner@state.nm.us and Jennifer.Fullam@state.nm.us

Re: Second Set of Comments and Hearing Request of the *Communities for Clean Water*,
Tewa Women United and three individuals on the proposed permit DP-1132

Dear Mr. Schoeppner and Ms. Fullam:

Below are the Second set of Comments and the Hearing Request of *Communities for Clean Water* ("CCW"), *Tewa Women United* ("TWU") and individuals *Kathy WanPovi Sanchez*, *J. Gilbert Sanchez* and *Robert H. Gilkeson*, *Independent Registered Geologist*, as referenced above. We incorporate herein by reference the hearing request in our first set of comments and the materials set forth in attached Appendices A - H. The second set of comments are page numbered to follow the first set of comments.

We thank you in advance for your careful attention to these comments and look forward to an opportunity to attempt to resolve the issues raised by the First and Second Set of Comments in a cooperative manner with your agency and the permit applicant.

Respectfully submitted:

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Kathy WanPovi Sanchez, J. Gilbert Sanchez and Robert H. Gilkeson*

IV. INTRODUCTION TO SECOND SET OF COMMENTS

A. Acknowledging Our Government's Occupation and Pollution of Sacred Places.

In the support of the statements made in the first set of comments, dated December 6, 2013, we cite the following Declarations of Indigenous Women. The Declarations state the threats and harms from dangerous industries such as is the Los Alamos National Laboratory nuclear, chemical and biological weapons complex. Recommendations are made and references to actions being taken to restore justice and well-being to Indigenous communities. The Declarations are attached to these comments in Appendices B through F. The information therein documents the environmental justice aspects of this permit.

1. *Las Mujeres Hablan: The Women Speak - Women's Declaration for New Mexico 2010*

9. Be it further resolved that we will support the work of **Las Mujeres Hablan**. (New Mexico Acequia Association (NMAA); Honor Our Pueblo Existence (HOPE), Tewa Women United (TWU); Concerned Citizens for Nuclear Safety (CCNS); Embudo Valley Environmental Monitoring Group (EVEMG); New Mexico Conference of Churches (NMCC); Community Service Organization (CSO) Del Norte

Mission: To address past, present and future issues arising from the nuclear industry's releases of toxic chemicals and radioactive materials that cause contamination to our land, air, and water; demand clean-up of these sites; question the continued manufacturing of nuclear weapons; and restore justice to the Peoples who have been impacted by this industry. And, address other activities that violate and cause harm to our environment and well-being within the Sacred Mountains of New Mexico and other places in the world,

2. *Indigenous Women and Environmental Violence, A Rights-based approach addressing impacts of Environmental Contamination on Indigenous Women, Girls and Future Generations. Submitted to the United Nations Permanent Forum on Indigenous Issues Expert Group Meeting Combating Violence Against Indigenous Women and Girls, January 18 – 20, 2012, United Nations Headquarters, New York, by Andrea Carmen, International Indian Treaty Council and Indigenous Women's Environmental and Reproductive Health Initiative, and Viola Waghiyi, Native Village of Savoonga, St. Lawrence Island, Alaska and Alaska Community Action on Toxics – Theme 2: Contextualizing Violence.*

From a traditional perspective, the health of our Peoples cannot be separated from the health of our environment, the practice of our spirituality and the expression of our inherent right to self-determination, upon which the mental, physical and social health of our communities is based.

--- IITC Oral Intervention presented by Faith Gemmill, Gwich'in Nation Alaska
United Nations Working Group on Indigenous Populations, Geneva July 31, 1996

3. *Report of the International Indigenous Women's Environmental and Reproductive Health Symposium*, April 27th – 29th, 2012, Chickaloon Native Village, Alaska. Co-hosted by the International Indian Treaty Council (IITC) and Indigenous Women's Initiative for Environmental and Reproductive Health, Alaska Community Action on Toxics (ACAT), Chickaloon Native Village and International Indigenous Women's Forum (FIMI). Submitted to the 11th Session of the United Nations Permanent Forum on Indigenous Issues as a Conference Room Paper by the International Indian Treaty Council, Indigenous Non-governmental Organization in General Consultative Status to the United Nations Economic and Social Council. May 5th, 2012. Kathy WanPovi Sanchez of Tewa Women United and Marian Naranjo of Honor Our Pueblo Existence participated in the Symposium and signed the Report.

Based on these shared understandings, we adopt by consensus this ***2nd DECLARATION for the Health, Survival and Defense of OUR LANDS, OUR RIGHTS and our FUTURE GENERATIONS and make the following recommendations:***

That Indigenous Peoples, Nations and Communities:

- 1) Identify and document the disproportionate impacts of environmental toxins on Indigenous women and children as "environmental violence" for which States and corporations can be held accountable.
- 2) Provide community capacity-building and training linking reproductive and environmental health and human rights.
- 3) Maintain, support, strengthen and assert traditional systems of law, community organization, decision-making, leadership and representation.

4. *Sovereignty: Long Live Mother Earth – Women's Declaration 2012: Year of Indigenous Women*, by Las Mujeres Hablan: The Women Speak, which include Honor Our Pueblo Existence, Tewa Women United, and Concerned Citizens for Nuclear Safety.

29. Be it further resolved that we will work in solidarity with each other in our struggles to defend the air, land, and water from contamination, exploitation, and militarization,

30. Be it further resolved that we honor, respect, and recognize the dignity of women and their families throughout the world and here at home who are subjected to exposure to toxins through their work, their food, or their proximity to pollution and that we resolve to speak and act in solidarity with them in efforts to defend the health of their families and communities,

31. Be it further resolved that we will continue to play an important role in reshaping our communities to achieve a vision of safe, healthy, and joyful lives for our families and communities with good, healthy and locally grown food, good livelihoods that honor the dignity of every human person, and a meaningful and spiritual relationship with Mother Earth.

5. *References to Indigenous Women in the ALTA Outcome Document*, Compiled and submitted to the World Conference of Indigenous Women, October 28 – 30, 2013, Lima Peru, by Andrea Carmen (North America Region) and Mililani Trask (Pacific Region).

Recommend that States uphold and respect the right of self determination and the free, prior and informed consent of Indigenous Peoples who do not want mining and other forms of resource extraction, “development” and technologies deemed as degrading to their human, cultural, **reproductive** and ecosystem health. Where mining and other forms of resource extraction are already occurring, States shall develop mechanisms with the full and effective participation of Indigenous Peoples to develop a comprehensive strategy for ecologically sustainable and equitable development to end and prevent uncontrolled and unsustainable industrial contamination and degradation with plans for clean-up, remediation and restoration. Such as strategy shall incorporate strengthening the capacity of Indigenous youth in relation to sustainable development practices based on Indigenous knowledge and the relationship with the land as well as the protection and promotion of the important role of traditional knowledge holders including Indigenous Elders and **women**; (**Theme 1: Indigenous Peoples’ lands, territories, resources, oceans and waters, Paragraph 6**)

V. SUPPLEMENT TO SECTION II, GENERAL COMMENTS ON THE PERMIT.

A. Second Set of General Comments on DP-1132.

Appendix A to these comments provides the analysis and comment of Independent Registered Geologist Robert H. Gilkeson on the ground water monitoring issues related to the permit. Appendices B through F contain documents related to the environmental justice issues involved in this permit. Appendix G to these comments demonstrates that we have been denied ready access to documents necessary to fully and effectively analyze the potential human health impacts of the Radioactive Liquid Waste Treatment Facility operations sanctioned by the permit. Appendix H to these comments provides documentation of the lengthy history of the attempt to regulate this facility and obtain public hearings of the permit.

1. Commenters - Section II.A.4. **DOE-IG Report.** We are concerned about the issues raised in the September, 2013 U.S. DOE, Office of Inspector General, Office of Audits and Inspections report entitled, *The Radioactive Liquid Waste Treatment Facility Replacement Project at Los Alamos National Laboratory*, OAS-L-13-15.¹ We

¹ See <http://energy.gov/ig/downloads/audit-report-oas-l-13-15>

incorporate this report herein by reference. It is ironic that, according to the DOE report, LANL wasted \$100,000,000 on planning a new facility, yet, now that the permit is pending LANL ignores studies it has done since the 1970s which conclude that the existing facility can be converted to have “zero discharge”. It confounds reason that LANL spent that much money and never built a facility. We contend that this is further evidence that LANL should be forced to seek a Resource Conservation and Recovery Act (RCRA) permit for this facility as a hazardous waste treatment facility – and go to zero discharge within one year of issuance of the permit.

2. Commenters - Section II.A.5. **Effluent Quality Limits for Discharges to the MES and SET.** The waste treatment processes under this draft permit presents a regulatory intersection of DOE self-regulation, an NMED draft ground water discharge permit, and EPA regulation of the radionuclide air emissions from LANL. *See generally*, 40 CFR 61, Subpart H. We have been in communication with LANL and EPA staff since November 1, 2013 in order to obtain documents about the evaporation of inorganic chemicals, nitrogen compounds and radioactivity from the Solar Evaporative Tank System (SET) and Mechanical Evaporator System (MES). Because of the incomplete responses, on November 27, 2013 we have had to file Freedom of Information Act (FOIA) requests with both DOE/LANL and EPA. *See generally* Appendix G, Copies of FOIA requests and responses.

We have learned that the MES may be designated by LANL as TA-50-257. It is a non-monitored emission source under 40 CFR 61, Subpart H. *See* 2011 LANL Radionuclide Air Emissions Report, LA-14458 at 21. The annual report to EPA, however, does not mention the SET and how its emissions are being monitored. *See id.*, and 2012 LANL Radionuclide Air Emissions Report, LA-14469. Given the extremely large volumes of evaporated liquid from these two evaporation units and the potential inorganic chemical and radioactive constituents of the liquid – see DP-1132 at 20-21-- there is a serious issue concerning the apparent lack of monitoring to demonstrate that the established effluent limits on the evaporators is appropriate for the protection of public health and ground water quality. We reserve the right to supplement these comments once we have secured all the information requested under FOIA. *See generally*, Appendix G.

VI. SUPPLEMENTAL COMMENTS ON SPECIFIC PORTIONS OF THE PERMIT.

A. Supplementing previous comments on specific permit conditions as follows:

1. **Section IV.B.25. Effluent Sampling at 26.** COMMENT: The Permittees should be required to post their submittal to NMED when no discharge occurs for any calendar month.

2. Section VI.E.51. Modifications and Amendments at 46. COMMENT: The Permittees should be required to post any proposed modifications and amendments to the discharge to the Electronic Public Reading Room. *See* Section VII below.

3. Sections VI.B. 26, 27, 28 and other portions of the permit dealing with ground water monitoring issues. COMMENT: Ground water monitoring issues are extensively addressed in Appendix A to these supplemental comments. Appendix A was prepared by Independent Registered Geologist Robert H. Gilkeson. We incorporate herein by reference the observations and conclusions in Appendix A and note generally that Mr. Gilkeson's analysis and comments make clear that a rewrite of the water quality monitoring program is necessary to address the appropriate location and construction of new monitoring wells. This must include replacement of the existing antiquated monitoring and characterization wells, and augmentation of a number of new wells to protect the regional aquifer and to monitor potential seepage and discharges from the tritium evaporation tanks

4. Section VI.B.26. Soil Moisture Monitoring System for the SET at 27. COMMENT: In addition to comments on this issue incorporated from Appendix A, there should be a requirement to establish a baseline for the probe and an action level and the soil moisture detection action level and requests an opportunity to discuss this concern with NMED. Also, the permit should only provide LANL thirty (30) days to repair a failure of the moisture monitoring boreholes and neutron probes.

VII. EXPANDED PUBLIC PARTICIPATION AND NOTIFICATION.

A. We appreciate that NMED required the Permittees to post submittals to NMED and NMED's response to LANL's Electronic Public Reading Room (EPRR). In some sections of the draft permit, however, the Permittees are required to post their submittal and NMED response at the same time. *See* Section IV.A.3. In other sections, the Permittees are required to post their submittal promptly and subsequently, to post the NMED response. *See* Section VI.C.30. In order to be transparent, we request that the Permittee's submittal be posted when submitted to NMED. Upon receipt of NMED's response, we request a requirement that the Permittees post - in a timely manner - the NMED response to the EPRR. We note below the sections requiring this change:

1. Section VI.A. Operational Plan

- 3) Submittal of Plans and Specifications
- 12) Freeboard

2. Section IV.B. Monitoring and Reporting

- 26) Soil Moisture Monitoring System for the SET
- 28) Ground Water Monitoring

3. Section IV.C. Contingency Plans

- 29) Containment
- 31) Settled Solids Removal
- 32) Damage to Structural Integrity
- 33) Freeboard Exceedance
- 34) Effluent Exceedance
- 35) Soil Moisture Detection System Exceedance
- 36) Monitoring Well Location
- 37) Monitoring Well Construction
- 38) Ground Water Exceedance
- 39) Spill or Unauthorized Release
- 40) Failures in Discharge Plan/Discharge Permit

4. Section VI.D. Closure

- 42) Stabilization of Individual Units and Systems
- 43) Final Closure Plan
- 44) Final Closure
- 45) Post-Closure Ground Water Monitoring
- 46) Termination

5. Section VI.E. General Terms and Conditions

- 51) Modifications and Amendments
- 56) Right to Appeal
- 57) Transfer of Ownership

Appendix A

To CCW, TWU and Individual Public Comments and Hearing Request - DP-1132

Deficiencies in Ground Water Protection in the Draft Ground Water DP-1132 Permit, by Independent Registered Geologist Robert H. Gilkeson

The five groundwater monitoring wells in the draft discharge permit for the LANL TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) are not reliable to detect:

1. groundwater contamination from past, present or future leaks below the RLWTF, which began operations in 1963;
2. groundwater contamination from waste water discharged from the 051 outfall located 1,100 feet to the north of the RLWTF (Outfall 051 began discharges in 1963); or
3. groundwater contamination from leaks below the Solar Evaporative Tank System (SET) at Technical Area 52 located a considerable distance to the east of the RLWTF.

The factors necessitating replacement of the wells are described below. The New Mexico Environment Department (NMED) is required to order the Permittees (the Department of Energy (DOE) and Los Alamos National Security, LLC (LANS)) to replace the wells. Significantly, the five groundwater monitoring wells in the draft discharge permit do not comply with the NMED well construction requirements. *See generally*, NMED GWQB, *Monitoring Well Construction and Abandonment Guidelines, Revision 1.1* (March 2011).

The five groundwater monitoring wells are listed on page 29 in the Draft Discharge Permit for the TA-50 RLWTF as follows:

- a. **MCO-3-** previously constructed and located in the alluvial aquifer presumed to be hydrologically downgradient of Outfall 051.
- b. **MCO-7-** previously constructed and located in the alluvial aquifer presumed to be hydrologically downgradient of Outfall 051.
- c. **MCOI-6-** previously constructed and located in the intermediate aquifer presumed to be hydrologically downgradient of Outfall 051.
- d. **R-46-** previously constructed and located in the regional aquifer, downgradient of the RLWTF.
- e. **R-60-** previously constructed and located in the regional aquifer, downgradient of the RLWTF.

Figure 1 on the top of page 3 displays the locations of the five monitoring wells. Figure 1 shows the location of the LANL RLWTF in TA-50 approximately 400 feet north of the center of the LANL waste disposal dump known as Material Disposal Area (MDA) C. Figure 1 also shows the location of Outfall 051 approximately 1,400 feet north of the RLWTF. Outfall 051 discharges to Effluent Canyon; a tributary to Mortandad Canyon. Discharges to Outfall 051 began in 1963 coincident with the start of the treatment of radioactive liquid wastes at the RLWTF (see Figure 2).

Figure 1 is a contour map of groundwater flow at the water table of the regional aquifer below and away from MDA C, the RLWTF, and Outfall 051. The elevation of the water table of the regional aquifer is displayed on Figure 1 by the blue contour lines. The direction of groundwater flow at the water table is perpendicular to the contour lines along a trend from higher to lower elevations. From west to east on Figure 1, the bold blue contour lines show the elevation of the water table declines by 100 feet from 5950 feet above mean sea level (ft amsl) to 5850 ft amsl.

However, Figure 1 does not provide accurate knowledge of the direction of groundwater flow away from MDA C, the RLWTF, or Outfall 051. For example, the uncertainty in the direction of groundwater travel in the regional aquifer east of MDA C is displayed by the pair of red arrows on Figure 1. They show that the actual direction of groundwater travel at the water table may be to the northeast or to the southeast. The great uncertainty in the direction of groundwater travel in the vicinity of MDA C, the RLWTF and Outfall 051 is due to the lack of an adequate number of monitoring wells installed at the water table in the regional aquifer.

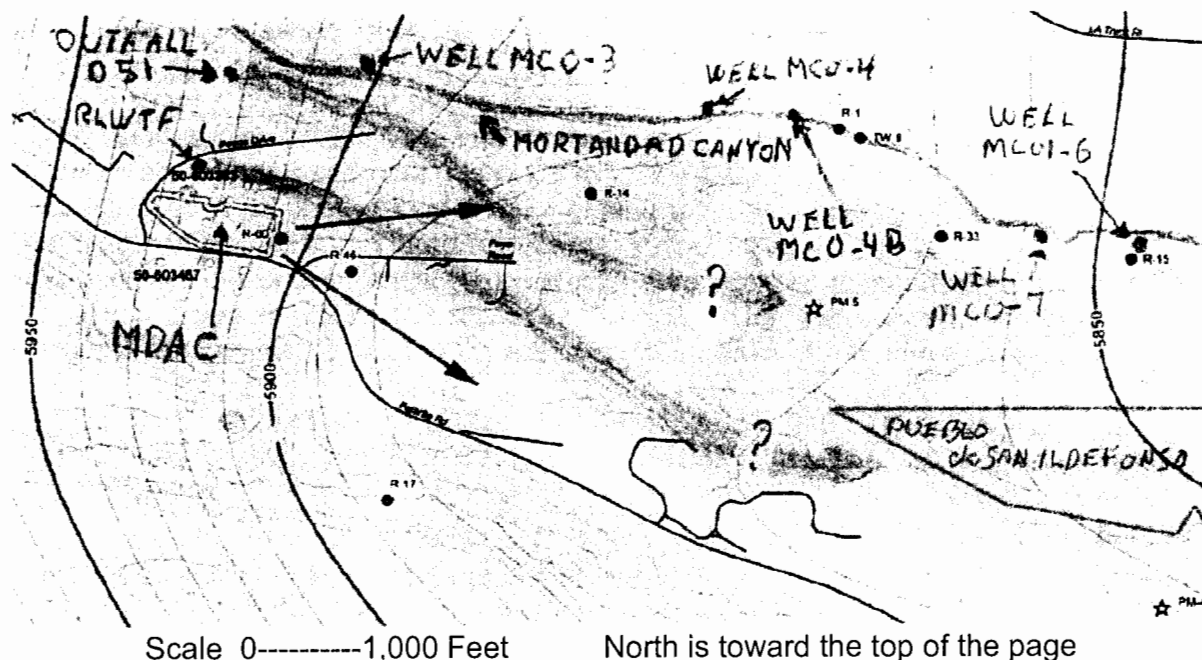
Indeed, the LANL September 2012 report titled *Corrective Measures Evaluation Report for Material Disposal Area C, Solid Waste Management Unit 50-009 at Technical Area 50* (LA-UR-12-24944) on page F-2 described the need for monitoring wells in the vicinity of the RLWTF and Outfall 051 as follows:

Groundwater flow directions and magnitudes that control contaminant transport in the aquifer are generally dictated by the shape of the regional water table. However, the groundwater flow directions in the regional aquifer beneath MDA C are uncertain because of the low density of existing wells in the vicinity of MDA C; more specifically, the water-level data for defining regional flow directions west and north of MDA C are limited.

NMED is required to order the Permittees to install the necessary number of additional monitoring wells for accurate knowledge of the direction and speed of groundwater travel at the water table for MDA C, RLWTF, and Outfall 051. See generally, NMED GWQB, *Monitoring Well Construction and Abandonment Guidelines, Revision 1.1* (March 2011).

Regional aquifer monitoring wells R-46 and R-60 do not monitor groundwater contamination from the TA-50 RLWTF or from Outfall 051. The draft discharge permit has made a serious mistake to describe wells R-46 and R-60 as hydraulically downgradient from the RLWTF. The information on Figure 1 is irrefutable evidence that wells R-46 and R-60 are **NOT** hydraulically downgradient of the TA-50 RLWTF or Outfall 051. The two gray groundwater flow lines on Figure 1 show that there are no LANL monitoring wells installed in the regional aquifer at appropriate locations to detect contaminated groundwater from the LANL RLWTF or from outfall 051.

Figure 1. Locations of the existing regional monitoring wells near MDA C, including the elevation of the regional water table representative of September 2010. Reproduced with additional annotations from *Corrective Measures Evaluation Report for Material Disposal Area C, Solid Waste Management Unit 50-009 at Technical Area 50* (LA-UR-12-24944, September 2012) at Figure F-1.0-1.



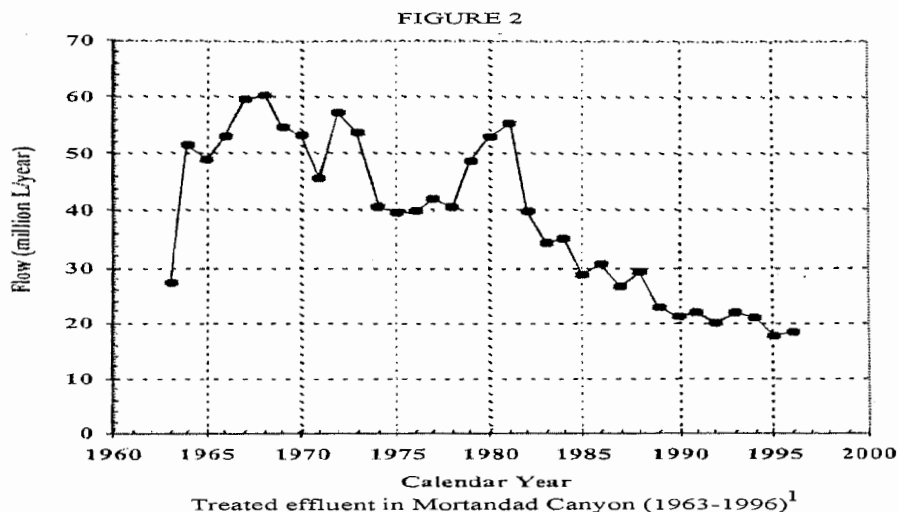
- The red arrows east of MDA C represent the large uncertainty in the direction of groundwater flow at the water table of the regional aquifer east of MDA C, RLWTF, and Outfall 051.
- The blue contour lines on Figure 1 are the elevation of the water table of the regional aquifer. The water table declines by more than 100 feet from west to east. The blue contour lines are based on the network of R-wells installed in the regional aquifer. The spacing of the blue contour lines is close below MDA C, the RLWTF, and Outfall 051 with a wide spacing of the contour lines in the region to the east. The close spacing identifies a high hydraulic gradient present in the immediate vicinity of MDA C, the RLWTF and Outfall 051.
- Accurate knowledge of the hydraulic gradient is necessary to calculate an accurate speed of groundwater travel in the regional aquifer. The high hydraulic gradient requires installation of a minimum of two monitoring wells at the water table of the regional aquifer immediately east of the RLWTF and immediately east of Outfall 051. This is demonstrated on Figure 1 by the location of well R-60 close to the eastern side of MDA C and well R-46 located 800 feet east of well R-60.
- Figure 1 shows that Outfall 051 is located close to the confluence of Effluent Canyon with Mortandad Canyon.
- On Figure 1, the upper gray flow line shows the direction of groundwater flow at the water table of the regional aquifer below and away from Outfall 051 is toward Los Alamos County Drinking Water Well PM-5. The very large amount of waste water discharged from Outfall 051 displayed in Figure 2 for the years 1963 to 2000 may have caused groundwater

contamination in the regional aquifer. The requirement to install a minimum of two monitoring wells in the regional aquifer close to the east side of Outfall 051 was described earlier.

--The distance from Outfall 051 to well Los Alamos County Drinking Water Well PM-5 is approximately 6,100 feet. There is a requirement to install two monitoring wells in the regional aquifer close to the west side of well PM-5. One well installed at the water table of the regional aquifer and the second well installed at the depth of the top of the well screen in well PM-5. The two monitoring wells will provide important information on the hydraulic interaction of pumping well PM-5 on the elevation of the water table of the regional aquifer in the vicinity of well PM-5. The two wells will also serve as sentry wells for the detection of contaminated groundwater. LANL has already installed two sentry wells, R-35a and R-35b, close to Los Alamos County Drinking Water Well PM-3 in order to provide early knowledge of the migration of the large chromium plume to well PM-3. The request duplicates LANL efforts to provide an early warning for the Los Alamos County drinking water wells.

– On Figure 1, the lower gray flow line shows the direction of groundwater flow at the water table of the regional aquifer below and away from the RLWTF toward the property of the Pueblo de San Ildefonso.¹ The distance from the RLWTF to the Pueblo property line is approximately 6,800 feet. The requirement to install two monitoring wells in the regional aquifer close to the eastern side of the RLWTF because of the high hydraulic gradient was described earlier. In addition, there is a minimum requirement to install two monitoring wells at the water table in the regional aquifer close to the boundary of the Pueblo de San Ildefonso. The two wells are necessary because of the great uncertainty in the actual direction of groundwater flow below and away from the RLWTF.

-Outfall 051 discharged large volumes of liquid wastes from the LANL RLWTF into Effluent Canyon for more than 50 years beginning in 1963. Treated RLWTF effluent volumes were as much as 60 million liters per year. See Figure 2 below.²



¹ References herein to Pueblo de San Ildefonso are solely for the purpose of describing the direction of ground water flow from the LANL property.

² D. Moss et al., *Elimination of Liquid Discharge to the Environment from the TA-50 Radioactive Liquid Waste Treatment Facility*, LA-13452-MS, UC-902 (1998) at Figure 1, "Treated RLWTF Effluent to Mortandad Canyon (1963 – 1996)."

In summary: Figure 1 shows that there are no monitoring wells at appropriate locations to detect groundwater contamination in:

1. the shallow alluvial aquifer close to and downgradient from Outfall 051;
2. in perched aquifers close to and downgradient of Outfall 051;
3. at the water table in the regional aquifer close to and downgradient from Outfall 051; and
4. at the water table in the regional aquifer close to the western side of Los Alamos County Well PM-5.

The immediate installation of monitoring wells to address the above four omissions is a requirement in Section VI.C.36 and 37 for the draft discharge permit for the TA-50 RLWTF.

Further, Figure 1 also shows that there are no monitoring wells at appropriate locations to detect groundwater contamination in:

1. perched zones below the RLWTF;
2. at the water table in the regional aquifer below and downgradient of the RLWTF;
3. at the water table of the regional aquifer on the property of the Pueblo de San Ildefonso; and
4. at the water table in the regional aquifer close to the western side of Los Alamos County Well PM-4.

The immediate installation of monitoring wells to address the above four omissions is a requirement as described above for the draft discharge permit for the TA-50 RLWTF.

The NMED Ground Water Quality Bureau (GWQB) made a serious mistake by identifying wells R-46 and R-60 as ***“previously constructed and located in the regional aquifer, downgradient of the RLWTF.”*** There is substantial information on record in LANL reports that the two wells are NOT hydraulically downgradient of the RLWTF.

In fact, Section VI.C.36 in the draft RLWTF Discharge Permit describes the replacement process to be followed when information shows a monitoring well is not located hydrologically downgradient of the discharge location it is intended to monitor as follows:

36. MONITORING WELL LOCATION - In the event that ground water flow information obtained pursuant to this Discharge Permit indicates that a monitoring well is not located hydrologically downgradient of the discharge location it is intended to monitor, NMED may require the Permittees to install a replacement well or wells. Within 30 days following receipt of such notification from NMED, the Permittees shall submit to NMED for approval a well installation work plan, describing each proposed well location, drilling methods and well specifications, and proposing a schedule for construction. Upon NMED approval, the Permittees shall construct the replacement well or wells according to the approved work plan and schedule. The Permittees'

Proposal along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://eprr.lanl.gov/oppie/service> (or as updated).

Section VI.C.36 requires the NMED GWQB to take action now, before a public hearing on the draft permit, to require the Permittees to install the required monitoring wells in the regional aquifer hydraulically downgradient of the RLWTF, Outfall 051 and also the Solar Evaporator Tank System (SET). The requirement for monitoring wells in the regional aquifer at the SET is described below.

Monitoring wells in the regional aquifer are required at the location of the SET. The draft RLWTF discharge permit includes discharge of large volumes of waste water to the "unsealed subgrade concrete structure with a single double-lined synthetic liner, and a leak detection system within the synthetic liner" for solar evaporation. See Section V.D. The soil moisture monitoring tubes do not provide adequate monitoring of leakage from the unsealed concrete tanks. **Protection of precious groundwater resources require installation of a minimum of three monitoring wells at the water table of the regional aquifer at locations close to the SET.** See Section VI.B.26.

Monitoring Wells MCO-3, MCO-7 and MCOI-6 require replacement. The NMED GWQB report, *Monitoring Well Construction and Abandonment Guidelines, Revision 1.1* (March 2011), requires that the monitoring wells MCO-3, MCO-7 and MCOI-6 in Mortandad Canyon be plugged, abandoned, and replaced with new monitoring wells. The locations of the three wells are displayed on Figure 1. These wells must be replaced before a public hearing on the draft discharge permit.

Alluvial Aquifer Monitoring Wells MCO-3 and MCO-7. The details on drilling and installation of wells MCO-3 and MCO-7 are provided in Purtymun, W.D., *Geologic and Hydrologic Records of Observation Wells, Test Holes, Test Wells Supply Wells, Springs, and Surface Water Stations in the Los Alamos Area*, LA-12883-MS (1995) ("Purtymun report").

The Purtymun report states, in pertinent part:

The earlier holes [from 1960 to 1973] were augered using a 4.5-in.-diam bit. For casing, 2-in.-diam and 3-in.-diam plastic pipe was used. These wells were not gravel packed. The casing was placed in the hole, and the annulus between the casing and the hole wall was sealed with cuttings from the hole. . . The screen section of the plastic pipe was perforated with a 1/4-in. drill bit. At the surface the hole was sealed with cement and a security cap installed. Geologic logs and construction data are shown in Table VI-B.

Id. at 69. A table in the report set forth as follows:

Observation Well MCO-3

Geologic Log
Alluvium

Sand and gravel in a matrix of silt and clay

Thickness (ft)	Depth (ft)
-------------------	---------------

Tuff (weathered in place)		
Silt and clay with some lenses of sand and gravel	11	18

Construction

12 ft of 3-in.-diam plastic pipe, lower 10 ft perforated.

Observation Well MCO-7

	Thickness (ft)	Depth (ft)
Geologic Log		
Alluvium		
Sand and gravel in a silt and clay matrix		
Tuff (weathered in place)		
Silt and clay with lenses of sand and gravel	22	77

Construction

69 ft of 3-in.-diam plastic pipe, lower 30 ft perforated.

Id. at Table VI.B.

Well MCO-3: The information provided in the Purtymun report shows that well MCO-3 was installed in 1967 in a borehole with diameter of 4.5 inches to a total depth of 12 feet. The well screen was formed by perforating the 3 inch plastic casing with a ¼-inch drill bit over the 10 foot interval from 2 feet to 12 feet below ground surface.

Well MCO-7: The information provided in the Purtymun report shows that well MCO-7 was installed in 1960 in a borehole with diameter of 4.5 inches to a total depth of 69 feet. The well screen was formed by perforating the 3 inch plastic casing with a ¼-inch drill bit over the 30 foot interval from 39 feet to 69 feet below ground surface.

There are many factors that show the construction of wells MCO-3 and MCO-7 are not in compliance with the well construction specifications in the NMED GWQB *Monitoring Well Construction and Abandonment Guidelines, Revision 1.1*. Examples are as follows:

Specification 2. The borehole diameter must be drilled a minimum of 4 inches larger than the casing diameter to allow for the emplacement of sand and sealant.

– For wells MCO-3 and MCO-7, the borehole diameter was only 1.5 inches larger than the casing diameter. The required annular space was not provided for the emplacement of sand and sealant.

Specification 6. A 20-foot section of continuous slot, machine slotted, or other manufactured PVC or stainless steel well screen or well screen of an alternate appropriate material that has been approved for use by NMED must be installed across the water table. Screens created by cutting slots into solid casing with saws or other tools must not be used. The screen material selected for use must be compatible with the anticipated chemistry of the ground water and appropriate for the contaminants of interest at the facility. . . The well screen slots must be appropriately sized for the formation materials and should be selected to retain 90 percent of the filter pack. A slot size of 0.010 inches is generally adequate for most installations.

- For wells MCO-3 and MCO-7, we are not aware of a document from NMED for approval of the alternate plastic pipe that was used for the well casing and well screen.
- For wells MCO-3 and MCO-7, the screens were created by drilling slots in the solid plastic casing, a screen construction practice that is not allowed by Specification 6.
- For wells MCO-3 and MCO-7, there is no documentation that the chemistry of the plastic casing was compatible with the chemistry of the groundwater and appropriate for the contaminants of interest at the RLWTF.
- The slot size of 0.25 inches from the drill bit was much too large to retain the clay rich drill cuttings that were used as the filter pack in wells MCO-3 and MCO-7.

Specification 7. Casing and well screen must be centered in the borehole by placing centralizers near the top and bottom of the well screen.

- Centralizers were not installed near the top and bottom of the slotted plastic casing in wells MCO-3 and MCO-7. No measures were taken to center the “well screen” in the borehole.

Specification 8. A filter pack must be installed around the screen by filling the annular space from the bottom of the screen to 2 feet above the top of the screen with clean silica sand.

- For wells MCO-3 and MCO-7 a filter pack of clean silica sand was not installed in the annular space surrounding the field fabricated well screens. Instead, the well screens were surrounded by the drill cuttings produced from the boreholes.

Specification 9. A bentonite seal must be constructed immediately above the filter pack by emplacing bentonite chips or pellets (3/8-inch size or smaller) in a manner that prevents bridging of the chips/pellets in the annular space. The bentonite seal must be 3 feet in thickness and hydrated with clean water. Adequate time should be allowed for expansion of the bentonite seal before the installation of the annular space seal.

- The required bentonite seal was not installed above the screened intervals in wells MCO-3 and MCO-7. Instead, the interval immediately above the well screens was filled with the borehole cuttings.

Specification 10. The annular space above the bentonite seal must be sealed with cement grout or a bentonite-based sealing material acceptable to the State Engineer pursuant to 19.27.4 NMAC. A tremie pipe must be used when placing sealing materials at depths greater than 20 feet below the ground surface. Annular space seals must extend from the top of the bentonite seal to the ground surface.

- For wells MCO-3 and MCO-7, the annular space above the well screens was not sealed with a cement grout or a bentonite-based sealing material. Instead, the

annular space was filled with the borehole cuttings. A tremie pipe was not used to place sealing materials at well MCO-7 which has a total dept of 69 feet.

Specification 11. For monitoring wells finished above grade, a concrete pad (2-foot minimum radius, 4-inch minimum thickness) must be poured around the shroud and wellhead. The concrete and surrounding soil must be sloped to direct rainfall and runoff away from the wellhead.

– For wells MCO-3 and MCO-7, the Purtymun report also states, “At the surface the hole was sealed with cement and a security cap installed.” There is no information provided on the radius or thickness of the cement seal or that the cement seal was sloped to direct rainfall and runoff away from the wellhead.

In summary, there is substantial evidence that establishes the requirement to plug and abandon wells MCO-3 and MCO-7 because they do not meet the basic NMED GWQB requirements. Specifically, there is not a seal to prevent rainfall, snowmelt, or stormwater from entering the unsealed annular space. Further, the clay-rich drill cuttings used as filter pack around the field site fabricated screens have properties to prevent collection of reliable and representative groundwater samples for contaminants of concern.

The NMED GWQB must require the Permittees to install new monitoring wells at locations close to the locations of wells MCO-3 and MCO-7 before any public hearing on the draft discharge permit.

Two new monitoring wells installed at the locations of wells MCO-3 and MCO-7 are not sufficient to monitor groundwater contamination in the shallow alluvium along Mortandad Canyon from the large volume of treated waste water discharged from Outfall 051.

First, new monitoring wells are required to be installed because the distance from Outfall 051 to Well MCO-3 is too great, at approximately 1,100 feet. NMED is required to order the Permittees to install a monitoring well in the shallow alluvium in Effluent Canyon north of Outfall 051 near the confluence with Mortandad Canyon before the public hearing on the discharge permit.

Second, the distance from well MCO-3 to MCO-7 is too great at approximately 7,700 feet. There is a large zone of highly contaminated alluvial sediments in the Mortandad Canyon stream section between MCO-3 and MCO-7 that is not monitored. The discharge of large volumes of treated waste water from Outfall 051 will remobilize the contamination that is presently bound up on the alluvial sediments in this zone.

On Figure 1, wells MCO-4 and MCO-4B are within the large zone of highly contaminated sediments. Groundwater samples are not collected by the Permittees from the two wells because of low water levels. The wells must be replaced. See Section VI.C.37.

The highly contaminated alluvial sediments at well MCO-4 are documented by the contaminated groundwater samples collected from well MCO-4 as described in the LANL *Hydrogeologic Workplan*, LA-UR-01-6511 (1998) as follows:

[a]lluvial well MCO-4 which contains elevated concentrations or activities of NO3 [nitrate], tritium, strontium-90, cesium-137, plutonium-238, plutonium-239, 240 and americium-241.

Id. at 4-92. The highly contaminated alluvial sediments at well MCO-4B are documented in the LANL report, *Demonstration of a Multi-Layered Permeable Reactive Barrier in Mortandad Canyon at Los Alamos National Laboratory* (LA-UR-03-7320), as follows:

Table 3-1. Summary of Groundwater Data for Mortandad Canyon

Constituent	Concentration	Action Level	Comment
⁹⁰ Sr	80 pCi/L	8 pCi/L	DCG
²³⁸ Pu	1.182 pCi/L	1.6 pCi/L	DCG
^{239,240} Pu	0.61 pCi/L	1.2 pCi/L	DCG
²⁴¹ Am	1.53 pCi/L	1.2 pCi/L	DCG
Nitrate (N)	5.7 mg/L	10 mg/L	MCL
Perchlorate	120-250 ppb	4 µg/L	Proposed EPA MCL

Data from monitoring well MCO-4B upgradient from the multiple PRB (LANL, 2002). DCG is derived concentration guideline from DOE. MCL = maximum contaminant level.

Id. at Table 3-1. Indeed, Section VI.C.37 in the draft RLWTF Discharge Permit requires that Permittees install new monitoring wells as described above in the alluvial aquifer:

37. MONITORING WELL CONSTRUCTION-In the event that information available to NMED indicates that a well is not constructed in a manner consistent with the *Ground Water Discharge Permit Monitoring Well Construction and Abandonment Guidelines, Revision 1.1*, March 2011; contains insufficient water to effectively monitor ground water quality; or is not completed in a manner that is protective of ground water quality, NMED may require the Permittees to install a replacement well or wells. Within 90 days following receipt of such notification from NMED, the Permittees shall submit to NMED for approval a well installation Work plan, describing each proposed well location, drilling methods, well specifications, and proposed schedule for construction. Upon NMED approval, the Permittees shall construct the replacement well or wells according to the approved work plan and schedule. The Permittees' proposal along with NMED's response shall be posted, by the Permittees, on LANL's Electronic Public Reading Room located at <http://epr.lanl.gov/oppie/service> (or as updated).

In summary, the RLWTF draft discharge permit requires that Permittees:

1. plug and abandon wells MCO-3 and MCO-7 with installation of new replacement wells;
2. install a new monitoring well in Effluent Canyon at an appropriate location north of Outfall 051 close to the confluence with Mortandad Canyon; and
3. install a minimum of two alluvial monitoring wells at the locations of wells MCO-4 and MCO-4B that are not sampled at the present time because of low water levels.

Section VI.C.37 requires the NMED GWQB to take action now to require LANL and DOE to install the required monitoring wells in the alluvial sediments in Effluent Canyon and in Mortandad Canyon before any public hearing.

Perched Zone Monitoring Well MCOI-6 requires replacement. Well MCOI-6 is not reliable to detect groundwater contamination because of:

1. the deep placement of the top of the well screen below the water table of the perched zone of saturation; and
2. the drilling method allowed organic drilling fluids to flow into the strata surrounding the well screen.

The deep placement of the well screen in well MCOI-6. The NMED GWQB report, *Monitoring Well Construction and Abandonment Guidelines, Revision 1.1* (March 2011), requires well screens in monitoring wells to be installed across the water table. The requirement is in Specification 6 as follows:

Specification 6. A 20-foot section (maximum) of continuous-slot, machine slotted, or other manufactured PVC or stainless steel well screen or well screen of an alternate appropriate material that has been approved for use by NMED must be installed across the water table.

However, the water level data in the LANL Intellus data base shows that the water level in the perched zone at the location of well MCOI-6 was 27.5 feet above the top of the screen for the most recent water level measurement reported on August 22, 2013. For the previous 12 month period, the water levels varied from 27.1 feet to 29.4 feet above the top of the well screen. The deep placement of the well screen does not provide groundwater samples that are representative of contaminated groundwater at top of the perched zone of saturation.

Characterization well MCOI-6 was installed as an activity of the LANL Hydrogeologic Work Plan with well drilling and well installation performed over the period from January 3 to January 13, 2005. The LANL characterization well MCOI-6 was drilled with methods that allowed a large volume of organic water-based drilling fluids to flow into the strata surrounding the depth interval where the well screen was installed. The organic drilling fluids form a new chemistry in the sampling zone with strong properties to conceal accurate knowledge of many LANL contaminants in the groundwater samples collected from the impacted wells.

The National Academy of Sciences issued a report entitled "Plans and Practices of Groundwater Protection at Los Alamos National Laboratory" in 2007 that described the requirement to replace many and possibly all of the LANL characterization wells.³ The NAS report states in pertinent part:

Many if not all of the wells drilled into the regional aquifer [and into perched zones of saturation] under the LANL Hydrogeologic Workplan appear to be compromised in

³ See http://www.nap.edu/catalog.php?record_id=11883

their ability to produce water samples that are representative of ambient groundwater for the purpose of monitoring.

Id. at 49. Further on in the NAS report we find the following recommendation:

Recommendation: *LANL should design and install new monitoring wells with the following attributes:*

- *A borehole drilled through the monitoring zone without the introduction of drilling muds or additives (i.e., use air or water).*

Id. at 60.

In November 2010, the NMED Hazardous Waste Bureau (HWB) issued General Response to Comment on the LANL Renewal RCRA Permit.⁴ In that report, the NMED HWB agreed with the conclusions in the NAS 2007 Report about the greater than 40 LANL characterization wells installed for the LANL Hydrogeologic Work Plan. The NMED described the LANL characterization wells as not meeting the requirement to be monitoring wells for the NMED 2005 Consent Order or the NMED 2010 Renewal of the Federal Resource Conservation and Recovery Act (RCRA) Permit for LANL.

For example, in the NMED 2010 General Response to Comment it states in pertinent part:

The Department agrees with many of the conclusions in the referenced National Academy of Sciences (NAS) Report; however the report is based on conditions at the time that the NAS conducted the evaluation. Since that time, the Permittees have installed, replaced and rehabilitated numerous wells completed in the intermediate perched aquifers and the regional aquifer at the Facility. The NAS report does not account for the additional groundwater characterization and actions taken to address deficient wells.

The NAS report references wells that were installed as part of LANL's groundwater characterization efforts that were conducted in accordance with their Hydrogeologic Work Plan (1998). These [characterization] wells were not installed for contaminant detection or groundwater monitoring. Therefore, these wells have limited relevance to groundwater protection goals set forth by the March 1, 2005 Consent Order [Emphasis supplied].

Id. at 31. There was no effort to rehabilitate characterization well MCOI-6. Further, the attempt to rehabilitate many of the LANL characterization wells was categorically unsuccessful and a great mispending of financial resources that should have been used to replace the wells. The NMED GWQB has a duty to require the Permittees to plug and abandoned characterization well MCOI-6 and replaced with a new monitoring well before any public hearing takes place.

⁴ See <http://www.nmenv.state.nm.us/HWB/Permit.htm> On the NMED webpage under the heading "Renewal Permit," click on the topic "General Response to Comments."

Las Mujeres Hablan: The Women Speak

Women's Declaration for New Mexico 2010

Preamble

The Earth community stands at a defining moment in time. Injustices, poverty, ignorance, corruption, crime and violence have deepened and our Earth Mother is suffering. These offenses have lead to values that have become hurtful and a destructive way of living.

We believe that women are sacred unique human beings of the Earth. We believe that female and male energy is found within the other. We believe that all people belong to one earth community as a human family.

We, therefore, declare the following:

1. Whereas, women are the nurturers of the human seed within their wombs and bearers of the blessing of creation through the process of giving birth,
2. Whereas, because of the profound role of women in creation, ancient cultures and civilizations throughout human history and today have revered the earth as our Mother, the source of all life,
3. Whereas, women's bodies are intimately connected to Mother Earth as reflected in our moon cycles that are the basis for procreation and birthing of children,
4. Whereas, mothers and grandmothers continue to be the primary caregivers of children through breastfeeding, feeding, and nurturing, from infancy through all the stages of our human lives,
5. Whereas, women have also nurtured other women historically and traditionally serving as midwives and helping one another raise their children along with their extended families,
6. Whereas, women are believed to have been the first seed savers and contributed to the cultivation of crops in a way that transformed human existence and, today, in our families and communities mothers and grandmothers have continued to be the primary caretakers of seeds,
7. Whereas, women have a special relationship with food in their role as farmers, nurturers, seed savers, and cooks and, therefore, they are the holders of culturally significant recipes and methods for storing and preparing food,

8. Whereas, many of the increasing numbers of small scale, independent farmers are women farmers from various backgrounds who are dedicated to growing clean, healthy, and fair food and to restoring harmony to the earth,
9. Whereas, women provide an important support system for all the activities of operating our *ranchitos*, the family farms and ranches, including serving as part of the labor essential to the process, providing meals for other laborers, and teaching children the values of land-based culture and way of life,
10. Whereas, women are often the teachers of life skills to their children and are therefore important to ensuring that traditional knowledge is passed from generation to generation.
11. Whereas, women play important roles in our communities as spiritual leaders who offer blessings at important times in our lives and who offer guidance on important life decisions,
12. Whereas, women in traditional communities hold essential traditional knowledge including teachings about medicinal plants, where they can be harvested, and how they should be used,
13. Whereas, historically, women's role as homemakers was broad and included helping one another to build, periodically plaster and re-plaster, and maintain their homes,
14. Whereas, for millennia, women have harvested foods such as *piñon*, *quelites*, *tsimaja*, asparagus, *verdolagas*, *chocoyole*, and many varieties of berries, which we regard as special gifts and blessings,
15. Whereas, historically and traditionally, women's roles in families and communities were highly valued and the equally important role of men included providing the needed support system in order to raise healthy families,
16. Whereas, historically and in modern times, women have, out of the love of their children and men in their families, been at the forefront of resisting all forms of violence, including war,
17. Whereas, women today are often not respected as they were traditionally and are often subjected to violence in their own homes by those closest to them,
18. Whereas, because of the nature of women's bodies related to procreation and our intimate relationship with the earth through farming, herb gathering, and earthwork, we are particularly sensitive to exposure to pollutants from various sources,
19. Whereas, the parts of our bodies meant to nurture and nourish our children are also most susceptible to disease and cancer considering that elevated levels of breast cancer, ovarian cancer, and other deadly diseases result from exposure to toxins,

20. Whereas, mothers and grandmothers who feed and nurture their children are concerned about the existence of synthetic hormones and pesticide residues in foods resulting in unprecedented effects on boys and girls such as premature puberty, cancer, and other long-term effects that are unknown,
21. Whereas, our families are also threatened by the unknown health and ecological effects of genetically engineered seeds, plants, and animals, and we are gravely concerned about the patenting of human life which could have unintended consequences for our families and future generations,
22. Whereas, New Mexico is home to various polluting industries, mining operations, power plants, and nuclear facilities that, although serve as a source of financial income for some of our families, also are responsible for pollution that harms all of our families and are part of a pattern of economic development that displaces traditional peoples from the land,
23. Whereas, women are often low-wage workers in these same polluting industries exposed to certain toxins and women are often low-wage agricultural workers who are exposed to pesticides and herbicides in industrial agriculture,
24. Whereas, women have played a key role along with men in social movements to achieve social, economic, and environmental justice by voicing concerns about the threats of toxins to our families and by calling for livelihoods for ourselves and our families that are clean, healthy, and dignified,

Be it resolved;

1. That we are gathered to declare our reverence for our women ancestors that nurtured generation upon generation so that we could be given the blessing of life,
2. Be it further resolved that we will collectively and intentionally work to carry on the seed saving, farming, and ranching traditions of our ancestors and to pass these teachings on to the younger generations,
3. Be it further resolved that we will resist the genetic engineering and patenting of life so that we may maintain the integrity of our seeds, our right to grow our own food, and the sacredness of life itself,
4. Be it further resolved that we will raise our children to be conscious human beings mindful of the sacred gift of life we have been granted by the creator, to be reverent of our Mother Earth, and to be respectful in their relations,
5. Be it further resolved that we will work in solidarity with each other in our struggles to defend the land, air, and water from contamination, exploitation, and commoditization,

6. Be it further resolved that we honor, respect, and recognize the dignity of women and their families throughout the world and here at home who are subjected to exposure to toxins through their work, their food, or their proximity to pollution and that we resolve to speak and act in solidarity with them in efforts to defend the health of their families and communities,

7. Be it further resolved that we will continue to play an important role in reshaping our communities to achieve a vision of safe, healthy, and joyful lives for our families and communities with good, healthy, locally grown food, good livelihoods that honor the dignity of every human person, and a meaningful, spiritual relationship with Mother Earth.

8. Be it further resolved that we will support the work of the **New Mexico Food and Seed Sovereignty Alliance**. (New Mexico Acequia Association (NMAA); Traditional Native American Farmers Association (TNAFA); Tewa Women United (TWU); Honor Our Pueblo Existence (HOPE); Agriculture Implementation, Research and Education (AIRE).

Mission: To continue, revive, and protect our native seeds, crops, heritage fruits, animals, wild plants, traditions, and knowledge of our indigenous, land- and acequia- based communities in New Mexico for the purpose of maintaining and continuing our cultural integrity and resisting the global, industrialized food system that can corrupt our lives, freedom, and culture through inappropriate food production and genetic engineering.

9. Be it further resolved that we will support the work of **Las Mujeres Hablan**. (New Mexico Acequia Association (NMAA); Honor Our Pueblo Existence (HOPE), Tewa Women United (TWU); Concerned Citizens for Nuclear Safety (CCNS); Embudo Valley Environmental Monitoring Group (EVEMG); New Mexico Conference of Churches (NMCC); Community Service Organization (CSO) Del Norte

Mission: To address past, present and future issues arising from the nuclear industry's releases of toxic chemicals and radioactive materials that cause contamination to our land, air, and water; demand clean-up of these sites; question the continued manufacturing of nuclear weapons; and restore justice to the Peoples who have been impacted by this industry. And, address other activities that violate and cause harm to our environment and well-being within the Sacred Mountains of New Mexico and other places in the world,

10. Be it further resolved that we will honor and respect the women in our lives including our mothers, grandmothers, and great-grandmothers by thanking them for giving us life and for nurturing us throughout our lives,

AND:

May it be further resolved that we the undersigned, have read this document and are in support of Las Mujeres Hablan: The Women Speak; Women's Declaration for New Mexico 2010. We find it to be true and will assist wherever possible to learn and teach the children, boys and girls, the importance of living close to the land, having respectful relations with one another and act with dignity and respect to protect Mother Earth, so she in turn can continue to care for us.

"Indigenous Women and Environmental Violence"

**A Rights-based approach addressing impacts of Environmental Contamination on
Indigenous Women, Girls and Future Generations**

Submitted to the United Nations Permanent Forum on Indigenous Issues Expert Group Meeting
"Combating Violence Against Indigenous Women and Girls", January 18 – 20, 2012, United Nations
Headquarters, New York by Andrea Carmen, International Indian Treaty Council and Indigenous Women's
Environmental and Reproductive Health Initiative, and Viola Waghiyi, Native Village of Savoonga, St.
Lawrence Island, Alaska and Alaska Community Action on Toxics
Theme 2: "Contextualizing Violence"

***"From a traditional perspective, the health of our Peoples cannot be separated from the health of our
environment, the practice of our spirituality and the expression of our inherent right to self-determination,
upon which the mental, physical and social health of our communities is based."***

--- IITC Oral Intervention presented by Faith Gemmill, Gwich'in Nation Alaska
United Nations Working Group on Indigenous Populations, Geneva July 31, 1996

***"We have listened to each other's stories, and have seen the tragic effects within our own families,
communities, and nations of the environmental, economic, social and cultural impacts of toxic contamination.
These imposed, deplorable conditions violate the right to health and reproductive justice of Indigenous
Peoples, and affect the lives, health and development of our unborn and young children. They seriously
threaten our survival as Peoples, Cultures, and Nations."***

--- Declaration for Health, Life and Defense of Our Land, Rights and Future Generations", 1st
International Indigenous Women's Environmental and Reproductive Health Symposium, June
30 – July 1, 2010, UN Permanent Forum's 10th session [E/C.19/2011/CRP. 9]



Above: Annie Alowa, Yupik elder and community health aide
stands among toxic waste at the formerly used defense site,
Northeast Cape, St. Lawrence Island, Ak photo: ACAT
Right: Three generations of women and girls from a Yaqui family
affected by pesticides: Potam Pueblo, Rio Yaqui, Sonora Mexico,
June 2006. Photo: Jeff Conant



I. Introduction

The severe and ongoing harm caused by environmental toxics to Indigenous women, girls, unborn generations and Indigenous Peoples as a whole, requires immediate attention. These toxics include pesticides and other Persistent Organic Pollutants, as well as chemicals produced by extractive industries (coal, oil, tar sands etc.), military installations and weapons testing, waste dumping and incineration, industrial processes, all phases of uranium mining, milling and waste storage.

The production, use, dumping, and general proliferation of environmental toxics adverse effect the collective and individual rights of Indigenous Peoples, and Indigenous women and children specifically, to free prior and informed consent, health, well-being, culture, development, food and subsistence, life and security of person. The lack of accountability by corporations and States is resulting in devastating health impacts that continue to release environmental toxics into the environment. Of more than 80,000 chemicals in commerce, more than 85% of these chemicals have never been assessed for possible effects on human health in general, let alone their specific impacts on Indigenous women as a uniquely vulnerable group.

States and industry knowingly permit, produce, release, store, transport, export and dump hazardous chemicals that impair the endocrine and immune systems, adversely affect neurodevelopment and reproduction, and cause disease including all forms of cancer with few consequences. This is an egregious example of impunity. Unlike infectious diseases, environmental contaminants that cause disease and death are either deliberately released into the environment specifically *because* they are toxic to living things (i.e. pesticides), or they are a result of manufacturing from industrial or military processes that are judged by States and corporations to pose an “acceptable risk” as compared to their purported economic or military “benefits” to society as a whole. States and corporations deny “provable” impacts despite the clear evidence that these environmental toxics cause a range of serious, well documented health impacts, including harm to reproduction, health and fetal development which disproportionately affect Indigenous women.

Indigenous Peoples live in some of the most remote areas in the world: the deserts, mountains, forests and Arctic tundra. Indigenous families subsist off the land and waters through farming, herding, hunting, fishing and gathering for their main food supplies. Many of these regions are heavily exposed to toxic contaminants as a result of mining and extractive industries as well as industrial agriculture and “green revolution” programs which rely heavily on the use of toxic pesticides. Many chemicals are also transported atmospherically and through ocean currents, and heavily contaminate Indigenous lands and foods far from the points of production and use.

Indigenous women play a key role in farming, food gathering and preparation. They are also cultural practitioners, healers, teachers and knowledge holders who have a central role in the transmission of language and culture to younger generations. Indigenous women have a central role in food gathering and preparation and in a range of traditional cultural practices inextricably linked to the natural environment. These everyday practices increase their exposure and makes them particularly vulnerable to absorbing environmental contaminants, which are increasingly affecting their health, livelihoods and reproductive capacities.

The particular health effects of toxic contaminants on Indigenous women are well documented, and are further affirmed through a range of testimonies from the communities most affected, some of which have been included in this paper. Multiple studies confirm that alarmingly high levels of toxics are found in Indigenous women’s breast milk, placental cord blood, blood serum and body fat. Devastating impacts on maternal health include sterility, reproductive system cancers, decreased lactation and the inability to produce healthy children. Research also demonstrates the link between chemical exposures and intellectual and neurological

development of children, impacting their ability to retain and pass on culture, ceremonies, stories, language, songs -- a primary concern of Indigenous women.

Participants in the **1st International Indigenous Women's Environmental and Reproductive Health Symposium** from the North America, Latin America, Pacific, and Arctic and Caribbean regions summarized the impacts:

"Indigenous Peoples, and in particular women and children, are suffering the detrimental, devastating, multi-generational and deadly impacts of environmental toxins and contaminants that were unheard of in our communities prior to industrialization, including:

- *Contamination of mothers' breast milk at 4 to 12 times the levels found in the mother's body tissue in some Indigenous communities;*
- *Elevated levels of contaminants such as POPs and heavy metals in infant cord blood; Disproportionate levels of reproductive system cancers of the breasts, ovaries, uterus, prostate and testicles, including in young people;*
- *Increasing numbers of miscarriages and stillbirths, and;*
- *High levels of sterility and infertility in contaminated communities."*¹

The disproportionate impacts of environmental contamination on Indigenous Peoples and communities of color are the basis of the now well-accepted concept "environmental racism". The concept of "gender-based environmental violence" is not yet as common. Through this paper, we hope to lay some initial groundwork for the continuing development of this concept, and the development of solutions through implementation of human rights accountability. We will demonstrate why Indigenous women, and the unborn children that they carry, are disproportionately affected by environmental toxics for a number of cultural and biological reasons. We will also address some of the associated pervasive human rights violations that impact Indigenous women, girls, and the cultural health, viability and survival of Indigenous Peoples as a whole.

II. Environmental Violence Against Indigenous Women and Children: Human Rights Framework

*"The protection of our health, lands, resources including air and water, languages, cultures, traditional foods and subsistence, sovereignty and self-determination, and the transmission of our traditional knowledge and teachings to our future generations are inherent and inalienable human rights. These rights are affirmed in the **UN Declaration on the Rights of Indigenous Peoples** and other international standards, and must be upheld, respected and fully implemented."*²

*"Human rights are integral to the promotion of peace and security, economic prosperity and social equity... A major task for the United Nations, therefore, is to enhance its human rights programme and fully integrate it into the broad range of the Organization's activities".*³

The fundamental link between human rights and environmental contamination is a relatively new and evolving concept in the UN system. It has yet to be fully recognized and effectively integrated in international Convention

¹ Declaration for Health, Life and Defense of Our Land, Rights and Future Generations", *1st International Indigenous Women's Environmental and Reproductive Health Symposium, June 30 – July 1, 2010*, submitted to the UN Permanent Forum's 10th session as Conference Room Paper [E/C.19/2011/CRP. 9]

² Ibid

³ "Human Rights in the Report of the Secretary-General on Renewing the United Nations: a Programme for Reform, Extracts from the report of the Secretary-General to the General Assembly, A/51/950, para. 78 and 79, 14 July 1997

processes addressing toxic contaminants. Many States continue to resist addressing this fundamental inter-relationship in the context of UN Environmental Convention processes, despite the fact that a number of existing international human rights norms and standards provide a clear and compelling case for doing so.

A central factor of the proliferation of environmental toxics is the conscious and deliberate nature of their production, marketing, export and release despite their well-known and well documented risks and impacts. Identifying the disproportionate and often devastating impacts on Indigenous women as "environmental violence" for which States and corporations can be held accountable is an even newer concept. A review of some of the inter-related human rights affirmed in international standards can begin to provide the elements and framework for the development of this emerging concept. These include, inter alia:

1. The rights of all individuals to health, food and well-being (Article 25), and life and security of person (Article 3) as per the Universal Declaration on Human Rights.
2. The rights of Indigenous Peoples to self-determination and free prior informed consent, regarding matters which affect them including the use of hazardous materials on their lands, to determine their own priorities for development, and to maintain the productive capacity of their lands⁴, in particular, in this context, as applies to the economic, subsistence and cultural activities to which Indigenous women are directly tied.
3. The rights of Indigenous Peoples to attain the highest levels of health.⁵
4. The rights of Indigenous Peoples to practice and transmit their cultures and traditional knowledge to future generations.⁶
5. The rights of Indigenous women and children to special protection.⁷
6. The obligation of States to implement, promote and monitor the enjoyment of these rights, to implement effective solutions, remedies and mechanisms in conjunction with Indigenous Peoples and monitor the human rights impacts of corporations which they license as specifically recommended by the UN CERD in its periodic reviews of Canada and the US. (2007 and 2008)

The ongoing resistance of States to the mainstreaming of human rights into international environmental standard-setting processes may be directly related to their resistance to consider accountability mechanisms for the egregious and ongoing violations of human rights resulting from the deliberate production, sale and use of toxic substances with well-known and well-documented harmful effects on human health and development.

Specific relevant Human Rights Standards which can provide a useful framework for the UNPFII's consideration of "environmental violence" as new area of human rights include:

A. The United Nations Declaration on the Rights of Indigenous Peoples in its preamble affirms the principle of non-discrimination as well as the rights of Indigenous People to maintain their traditional economic, cultural and subsistence activities, protect their health and exercise free prior informed consent regarding decisions and activities affecting them, including the release of environmental toxics in their lands. These rights have been directly threatened and violated, both on an individual and collective level, by State policies and corporate activities which promote, allow and impose unsustainable economic development, including resource extraction and industrial agriculture.

⁴ Article 29, UN Declaration on the Rights of Indigenous Peoples as well as CERD General Recommendation XXIII

⁵ UNDRIP Article 24

⁶ various Articles of the UNDRIP as well as UNESCO, the Convention on the Rights of the Child and others

⁷ affirmed in both the UDHR Article 25 and UNDRIP Articles 21 and 22

A number of Preambular paragraphs and Articles of the UN Declaration on the Rights of Indigenous Peoples directly address the rights of Indigenous Peoples, and Indigenous women, as well as State obligations to take both preventative and restorative action. These include:

- Article 3 - Right to Self-Determination
- Article 7 – the Right to Life, physical and mental integrity and the security of person; right to live as distinct Peoples
- Article 8 - Right to not be subjected to destruction of culture
- Article 13 - Right to revitalize, use, develop and transmit histories, languages and oral traditions to future generations
- Article 19 – Free Prior and Informed Consent regarding legislative and administrative measures by states
- Article 20 - Right to be secure in subsistence and development
- Article 21 – Right to the improvement of their economic and social conditions, including, inter alia, health
- Article 22 - Attention to the rights and special needs of indigenous elders, women, youth, children and persons with disabilities
- Article 24 - Right to the highest attainable standard of health and the conservation of vital plants and animals
- Article 25 – Right to maintain spiritual relationships to land and resources for future generations
- Article 26 – Right to traditional lands, territories and resources
- Article 29 - Right to conservation and protection of the environment and productive capacity of lands, territories and resources; right to free prior and informed consent regarding hazardous materials and the obligations of States to take action to restore the health of the Indigenous Peoples affected
- Article 31 - Right to maintain, control, protect and develop cultural heritage, traditional knowledge and cultural expressions including genetic resources, seeds and medicines
- Article 32 - Right to determine and develop priorities and strategies for development including the right to free, prior and informed consent
- Article 37 – Treaty Rights
- Article 42 - Obligation for implementation and follow-up by States and UN agencies and processes

Article 29, paragraphs 2 and 3 are of particular relevance to this discussion with regards to the rights of Indigenous Peoples and the related obligations of States:

2. States shall take effective measures to ensure that no storage or disposal of hazardous materials shall take place in the lands or territories of indigenous peoples without their free, prior and informed consent.

3. States shall also take effective measures to ensure, as needed, that programmes for monitoring, maintaining and restoring the health of indigenous peoples, as developed and implemented by the peoples affected by such materials, are duly implemented.

B. The International Covenant on Civil and Political Rights (ICCPR)

Article 27 of the ICCPR states:

"In those States in which ethnic, religious or linguistic minorities exist, persons belonging to such minorities shall not be denied the right, in community with other members of the group, to enjoy their own culture, to profess and practice their own religion, or to use their own language."

General Comment 23 of the Human Rights Committee is meant to serve as guidance to the States in their compliance with Article 27:

*"With regard to the exercise of the cultural rights protected under article 27, the Committee observes that culture manifests itself in many forms, including a particular way of life associated with the use of land resources, especially in the case of Indigenous Peoples. That right may include such traditional activities as fishing or hunting, and the right to live in reserves protected by law. The enjoyment of those rights may require positive legal measures of protection and measures to ensure the effective participation of members of minority communities in decisions that affect them."*⁸

C. The Right to Food, Food Security, Subsistence and Food Sovereignty

"...In no case may a people be deprived of its own means of subsistence."

-- Article 1 in Common, International Covenants on Civil and Political Rights and on Economic, Social and Cultural Rights

The Rights to Health and Culture for Indigenous Peoples are closely linked to the Right to Food and Subsistence. It is well documented that environmental toxins have a serious impact on traditional foods, creating a false and forced choice for Indigenous Peoples, in particular, pregnant and nursing mothers. They are often forced to choose between the cultural and nutritional value of their traditional foods and subsistence way of life, and the health and development of their unborn children, as well as their ability to have children at all.

In 1997 the United Nations Rapporteur on the Right to Food, Jean Zeigler responded to a submission by the International Indian Treaty Council on behalf of Indigenous Tribes and Peoples in Northern California addressing mercury contamination and St. Lawrence Island, Alaska regarding military toxics and the impacts of this contamination on their traditional subsistence foods.

*"The Special Rapporteur believes that the contamination of indigenous peoples' land and water affecting their livelihood (traditional fishing) may contribute to a violation of the Government's obligation to respect the right to food."*⁹

Indigenous Peoples have consistently identified toxic contaminants as one of the primary obstacles to their food sovereignty, also affirming the inter-related links to the health impacts on Indigenous women and children. The **"DECLARATION OF ATITLÁN"** from the **1st Indigenous Peoples' Global Consultation on the Right to Food** in Atitlán, Sololá, Guatemala, April 17 - 19, 2002, identified toxic chemicals, in particular those used in industrial agriculture as a primary obstacles to their Food Security and Food Sovereignty, also noting the effects on women's and children's health, as follows:

*"The growing imposition of the use of pesticides and chemical fertilizers that poison Mother Earth, the communities that work with the Earth, and the food resources on which Indigenous Peoples depend worldwide, affecting food production and hence nutrition and health, and increasing morbidity and mortality rates, in particular for our women and children;"*¹⁰

⁸ General Recommendation No. 23, the rights of minorities (article 27), CCPR/C/21/Rev.1/Add.5, 08/04/1994

⁹ UN Special Rapporteur on the Right to Food Jean Ziegler, report to the 4th session of the UN Human Rights Council [A/HRC/4/30/Add.1, 18 May 2007]

¹⁰ **"DECLARATION OF ATITLÁN"** from the 1st Indigenous Peoples' Global Consultation on the Right to Food, Sololá, Guatemala, April 17 - 19, 2002,

D. The United Nations Convention on the Rights of the Child (November 20, 1989) is the international instrument that directly addresses the rights of all children, including the female child. Significantly, it is the only human rights Convention which specifically mentions environmental pollution as a human rights concern affecting the health of children, as well as the closely interrelated issues of maternal and prenatal health:

Article 24

1. States Parties recognize the right of the child to the enjoyment of the highest attainable standard of health and to facilities for the treatment of illness and rehabilitation of health. States Parties shall strive to ensure that no child is deprived of his or her right of access to such health care services.
2. States Parties shall pursue full implementation of this right and, in particular, shall take appropriate measures:
 - (a) To diminish infant and child mortality;
 - (c) To combat disease and malnutrition, including within the framework of primary health care, through inter alia, the application of readily available technology and through the provision of adequate nutritious foods and clean drinking-water, taking into consideration the dangers and risks of environmental pollution;
 - (d) To ensure appropriate pre-natal and post-natal health care for mothers;

General Comment 11 of the Committee on the Rights of the Child [CRC/C/GC/11, 2009] further elaborates and underscores State parties' obligations under the Convention specifically with regards to Indigenous children. It also addresses the issue of maternal and family health and the impacts of environmental contaminants, specifically mentioning pesticides and herbicides:

Regarding "Right to Life, Survival and Development"

35. The Committee reiterates its understanding of development of the child as set out in its general comment No. 5, as a "holistic concept embracing the child's physical, mental, spiritual, moral, psychological and social development". The Preamble of the Convention stresses the importance of the traditions and cultural values of each person, particularly with reference to the protection and harmonious development of the child. In the case of indigenous children whose communities retain a traditional lifestyle, the use of traditional land is of significant importance to their development and enjoyment of culture. States parties should closely consider the cultural significance of traditional land and the quality of the natural environment while ensuring the children's right to life, survival and development to the maximum extent possible.

Regarding "Basic Health and Welfare"

53. States should take all reasonable measures to ensure that indigenous children, families and their communities receive information and education on issues relating to health and preventive care such as nutrition, breastfeeding, pre- and postnatal care, child and adolescent health, vaccinations, communicable diseases (in particular HIV/AIDS and tuberculosis), hygiene, environmental sanitation, and the dangers of pesticides and herbicides.

E. The United Nations Committee on the Elimination of Racial Discrimination (CERD)

Of particular relevance to the human rights framework pertaining to the theme and concerns of this Expert Seminar is General Recommendation No. XXIII on Indigenous Peoples, adopted by the 51st session of UN Committee on the Elimination on Racial Discrimination.¹¹ General recommendation XXIII, Paragraph 4 states as follows:

¹¹ CERD, the Treaty Monitoring Body for the International Convention on the Elimination of All Forms of Racial Discrimination, ICERD, adopted August 18th, 2007

4. The Committee calls in particular upon States parties to:

(c) Provide indigenous peoples with conditions allowing for a sustainable economic and social development compatible with their cultural characteristics;

(d) Ensure that members of indigenous peoples have equal rights in respect of effective participation in public life and that no decisions directly relating to their rights and interests are taken without their informed consent.

(e) Ensure that indigenous communities can exercise their rights to practice and revitalize their cultural traditions and customs and to preserve and to practice their languages.

F. The Universal Declaration of Human Rights (1948) firmly establishes that health and well-being are human rights, and also recognizes that “Motherhood and childhood are entitled to special care and assistance”¹²

G. One of the 5 objectives for the Plan of Action for the 2nd International Decade the Worlds Indigenous Peoples adopted by the UN General Assembly in January 2005 is *“is “promoting full and effective participation of indigenous peoples in decisions which directly or indirectly affect their lifestyles, traditional lands and territories, their cultural integrity as indigenous peoples with collective rights or any other aspect of their lives, considering the principle of free, prior and informed consent”*. This objective is of direct relevance in challenging activities related to environmental contamination which violate Indigenous Peoples’ human rights, and provides a framework and criteria by which effective solutions and responses can be developed in full partnership with Indigenous Peoples.

H. UN Convention on the Elimination of Discrimination Against Women (CEDAW)

Although CEDAW does not specifically mention Indigenous women or impacts of environmental toxins, its provisions that address employment and rural women are relevant to these concerns:

Article 11

1. States Parties shall take all appropriate measures to eliminate discrimination against women in the field of employment in order to ensure, on a basis of equality of men and women, the same rights, in particular:

(f) The right to protection of health and to safety in working conditions, including the safeguarding of the function of reproduction.

Article 14

1. States Parties shall take into account the particular problems faced by rural women and the significant roles which rural women play in the economic survival of their families, including their work in the non-monetized sectors of the economy, and shall take all appropriate measures to ensure the application of the provisions of the present Convention to women in rural areas.

2. States Parties shall take all appropriate measures to eliminate discrimination against women in rural areas in order to ensure, on a basis of equality of men and women, which they participate in and benefit from rural development and, in particular, shall ensure to such women the right:

(a) To participate in the elaboration and implementation of development planning at all levels

(b) To have access to adequate health care facilities

¹² Article 25

I. **Nation to Nation Treaties between States and Indigenous Nations** and the consensual relationships they are based on, if honored, respected and put into practice by all Parties, can be the foundation and model for respectful partnerships addressing this and a range of other issues. This is true, in particular, when there is an urgent need for joint and or/shared decision-making in order to correct current injustices, respond to critical violations and redress historic and ongoing wrongs.

The following and other preambular paragraphs, along with Articles 3, 18, 19, 27, 28, 32, 37 and 40, inter alia, of the UN Declaration on the Rights of Indigenous Peoples make important contributions to a human rights framework incorporating Treaty rights and relationships based on FPIC and full participation in decision-making:

"Considering also those treaties, agreements and other constructive arrangements, and the relationship they represent, are the basis for a strengthened partnership between indigenous peoples and States"

Indigenous Peoples have also affirmed the **"Treaty Right to Health"** as a legally binding and sacred obligation of the Colonial governments, including the British Crown, which entered into Treaties with Indigenous Nations:

*"That the medicine chest clause binds the federal government to provide medicines and all that is required to maintain proper health."*¹³

III. **Case Studies: Environmental Toxics and their impacts on Women and Girls in Indigenous Communities**

A. Rio Yaqui, Sonora Mexico: Threats to women's, girl's and future generations' health and development

In 1997, Dr. Elizabeth Guillette, a scientist from the University of Arizona carried out a study of the health effects of industrial agricultural pesticides in the homelands of the Yaqui Indians in Sonora, Mexico,¹⁴ a few hours south of the US/Mexico border. Yaqui Indigenous communities in the agricultural areas have been exposed to frequent aerial and ground spraying of pesticides since the government's implementation of the "Green Revolution" in the late 1940's. For some, their only source of water is contaminated irrigation canals.

In addition to the impacts of pesticides sprayed from airplanes affecting the entire community, Yaqui farm workers who are not provided by growers with any protective gear in the fields. Workers unintentionally carry poisons home in pesticides-soaked clothing and skin, unknowingly spreading the contamination to their families. The maternal health of Yaqui women working in the fields or living nearby, or whose husbands bring the contamination home on their clothing, is particularly impacted. Dr. Guillette's study documented the resulting high levels of pesticides found in the cord blood of newborns and in mother's milk (see table below).

Table 1: Mean concentrations in the cord blood at time of birth and in mothers milk one month post partum from women, Pueblo Yaqui, Sonora, Mexico. [Data from Garcia and Meza, 1991¹⁵]

¹³ "Treaty Right to Health" resolution adopted by the Chiefs in Treaty No. 6, No. 7 and No. 8, March 16-17, 2005, reaffirmed at the International Indian Treaty Council Conference, Ermineskin Cree Nation, Alberta Canada (Treaty No. 6 Territory) August 7th 2005

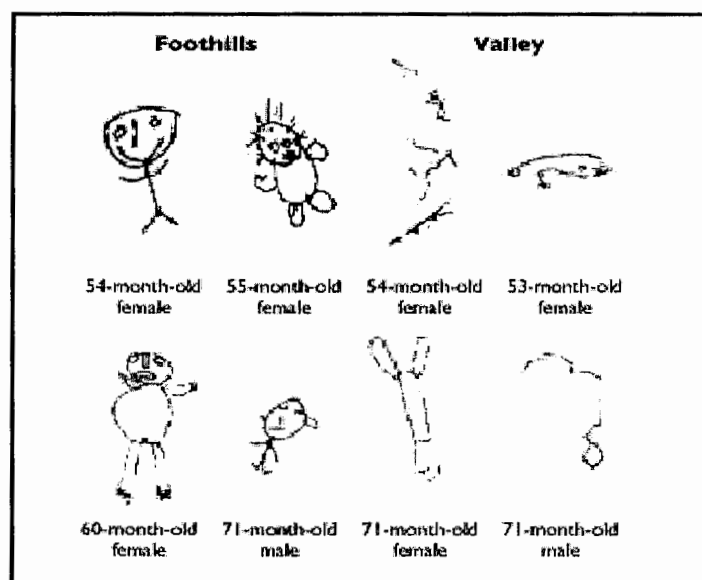
¹⁴ "An Anthropological Approach to the Evaluation of Children Exposed to Pesticides in Mexico", Elizabeth A. Guillette, María Mercedes Meza M. María Guadalupe Aquilar A, Alma Delia Soto A., and Idalia Enedina Garcia C., Bureau of Applied Research in Anthropology, University of Arizona, Tucson, AZ, U.S.A. and Direccion de Investigacion y Estudios de Postgrado, Instituto Tecnológico de Sonora, Cd. Obregón, Sonora Mexico, published in *Environmental Health Perspectives* Volume 106, Number 6, June 1998

¹⁵ Ibid

Pesticide	Cord Blood (ppm)	Milk (ppm corrected for fat)
N	19	20
α -HCH	0.030 ± 0.03	0.8599 ± 2.75
β -HCH	0	0.3791 ± 1.08
Lindane	0.084 ± 0.06	$0.6710 \pm 0.59^*$
Δ -HCH	0.0039 ± 0.1	0.4432 ± 0.84
Heptachlor	0	$1.269 \pm 1.65^*$
BHC	0.003 ± 0.002	$0.6270 \pm 0.66^*$
Aldrin	0	$0.2363 \pm 0.59^*$
Dieldrin	0.159 ± 0.12	0.0487 ± 0.08
Endrin	0.022 ± 0.02	$0.5238 \pm 1.1^*$
p,p'-DDE	0.03 ± 0.03	6.31 ± 5.9
Σ DDE	0.0434	6.52^*

*All exceed FAO/OMS established limits

This study also found birth defects, learning and development disabilities, leukemia and other severe health problems in Yaqui children. Combined with personal testimonies from community members collected over years, it also provides strong and compelling evidence of the detrimental impacts of pesticide exposure on the development of exposed Yaqui children. The comparison of Yaqui children in the valley (where pesticide use is heavy) with Yaqui children in the foothills of the Sierra Madre Occidental mountains (where pesticide and insecticide use is minimal to none) showed dramatic differences in motor skills—eye-hand coordination and balance. It showed marked developmental differences included in cognitive skills which were observed in recall, simple problem solving and ability to draw simple stick figures of people:



Her study also found that Valley children had significantly less stamina and hand-eye coordination, poorer short-term memory and were less adept at drawing a person (right) than were children in the foothills (left) where traditional methods of intercropping control pests in gardens and insecticides are rarely used.¹⁶

Of particular significance to the issues addressed at this EGM is a follow-up study carried out by Dr. Elizabeth Guillette et al examining impacts of in utero pesticides exposure on breast development among girls in Rio Yaqui Sonora Mexico, **“Altered Breast Development in Young Girls from an Agricultural Environment”** published in 2006. This second study was designed to test the hypothesis that abnormal breast development was caused by in utero exposure to agricultural chemicals with endocrine action. The principal difference between the two groups of girls studied was parental exposure to agricultural chemicals which are known to cause endocrine disruption in utero. The study noted that “Various pesticides, mainly organophosphates and organochlorines, were used extensively in the agricultural areas of the Yaqui Valley near the time of the girls’ birth (1992–1994), and many of these compounds are known to cross the placenta. A study of newborn children from the Yaqui Valley performed close to the period these children were conceived reported elevated pesticide levels, with cord blood values of lindane, heptachlor, benzene hexachloride, aldrin, and endrin all exceeding World Health Organization established limits (International Programme on Chemical Safety 2005)”¹⁷

This study was carried through medical examinations (with parental permission) of 50 girls ages 8 – 10 and noted an accelerated rate of breast size development (fatty tissue) in the girls from the high-pesticide use agricultural (valley) areas where their mothers had been exposed to greater levels of pesticides during pregnancy as compared to the girls in the foothill regions where exposure was minimal. Of particular concern to the scientists was the relative lack of and/or abnormal mammary gland development noted in the girls from valley communities, which could have an impact on lactation (breast feeding) later in life as well as a potential links to breast cancer. This first-of-its-kind study (as per Dr. Guillette) examining the relationship between human breast development and environmental contaminants is a unique and alarming confirmation of the impacts of pesticides exposure on the health and development of Indigenous women and girls.

Since 2002, the IITC’s **“North-South Indigenous Network against Pesticides Project”** collected and submitted over 50 testimonies from Yaqui community members in Sonora Mexico documenting cancer and leukemia, other illnesses, birth defects and deaths including many from mothers, community midwives and healers (“curanderas”). These community testimonies have been submitted consistently to the UN Rapporteurs on the adverse effects of the illicit movement and dumping of toxic and dangerous products and wastes on the enjoyment of human rights, the Right of everyone to the enjoyment of the highest attainable standard of physical and mental health, Right to Food and Rights of Indigenous Peoples. However, this issue has yet to be addressed as a specific area for in depth investigation by any of the UN mandate holders.

Following are translations into English of two of the most recent testimonies submitted to IITC by Yaqui community mothers and a midwife addressing women’s and girl’s health impacts, which have not as yet been submitted to any other UN body:

Mrs. Flor Reyna Osuna, (mother of the young woman)

Young woman, Flor Osuna García.

Jesús Gonzales, (midwife)

¹⁶ Ibid

¹⁷ “Altered Breast Development in Young Girls from an Agricultural Environment” by Elizabeth A. Guillette, Craig Conard, Fernando Lares, Maria Guadalupe Aguilar, John McLachlan, and Louis J. Guillette Jr.

Interviewer: Francisco Villegas Paredes

DECEMBER 15, 2011.

Mrs. Flor Reyna, the mother of a young woman who was born with deformities. Currently the young woman is 30 years old and is 1.20 meters [3'11"] tall. She says that when her daughter was born, the child's body was WATERY and JELLY-LIKE. The girl, due to her scant growth, is unable to move her legs. She can only move her arms. Her vital organs are atrophied. Studies conducted on her reveal that the girl developed deformities while in her mother's womb.

The physicians, as an important conclusion of the studies conducted, consider that the young woman's housing location, on the periphery of agricultural lands and exposed to spraying with agrochemicals, quickly leads to CONGENITAL DISEASES. Also, some biochemists specializing in clinical analysis have analyzed certain products. As a result they have reached important conclusions: mixtures of two or more chemicals applied in inhabited areas also lead to CANCERS.

The midwife, Jesús made the following comments: These deformities are the product of tumors produced by chemicals when young women are exposed to their application while working in the field without personal safety measures or other similar protection.

Mrs. Xóchitl Valdés, (mother of the girl)

Girl: Mariana López Valdés

Interviewer: Francisco Villegas Paredes

DECEMBER 20, 2011.

The girl's mother, Mrs. Mariana López Valdés stated that her pregnancy was very delicate. She was constantly going to the doctor. Even some midwives told her that her girl was not developing well. When the girl was born, she had deformities on her face, principally to her lips. She also stated that the girl's grandfather, Mr. Manuel Valdés works in agriculture and would generally leave chemical residues behind at his house. Some doctors told him, based on studies conducted on the girl that the agro-chemicals are having a direct effect.

The contact she had with the residues while still young caused deformations to some parts of her body when she was a fetus. The girl is alive. She is 1 year 6 months old and her deformities are growing.

The testimonies of these Indigenous women translated from Yaqui into Spanish and then into English, are tragically typical in the highly-impacted Yaqui communities of Sonora Mexico.

B. California, USA

"Indigenous women are life givers, life sustainers and culture holders. Our bodies are sacred places that must be protected, honored and kept free of harmful contaminants in order for the new generations of our Nations to be born strong and healthy."¹⁸

Data on health impacts of pesticides and the particular danger to maternal health and unborn generations is also well-documented in other regions, including in "developed" countries. For example, results of a 12 year

¹⁸ "The Declaration for Health, Life and Defense of Our Land, Rights and Future Generations", *International Indigenous Women's Environmental and Reproductive Health Symposium*, Alamo, CA in June 30 – July 1, 2010 [E/C.19/2011/CRP. 9

study by the University of California and other agencies of over 600 mothers and their children in the California's Central Valley exposed to pesticides during pregnancy was published in December 2010. The study confirmed that at age 2, the children of mothers who had the highest levels of organophosphate metabolites in their blood had the lowest levels of mental development in the group. They also had the most cases of pervasive developmental disorders. Prenatal exposure to pesticides has been consistently linked to ADHD and other developmental defects as well as cancers in children such as leukemia.¹⁹

This work, led by University of California Public Health Professor Brenda Eskenazi, served as a model for a recently launched National Children's Study by the National Institutes of Health (USA), which seeks to examine the effects of the environment on 100,000 children, tracking them from before birth until age 21.

It is apparent that the continuing tragic impacts of pesticides on Indigenous women, girls, babies including coming generations is finally beginning to generate greater attention among scientists and policy makers.

Indigenous women in California and elsewhere have stressed the cultural effects of pesticides, which are closely related to health impacts of Indigenous women, and produce a double impact. Traditional cultural activities carried out specifically by Indigenous women, which include food gathering, preparation and production as well as the activities related to the creation of traditional cultural items and art forms, create additional exposure to environmental toxins. The following testimony was presented by Monique Sonoquie, Chumash, of the Traditional California Indian Basket Weavers and Indigenous Youth Foundation at the Native Forum preceding the North America Indigenous Peoples preparatory session for UPFII10, March 18th 2011, in Arcata California:

"Pesticides are particularly dangerous to traditional native basket weavers. The Forest Service, Caltrans, governmental agencies, as well as the general public spray pesticides without thought to the natural environment, plants and animals, as well as those of us that work in the forests, parks, rivers, lakes, and oceans. Weavers are affected when gathering in areas sprayed with pesticides, we are constantly at risk as we breathe in, handle and ingest these toxins as we gather, weave and split reeds with our teeth. These pesticides also affect the life and quality of the plants, making them less bug resistant, more fragile, smaller and harder to find, as well as food sources for animals, and traditional medicines for practitioners"

Indigenous women have also expressed concerns regarding the developmental and neurological impacts of neurotoxins such as mercury, many pesticides and industrial chemicals, on the long-term ability of Indigenous peoples to retain and pass on their complex cultural systems which include oral histories, stories, songs language and ceremonies to the next generations. This is a primary responsibility of Indigenous women for girls and young women throughout their learning years, and for young children of both sexes.

It is clear that the use of toxic pesticides in these and other regions causes widespread suffering, injury and death, specifically impacting Indigenous women and girls on a level that constitutes "environmental violence" with a pattern of pervasive and brutal human rights violations that remain, by and large, unchallenged.

C. St. Lawrence Island, Alaska and the Arctic: Military Contamination and Global Transport of Persistent Chemicals

The Yupik Indigenous People of St. Lawrence Island, Alaska (USA) have been harmed and displaced by contamination from formerly used US military bases, with particular effects on women whose breast milk and adipose tissues concentrate chemical contaminants. The US military and Department of Defense disposed of

¹⁹ "Study by the Center for Health Assessment of Mothers and Children of Salinas, a joint project of UC Berkeley, the Natividad Medical Center, Clinica de Salud Del Valle de Salinas and other community organizations, December 2010.

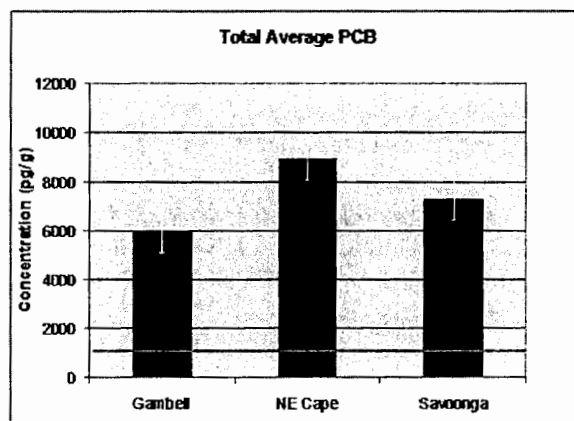
toxic waste on the Island, located in the Arctic Circle between Alaska and Russia, including massive amounts of fuels, solvents, PCBs, PAHs and, mirex (flame retardant), unexploded ordnance, and other persistent pollutants.

Annie Alowa, a respected elder and community health aide from the village of Savoonga, began to raise concerns in the late 1970's about the adverse health effects she attributed to contamination from the abandoned military site at Northeast Cape, including particular effects on women and children. These included miscarriages, cancer, low-birth weight, and other reproductive health problems. Cancer deaths among the people of St. Lawrence Island are nearly ten times higher than in the general population in Alaska. Contamination from the military sites, which were closed in 1972 but which the US government never removed or adequately cleaned up, continues to adversely affect the health and well-being of the Islands' Indigenous Peoples to this day.

As a result of its strategic importance to the U.S. military during World War II and into present times, Alaska now has 700 formerly used defense sites (FUDS). Two of the most contaminated are located on St. Lawrence Island. The village of Gambell was used as a base for the military beginning in 1948. Hazardous wastes, military debris, unexploded ordnance and spills remain in the soil and groundwater beneath the village. The vulnerability of the drinking water source in Gambell is heightening due to increasing storm surges that accompany rapid climate warming. Northeast Cape is a former U.S. Air Force Base and was also used as a "White Alice" site, part of a military communications network established during the Cold War. Northeast Cape is a traditional food gathering and hunting camp for the residents of Savoonga. A village at Northeast Cape was displaced.

The military installed and later abandoned major facilities at Northeast Cape and Gambell with little or no consideration for the impact on the Island's residents. The Yupik People of St. Lawrence are doubly impacted because the Arctic has become a hemispheric sink for persistent chemicals that travel hundreds of miles into the region and accumulate in the bodies of wildlife and humans.

Hazardous chemicals from military waste sites combined with global transport of POPs to the north contaminate traditional subsistence foods, water supplies, medicinal and food plants (berries, herbs, greens, roots, etc.) that women use, gather and prepare, further exposing them in particular. This double source of toxic contamination undermines the health, cultural practices and development of the Yupik People of St. Lawrence Island, the reproductive health of Yupik women, and the right to survival of their future generations. This pattern is repeated in many other Arctic Indigenous communities.



Levels of PCBs in the blood of St. Lawrence Island Yupik people are 6-9 times higher than the average in the continental United States populations (indicated by the red line).

Tribal members from the Villages of Savoonga and Gambell on St. Lawrence Island have levels of PCBs in their blood serum that are 6-9 times higher the average levels in people living in the continental United States due to global transport, with discernibly higher PCB levels among the people who lived or worked at the military base at Northeast Cape. Community health researchers on the island have documented health outcomes of concern including cancers, thyroid disease, learning and developmental problems, diabetes, heart disease, and reproductive health problems. As stated by Dr. David Carpenter, Director of the Institute for Health and the Environment at the University at Albany: "The evidence that there are health hazards from exposures to PCBs in the range of 6-9 ppb is very strong, with disease outcomes ranging from cancer to neurobehavioral effects to endocrine disruption and immune suppression."

Temperatures in the Arctic are warming 5-10 times faster than elsewhere in the world. These outcomes of climate change also cause more rapid dispersal of contaminants into freshwater and marine environments, affecting the health of fish and marine mammals that serve as the main traditional foods for Arctic and northern Indigenous Peoples. Atmospheric loading of contaminants to the ocean surface is increased as sea ice retreats.

D. Global Transport of Persistent Organic Pollutants (POPs) and Impacts on Arctic Indigenous Peoples

Persistent organic pollutants (POPs) are long-lasting pesticides and industrial chemicals that bioaccumulate through the food web, are capable of long-range transport and are toxic to humans and wildlife.²⁰ The highly toxic organochlorine (OC) pesticides DDT, toxaphene, chlordane, endosulfan, and lindane, and other POPs such as PCBs have been found in human and animal tissue as well as human breast milk in the Arctic at levels several times higher than in the rest of the world. The levels keep rising long after certain of these substances have been banned. For instance, even though DDT agricultural uses have been banned for 30 years in the U.S, it is still accumulating in the Arctic in peregrine falcons, orcas, and human beings

Through a well-known process known as 'global distillation' POPs travel northward and bioaccumulate in high quantities in the bodies of fish, marine mammals and other components of the traditional diets of the Indigenous Peoples in the Arctic. Prevailing ocean and wind currents bring contaminants to the Arctic where they are subsequently trapped by the cold climate. This process is often referred to as the "grasshopper effect", as chemicals repeatedly evaporate and condense while in their journey toward the Arctic. The Arctic is known as the ultimate sink because these contaminants concentrate in the cold environment and fat-based food web.

Levels of OC pesticides such as DDT, chlordane and endosulfan have been increasing in the Arctic. DDT in people is higher in the Arctic than in the rest of the world. PCB levels are 8 to 12 times higher than in the "lower 48 states" of the U.S. and Chlordane levels are 8 to 10 times higher in the people of St. Lawrence Island. Yupik women of the Yukon-Kuskokwim Delta region of Alaska have the highest levels of the POPs chemicals known as PBDEs (polybrominated diphenyl ethers) used as flame retardants in furniture, mattresses and electronics.²¹

POPs chemicals are causing changes in the very DNA of the people living in these areas, which has implications related to intergenerational health effects. The health impacts of POPs on Indigenous Peoples are well-documented on St. Lawrence Island. Much of the contamination by PCBs and other POPs is attributed to past

²⁰ Stockholm Convention on Persistent Organic Pollutants. <http://chm.pops.int/Convention/ThePOPs/tabid/673/Default.aspx> accessed November 2011.

²¹ Alaska Community Action on Toxics. 2009. Persistent Organic Pollutants in the Arctic: a report for the delegates of the fourth conference of parties of the Stockholm Convention; http://www.akaction.org/Publications_FactSheets_and_Video.htm

and present U.S. military base operations.^{22, 23} However, POPs pesticides also continue to build up in Indigenous Peoples' and animals' bodies as these chemicals move northward.

In 1991, the United States joined several other Arctic States in adopting the Arctic Environmental Protection Strategy (AEPS). The AEPS addresses the monitoring, assessment, protection, and conservation of the Arctic zone. The U.S. and the other signing countries made a commitment to, among other things, "monitor the levels of, and assess the effects of, anthropogenic pollutants in all components of the Arctic environment" and "take preventive and other measures directly or through competent international organizations regarding marine pollution in the Arctic irrespective of origin."

In a statement made to U.S. officials of the Environmental Protection Agency, St. Lawrence Island tribal leaders asserted: "The Indigenous Arctic peoples are suffering the most from these chemicals because the chemicals – DDT, endosulfan, lindane, perfluorinated compounds and toxic flame retardants, to name a few—are long lasting, and drift North on wind and water currents from where they are applied in the Southern latitudes. That means these chemicals are also in our traditional foods and affecting our health and the health of our children."

The Arctic is home to approximately half a million Indigenous Peoples, who face significant cultural, food security/subsistence and human health threats from global contaminants combined with climate change which also threatens their food security and traditional subsistence food sources. Indigenous communities of the north are reliant on a traditional diet of foods from the land and ocean for their physical, cultural, and spiritual sustenance. In a 2010 study, researchers found levels of PCBs in the traditional foods of the Yupik people of St. Lawrence Island at 200-400 times the levels considered safe for consumption, particularly in the rendered oils that are so vital for survival in the cold Arctic environment.

The cost of store-bought food is almost six times higher for the same products in rural Alaska compared to other U.S. states. Loss of subsistence foods causes an unbearable economic and nutritional hardship for Arctic Indigenous Peoples and undermines cultural practices handed down through generations.

Specific impacts on women, children and maternal health are well documented. Disparities of health problems in the Alaskan Arctic include high levels of birth defects and neonatal deaths among Alaska Native infants that cannot be explained by the usual risk factors of maternal use of tobacco or alcohol. Data from the Alaska Birth Defects registry shows that the prevalence of birth defects in Alaska is twice as high as in the United States as a whole and that Alaska Native infants have twice the risk of birth defects as white infants born in Alaska. Mothers residing in villages with high hazard ranking are 43% more likely to have a low birth weight baby, 45% more likely to give birth prematurely and more likely to have babies afflicted with intrauterine growth retardation.²⁴

IV. Scientific Evidence: Impacts of these Environmental Contaminants Women, Children, and Maternal Health

"We must never forget that it is at this most critical window of development in the mother's womb, the child's first environment and first relationship, where the embodied wealth of indigenous nations is determined."²⁵

²² Henifin, Kai A. 2007. Toxic Politics at 64N, 171W: Addressing Military Contaminants on St. Lawrence Island. (Graduate thesis) http://ir.library.oregonstate.edu/dspace/bitstream/1957/4531/1/Henifin_Thesis_Revised.pdf

²³ Christopherson, S., M. Hogan, & A. Rothe. 2006. Formerly Used Defense Sites in the Norton Sound Region: Location, History of Use, Contaminants Present, and Status of Clean-up Efforts. Prepared for Alaska Community Action on Toxics

²⁴ Gilbreath, S. and Philip Kass. 2006. Adverse birth outcomes associated with open dumpsites in Alaska Native villages. American Journal of Epidemiology 164(6):518-528.

²⁵ ---Tekatsitsiakwa Katsi Cook, Akwesasne Mohawk: "Protecting the Child in the First Environment: Preconception Health To Save Native Future": Journal of the National Museum of the American Indian, Winter, 2011, 24-27

---Tekatsitsiakwa Katsi Cook, Akwesasne Mohawk: "Protecting the Child in the First Environment: Preconception Health to Save Native Future": Journal of the National Museum of the American Indian, Winter, 2011

A growing body of scientific evidence demonstrates that harm to women's health, particularly reproductive health, is closely associated with exposure to endocrine-disrupting chemicals, which include many POPs and pesticides, often at extremely low levels. In 2009, the Endocrine Society, a medical association of 14,000 endocrine researchers and specialists from more than 100 countries, warned that "even infinitesimally low levels of exposure [to endocrine-disrupting chemicals]—indeed, any level of exposure at all— may cause endocrine or reproductive abnormalities, particularly if exposure occurs during a critical developmental window. Surprisingly, low doses may even exert more potent effects than higher doses."²⁶ Studies from various fields are converging to implicate endocrine disrupting chemicals as a significant concern to public health. These are substances in our environment, food, and consumer products that interfere with "hormone biosynthesis, metabolism, or action resulting in a deviation from normal homeostatic control of reproduction. Effects of endocrine-disrupting chemicals may be transmitted to further generations through germline epigenetic modifications or from continued exposure of offspring to the environmental insult."²⁷

*"On top of our basic genetic inheritance lies epigenetics, or those environmental influences that drive changes in the gene function of the developing fetus. Many external agents during critical windows of a child's development, including maternal stress during pregnancy, maternal behaviors, exposures to toxic chemicals, radioactivity, cigarette smoke, diesel exhaust, heavy metals, and persistent organic pollutants like PCBs have lifelong effects on the child's physical, mental and emotional health and well-being. These epigenetic effects and their "reprogramming" of our mammalian physical functions during fetal development and through the end of adolescence can persist across generations."*²⁸

A 2005 peer-reviewed study by the Environmental Working Group found an average of 200 industrial chemicals and pollutants in the umbilical cord blood of ten babies born in U.S. hospitals.²⁹ In a study of infants born in 2007 and 2008, the Environmental Working Group commissioned five laboratories in the U.S., Canada, and Europe to analyze umbilical cord blood collected from 10 "minority" infants born in 2007 and 2008. "Collectively, the laboratories identified up to 232 industrial compounds and pollutants in these babies, finding complex mixtures of compounds in each infant. This research demonstrates that industrial chemicals cross the placenta in large numbers to contaminate a baby before the moment of birth." The developing child is particularly vulnerable. Exposures in the womb can result in immediate harm to the child's development; however "some adverse effects may not manifest themselves for years or decades. Scientists refer to this phenomenon as the "fetal basis of adult disease."³⁰

²⁶ Diamanti-Kandarakis, Evanthia. Jean-Pierre Bourguignon, Linda C. Giudice, Russ Hauser, Gail S. Prins, Ana M. Soto, R. Thomas Zeller, Andrea C. Gore. 2009. Endocrine-Distrupting Chemicals: An Endocrine Society Scientific Statement. *Endocrine Reviews* 30(4):293-342. <http://www.ncbi.nlm.nih.gov/pubmed/19502515>

²⁷ Diamanti-Kandarakis, Evanthia. Jean-Pierre Bourguignon, Linda C. Giudice, Russ Hauser, Gail S. Prins, Ana M. Soto, R. Thomas Zeller, Andrea C. Gore. 2009. Endocrine-Distrupting Chemicals: An Endocrine Society Scientific Statement. *Endocrine Reviews* 30(4):293-342. <http://www.ncbi.nlm.nih.gov/pubmed/19502515>

²⁸ Cook, Tekatsitsiakwa Katsi. 2011. Protecting the Child in the First Environment: Preconception Health to Save the Native Future. Journal of the National Museum of the American Indian Winter 2011:24-27.

²⁹ Environmental Working Group Report Industrial Pollution Begins in the Womb, a Benchmark Investigation of Industrial Chemicals, Pollutants, and Pesticides in Human Umbilical Cord Blood. 2005. Accessed at: www.ewg.org.

³⁰ Environmental Working Group Report Pollution in Minority Newborns. 2009. Accessed at: www.ewg.org.

Exposure to chemicals can damage women's reproductive health by causing structural malformations and disease, adversely affect tissues or cells of the reproductive organs, and interfere with the endocrine system. Exposure to chemicals is linked with impaired fertility and ability to carry a baby to term. Chemical exposures also confer a higher risk of cancers and disorders of women's reproductive system. Some examples include:

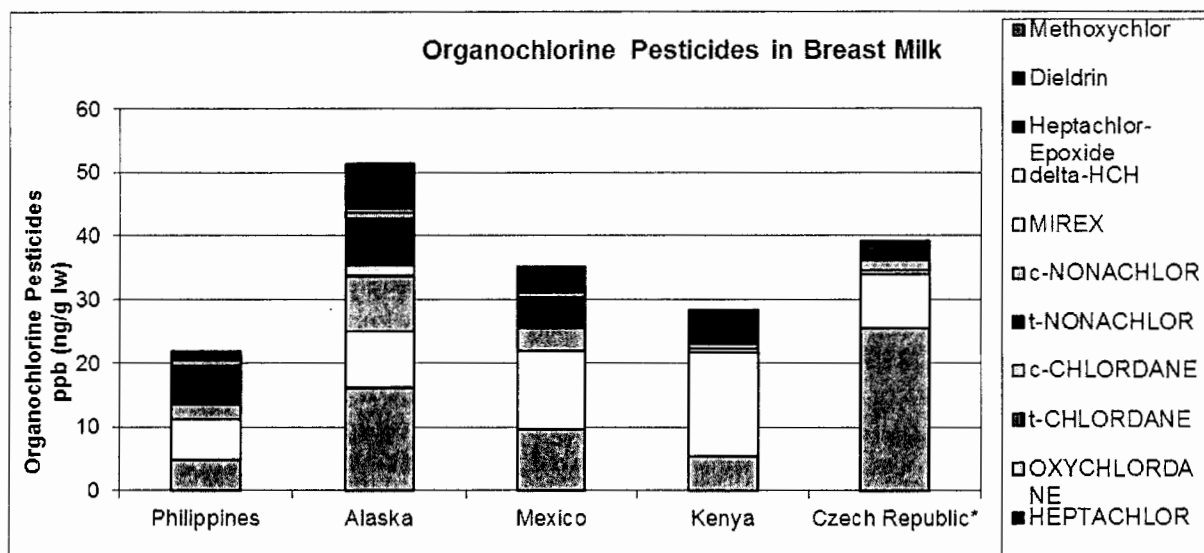
- Uterine fibroids—these noncancerous tumors of muscle lining of the uterus occur in 50% or more of women and are the major cause of hysterectomy in women of reproductive age. They can cause pain, abnormal bleeding, infertility and complications in pregnancy. Although all of the causes are not well understood, exposure to endocrine-disrupting chemicals (xenoestrogens) may cause fibroids. For example, researchers have found that exposure to the chemical bisphenol-A (BPA), found in certain hard plastics and the material lining canned foods and beverages is associated with fibroid development in laboratory studies.
- Endometriosis—is a painful disease occurring when the endometrium, tissue lining the inside of the uterus, grows outside of the uterus into the abdomen, pelvis, or ovaries. Endometriosis affects 10-20% of women of reproductive age and is a leading cause of infertility and hysterectomy. Dioxins and PCBs are among the chemicals associated with endometriosis in animal and human studies. Higher levels of phthalates (an endocrine-disrupting chemical found in personal care products and soft plastics) were found in women with endometriosis.
- Reproductive tract development and disease—exposure to certain xenoestrogenic chemicals such as BPA and the pesticide methoxychlor can interfere with the implantation of fertilized eggs in the uterus or harm the developing bones and uterus of developing babies.
- Effects on ovarian follicles—exposure to endocrine-disrupting chemicals during fetal development can adversely affect the quality and quantity of ovarian follicles. A recent study found that when laboratory animals are exposed to bisphenol-A at levels commonly measured in people, that high percentages (nearly 50%) of their eggs have chromosomal abnormalities. This genetic defect is then also found in the embryos that develop from these eggs. Chromosome abnormalities are the leading cause of miscarriages, birth defects, and mental retardation in people. Bisphenol-A is also associated with recurrent miscarriages in humans.
- Early puberty—research demonstrates that exposure to chemicals such as PCs, PBDEs (polybrominated diphenyl ethers), dioxins, and phthalates is associated with earlier onset of puberty in girls.
- Breast cancer—more than 200 chemicals, including a number of endocrine-disrupting chemicals, are associated with increased incidence of breast tumors. Breast cancer incidence rates increased in the U.S. more than 40% between 1973 and 1998, a period that coincides with increasing production and use of pesticides and other industrial chemicals. A woman's lifetime risk of breast cancer is one in eight, as of January 1, 2006 (the most recent point in time for which data are available).
- Miscarriages—exposures to BPA and pesticides such as DDT are associated with miscarriages. Miscarriages affect 21% of known pregnancies and although there are a variety of factors, there is strong evidence that toxic chemicals are significant risk factors.
- Shortened lactation—PCBs and pesticides such as atrazine are associated with a reduction in the length of time that women can breastfeed her baby. Shortened lactation is a critical problem because it has long-term consequences for the development of a healthy child, including increased risk for infection and impaired immunity, obesity, and learning disorders.³¹

V. Contamination of Breast Milk Threatens Current and Future Generations

³¹ Information in this section from the report *shaping Our Legacy: Reproductive Health and the Environment*. 2008. A report by the Program on Reproductive Health and the Environment, Department of Obstetrics, Gynecology, and Reproductive Sciences, National Center of Excellence in Women's Health, University of California, San Francisco.

Levels of contaminants found in breast milk demonstrate disproportionate effects in Indigenous communities. Human breast milk is a bioresource at the foundation of subsistence economies and traditional food ways of Indigenous communities. Biomonitoring of human breast milk has shown the ubiquity of persistent organic pollutants in the environment.³² One study noted that in the Akwesasne Mohawk population with lifetime exposures to consuming fish near contaminated sites, women produced breast milk with higher concentrations of PCBs; yet when later generations of Akwesasne Mohawk mothers heeded fish advisories and did not have such lifetime exposures, the breast milk concentrations of PCBs went down.³³ Unfortunately, in many tribal jurisdictions, where subsistence foods provide an economic and healthy means to eat, and where other sources of food are less available and less desirable, tribal women may not have such a choice.

In a more recent study looking at body burdens of persistent organic pollutants in the Akwesasne Mohawk youth ages 17 to 21 years old, significantly higher levels of PCBs were found among individuals who were breastfed as infants, were first born, or had consumed local fish within the past year.³⁴ Comparing levels of various persistent organic pollutants (POPs) reported by the U.S. Centers for Disease Control (CDC) for youth between the ages of 12 and 19 years old, the geometric mean of several congeners was significantly higher than the reported CDC 90th percentile. This suggests continued higher than acceptable exposures and body burdens in Indigenous communities either through diet or other sources. Of five women tested from Czechoslovakia, Kenya, Mexico, Philippines and Alaska, levels of pesticides and the industrial chemicals PBDEs (polybrominated diphenyl ethers—used as flame retardants in furniture, mattresses and electronics) were highest in the breast milk of a Yupik woman from Arctic Alaska (see charts below).³⁵



Contamination of human milk in Arctic mothers by POPs has been documented at levels considered unsafe. Impacted Indigenous Peoples have stated that they consider the contamination of breast milk as a clear human rights violation, making the most nutritious food for infants poisonous and contaminated in the pursuit of profit.

³² Fitzgerald, E. Hwang, S. et al. 1998. Fish Consumption and Breast Milk PCB Concentrations among Mohawk Women at Akwesasne, American Journal of Epidemiology 148:164-172.

³³ Fitzgerald et al. 1998.

³⁴ Gallo et al. 2011. Levels of persistent organic pollutant and their predictors among young adults. Chemosphere 03/2011; DOI: 10.1016/j.chemosphere.2011.02.071.

³⁵ Commonweal. 2009. Report: Monitoring Mother Earth by Monitoring Mother's Milk. www.ipen.org.

Indigenous women continue to strongly encourage breastfeeding for a number of nutritional, spiritual, social, cultural, health and economic reasons. However they demand an immediate halt to all activities which cause it to be contaminated.

VI. State and International Complicity: the Manufacture and Exportation of Banned Pesticides from the United States to Mexico and others countries

"Just because something is not illegal, it may still be immoral. Allowing the export of products recognized to be harmful is immoral."

- UN Special Rapporteur on Adverse effects of the illicit movement and dumping of toxic and dangerous products and wastes on the enjoyment of human rights, Ms. Fatma-Zohra Ouhachi-Vesely on her first official country visit to the United States, 2001

In 2001, the Special Rapporteur on Adverse effects of the illicit movement and dumping of toxic and dangerous products and wastes on the enjoyment of human rights, Ms. Fatma-Zohra Ouhachi-Vesely visited the United States. She found that the United States allowed the manufacture and exportation of pesticides that were banned for use in the United States to other, primarily developing, countries. She cited a report on the alarming levels of this exportation:

*"United States Customs records reveal that 3.2 billion pounds of pesticide products were exported in 1997-2000, an average rate of 45 tons per hour. Nearly 65 million pounds of the exported pesticides were either forbidden or severely restricted in the United States [...]. In the 1997-1999 periods, shipments of banned products were found in Customs Records [...] 57 per cent of these products were shipped to a destination in the developing world. Nearly half of the remaining 43 per cent were shipped to ports in Belgium and the Netherlands. Though it is not possible to make a final determination from available data, it is likely that the final destinations of a large number of these shipments were also developing countries."*³⁶

The same report further stated that:

*"[B]etween 1996-2000, the United States exported nearly 1.1 billion pounds of pesticides that have been identified as known or suspected carcinogens, an average rate of almost 16 tons per hour [...]"*³⁷

These figures have particular importance in regard to girls and boys in developing countries. According to the International Labor Organization, 65 to 90 per cent of the children estimated to be working in Africa (80 million), Asia (152 million) and Latin America (17 million) are working in agriculture. Evidence that children have heightened susceptibility to the carcinogenic effects of pesticides has even greater significance for developing countries. There, children live and work in conditions that involve almost continuous exposure, ranging from contact in fields to contaminated water, pesticide-contaminated clothing, and storage of pesticides in homes.

A more recent report based on US Government Custom Service Records, *"Pesticide Exports from U.S. Ports, 2001-2003"* states that:

³⁶ Carl Smith, "Pesticide Exports from US ports, 1997-2000", vol. 7 *International Journal of Occupational and Environmental Health* (2001), 266-274.

³⁷ Ibid

*"Analysis of U.S. Custom Service records for 2001-2003 indicates that nearly 1.7 billion pounds of pesticide products were exported from U.S. ports, a rate >32 tons/hour. Exports included >27 million pounds of pesticides whose use is forbidden in the United States. WHO Class 1a and 1b pesticides were exported at an average rate of >16 tons/day. Pesticide exports included >500,000 pounds of known or suspected carcinogens, with most going to developing countries; pesticides associated with endocrine disruption were exported at an average rate of >100 tons/day."*³⁸

The United Nations Declaration on the Rights of Indigenous Peoples as well as CERD General Recommendation XXIII requires the Free Prior Informed Consent by Indigenous Peoples who are exposed and detrimentally affected by exposure these highly toxic substances. The IITC has received extensive documentation from many such communities, in particular in Mexico and Guatemala, affirming that this is, in fact, not the case.

During her visit to the United States Mme. Vesely also met with government officials, reporting that "US officials told me that pesticides banned in the United States but exported cannot be regulated if there is a demand overseas, because of free-trade agreements."³⁹ The Rapporteur, Ms. Vesely justifiably found that the US policy is based upon, among other unacceptable premises, "... on an untenable premise that pesticides deemed unacceptable for the residents and environment of the United States are somehow acceptable in other countries. Clearly, countries such as the US often choose to offer their citizens a higher degree of protection than they insure for others in other countries and fail to monitor the human rights impacts of this practice by US corporations. One of the most common reasons for doing so is to acknowledge different levels of economic and social development among States. However this disparity is difficult to justify in respect of pesticides found to be so dangerous that they are banned from sale or use."⁴⁰

As one farm worker who is a member of a Yaqui community in Mexico expressed in a meeting with the US's Environmental Protection Agency in the San Diego, California USA in 2001, commenting on the US's policy of banning pesticides for use in the US but still permitting their production for export, "Why are the lives of our Yaqui children in Mexico worth less than the lives of your children here in the US?"

There are a great many difficulties in tracing the use abroad of banned pesticides manufactured in the US. In Mexico and Guatemala, for example, there is no labeling of origin or content of pesticides. They are given names like "Veloz" (speedy), or "Ninja" in Guatemala. As the Special Rapporteur pointed out, "Even if something is marked 'poison' it tends to be shipped in large amounts, and then transferred to smaller containers without proper labeling for local sale and use. And the people actually using the products often cannot read anyway."⁴¹

In an investigation conducted by the International Indian Treaty Council in Sonora, Mexico, on Indigenous Yaqui ancestral lands received testimony from an indigenous agricultural worker who was told by the agricultural companies involved in aerial spraying to bury large pesticide canisters because they knew that the pesticide was banned. As stated above, many Yaqui family members, farm workers and midwives and mothers have presented testimonies about increasing levels of birth defects, cancers and deaths due to toxic exposure from

³⁸ Pesticide Exports from U.S. Ports, 2001-2003 CARL SMITH, KATHLEEN KERR, MD, AVA SADRIPOUR, ESQ. International Journal of Occupational and Environmental Health ,VOL 14/NO 3, JUL/SEP 2008

³⁹ U.N. Deems Export of Banned Pesticides Immoral, U.S. Newswire, 202-347-2770/ 12/17 16:09

⁴⁰ Special Rapporteur on Adverse effects of the illicit movement and dumping of toxic and dangerous products and wastes on the enjoyment of human rights, Ms. Fatma-Zohra Ouhachi-Vesely , Mission to the United States, UN Doc. E/CN.4/2003/56/Add.1.

⁴¹ U.N. Deems Export of Banned Pesticides Immoral, U.S. Newswire, 202-347-2770/ 12/17 16:09,

indiscriminate aerial spraying, storage and use of highly toxic pesticides in communities and unsafe working conditions with no safety precautions or information about the dangers provided.

The export of banned and dangerous toxics from the “developed/industrialized” to the “developing” countries continues, with impacted Indigenous and other communities at the bottom end uniformed, sickened and killed. It should be noted with concern that the production and export of banned pesticides by the US is permitted under federal law (the Federal Insecticide, Fungicide, and Rodenticide Act, FIFRA) as well as under the International Rotterdam Convention, as long as the receiving country is informed of this status. Unfortunately no one informs the Indigenous communities “on the ground” who suffer grave human rights consequences.

VII. Holding States and Corporations Accountable

“The agrochemical industry is valued at over \$42 billion and operates with impunity while, according to the World Bank over 355,000 people die from pesticide poisoning every year.”⁴²

On December 3rd 2011, 27 years later after the Bhopal disaster caused by the release of toxic pesticides from the Union Carbide factory in Bhopal India killed over 25,000 people, the **Permanent Peoples Tribunal** convened in Bangalore India with an international panel of 5 judges. Based on testimonies and statements about health and other human rights violations caused by pesticides from communities around the world, including Indigenous communities from Alaska, Mexico, Peru and elsewhere, the Tribunal delivered a scathing indictment of the pesticide industry. It focused on the “Big 6” agrochemical giants, the Multi-national Corporations (MNC’s) Monsanto, Syngenta, Dow, DuPont, Bayer, and BASF (Dow bought Union Carbide in 2001).

Blame for the agrochemical industry’s human rights abuses was also assigned to the three States where these corporations are headquartered—the United States, Switzerland, and Germany. As stated in the PPT’s findings, these countries “*failed to comply with their internationally accepted responsibility to promote and protect human rights, especially of vulnerable populations.*”

Other findings included:

“The Tribunal makes the following declaration of responsibility for the six indicted MNCs and three Governments in particular and further also declares the responsibilities of all States, international organizations, UN Specialist Agencies, all other institutions of global governance.”

“AS CONCERNS THE INDICTED SIX CORPORATIONS (BASF, BAYER, DOW CHEMICAL, DUPONT, MONSANTO

-- The Tribunal finds on all evidence presented before it the six MNCs responsible for gross, widespread and systematic violations of the right to health and life, economic, social and cultural rights, as well as of civil and political rights, and women and children’s’ rights.

-- The Tribunal also finds these corporations responsible for their systematic conduct resulting in violation of indigenous peoples’ human rights and other entitlements.

AS CONCERNS THE THREE SPECIFICALLY INDICTED STATES:

⁴² Pesticides Action Network North America, January 10th, 2012

*“The United States of America (USA), the Swiss Confederation (Switzerland) and the Federal Republic of Germany (Germany) have failed to comply with their internationally accepted responsibility to promote and protect human rights, especially of vulnerable populations and their specific customary and treaty obligations in the sphere of environment protection...”*⁴³

The Permanent Peoples tribunal was convened by Non-Governmental organizations and its findings are considered non-binding upon the States and corporations in question. However similar conclusions were reached by a legally binding UN Treaty Monitoring body process, the UN Committee on the Elimination of Racial Discrimination in its Concluding Observations for the periodic review of the United States which took place in February 2008. The International Indian Treaty Council coordinated a joint Indigenous Peoples shadow report which includes testimony and documentation addressing the human rights impact of the production and export of toxic pesticides, including tons of pesticides banned for use in the US due to ample proof of severe health impacts including cancers and birth defects.

In response, the CERD issued the following recommendation to the US, following up on a similar recommendation to the Canadian government during its periodic review the previous year (March 2007):

“30. The Committee notes with concern the reports of adverse effects of economic activities connected with the exploitation of natural resources in countries outside the United States by transnational corporations registered in the State party on the right to land, health, living environment and the way of life of indigenous peoples living in these regions.

In light of article 2, paragraph 1 (d), and 5 (e) of the Convention and of its general recommendation no. 23 (1997) on the rights of indigenous peoples, the Committee encourages the State party to take appropriate legislative or administrative measures to prevent acts of transnational corporations registered in the State party which negatively impact on the enjoyment of rights of indigenous peoples in territories outside the United States. In particular, the Committee recommends that the State party explore ways to hold transnational corporations registered in the United States accountable. The Committee requests the State party to include in its next periodic report information on the effects of activities of transnational corporations registered in the United States on indigenous peoples abroad and on any measures taken in this regard.”⁴⁴

The IITC Shadow report submitted to the CERD for the US review specifically documented the export of banned pesticides by the US to Mexico. The issue of Mexico’s continuing IMPORT and use of dangerous and banned pesticides and their use in agricultural area of Mexico as impacting Indigenous communities (Yaqui and Huichol) was also submitted by IITC and addressed in the recommendations of the UPR review of Mexico by the UN Human Rights Council in September 2008.

Clearly, United States policies and laws as well as International Conventions allowing banned pesticides to be manufactured and exported by US based corporations are immoral and wrong, and violate the human rights of the impacted Indigenous communities where they are applied without their free, prior and informed consent,

⁴³ DRAFT FINDINGS AND RECOMMENDATIONS, PERMANENT PEOPLE’S TRIBUNAL ON AGROCHEMICAL TRANSNATIONAL CORPORATIONS, Bangalore, India, 3-6 December 2011

⁴⁴ Concluding Observations of the UN Committee on the Elimination of Racial Discrimination, United States of America [CERD/C/USA/CO/6 May 8th 2008]

and also where they travel as a result of global transport. As Mme. Ouachi-Veseley stated in her report to the Commission of Human Rights, “[i]n particular, the right to life, the right to health, the right to found a family, the right to a private life are most commonly violated by the effects of pesticide use.”⁴⁵

The National Congress of American Indians also affirmed the human rights impacts on Indigenous Peoples of the export of banned pesticides by the United States and US based corporations in a resolution adopted by consensus at its annual conference in November 2007:

*“WHEREAS, the production, export and unmonitored use of banned, prohibited and dangerous toxics including pesticides violates a range of human rights for Indigenous Peoples around the world including the Rights of the Child, Right to Health, Food Security, Development Life, Physical Integrity, Free Prior Informed Consent, Cultural Rights, the Right to be Free from all Forms of Racism and Racial Discrimination and the Right of All Peoples not to be Deprived of Their Own Means of Subsistence.”*⁴⁶

This NCAI resolution also called for a formal Hearing by the United States Senate to further address this matter.

VIII. Advances and Challenges in International Environmental Standards Regarding Environmental Toxics: An opportunity for the UNPFII to exert pressure in support of Indigenous Women and communities’ voices, rights and participation

A. The Stockholm Convention on Persistent Organic Pollutants

The Stockholm Convention was adopted by States from around the world in 2001 and entered into force in 2004 when 50 States had ratified it. Currently, the Convention includes 176 State parties that agree to work together toward global elimination of the world’s most dangerous chemicals. The Stockholm Convention is a living Treaty that includes provisions to add new chemicals that meet scientific criteria for persistence, long-range transport, adverse effects, and bioaccumulation. In addition to the initial list of twelve chemicals including nine pesticides, which were included in the Convention, the “dirty dozen” (aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex, toxaphene, hexachlorobenzene, PCBs, dioxins, and furans), the Parties agreed to add 9 new substances in 2009 and an additional pesticide, endosulfan, in 2011. The scientific committee of the Stockholm Convention, the POPs Review Committee (POPRC), works to determine whether chemicals that are nominated for inclusion under the Convention meet the scientific criteria and warrant global action.

The Preamble of the Convention recognizes the serious health concerns including “*particular impacts upon women and children and, through them, upon future generations;*” and that “*Arctic ecosystems and indigenous communities are particularly at risk because of the biomagnification of persistent organic pollutants and that contamination of their traditional foods is a public health issue.*” Because exposure to even low levels of POPs can harm human health and development, the Convention is strongly based on the Precautionary Principle.

However major challenges remain. The chemical industry remains a strong political force in this process, exerting constant and well-funded pressure on States to avoid or delay adding new chemicals. Despite the recognition of impacts on health of women, children and Indigenous Peoples in the Convention’s preamble,

⁴⁵ Special Rapporteur on Adverse effects of the illicit movement and dumping of toxic and dangerous products and wastes on the enjoyment of human rights, Ms. Fatma-Zohra Ouhachi-Vesely, Mission to the United States, UN Doc. E/CN.4/2003/56/Add.1, para 39.

⁴⁶ National Congress of American Indians Resolution #DEN-07-050, “Impacts on the Contamination of Subsistence Food Resources, Health, Human Rights and Development of Tribes and Indigenous Communities

Human rights including the Rights of Indigenous Peoples most often take a back seat to industry concerns or are not addressed at all in the States' deliberations. Also, there is no formal mechanism for the participation of Indigenous Peoples in the implementation of the Convention. This continues to be a key demand of Indigenous Peoples participating in this process, along with unqualified recognition of human rights.

In the closing statement of the Global Indigenous Peoples Caucus at the 2011 4th Conference of the Parties to the Stockholm Convention (April 6 – 10, 2011, Geneva), these ongoing concerns were emphasized:

*"For Indigenous Peoples, the impacts of the production, export and use of dangerous toxics violates and threaten human rights protected under International Laws, norms and Conventions, including the UN Declaration on the Rights of Indigenous Peoples. Reproductive health and justice, which includes our right to bear and raise healthy children, also continue to be undermined for Indigenous Peoples living at the source of application as well as in Arctic communities, far from the original point of exposure. Indigenous Peoples reiterate our call for formal participation in this process so that we are able to work more effectively with the State parties for the realization of the Stockholm Convention's goals."*⁴⁷

B. The Rotterdam Convention

The **Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade** is an important tool to protect human health and the environment by controlling trade in hazardous chemicals and pesticides that meet the requirements of the Convention. However, as with the Stockholm Convention, there is no formal mechanism for the participation of Indigenous Peoples or to address the human rights abuses caused by the export of hazardous substances when they are used in the lands and territories of Indigenous Peoples without their free prior and consent.

In fact, the Rotterdam Convention specifically allows for the export of pesticides and other chemicals that have been banned for use in the producing State as long as the receiving (importing) State is properly notified. There is no provision to ensure that Indigenous Peoples are afforded the right of Free Prior Informed Consent as stipulated by Article 29 of the UN Declaration of the Rights of Indigenous Peoples, CERD General Recommendations XXIII and other human rights standards. Also, there is no formal process for consideration by State parties of the widespread, brutal Human Rights impacts caused by this practice as have been documented in this paper, putting this UN Convention directly at odds with a number of existing UN human rights standards.

C. Agenda 21 and Rio + 20, the World Conference on Sustainable Development, June 2012

In 1972, the United Nations held the World Conference on the Human Environment in Stockholm, Sweden. The resultant Declaration of the United Nations Conference on the Human Environment was the first pronouncement by the international community on the world's environment. Calling for an environment of a quality that permits a life of dignity and well-being, the Conference established the United Nations Environmental Programme (UNEP).

The Stockholm Declaration addressed the issue of the environment and development but left it up to the States to deal with the growing problem of environmental degradation as a result of development throughout the

⁴⁷ United Nations Stockholm Convention on Persistent Organic Pollutants , 5th Conference of the Parties, April 25th 29th, 2011, Geneva Switzerland , Global Indigenous Peoples Caucus Closing Statement , Presented by Monique Sonoquie, International Indian Treaty Council I

world. The Stockholm Declaration did recognize the connection between human right and the environment, but in its formulation of a right to the environment, it framed this right as an individual right even though the right to the environment, like the rights of self-determination, development, and peace, are all so-called “third generation” collective rights of peoples.

The World Conference on the Environment and Development (Rio) was held twenty years later, in 1992, in Rio de Janeiro, Brazil, leading to an explosion of international activity, including development of international conventions addressing the environment.

Principle 22 of the Rio Declaration recognizes that:

Indigenous Peoples and their communities... have a vital role in environmental management and development because of their knowledge and traditional practices. States should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of their sustainable development.

Indigenous Peoples are addressed in Agenda 21, Chapter 26 which calls for a “full partnership” with Indigenous Peoples in the accomplishment of the goals of Agenda 21. Chapter 26.3 calls upon the States to “strengthen and facilitate” Indigenous Peoples’ participation in their own development and in external development activities that may affect them.

Another important advance, which was also included in the Stockholm Convention, was the key concept of the “Precautionary Principle” placing the burden of proof on the corporation or State that chemicals are safe for human and environmental health BEFORE they are produced, used or released. This formula stands as a rights-based alternative to current practices supported by governmental regulatory models such as “risk assessment”, “safe management”, and “acceptable risk” which allow the continued use and proliferation of chemicals known to be dangerous if their impacts can be “controlled” or limited to low or “acceptable” rates of illness and death.

Agenda 21 Section I, Chapter 6: “Protecting & Promoting Human Health, E. Reducing health risks from environmental pollution and hazards” recognizes that pesticides pose a serious threat to human health. Although Agenda 21 also endorses partnership with Indigenous Peoples, the Precautionary Principle and Free Prior and Informed Consent, in Chapter 19 and 20 it endorses another model altogether regarding the Management of Chemicals and Hazardous Wastes.

In Chapter 19 it states that “the principle of the right of the community and of workers to know those risks [of chemicals] should be recognized. However, the right to know the identity of hazardous ingredients should be balanced with industry's right to protect confidential business information”.⁴⁸ In other words, it proposes that the fundamental right of exposed communities to FPIC be “balanced” with corporate business interests. Chapter 19 paragraph 52 f) also allows for the “export of chemicals that are banned, severely restricted, withdrawn or not approved for health or environmental reasons, except when such export has received prior written consent from the importing country”⁴⁹ This provides the basis for similar provisions in the Rotterdam Convention.

⁴⁸ Agenda 21, Chapter 19 paragraph 8

⁴⁹ Agenda 21 Chapter 19, “Environmentally Sound Management Of Toxic Chemicals, Including Prevention Of Illegal International Traffic In Toxic And Dangerous Products”, paragraph 52) f

Indigenous Peoples have challenged these provisions of Agenda 21, and the health and human rights threats they pose, in their statements in preparation for the upcoming World Conference on Indigenous Peoples, “Rio + 20” in June 2012, based on the minimum standard in the UN Declaration on the Rights of Indigenous Peoples, in particular Article 29, in this regard. Indigenous Peoples are optimistic regarding the inclusion of the UN Declaration on the Rights of Indigenous Peoples in the “Zero-draft outcome document” for Rio+20 as drafted by the United Nations Secretary General⁵⁰ and encourage the UNPFII to urge that this reference remain or be strengthened in the final outcome document.

D. The United Nations Legally-Binding Instrument on Mercury: A Current International Standard-setting opportunity to incorporate the right to health for Indigenous Women, Girls and Future Generations

Mercury is highly toxic. Some levels of inorganic mercury are found in nature. Metallic mercury is used in batteries, thermometers and dental amalgams. The largest amounts of mercury are released into the environment by coal-fired power plants, paper milling, mining and other industrial processes. The most toxic form is “methylated mercury”, created when mercury is exposed to decaying plant matter, for example in marshes or lakes created by dams. This form of organic mercury “bio-accumulates” or builds up in the cells of fish and other animals, moving up the food chain in higher and higher concentrations. Humans are most commonly exposed by eating contaminated fish. Mercury contaminates our air, water, lands and traditional foods, in particular the fish upon which so many Indigenous communities depend, producing serious health impacts for persons of all ages. But the gravest danger is to the health and development of our children. Exposure to mercury impairs the neurological development of infants, babies and children, including those still in those mothers’ wombs.

The Second Ministerial Meeting of the Arctic Council met in Barrow, Alaska in 2000. Participants were concerned about effects to human health and the environment of mercury and its impacts globally, particularly the Arctic. The Arctic Council asked UNEP to complete a global assessment of mercury to provide information for next steps. UNEP released “Global Mercury Assessment” report in 2002. In summary the report acknowledged that mercury, due to its long range transport, its ability to bioaccumulate in the environment, its persistence and its harm to human health and the environment, is of global concern. In 2009, UNEP agreed to negotiate a global, legally binding mercury-control Treaty. The Treaty was to be drafted in five “Intergovernmental Negotiating Committee” or INC meetings to begin in 2010 and to be completed in early 2013. The first three took place in Japan, Sweden and Kenya. The next session, INC 4, is scheduled in Uruguay in June 2012.

About two-thirds of the mercury released in the environment can be attributed to human activity. The largest source of global mercury pollution comes from burning fossil fuels, primarily coal. The second largest source appears to be artisanal and small scale gold mining, as well as continued run offs from abandoned gold mines. Mercury can also be found in a number of products (batteries, dental fillings, cosmetics etc.)

Mercury contamination is bound to the protein tissue rather than the fatty tissue, unlike contamination from POPs. Although mercury can travel far from the source, contamination is of particular concern for waterways that are near coal-fired power plants, waste dumps, pulp and paper mills, cement kilns, gold mines, sites of fossil fuel extraction for oil, coal and tar sands and chlor-alkali facilities.

⁵⁰ “The Future We Want”, Zero-Draft text for Rio+20, January 10, 2012, para. 21

Abandoned mercury and gold mines in areas such as California, South Dakota and Alaska continue to emit mercury. Current gold mining and processing taking place in many countries in Latin America, Asia and Africa as well as North America produce new mercury contamination. For example, in 2003, gold mining and processing at Placer Dome's Cortez mine and Barrick's Gold strike in Northern Nevada released 2435 pounds of mercury into the environment.

Methylmercury is known to affect the neurological system of both the developing as well as the adult brain. Prenatal exposure can cause irreversible damage to the developing nervous system resulting in reduced IQ, abnormal muscle tone and losses in motor function and attention. Heart disease and high blood pressure have also been associated with methylmercury consumption as well as damaged immune systems kidney damage and reproductive effects.

As a mother accumulates mercury in her body she can then pass this pollution onto her unborn child. Babies can be exposed by consuming breast milk with high levels of mercury. Indigenous Peoples that rely primarily on fish for their physical, economic and cultural survival are at highest risk. In 2000, the National Academy of Sciences estimated that 60,000 babies born each year in the US are at risk for learning disabilities and other kinds of neurological damage due to mercury contamination. The Academy concluded that there is "little or no margin of safety" for consumption of mercury by women of childbearing age. In 2004, the US Environmental Protection Agency estimated that over ten times that many babies may actually be at risk. Umbilical cord blood has been found to contain almost twice the level of mercury than that found in the mothers' blood, further increasing the risks to unborn generations.

Mercury is an international problem affecting Indigenous Peoples around the world. In British Colombia Canada, the dam holding Teck Cominco's mercury mine tailings burst in 2004, releasing large amounts of mercury into water used for traditional subsistence fishing. In Northern Ontario, paper mill emissions containing mercury had devastating effects on the health and subsistence fishing of the Grassy Narrows First Nation Peoples. The UN Environmental Programme estimates that over one million people in Latin America, including many women and children, are currently involved in small-scale mining activities in which mercury is used.

Indigenous Peoples participating in the INC sessions have proposed including references to Indigenous Peoples in several places in the current Treaty negotiating text, in addition to the current language recognizing "vulnerable populations" as well as a new operative article addressing specific impacts for Indigenous Peoples. The Indigenous Peoples' Global Caucus at INC 3 in Nairobi Kenya (31 October – 4 November 2011) also strongly supported the inclusion of a new operative paragraph on "Health Aspects" currently proposed as Article 20 bis by the GRULAC (Latin American) countries. Their statement to the INC3 plenary linked health impacts to cultural concerns and also called for better data regarding specific impacts on Indigenous women and children.

"Harms from all mercury releases and a need for more and better data on impacts to Indigenous Peoples and vulnerable populations, such as pregnant women, the developing fetus, children, and workers, need to be better tracked and communicated. For us, these harms are linked to traditional foods and diets, and cultural values. This expanded definition of vulnerability includes other factors of poverty, poor nutrition, reproductive concerns of our women, learning disabilities of our children, and the retention of our languages."⁵¹

Indigenous Women have taken a strong stand regarding the continued release of mercury into the international environment, the lack of political will by States to conduct effective cleanup of lands and waterways that are

⁵¹ Indigenous Peoples Global Caucus intervention on Health Aspects, INC 3, Nairobi Kenya, November 3rd, 2011

contaminated and the need for a strong international instrument on mercury guided by health and human rights concerns rather than priorities set by industry.

The “Indigenous Mothers against Mercury Open Letter to National, State and regional Policy- Makers”, was finalized on May 18th 2011 and has received over 1000 signatures from Indigenous mothers around the world. It reiterates the health impacts of mercury as a neurotoxin which most severely damages the developing fetus. It reminds policy makers that this represents “a violation of our human rights to health, cultural practices, Treaty rights, subsistence, Rights of the Child, and our Right to Free Prior and Informed Consent as recognized by the UN Declaration on the Rights of Indigenous Peoples and other international human rights instruments, norms and standards.”⁵²

Regarding the international standard setting process currently underway, the letter stresses the need for full and effective participation of Indigenous Peoples, including women, and for a strong and effective outcome. The letter concludes with the following 3 proposals to policy-makers:

As policy-makers, we call upon you to take a strong stand for the development of the Global Mercury Treaty, and through policies on the national and international levels that will:

1. *Halt emissions of mercury into the environment from all sources, including the burning of coal, current and past gold mines and production and disposal of medical products that use mercury*
2. *Commit to thorough cleanup of sources of current contamination including legacy mine sites, working in full collaboration with Indigenous Peoples when their homelands, waters, sacred areas and subsistence foods have been impacted.*
3. *Ensure the full, formal and effective participation of Indigenous Peoples, including Indigenous women, in the development of a Global Mercury Treaty and in measures to implement its provisions on the national, regional and local levels.”*⁵³

IX. RECOMMENDATIONS

In light of the information and concerns presented in this paper, we suggest that the following recommendations be included in the report of this Expert Group Meeting of the UN Permanent Forum on Indigenous Issues, and be considered for inclusion in the final report of the UNPFII 11th Session in May 2012. These include support for relevant recommendations that have already emerged from a number of consensus documents and processes agreed to by Indigenous Peoples in response to the concerns raised in this paper:

1. This EGM calls upon States to eliminate the production and use of pesticides, industrial chemicals and toxic byproducts that disrupt the endocrine system, affect learning and neurological development, cause cancers and other illnesses, undermine women’s and maternal health, contaminate lands, waters and traditional food sources, cause harm to reproduction and affect any aspect of the health and development of our future generations. This EGM also calls upon States to take responsibility for

⁵² “Indigenous Mothers against Mercury Open Letter to National, State and regional Policy- Makers”, International Indian Treaty Council and the Indigenous Women’s Environmental Justice and Reproductive Health Initiative
May 18th 2011

⁵³ “INDIGENOUS MOTHERS AGAINST MERCURY OPEN LETTER TO NATIONAL, STATE AND REGIONAL POLICY-MAKERS”, MAY 8TH, 2012, Submitted by the International Indian Treaty Council and the Indigenous Women’s Environmental Justice and Reproductive Health Initiative, May 8th 2011

effective and immediate clean-up of contaminated sites created by activities which it either permitted or approved, in collaboration and coordination with the impacted Indigenous Peoples.

2. The EGM calls upon States to report on their progress at the 12th session on the UNPFII towards full and effective implementation of Article 29 of the UN Declaration on the Rights of Indigenous Peoples, in particular paragraphs 2 and 3 regarding their obligation to ensure free prior and informed consent regarding hazardous materials and to implement programs to restore the health of impacted Peoples in conjunction with these Peoples, ensuring the participation of Indigenous women.
3. We recommend that the “precautionary approach” (principle 15 of the Rio Declaration on Environment and Development) be reaffirmed at Rio + 20, together with a renewed commitment by States to eliminate the production, use and dumping of chemicals that are toxic, persistent and hazardous that pose dire threats to the health of impacted communities and ecosystems, and most of all violate human rights; including the rights of Indigenous Peoples to free, prior and informed consent as stated in Article 29 of the UN Declaration on the Rights of Indigenous Peoples. We call upon States to make a commitment to utilize and implement the Precautionary Principle as an alternative to the models of “risk assessment” and “management” of toxic chemicals presented in sections 19 and 20 of Agenda 21. In addition, we recommend that agricultural methods and practices used traditionally by Indigenous communities based on safe alternatives to toxic pesticides be recognized and supported.⁵⁴
4. The EGM calls upon the UNPFII to urge States and the UN Secretary General to ensure that the reference recognizing “the importance of the UN Declaration on the Rights of Indigenous Peoples in the global, regional and national implementation of sustainable development strategies”⁵⁵ be maintained and strengthened in the final Rio + 20 Outcome Document.
5. We recommended that the practice of exporting banned pesticides and other chemicals by the USA and other States cease immediately. We also recommend that the provisions within UN Conventions and national laws which permit this practice without the free, prior and informed consent of the Indigenous Peoples and communities who may be impacted at the source of exposure as well as through global transport, be reviewed immediately and revised.⁵⁶
6. The EGM calls upon the United Nations, its agencies and members to ensure that Human Rights principles and standards must be mainstreamed in all international standard setting processes addressing environment and development, including, inter alia, including the Rights to Health, Free Prior Informed Consent, Food and Subsistence, Treaty Rights, Rights of Women and Children and Right to Life, and all rights affirmed in the United Nations Declaration on the Rights of Indigenous Peoples.
7. The EGM recommends that all relevant national and international bodies and processes respect the traditional knowledge of Indigenous women regarding sustainable development, environmental protection, cultural practices, food production and health and take action to strengthen their roles as participants, leaders, and experts in all levels of discussions and decision-making on these matters.

⁵⁴ Conclusions and recommendations, from the “Rio + 20: Indigenous Peoples in Route to the Rio +20 Conference” from the Global Preparatory Meeting of Indigenous Peoples on Rio +20 and Kari-Oca 2, August 22 - 24, 2011, Manaus, Amazonia, Brazil”

⁵⁵ “The Future We Want”, Zero-Draft text for Rio+20, January 10, 2012, para. 2121

⁵⁶ Conclusions and recommendations, from the “Rio + 20: Indigenous Peoples in Route to the Rio +20 Conference” from the Global Preparatory Meeting of Indigenous Peoples on Rio +20 and Kari-Oca 2, August 22 - 24, 2011, Manaus, Amazonia, Brazil”

8. The UN Permanent Forum on Indigenous Issues, the UN Special Rapporteur on the Situation of Human Rights and Fundamental Freedoms of Indigenous Peoples and other UN bodies and mechanisms addressing Indigenous Peoples' rights are requested to focus attention and collect information from Indigenous Peoples, in particular Indigenous women, on the links between environmental contamination and reproductive health and justice, for the purpose of recommending effective solutions and remedies at the international level.⁵⁷
9. States and their Territories must be accountable for the implementation, with the full and effective participation of Indigenous Peoples of all international Treaties, Standards and Conventions entered into including the Nation to Nation Treaties with Indigenous Peoples and Nations. Processes and mechanisms to ensure accountability must be put in place, with the full participation of affected Indigenous Peoples.⁵⁸
10. Women, children and families who have suffered the impacts of toxic contaminants require special care. States and corporations which have allowed contamination to damage our communities must be held accountable to cover the costs and ensure that adequate care and services are provided, with the full participation and collaboration of the affected Indigenous Peoples.⁵⁹
11. We encourage the development and dissemination of educational materials explaining the links between environmental toxics and reproductive health and justice. We also encourage the development of training programs to inform Indigenous women of opportunities for their participation locally, nationally and internationally, and to build their capacity as strong voices for their families and Nations.⁶⁰
12. Regarding the current process being carried out by UNEP for the development of a legally-binding International Treaty on Mercury, we support the recommendations proposed by the "Indigenous Mothers Against Mercury" open letter, representing the voices of over 1000 Indigenous women worldwide regarding the development of strong language to: *halt emissions of mercury into the environment from all sources, including the burning of coal, current and past gold mines and production and disposal of medical products that use mercury; to commit to thorough cleanup of sources of current contamination including legacy mine sites, working in full collaboration with Indigenous Peoples when their homelands, waters, sacred areas and subsistence foods have been impacted; to Ensure the full, formal and effective participation of Indigenous Peoples, including Indigenous women, in the development of a Global Mercury Treaty and in measures to implement its provisions on the national, regional and local levels.*⁶¹

Further, we fully support the proposal of the Global Indigenous Peoples Caucus made at INC3 to include an operative paragraph addressing the health impacts, aspects and concerns regarding mercury in the context of human rights and the health of Indigenous women, children and unborn generations.

⁵⁷ Declaration for Health, Life and Defense of Our Land, Rights and Future Generations", 1st International Indigenous Women's Environmental and Reproductive Health Symposium, June 30 – July 1, 2010, UN Permanent Forum's 10th session Conference Room Paper [E/C.19/2011/CRP. 9], "Recommendations to the United Nations System and International bodies"

⁵⁸ Ibid, "Recommendations to States and their Territories"

⁵⁹ Ibid, "Recommendations to States and their Territories"

⁶⁰ Ibid, "Recommendations to Indigenous Peoples, Communities, Nations, Tribal Governments and Organizations"

⁶¹ "INDIGENOUS MOTHERS AGAINST MERCURY OPEN LETTER TO NATIONAL, STATE AND REGIONAL POLICY-MAKERS", MAY 8TH, 2012, Submitted by the International Indian Treaty Council and the Indigenous Women's Environmental Justice and Reproductive Health Initiative, May 8th 2011

13. We call for disaggregation of data and studies carried out with the consent and full participation of Indigenous women and communities, to provide better information about specific impacts of environmental toxics, including pesticides, mercury, mining runoffs, uranium mining and processing, waste dumping, and Persistent Organic Pollutants, on the health of Indigenous women, girls and children.
14. States, international financial institutions, United Nations programmes and actions, as well as private investors and corporations must do due diligence and fully disclose to all Indigenous Peoples, Nations, tribes, and communities, their activities and potential risks. Peoples and individuals who may be affected by or exposed to pesticides, mining, dumping, incineration and other forms of toxic chemical production, the complete known or suspected effects of the chemicals in question, the location and names of corporations producing them, any current or prior legal sanctions or cases filed against them, the Indigenous Peoples in the same or other countries who have experiences with the given process or corporation, so that informed decisions can be made as part of Indigenous Peoples right to free, prior and informed consent.⁶²
15. Based on paragraph 33 of the report of the UN Permanent Forum on Indigenous Issues 10th session affirming that “the Permanent Forum notes the intention of the International Indigenous Women’s Environmental Justice and Reproductive Health Initiative to organize an expert group meeting on the environment and indigenous women’s reproductive health and requests that the organizers invite members of the Permanent Forum to participate in the meeting...”⁶³ that this EGM requests the Symposium, scheduled for April 2012 in Alaska, to collect additional data, testimonies and case studies to submit to the UNPFII at its 11th session documenting environmental violence against Indigenous women.
16. We affirm that the rights and relationships affirmed in the legally-binding Nation-to-Nation Treaties between States and Indigenous Peoples, including self-determination, free prior and informed consent, partnership, mutual respect, full and effective participation in decision-making and the “Treaty Right to Health” are fundamental for developing solutions to critical problems affecting Indigenous Peoples, including all forms of violence against Indigenous Women.

⁶² From “Contributions to the UN Secretary General for preparation of the Rio + 20 “Zero-draft outcome document”, submitted by the International Indian Treaty Council (IITC), Dene Nation (Northwest Territories, Canada), Nishnawbe Aski Nation (Thunder Bay, Ontario, Canada), Indigenous Environmental Network (IEN), Indigenous Peoples Council on Biocolonialism (IPCB), Indigenous World Association (IWA), Alaska Community Action on Toxics (ACAT), and Ms. Mirna Cunningham, President, UN Permanent Forum on Indigenous Issues and CADPI (Nicaragua), October 31, 2011

⁶³ United Nations Permanent Forum on Indigenous Issues Report on the tenth session (16-27 May 2011), Economic and Social Council Official Records, 2011, [E/2011/43-E/C.19/2011/14]

Andrea Carmen and Vi Waghiyi wish to thank:

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We also wish to thank the UNPFII for its interest and attention to this critical issue in the context of the theme "Violence against Indigenous Women". This context provides an innovative approach for consideration of the urgent issues presented in this paper, bridging several areas of the UNPFII's mandate and priority focus areas, including human rights, environment, health, development, indicators of well-being and the specific situations affecting Indigenous women and girls.



*Participants in the 1st International Indigenous Women's Environmental and Reproductive Health Symposium
June 30 – July 1, 2010*

REPORT OF THE INTERNATIONAL INDIGENOUS WOMEN'S ENVIRONMENTAL AND REPRODUCTIVE HEALTH SYMPOSIUM

**APRIL 27TH – 29TH 2012,
CHICKALOON NATIVE VILLAGE, ALASKA**

**Co-hosted by the International Indian Treaty Council (IITC) and Indigenous Women's Initiative
for Environmental and Reproductive Health, Alaska Community Action on Toxics (ACAT),
Chickaloon Native Village and International Indigenous Women's Forum (FIMI).**

Submitted to the 11th Session of the United Nations Permanent Forum on Indigenous Issues as a
Conference Room Paper by the International Indian Treaty Council, Indigenous Non-governmental
Organization in General Consultative Status to the United Nations Economic and Social Council
May 5th, 2012

THE 2nd DECLARATION FOR HEALTH, LIFE AND DEFENSE OF OUR LANDS, RIGHTS AND FUTURE GENERATIONS

We, Indigenous women from North America, Latin America, the Arctic and the Pacific, gathered April 27th - 29th, 2012 at the **2nd INTERNATIONAL INDIGENOUS WOMEN'S ENVIRONMENTAL AND REPRODUCTIVE HEALTH SYMPOSIUM**, at the Yah Ne Dah Ah Tribal School, Chickaloon Native Village in Alaska.

We express our heartfelt thanks to the Native Village of Chickaloon and the Ya Ne Dah Ah Tribal School for their warm hospitality. We heard their stories, songs and language and learned about the devastating environmental, cultural, and social impacts of coal mining by the US Navy in Chickaloon traditional lands from 1914 to 1922. We stand in strong solidarity with Chickaloon Village's current fight to prevent new coal mining in their traditional lands which would drastically impact the health of the children, the environment and Community as a whole.

We thank the UN Permanent Forum on Indigenous Issues for recognizing the 1st International Indigenous Women's Symposium on Environmental and Reproductive Health at its 10th session, and receiving the report of the 2nd Symposium at this session. We also thank the UN Special Rapporteur on the Rights of Indigenous Peoples James Anaya for visiting the 2nd Symposium in conjunction with his US Country Visit on April 28th, 2012, and for his commitment to include the concerns expressed by participants his report to the UN Human Rights Council.

We have shared our stories and the experiences of our Peoples. We express our collective outrage that current federal and international laws permit industry, military and all levels of government to knowingly produce, release, store, transport, export, import and dump hazardous chemicals and radioactive materials, and expand contaminating activities such as fossil fuel development, hydraulic fracturing, uranium mining and milling, introduction of genetically modified seeds and animals, bio-fuel production and high-pesticide agriculture.

As Indigenous mothers and grandmothers, youth and elders, traditional healers, tribal leaders, human rights and environmental activists, we express our profound concern for the life and health of our communities, children, ecosystems and Mother Earth due to the proliferation of environmental toxins.

In response, we affirm, and reaffirm, the following:

- 1) We steadfastly reaffirm the 1st "**DECLARATION FOR HEALTH, LIFE AND DEFENSE OF OUR LANDS, RIGHTS AND FUTURE GENERATIONS**" adopted by consensus at the International Indigenous Women's Symposium in Alamo, California on July 1st, 2010.
- 2) We acknowledge the sacredness of the life-giving force of our birthing places. Many are under attack from toxic contamination, extractive industries and other industrial processes. These include salmon spawning, caribou and moose birthing places, as well as women's wombs.
- 3) Our health and well-being, lands and resources including air and water, languages, cultures, traditional foods and subsistence, sovereignty and self-determination, life and security of person, free prior and informed consent and the transmission of traditional knowledge and teachings to our future generations are inherent and inalienable human rights. They are affirmed in the UN *Declaration on the*

Rights of Indigenous Peoples and other international standards, and must be upheld, respected and fully implemented by States, UN bodies, corporations and Indigenous Peoples of the world.

4) Our bodies are sacred places that must be protected, honored and kept free of harmful contaminants so that new generations of our Nations are born strong and healthy. The right to self-determination for Indigenous Peoples includes our Indigenous identities, our sexualities and our reproductive health for the future of our Nations.

5) The detrimental health effects of toxic contaminants on Indigenous women are well documented, and are affirmed through testimonies presented in this Symposium. These include high levels of toxics in Indigenous women's breast milk, placental cord blood, blood serum and body fat infertility, miscarriages, premature births, premature menopause, early menses, reproductive system cancers, decreased lactation and inability to produce healthy children. This causes severe psychological, relational, emotional and economic damage to mothers, families and communities.

6) Environmental toxins also have severe negative impacts on the health and development of our children and unborn generations. Many toxic chemicals impair the endocrine and immune systems in utero, affecting health and reproductive capacity of future generations. The intellectual and neurological development of our children are also affected, impacting their ability to retain and pass on our culture, ceremonies, stories, languages and songs.

7) The individual and collective impacts of intergenerational trauma and the legacy of removal and violence are passed on to future generations. Intergenerational trauma amplifies and reinforces impacts of extractive industry, military and environmental degradation in our communities. Addressing intergenerational trauma is a core component of rebuilding reproductive health for our communities.

8) Environmental contaminants causing disease, birth defects and death are deliberately released into the environment *because* they are toxic to living things (i.e. pesticides), or as a result of industrial or military processes that are judged by States and corporations to pose an "acceptable risk" and "allowable harm." States and corporations deny "provable" impacts despite the clear evidence that they cause a range of serious health and reproductive impacts which disproportionately affect Indigenous women and children. This constitutes "environmental violence" by States and corporations and must be identified as such by Indigenous Peoples and human rights bodies.

9) Environmental contamination infringes on the cultural practices of Indigenous Peoples including women's coming of age, rites of passage and other ceremonies for the continuation of life. The use of pesticides on materials used for baskets and cradle boards has resulted in increased rates of cancer for basket makers. Plants, herbs, and traditional medicines vital to Indigenous Peoples' maternal and child health are often outlawed, prohibited, contaminated or are becoming extinct.

10) Land privatization, corporatization and militarization divides our collective land bases, facilitating resource extraction, displacement, forced removal and environmental contamination, impacting Indigenous women's economic, cultural and social practices and reproductive health.

11) We recognize the links between our concerns and struggles. Coal mining contaminates water and decimates fish, wildlife and traditional medicines. Burning coal is also a primary source of mercury emissions and climate change, affecting Indigenous communities globally. Pesticides used in Mexico and other countries contaminate Indigenous communities at the source of exposure, and then enters the

environment and food chain, traveling to the Arctic and concentrating in traditional food, bodies, and breast milk. Likewise, introduction of extractive industries near our communities often results in increased levels of sexual exploitation and violence for our Indigenous women and girls.

12) We will continue to use our own languages and ways of knowing. Our understandings cannot always be expressed in the language of modern science and law. Our Peoples, especially our traditional knowledge holders, spiritual leaders and elders are the experts. We affirm their teachings that we are now in a time that will determine our survival, depending on the choices we make.

13) We affirm the use of our own Indigenous justice and legal systems, including Treaty-Based justice systems to hold those accountable for environmental violence.

14) We recognize the importance of continuing to educate our own Peoples and communities about the links between reproductive health, environmental contaminants and their human rights as affirmed in the UN Declaration, Nation-to-Nation Treaties and other international standards. When Indigenous communities understand these links, they become active participants in resisting environmental violence and violations of their rights.

15) We firmly denounce the continued impunity of States and corporations for the environmental violence they carry out or permit affecting Indigenous Peoples ecosystems, traditional foods, health, well-being and ways of life.

16) While we recognize the impacts and tragedies that have occurred as a result of environmental violence, we also celebrate our struggles, victories and our continued strength, resilience and resistance.

Based on these shared understandings, we adopt by consensus this ***2nd DECLARATION for the Health, Survival and Defense of OUR LANDS, OUR RIGHTS and our FUTURE GENERATIONS and make the following recommendations:***

That Indigenous Peoples, Nations and Communities:

- 1) Identify and document the disproportionate impacts of environmental toxins on Indigenous women and children as "environmental violence" for which States and corporations can be held accountable.
- 2) Provide community capacity-building and training linking reproductive and environmental health and human rights.
- 3) Maintain, support, strengthen and assert traditional systems of law, community organization, decision-making, leadership and representation.

That States and their subsidiary governments (Territories, provinces/states, municipal etc.):

- 1) Fully implement and uphold, without qualification, the UN Declaration on the Rights of Indigenous Peoples, including Article 29 regarding the right of Indigenous Peoples to the protection of their environments and the State obligation to ensure free prior and informed consent regarding hazardous materials. We also call for the full and unqualified implementation of Articles 23 and 24 affirming our collective rights to health and use of traditional medicines.

- 2) Eliminate the production and use of pesticides, industrial chemicals and toxic by-products that disrupt the endocrine system, affect learning and neurological development, cause cancers and other illnesses, undermine women's reproductive and maternal health, contaminate lands, waters and traditional food sources and affect any aspect of the health and development of our future generations.
- 3) Take responsibility for effective and immediate clean-up of contaminated sites created by activities which they permitted or approved in collaboration and coordination with impacted Indigenous Peoples.
- 4) Implement programs to restore the health of Indigenous Peoples, including women and children who have been negatively impacted by environmental toxins, including their export and import in collaboration and coordination with the affected Indigenous Peoples including Indigenous women.
- 5) Immediately cease the practice of exporting and importing banned pesticides, toxic wastes and other chemicals in particular from the United States. .
- 6) Implement and mandate culturally relevant gender based analysis in all impact statements regarding mining and other industries, also ensuring FPIC.
- 7) Recognize the knowledge and practices of Indigenous women's health, birthing, traditional midwifery, and the use of Indigenous medicinal knowledge on equal footing with other health systems and methods, and the right of Indigenous healers to protect and use this knowledge as they so choose.
- 8) Prosecute companies and hold military accountable for the full extent of their violations to the rights of Indigenous Peoples pertaining to the contamination of lands, territories and resources, and respect Indigenous Peoples' legal and judicial systems in accordance with Article 27 of the UN Declaration in their efforts to hold government and corporations accountable.
- 9) We call in particular upon Canada and the United States to implement the recommendations made in 2007, 2008 and 2012 by the UN Committee on the Elimination of Racial Discrimination (CERD) calling upon them to take appropriate legislative measures to prevent the transnational corporations they license from negatively impacting the rights of Indigenous outside Canada and the United States.

Recommendations to the United Nations System and International processes:

- 1) That the Permanent Forum 11th session in its half-day session on food sovereignty consider the direct links between food sovereignty, environmental violence and reproductive health and the specific impacts to Indigenous women, children and unborn generations.
- 2) That the World Conference on Indigenous Peoples address reproductive and environmental health, and receive the report of the 3rd symposium to be held in 2014 in the autonomous region of Nicaragua.
- 3) That effective, transparent international mechanisms be established to ensure accountability, redress and restitution with the full participation of affected Indigenous Peoples and for UN Human rights bodies to dedicate particular attention to the matter of environmental violence.
- 4) That the World Conference on Sustainable Development (Rio + 20, 2012) reaffirm the "precautionary approach as an alternative to the models of "risk assessment" and "management" of toxic chemicals and

pesticides, and recognize and support sustainable agricultural methods and practices used traditionally by Indigenous Peoples.

5) That UN Conventions and national laws which permit the export, transport and import of banned pesticides, wastes and other toxics without the free, prior and informed consent of the Indigenous Peoples and communities who may be impacted be immediately reviewed and revised

6) That the United Nations, its agencies and members ensure that Human Rights principles and standards are mainstreamed in all international standard-setting processes addressing environment and development, including the United Nations Declaration on the Rights of Indigenous Peoples.

7) That the UN Permanent Forum on Indigenous Issues, the UN Special Rapporteur on the Rights of Indigenous Peoples and other UN bodies and mechanisms focus attention and collect information from Indigenous Peoples, in particular Indigenous women, on the links between environmental contamination and reproductive health and recommend effective solutions and remedies at the international level.

8) We endorse the “Indigenous Mothers Against Mercury” open letter’s recommendations calling for strong language in the new legally-binding International Treaty on Mercury, to “*halt emissions of mercury into the environment from all sources, including the burning of coal,*” and “*to ensure the full, formal and effective participation of Indigenous Peoples, including Indigenous women.*” We also recommend that the Permanent Forum at its 11th session call upon States and the UN Environmental Program to incorporate the recognition of Indigenous Peoples and in the operative text of the Treaty.

Cross Cutting

1) We recommend that States, UN agencies and Indigenous Peoples affirm and utilize the Precautionary Principle, recognizing Indigenous Peoples’ traditional knowledge about the effects of chronic pollution as well as the social stressors caused by development and industry that impact and divide communities. These include increased mental health concerns, violence against Indigenous women, children, and families, sexually transmitted infections including HIV, incarceration, child removal and suicide.

2) We reiterate our support for a moratorium on new fossil fuel exploration, processing and extraction, as the first step towards the full phase-out of fossil fuels with a just transition to sustainable energy and the protection of our Peoples and ecosystems from the devastating impacts of climate change.

3) We call upon Indigenous, National and International processes to respect the traditional knowledge of Indigenous women regarding sustainable development, environmental protection, cultural practices, food production and health and to include their full and effective participation as leaders and experts in all levels of decision-making on these matters.

Conclusion

We commit to continue our work and fulfill our responsibilities to our children and the generations still to come. We commit to reclaim our wellness as Indigenous women and Peoples. We reaffirm that our children have a right to be born healthy and to live in a clean environment, and that in order to heal our Peoples and Mother Earth, we have to continue to heal ourselves, tell our stories and be who we are.

“We are like a strong river that rises and falls, is always connected and will never stop flowing.”

Affirmed by consensus of the participants in the Symposium on April 29th, 2012:

1. Alice Skenandore – Midwife, Wise Women Gathering Place, LCO Ojibwe, Wisconsin, USA
2. Alyssa Macy – International Indian Treaty Council, Warm Spring Tribe, Oregon, USA
3. Andrea Carmen - International Indian Treaty Council, Yaqui Nation, Mexico, USA
4. Aurelia Espinoza Buitimea – Traditional healer, curandera and midwife, Jittoa Bat Natika Weria, Yaqui Nation, Sonora Mexico
5. Blanch Okboak – Teller Traditional Council, Inupiat, Alaska
6. Brandy Standifer – Village of Tyonek Tribal Member, Tyonek, Alaska
7. Camille Gemmill – Youth Representative, Gwich'in Nation, Alaska
8. Charlotte Jane Kava - Inupiat, St. Lawrence Island, Native Village of Savoonga, Alaska
9. Danika Littlechild – International Indian Treaty Council, Ermineskin Cree Nation, Canada
10. Donna Miranda-Begay – Chairwoman, Tubatulabal Tribe, California, USA
11. Edda Moreno – Centro para la Autonomía y Desarrollo de los Pueblos Miskitu, Nicaragua
12. Elvia Beltran Villeda - Red Indigena de Turismo de México, Pueblo Hnahnu, Mexico
13. Emily (Funny) Murray – Elim Students Against Uranium, Inupiaq, Elim, Alaska
14. Erin Konsmo - Native Youth Sexual Health Network, Metis Nation, Canada
15. Enei Begay – Black Mesa Water Coalition, Dine, Arizona, USA
16. Faith Gemmill - California Indian Environmental Alliance, International Indian Treaty Council, REDOIL, Arctic Village, Gwich'in, Alaska and Pit River, Wintu California, USA
17. Faustina Buitimea Gotogopicio – Traditional healer, curandera, Yaqui Nation, Sonora Mexico
18. Harriett Penayah – Elder, Native Village of Savoonga, St. Lawrence Island, Yupik, Alaska
19. Hinewirangi Kohu – Te Rau Aroha, Maori Women's Centers, Aotearoa (New Zealand)
20. Jackie Warledo - International Indian Treaty Council, Seminole Nation of Oklahoma, USA
21. Janet Mitchell – Inupiaq, Kivalina City Council, Alaska
22. Janet Daniels – Elder, Chickaloon Native Village, Chickaloon, Alaska
23. Jeannette Corbiere Lavel – Native Women's Association of Canada, Anishnabe Nation, Canada
24. Jessica Danforth - Native Youth Sexual Health Network, Mohawk Nation, USA and Canada
25. Judy Hughes – National Aboriginal Health Organization, Metis Nation, Canada
26. Julia Dorris – Traditional Council of Kalskag, Yupik, Alaska
27. Kandi Mossett – Indigenous Environmental Network, Fort Berthold Indian Reservation, USA
28. Kari L. Shaginoff - International Indian Treaty Council, Ya Ne Dah Ah Tribal School, Chickaloon, Alaska
29. Karla Brollier – Alaska Community Action on Toxics, Ahtna-Cantwell, Alaska
30. Kathy Sanchez – Tewa Women United, San Ildefonso Pueblo, New Mexico, USA
31. Lisa Wade – Chickaloon Village Health Director, Chickaloon, Alaska
32. Manuela Victoria Barrientos Carbajal – Chirapaq, Community of Hualia, Peru
33. Maria Berenice Sandez Lozada – Di sunga a Nana Shimjai, Nahua-Otomi, Mexico
34. Marian Naranjo - Honor Our Pueblo Existence, Santa Clara Pueblo, New Mexico, USA
35. Martha Itta - Inupiaq, Tribal Administrator, Native Village of Nuiqsut, Alaska
36. Maudilia López Cardona - Frente de Defensa Miguelense, Mam Maya, Guatemala
37. Melina Laboucan-Massimo – Lubicon Cree First Nation, Canada
38. Monique Sonoquie - California Indian Basket Weavers Alliance, Chumash, California, USA
39. Norma Chickalusion – Village of Tyonek Tribal Member, Tyonek, Alaska

40. Patricia Wade – Editor Chickaloon News, Chickaloon, Alaska
41. Pauline Kohler – Aleknagik Traditional Council, Yupik, Alaska
42. Penny Westing – Chickaloon Village Traditional Council Secretary, Chickaloon, Alaska
43. Princess Lucaj – Gwich'in Steering Committee, Gwich'in, Alaska
44. Rita Blumenstein – Traditional Healer, Yupik, Chefornak, Alaska
45. Rosemary Ahtuangeruk – Inupaiq, Native Villate of Nuiqsut, Alaska
46. Samantha Englishoe – Alaska Community Action on Toxics, Tlingit, Gwichin
47. Sewa Carmen – Chickaloon Village Youth Representative, Chickaloon, Alaska
48. Shawna Larson – Chickaloon Village Traditional Council Member, Chickaloon, Alaska
49. Sondra Stuart – Chickaloon Village Tribal Citizen, Chickaloon, Alaska
50. Susie Booshu – Native Village of Gambell, Yupik, Alaska
51. Viola Waghiyi – Native Village of Savoonga, St. Lawrence Island, Yupik, Alaska
52. Xiomara Ownes – Traditional Healer, Tlingit, Athabascan, Alaska



Sovereignty: Long Live Mother Earth

Women's Declaration 2012: Year of Indigenous Women

Preamble

Indigenous women have sacred parallel earth energy with Mother Earth.

In our diverse yet increasingly interdependent homelands, it is imperative that we, the people of Earth, declare our responsibility to one another as in all relationships, to the greater community of life and to future generations. We are one human family with one earth community with a common destiny. Yet as female and male energy is found within the other, so are we to love each other and do no harm to each other in the home of our mother, Mother Earth. All lands are sacred and in sacred time and space.

Humanity is part of a vast evolving multi-verse. Earth is our home and our mother is alive with a unique community of life givers. The life givers are Women. The protection of Women, their vitality and their well-being is the sacred fluid and energy of love.

The Earth community stands at a defining moment in time. Injustices, poverty, ignorance, corruption, crime and violence against women have deepened and our earth mother is crying and suffering. Corrupt fundamental racism has made changes into our present attitudes and values. Militaristic ways of making a living as have become harmful and destructive. Extreme materialism has dug deep into the holy body of our Mother Earth. These unhealthy ways need to be returned to the light of truth and colorful sounds of lovingness returned to our Earth Mother. The choice is ours: to care for our Mother Earth and one another or participate in the destruction of ourselves and all life givers.

We, therefore, declare the following:

1. Whereas, women are the nurturers of the human seed within their wombs are bearers of the blessing of creation through the process of giving birth,
2. Whereas, in worldwide ancient creation stories, in ancient cultures and throughout human life narratives, women have played a profound role to return and revere earth as our source of all life,
3. Whereas, women's bodies are intimately connected to Mother Earth as reflected in our moon cycles that are the basis for procreation and birthing of children,
4. Whereas, mothers and grandmothers continue to be the primary caregivers of children through breastfeeding, feeding, and nurturing, from infancy to all the stages of our human lives,
5. Whereas, women have also nurtured other women herstorically and traditionally serving as midwives and helping one another raise their children along with their extended families,
6. Whereas, women are believed to have been the first seed savers and contributed to the

cultivation of crops in a way that transformed human existence and, today, in our families, communities mothers and grandmothers have continued to be the primary caretakers of seeds,

7. Whereas, women have a special relationship with food in their role as farmers, nurturers, seed savers, and cooks and, therefore, they are the holders of culturally significant recipes and methods for storing and preparing food,

8. Whereas, many of the increasing numbers of small scale, independent farmers are women farmers from various backgrounds who are dedicated to growing clean, healthy, and fair food and to restoring harmony to the earth,

9. Whereas, women provide an important support system for all the activities of operating our family farms and ranches, including serving as part of the labor essential to the process, providing meals for other laborers, and teaching children the values of land-based culture and way of life,

10. Whereas, women are often the teachers of life skills to their children and are therefore important to ensuring that traditional knowledge is passed from generation to generation.

11. Whereas, women play important roles in our communities as spiritual leaders who offer blessings at important times in our lives and who offer guidance on important life decisions,

12. Whereas, women in traditional communities hold essential traditional knowledge including teachings about medicinal plants, where they can be harvested, and how they should be used,

13. Whereas, in recorded time, women's role as homemakers was broad and including helping one another to build,thatch ,plaster, and maintain their earthen homes,

14. Whereas, for millennia, women have harvested foods such as *piñon*, *quelites*, *tsimaja*, asparagus, *verdolagas*, *chocoyole*, and many varieties of berries, which we regard as special gifts and blessings,

15. Whereas, herstorically and traditionally, women's roles in families and communities were highly valued and the equally important role of men included providing the needed support system in order to raise healthy families,

16. Whereas, women today are often not respected as they were traditionally and are often subjected to violence in their own homes by those closest to them,

17. Whereas, women today and herstorically have, out of the love of their children and men in their families, have been at the forefront of resisting all forms of domesticated violent ways of living, including economic ways of the war culture,

18. Whereas, because of the nature of women's bodies related to procreation and our intimate relationship with the earth through farming, herb gathering, and earthwork, we are particularly sensitive to exposure to toxic pollutants from various sources,

19. Whereas, the parts of our bodies meant to nurture and nourish our children are also most susceptible to disease and cancer considering that elevated levels of breast cancer, ovarian cancer, and other deadly diseases result from exposure to toxins,
20. Whereas, mothers and grandmothers who feed and nurture their children are concerned about the existence of synthetic hormones and pesticide residues in foods resulting in unprecedented effects on boys and girls such as premature puberty, cancer, and other long-term effects that are unknown,
21. Whereas, our families are also threatened by the unknown health and ecological effects of genetically engineered seeds, plants, and animals, and we are gravely concerned about the patenting of human life which could have unintended consequences for our families and future generations,
22. Whereas, sacred homelands are manipulated settings for various polluting industries, mining operations, power plants, and nuclear facilities that, although serve as a tainted source of financial income for some of our families, also are responsible for pollution that harms all of our families and are part of a pattern of economic development that displaces traditional peoples from the land,
23. Whereas, women are often low-wage workers in these same polluting industries exposed to certain toxins and women are often low-wage agricultural workers who are exposed to pesticides and herbicides in industrial agriculture,
24. Whereas, women have played a key role along with men in social movements to achieve social, economic, and environmental justice by voicing concerns about the threats of toxins to our families and by calling for livelihoods for ourselves and our families that are clean, healthy, and dignified,
25. Be it resolved that we are gathered to declare our reverence for our women ancestors of ancient times that nurtured generation upon generation so that we could be given the blessings of life for all,
26. Be it further resolved that we will collectively and intentionally work to carry on the seed saving, farming, and land-based traditions of our ancestors and to pass these teachings on to the younger generations,
27. Be it further resolved that we will resist the genetic engineering and patenting of life so that we may maintain the integrity of our seeds, our right to grow our own food, and the sacredness of life itself,
28. Be it further resolved that we will raise our children to be conscious human beings mindful of the sacred gift of life we have been granted by the creator, to be reverent of our Mother Earth, and to be respectful in their relations,
29. Be it further resolved that we will work in solidarity with each other in our struggles to defend the air, land, and water from contamination, exploitation, and militarization,
30. Be it further resolved that we honor, respect, and recognize the dignity of women and

their families throughout the world and here at home who are subjected to exposure to toxins through their work, their food, or their proximity to pollution and that we resolve to speak and act in solidarity with them in efforts to defend the health of their families and communities,

31. Be it further resolved that we will continue to play an important role in reshaping our communities to achieve a vision of safe, healthy, and joyful lives for our families and communities with good, healthy and locally grown food, good livelihoods that honor the dignity of every human person, and a meaningful and spiritual relationship with Mother Earth.

36. Be it further resolved that we will honor and respect the women in our lives including our mothers, sisters, aunties, grandmothers, and great-grandmothers by thanking them for giving us life and for nurturing us throughout our lives,

37. Be it further resolved that we will teach our children, both boys and girls, the importance of living close to the land, having good relations with one another, and acting with dignity and respect in our actions to protect Mother Earth.

38. May it be further resolved that we the undersigned, have read this document and are in support of **Sovereignty: Long Live Mother Earth**

Women's Declaration for 2012: Year of Indigenous Women. We find it to be true and will assist wherever possible to learn and teach the children the importance of living close to the land, having respectful relations with one another and act with dignity and respect to protect Mother Earth, so she in turn can continue to care for us.

References to Indigenous Women in the ALTA Outcome Document

“We reaffirm the peremptory norms of international law, including on equality and non-discrimination, and assert that the realization of the rights of Indigenous Peoples, including those affirmed in the Declaration, must be upheld by States, individually and collectively, free from all forms of discrimination including discrimination based on race, ethnicity, religion, **gender**, sexual orientation, age and disability. We also reaffirm that the Declaration must be regarded as the normative framework and basis for the Outcome Document and its full realization. *(Preamble, Paragraph 7)*

“We condemn violence against Indigenous **women**, youth and children as one of the worst human rights violations affecting Indigenous Peoples and families. Violence against Indigenous **women**, youth and children is dehumanizing and also affects their spiritual development and violates their fundamental rights.” *(Preamble, Paragraph 9)*

“*Recommend* that States uphold and respect the right of self determination and the free, prior and informed consent of Indigenous Peoples who do not want mining and other forms of resource extraction, “development” and technologies deemed as degrading to their human, cultural, **reproductive** and ecosystem health. Where mining and other forms of resource extraction are already occurring, States shall develop mechanisms with the full and effective participation of Indigenous Peoples to develop a comprehensive strategy for ecologically sustainable and equitable development to end and prevent uncontrolled and unsustainable industrial contamination and degradation with plans for clean-up, remediation and restoration. Such as strategy shall incorporate strengthening the capacity of Indigenous youth in relation to sustainable development practices based on Indigenous knowledge and the relationship with the land as well as the protection and promotion of the important role of traditional knowledge holders including Indigenous Elders and **women**,” *(Theme 1: Indigenous Peoples’ lands, territories, resources, oceans and waters, Paragraph 6)*

“ *Recommend* that all UN agencies, funds and programmes engaging in activities impacting on Indigenous Peoples from advisory councils or forums composed of representatives of Indigenous Peoples including **women**, youth and persons with disabilities to engage in dialogue and provide advice on policy making and country and regional level operations;” *(Theme 2: UN system action for the implementation of the rights of Indigenous Peoples, Paragraph 6)*

“*Recommend* that States using the principles of Indigenous consent, ownership, control, and access, collect, analyze and disaggregate data on Indigenous Peoples, including Elders, **women**, youth, children and persons with disabilities, to help draft and implement public policy and legislation that better

addressed the situation of Indigenous Elderly, **women**, youth, children and persons with disabilities;" ***(Theme 3: Implementation of the Rights of Indigenous Peoples, Paragraph 3)***

"Recommend that States uphold and implement the rights of Indigenous **women** as sacred life givers and nurturers as well as strengthen – with the full and effective participation of Indigenous **women** – the protection of Indigenous **women** and girls through the formulation and implementation of national, regional and international plans of action developed in conjunction with Indigenous Peoples effective laws, policies and strategies;" ***(Theme 3: Implementation of the Rights of Indigenous Peoples, Paragraph 5)***

"Recommend States with the full, equal and effective participation of Indigenous **women**, youth and girls take immediate action to review, monitor and provide comprehensive reports on violence against indigenous **women**, youth and girls, in particular sexual violence, domestic violence, trafficking and violence related to extractive industries as well as provide redress for victims;" ***(Theme 3: Implementation of the Rights of Indigenous Peoples, Paragraph 6)***

"Recommend States cease current, and refrain from any further, militarization and initiate processes to demilitarize the lands, territories, waters and oceans of Indigenous Peoples. This can be achieved inter alia through the repeal and/or discontinuance of "anti terrorist", national security, immigration, border control and other special laws, regulations, operations and executive orders that violate the rights of Indigenous Peoples. Special measures should be taken to ensure the protection of Indigenous Elders, **women**, youth, children and persons with disabilities, particularly in the context of armed conflicts;" ***(Theme 3: Implementation of the Rights of Indigenous Peoples, Paragraph 7)***

"Recommend States support programmes of Indigenous Peoples to strengthen the capacity of Indigenous youth, including the transmission of traditional knowledge, innovations and practices as well as languages and on the important role of Indigenous Peoples including Elders and **women** as traditional knowledge holders. Further, that States and UN agencies, programs and funds respect and promote Indigenous Peoples' right to free, prior and informed consent in relation to their traditional knowledge and traditional cultural expressions;" ***(Theme 4: Indigenous Peoples' priorities for Development with free, prior and informed consent, Paragraph 3)***

Referencias a las Mujeres Indígenas en el Documento Final de ALTA

"Reafirmamos las normas imperativas del derecho internacional, incluidas aquellas en materia de igualdad y no discriminación, y afirmamos que la realización de los derechos de los Pueblos Indígenas, incluidos los enunciados en la Declaración, deben ser defendidos por los Estados en forma individual y

colectiva, libre de todas las formas de discriminación, incluida la discriminación por motivos de raza, origen étnico, religión, **género**, orientación sexual, edad y discapacidad. Reafirmamos también que la Declaración debe ser considerada como el marco normativo y la base para el Documento Final y su plena realización.” *(Preámbulo, párrafo 7)*

“Condenamos la violencia contra **las mujeres**, jóvenes y niños Indígenas como una de las peores violaciones de derechos humanos que afectan a los Pueblos y familias Indígenas. La violencia contra **las mujeres**, jóvenes y niños Indígenas es deshumanizante y también afecta a su desarrollo espiritual y viola sus derechos fundamentales. *(Preámbulo, párrafo 9)*

“Recomendamos que los Estados defiendan y respeten el derecho de libre determinación y de consentimiento libre, previo e informado de los Pueblos Indígenas que no quieran la minería y otras formas de extracción de recursos, "desarrollo" y tecnologías consideradas como degradantes para la salud humana, cultural, **reproductiva** y del ecosistema. Cuando la minería y otras formas de extracción de recursos ya estén ocurriendo, los Estados deberán establecer mecanismos con la participación plena y efectiva de los Pueblos Indígenas para desarrollar una estrategia comprehensiva para el desarrollo ecológicamente sostenible y equitativo para poner fin y prevenir la contaminación industrial incontrolada e insostenible y la degradación, con planes de limpieza, rehabilitación y restauración. Esa estrategia deberá incluir el fortalecimiento de la capacidad de los jóvenes Indígenas en relación con las prácticas de desarrollo sostenible basadas en el conocimiento Indígena y la relación con la tierra, así como la protección y la promoción de la importancia del papel de los titulares de conocimientos tradicionales, incluidos los ancianos y **mujeres Indígenas;**” *(Tema 1: Tierras, territorios, recursos, océanos y aguas de los Pueblos Indígenas, párrafo 6)*

“Recomendamos que todas las agencias, programas y fondos de las Naciones Unidas que participen en actividades que impactan a los Pueblos Indígenas establezcan consejos consultivos o foros integrados por representantes de los Pueblos Indígenas, incluidas **las mujeres**, jóvenes y personas con discapacidad para participar en el diálogo y proporcionar asesoramiento sobre políticas y operaciones de los países y a nivel regional;” *(Tema 2: Acción del sistema de la ONU para la implementación de los derechos de los Pueblos Indígenas, párrafo 6)*

“Recomendamos que los Estados, utilizando los principios Indígenas de consentimiento, propiedad, control y acceso, recopilen, analicen y desglosen los datos sobre los Pueblos Indígenas, incluidos los ancianos, **mujeres**, jóvenes, niños y personas con discapacidad, para ayudar a redactar y poner en práctica la política pública y la legislación que se ocupe de mejorar la situación de los ancianos, **las mujeres**, jóvenes, niños y personas con discapacidad Indígenas;” *(Tema 3: Implementación de los Derechos de los Pueblos Indígenas párrafo 3)*

*“Recomendamos que los Estados respeten e implementen los derechos de **las mujeres Indígenas** como dadoras sagradas de vida y criadoras, así como fortalezcan—con la participación plena y efectiva de **las mujeres Indígenas**— la protección de las mujeres y niñas Indígenas a través de la formulación e implementación de planes de acción nacionales, regionales e internacionales desarrollados conjuntamente con las leyes, políticas y estrategias eficaces de los Pueblos Indígenas;” (Tema 3: Implementación de los Derechos de los Pueblos Indígenas párrafo 5)*

*“Recomendamos que los Estados, con la participación plena, equitativa y efectiva de las mujeres, jóvenes y niñas Indígenas, tomen medidas inmediatas para examinar, supervisar y presentar informes completos sobre la violencia contra **las mujeres**, las jóvenes y las niñas Indígenas, en particular la violencia sexual, la violencia doméstica, la trata y la violencia relacionada a las industrias extractivas, así como proporcionen reparación a las víctimas;” (Tema 3: Implementación de los Derechos de los Pueblos Indígenas párrafo 6)*

*“Recomendamos que los Estados cesen y se abstengan de continuar la militarización actual e inicien procesos de desmilitarización de las tierras, territorios, aguas y océanos de los Pueblos Indígenas. Esto se puede lograr mediante, entre otras cosas, la derogación y/o interrupción de la seguridad nacional "antiterrorista", las leyes sobre inmigración, control fronterizo y otras leyes, reglamentos, operaciones y órdenes ejecutivas especiales que violan los derechos de los Pueblos Indígenas. Se deben tomar medidas especiales para garantizar la protección de los ancianos, **las mujeres**, jóvenes, niños y personas con discapacidad, en particular en el contexto de los conflictos armados;” (Tema 3: Implementación de los Derechos de los Pueblos Indígenas párrafo 7)*

*Recomendamos que los Estados apoyen programas de los Pueblos Indígenas para fortalecer la capacidad de los jóvenes Indígenas, incluidos aquellos sobre la transmisión de los conocimientos tradicionales, innovaciones y prácticas, así como sobre los idiomas y el papel importante de los Pueblos Indígenas, incluidos los ancianos y **las mujeres**, como titulares de conocimientos tradicionales. Además, recomendamos que los Estados y las agencias, programas y fondos de Naciones Unidas respeten y promuevan el derecho de consentimiento libre, previo e informado de los Pueblos Indígenas en relación con sus conocimientos tradicionales y sus expresiones culturales tradicionales; (Tema 4: Prioridades de los Pueblos Indígenas en materia de Desarrollo con consentimiento libre, previo e informado, párrafo 3)*

Compiled and submitted to the World Conference of Indigenous Women, October 28 – 30, 2013, Lima Peru, by Andrea Carmen (North America Region) and Mililani Trask (Pacific Region)

Elaborado y presentado a la Conferencia Mundial de las Mujeres Indígenas, 28 de octubre - 30, 2013, Lima, Perú, por Andrea Carmen (Región de América del Norte) y Mililani Trask (Región de Pacífico).

Appendix G to CCW, TWU and Individual Public Comments and Hearing Request –
DP-1132

Freedom of Information Act (FOIA) Documents

November 27, 2013 Request Confirmation for Tracking Number: EPA-R6-2014-001500

December 2, 2013 Department of Energy HQ-2014-00270-F

Request Confirmation

Request Information

Tracking Number : *EPA-R6-2014-001500*

Requester Name : Joni Arends

Date Submitted : 11/27/2013

Request Status : Submitted

Description :

CCNS requests all correspondence, documents, emails, notes and data submitted to and responded by the Environmental Protection Agency (EPA) Region 6 from and to Los Alamos National Laboratory (LANL) as required by 40 CFR 61, Subpart H (Rad NESHAPs) about the new/modified source review for the Solar Evaporation Tank (SET) at Technical Area 52 and the Mechanical Evaporation System (MES) associated with operations at the TA-50 Radioactive Liquid Waste Treatment Facility. Please provide all information supporting the LANL determination that the evaporation systems (SET and MES) emit less than 0.1 millirems (mrems) into the environment annually. Please provide all EPA correspondence, documents, emails, notes and data regarding any approval or disapproval of the new/modified source review determination for the SET and MES.



Department of Energy

Washington, DC 20585

December 02, 2013

Ms. Joni Arends
Concerned Citizens for Nuclear Safety
107 Cienega Street
Santa Fe, NM 87501

HQ-2014-00270-F

Re: All documents, emails and data that Los Alamos National Laboratory (LANL) submitted to the Environmental Protection Agency (EPA) Region 6 regarding the Clean Air Act new/modified source review for the Zero Liquid Discharge Solar Evaporation Tanks (SET) at Technical Area 52, as well as the use of the Mechanical Evaporation System (MES). Copies of all documents, emails and data that support LANL's new/modified source determination that the evaporation systems emit below 0.1 millirem (mrem) of radiation to the environment as required by 40 CFR 61, Subpart H.

Dear Ms. Arends:

Thank you for the request for information that you made to the Department of Energy (DOE) under the Freedom of Information Act (FOIA), 5 U.S.C. 552. Your letter was received in this office on today, and has been assigned a controlled number, HQ-2014-00270-F. Since we receive several hundred requests a year, please use this number in any correspondence with the Department about your request.

We are reviewing your letter to determine if it addresses all of the criteria of a proper request under the FOIA and the DOE regulation that implements the FOIA at Title 10, Code of Federal Regulations, Part 1004. We will send you a subsequent letter to inform you if we need additional information or to state where the request has been assigned to conduct a search for responsive documents.

I appreciate the opportunity to assist you with this matter. If you have any questions about this letter, please contact this office on (202)586-5955.

Sincerely,

A handwritten signature in black ink, appearing to read "Alex C. Morris", is written over a horizontal line.

Alexander/C. Morris
FOIA Officer
Office of Information Resources



Printed with soy ink on recycled paper

: 10149



GARY E. JOHNSON
GOVERNOR

State of New Mexico
ENVIRONMENT DEPARTMENT
Ground Water Quality Bureau
Harold Runnels Building
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-2918 phone
(505) 827-2965 fax



MARK E. WEIDLER
Secretary

CERTIFIED LETTER - RETURN RECEIPT REQUIRED

February 26, 1999

Susan Diane
P.O. box 9855
Santa Fe, New Mexico 87504

RE: Discharge Plan (DP-1132) for Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility

Dear Ms. Diane:

The New Mexico Environment Department (NMED), Ground Water Quality Bureau (GWQB) received a request for public hearing from you, December 16, 1996, for the proposed discharge from the Los Alamos National Laboratory (LANL), Radioactive Liquid Waste Treatment Facility (RLWTF). In addition to your request, The Pueblo of San Ildefonso also requested a public hearing. However, the Pueblo of San Ildefonso withdrew their request for public hearing on April 27, 1998. The NMED has not been able to contact you by phone and would like to discuss with you the current status of the groundwater discharge plan and your current interest in a public hearing.

The following provides a response to the questions that were submitted with your request for a public hearing.

1. Q. Does the plan eliminate the discharge of radionuclides and bring the release of nitrates to within acceptable levels?

A. LANL has proposed discharge limitations for both radionuclides and nitrates in their permit application. Phase I of the upgrades to the RLWTF will include Tubular Ultrafiltration for removal of radionuclides followed by reverse osmosis. LANL states in the discharge plan application that the Phase I upgrades will ensure that treated effluent to be discharged will be below the Derived Concentration Guidelines (DCG's) for radionuclides set forth in DOE Order 5400.5.

Question & answer removed by reverse osmosis

Nitrate will be removed from the waste stream by reverse osmosis. Long term compliance with WQCC Regulation 3103 standards will be achieved by evaporating off reverse osmosis reject waste water with a mechanical evaporator. Short term compliance with WQCC Regulation 3103 standards will be achieved by containerizing the reverse osmosis waste stream and returning it to the clean water waste stream at a rate that will not cause effluent concentrations to be above any WQCC Regulation 3103 standard. This includes nitrate.

If treated wastewater does not meet the numerical discharge limitations, LANL has proposed to retain and recirculate treated wastewater at the treatment plant until it meets discharge limitations.

2. Q. *Does the plan address the extent of past contamination and possible remediation efforts?*

A. The original discharge plan application submitted August 1996 includes information on past contamination in the alluvial aquifer. In addition to the original discharge plan application, LANL has produced the Work Plan for Mortandad Canyon which provides details on a groundwater investigation for Mortandad Canyon. The work plan describes the actions LANL will take to determine the extent of past contamination in Mortandad Canyon. Without knowing the extent of current contamination, remediation requirements have not been determined. When information on the extent of past contamination becomes available, LANL will be required to propose and implement corrective actions.
3. Q. *Have adequate waste stream characterizations been performed for liquid volumes coming into RLWTF?*

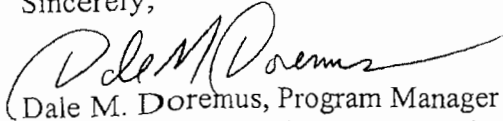
A. The influent quality data that has been submitted to the GWQB is composite and not specific to an upstream waste water generator. The data is more representative of the wastewater that is treated at the ROWTF. The GWQB has reviewed data for influent quality and has requested updated comprehensive influent data to the RLWTF. The data will be reviewed prior to issuing the permit to insure that effluent monitoring requirements are adequate. In addition to water quality data, the original discharge plan application contains the waste acceptance criteria that waste generators must follow. The waste acceptance criteria sets limits on concentrations of constituents that can be discharged to the RLWTF.
4. Q. *What volumes of radioactive sludge are being projected for future burial at TA-54, Area G?*

A. The groundwater discharge plan application does not address the volumes of sludge to be disposed at TA-54. For further regulatory information on the disposal of sludge, contact the NMED, Hazardous and Radioactive Material Bureau (HRMB).

Ms. Diane
February 26, 1999
Page 3

Please contact Phyllis Bustamante of the GWQB, Pollution Prevention Section (PPS) at 827-0166 by March 12, 1999 to discuss the status of the discharge plan application and your current concerns. Based on your current concerns, the NMED will make a decision on holding a public hearing by mid March.

Sincerely,



Dale M. Doremus, Program Manager
Ground Water Quality Bureau, Pollution Prevention Section

DMD/PAB/pab

xc: James Bearzi, District Manager, NMED District II

mon lunch

extend the deadline till
today

since I wrote the letter in

Dec

DOE plans to expand

it's operation - so therefore

I have additional comments
to submit

since I made my 1st

Comments over 2 years ago
a lot has changed & I know
quite a few people put in the
hearing

what kind
of deadline is that under
DOE did the permit
expire - can you send
any information permit



New Mexico Environment Department
Ground Water Quality Bureau

Memorandum of Meeting or
 Phone Conversation

Memorandum of Meeting or Phone Conversation

<input checked="" type="checkbox"/> Telephone	<input type="checkbox"/> Meeting	Time: 847	Date: 02.12.14
Individuals Involved			
Jennifer Fullam, NMED GWQB	was called by	Name: Jon Block	
		Affiliation: Attorney for CCNS	
		DP: 1132	
		Site Name: LANL RLWTF	
		Phone Number: 505.989.9022 x 22	
Subject: IPRA			
Discussion: Block left message for Fullam requesting a time to review the last correspondence following PN-2. 02.18.14 @ 1148 Fullam called Block and scheduled for him to come in to review the file on Wednesday 02.19.14 at 1:00 pm			
Conclusions:			
Distribution: DP Correspondence File <div style="float: right;"> Initialed JF </div>			

Pullen, Steve, NMENV

From: Fullam, Jennifer, NMENV
Sent: Wednesday, February 26, 2014 2:30 PM
To: Schoeppner, Jerry, NMENV; Hall, John, NMENV; Pruett, Jennifer, NMENV
Subject: RE: TP for WMRM (DP-1132)

I drafted the TP based on our meeting with LANL on 12.24.13. But after drafting it for review, I have notes from our follow-up discussions (internally) that we could not approve it based on public interest. I will redraft a response denying the request. Thanks

Jennifer T. Fullam
Environmental Scientist
Ground Water Quality Bureau
New Mexico Environment Department
505.827.2909
jennifer.fullam@state.nm.us

From: Schoeppner, Jerry, NMENV
Sent: Wednesday, February 26, 2014 2:13 PM
To: Hall, John, NMENV; Pruett, Jennifer, NMENV; Fullam, Jennifer, NMENV
Subject: RE: TP for WMRM (DP-1132)

My notes are consistent with yours John. Given the fact that we have at least one citizen group requesting a hearing, we can't grant a TP to be consistent with prior decisions at other facilities.

Jerry

From: Hall, John, NMENV
Sent: Wednesday, February 26, 2014 1:56 PM
To: Pruett, Jennifer, NMENV; Fullam, Jennifer, NMENV
Cc: Schoeppner, Jerry, NMENV
Subject: RE: TP for WMRM (DP-1132)

Jennifer P,

I checked my notes from 12/24/13 and found that you pointed out that issuing the TP could be a problem because we have a bunch of public comment/hearing requests. Then someone mentioned that it really is just LANL and one citizen group.

Therefore, I don't think we actually made a firm decision at the meeting. Do we need to meet again, quickly.

JH

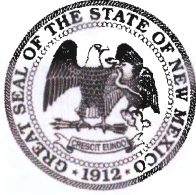
From: Pruett, Jennifer, NMENV
Sent: Wednesday, February 26, 2014 8:07 AM
To: Fullam, Jennifer, NMENV
Cc: Schoeppner, Jerry, NMENV; Hall, John, NMENV
Subject: TP for WMRM (DP-1132)

Hi Jenn,

My recollection is that we had decided to deny this TP, based on the outstanding requests for public hearing. I would like Jerry and John to weigh in on this question, based on their notes at our last meeting. If the answer is to deny, you can use some of the language in the attached VMC TP denial – different facts, but same argument that we can't approve when there is so much pending public interest. I'm hoping you can get this ready for review while I'm gone, as I realize that tomorrow is our 60-day TP response deadline.

Thanks,
JJP

Jennifer J. Pruett
Manager, Pollution Prevention Section
Harold Runnels Bldg.
1190 St. Francis Dr.
P.O. Box 5469
Santa Fe, NM 87502-5469
505-827-0652



SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

**NEW MEXICO
ENVIRONMENT DEPARTMENT**

Ground Water Quality Bureau
1190 South St. Francis Drive (87505)
P.O. Box 5469, Santa Fe, New Mexico 87502-5469
Phone (505) 827-2900 Fax (505) 827-2965
www.env.nm.gov



BUTCH TONGATE
Cabinet Secretary

J.C. BORREGO
Deputy Secretary

MEMORANDUM

To: File – LANL DP-1132

Through: NA

From: Steve Pullen, Project lead

Subject: RLWTF-UP LLW Subproject-Design Documents- 90%-January – dated March 28, 2014 - Contents of compact disc

Date: November 9, 2017

This memo explains that the contents of the subject disc are not printed herein but are instead readily available on the disc located in the GWQB's DP-1132 record folders. The disc contents are not printed due to their voluminous nature, approximately 8000 pages, and because the 90% design documents are similar to the 100% design documents that are printed and included in the administrative record. To view the subject documents, contact the project lead referenced above.

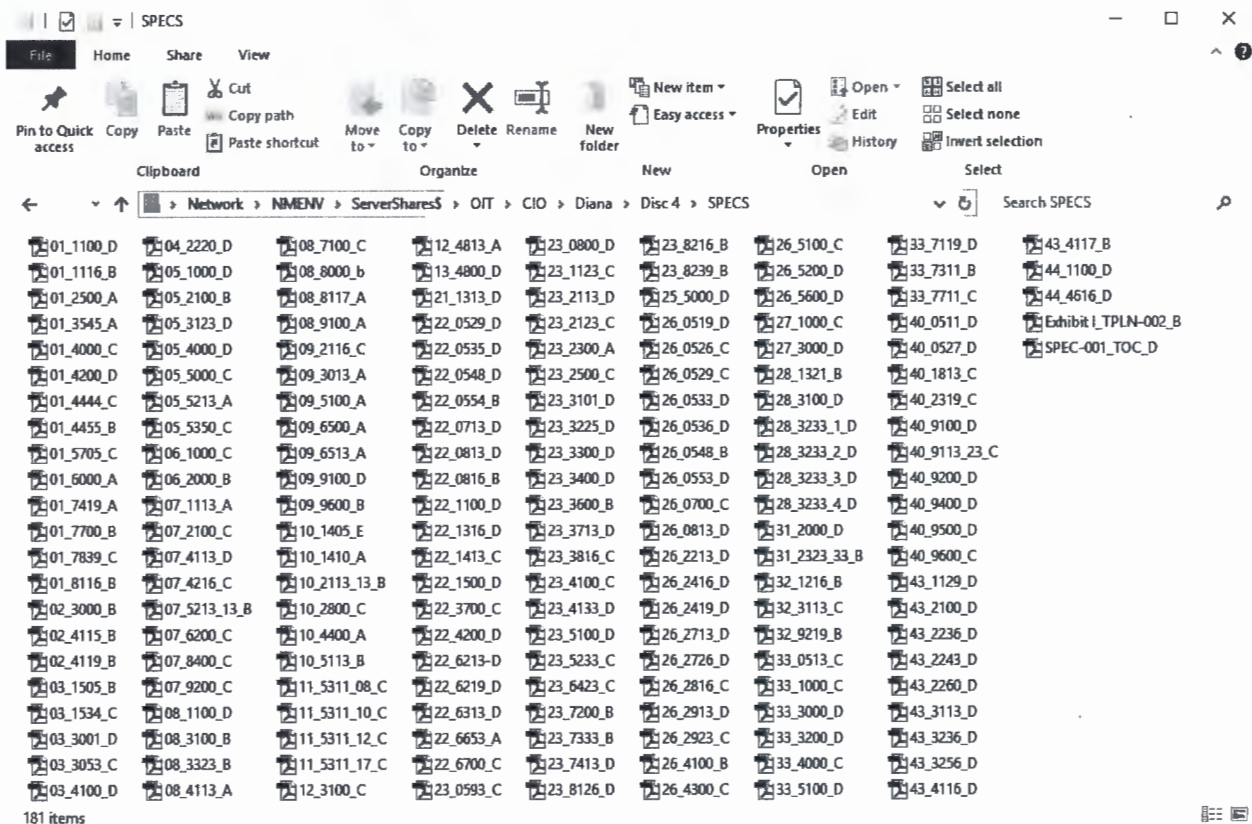
See a printed copy of a list of the disc folder and files attached.

Radioactive Liquid Waste Treatment
Facility Project 100761 (RLWTF-UP)
Low Level Waste (LLW) Subproject

RLWTF-UP
Project Office

March 28, 2014

RLWTF-UP
LLW Subproject
Design Documents 90%
January 2013



GWK5 / Employee files / Fullam does 030714 / case 10003 / LNUC / LNUC INTERESTED PARTIES
Int Parties DF-11321.X15M

Prefix (Mr., Mrs...)	First Name	Last Name	Address Line 1	Address Line 2	City	State	Zip	e-mail
Ms.	Joni	Arends	Concerned Citizens for Nuclear Safety	107 Cienega	Santa Fe	New Mexico	87501	jarends@nuclearactive.org
Ms.	Kathleen	Sanchez	Tewa Women United	Rt. 5, Box 298	Santa Fe	New Mexico	87506	
Ms.	Peggy	Prince	Peace Action New Mexico	226 Fiesta Street	Santa Fe	New Mexico	87501	
Mr.	George	Rice	Concerned Citizens for Nuclear Safety	414 East French Place	San Antonio	Texas	78212	lorie44@yahoo.com
Mr.	Brian	Shields	Amigos Bravos	P.O. Box 238	Taos	New Mexico	87571	bravos@taos.newmex.com
	Betty	Fcannapieco		2252 Espejo Place	Santa Fe	New Mexico	87505	



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Governor

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Lieutenant Governor

NEW MEXICO
ENVIRONMENT DEPARTMENT

Ground Water Quality Bureau

Harold Runnels Building
1190 St. Francis Drive
PO Box 5469, Santa Fe, NM 87502-5469
Phone (505) 827-2918 Fax (505) 827-2965
www.nmenv.state.nm.us

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

April 1, 2014

Ms. Alison Dorries, LANS-EP-RS
Los Alamos National Security, LLC
P.O. Box 1663 MS K404
Los Alamos, NM 87545

Mr. Gene Turner, DOE/AIP/POC
U.S. Department of Energy
Los Alamos Site Office, MS A31
528 35th Street
Los Alamos, NM 87545

**RE: Temporary Permission to Discharge, Waste Mitigation and Risk M
(WMRM) Influent Storage Tanks at Los Alamos National Laboratory's R
Liquid Waste Treatment Facility (RLWTF), DP-1132 (PRD20130011)**

Dear Mr. Turner and Ms. Dorries:

The New Mexico Environment Department (NMED) reviewed your request, dated 2013, for temporary permission to discharge no more than 40,000 gallons per day of radioactive liquid wastewater to newly installed tanks. Following review of your request, NMED issued a draft denial and scheduled a site tour/inspection of the RLWTF to learn more about the operation of the treatment facility and resulting discharge. NMED understands that radioactive liquid wastewater enters the facility through the influent collection system and is stored in the existing Waste Mitigation and Risk Assessment (WMRM) tanks prior to treatment at the Radioactive Liquid Waste Treatment Facility (RLWTF). Six (6) new tanks have been installed in order to replace the old, un-inspectable tanks, but have not been placed into operation pending the approval of DP-1132. The old as well as the new WMRM tanks are located within Los Alamos National Laboratory, approximately 1.5 miles south of Los Alamos, New Mexico, in Section 22, Township 19N, Range 06E, Los Alamos County.

Upon completion of the tour/inspection, it was clarified that Los Alamos National Security/U.S. Department of Energy's request for Temporary Permission to discharge is not required. LANS/DOE plans to place low level wastewater influent from the collection lines into two of the six newly constructed WMRM storage tanks at a maximum capacity of 80% for a 120 day period.



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Mr. Gene Turner, []
U.S. Department of Energy
Los Alamos Site Office
528 35th Street
Los Alamos, NM 87545

PS Form 3800, August 2006

March 27, 2014

Page 2

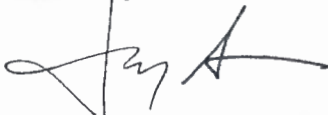
as part of the existing operation of the treatment facility in order to complete shake-down of the system and establish Standard Operating Procedures. The placement of the low level wastewater in the new WMRM tanks is prior to treatment of the low level waste and is therefore an operational change and not a change in the location, quality, or quantity of the resultant discharge. Therefore, Temporary Permission to discharge is not required and LANS/DOE can proceed with their 120 day operational test.

LANS/DOE will cease use of the new tanks 120 days from the date discharge commences, unless the pending Discharge Permit has been approved by the Secretary.

This change in operation does not relieve you of the responsibility to comply with any other applicable federal, state, and/or local laws and regulations, such as zoning requirements and nuisance ordinances. Also, this change in operation does not relieve you of liability should your operation result in actual pollution of surface or ground waters.

If you have any questions, please contact me at 505-827-2919.

Sincerely,



Jerry Schoeppner, Chief
Ground Water Quality Bureau

cc: Robert Italiano, District Manager, NMED District II
NMED Santa Fe Field Office
James Hogan, NMED SWQB, via electronic transmission to james.hogan@state.nm.us
John Kieling, NMED HWB, via electronic transmission to john.kieling@state.nm.us
Dave Cobrain, NMED HWB, via electronic transmission to dave.cobrain@state.nm.us
Steven Yanicak, NMED-DOE-Oversight Bureau, via electronic transmission to steve.yanicak@state.nm.us
Hai Shen, LASO-EO, via electronic transmission to hai.shen@nnsa.doe.gov
Carl Beard, PADOPS, via electronic transmission to cbeard@lanl.gov
Michael T. Brandt, ADESH, via electronic transmission to mtbrandt@lanl.gov
Randal S. Johnson, DSESH-TA55, via electronic transmission to randyj@lanl.gov
Robert C. Mason, TA55-DO, via electronic transmission to rcmason@lanl.gov
William H. Schewttmann, IPM, via electronic transmission to bills@lanl.gov
Dianne W. Wilburn, TA55-DO, via electronic transmission to dianne@lanl.gov
John C. Del Signore, TA55 RLW, via electronic transmission to jcds@lanl.gov
Michael T. Saladen, ENV-RCRA, via electronic transmission to saladen@lanl.gov
Robert S. Beers, ENV-RCRA, Los Alamos National Laboratory, K490, Los Alamos, NM
87545

From: [Jonathan Block](#)
To: [Joni Arends](#); [Brian Shields](#); [Rachel Conn](#); [Kathy Sanchez](#); [Beata Tsosie](#); [J. Gilbert Sanchez](#); [Mariann2@windstream.net](#); [Marian Naranjo](#); [Robert Gilkeson](#); [Pruett, Jennifer, NMENV](#)
Subject: Fwd: LANL DP-1132 PN-2 Draft Permit Withdrawal Questions about public notice
Date: Friday, June 13, 2014 11:37:43 AM

Good morning:

This is a joint message to CCW and Jennifer Pruett so that the Groundwater Quality Bureau can get all of your emails on the PN list.

Also, I think it would be helpful for people to take a look at the thoughtful and comprehensive investigation and summary below of Jennifer Pruett's work trying to clear up the notice issue. I called and let her know how much we appreciate this effort.

Jon

----- Original Message -----

Subject: LANL DP-1132 PN-2 Draft Permit Withdrawal Questions about public notice
Date: Fri, 13 Jun 2014 16:50:05 +0000
From: Pruett, Jennifer, NMENV <Jennifer.Pruett@state.nm.us>
To: Jonathan Block (jblock@nmelc.org) <jblock@nmelc.org>, Joni Arends (jarends@nuclearactive.org) <jarends@nuclearactive.org>
CC: Hower, Jennifer, NMENV <Jennifer.Hower@state.nm.us>, Schoeppner, Jerry, NMENV <jerry.schoeppner@state.nm.us>, Hall, John, NMENV <john.hall@state.nm.us>, Fullam, Jennifer, NMENV <Jennifer.Fullam@state.nm.us>

Greetings Jon,

As you requested, GWQB has reviewed the public notice for the PN-2 withdrawal of DP-1132 for LANL's Radioactive Liquid Waste Treatment facility pursuant to the requirement of 20.6.2.3108.H NMAC. It appears that there were errors and omissions that occurred. The Bureau thanks you for bringing this to its attention.

After the initial PN-2 for DP-1132, you submitted comments on behalf of several clients, including the Communities for Clean Water, TEWA Women United, Kathy WonPovi Sanchez, J. Gilbert Sanchez, and Robert Gilkeson. No separate or independent filing or contact information was received by the GWQB for these entities besides your contact information, so our assumption was that service through you as the attorney was the preferred method of contact. If you would like us to add these people and groups to the facility-specific list for this DP individually, please let me know and provide contact information for each (email preferred but not required).

Additionally, GWQB apparently failed to update the facility-specific list with Jay Coghlan and

Scott Kovac of Nuclear Watch New Mexico, who also filed comments. We have now added them to the facility-specific list for DP-1132, and provided them with a copy of the PN-2 withdrawal.

I also reviewed the general public notice lists for GWQB facilities, which is accumulated on an ongoing basis as entities request to be placed on the list. Your email address is on that list, so you receive a notice any time any facility goes to PN-1, as provided in 20.6.2.3108.E NMAC. I believe that at least one other staff member of the New Mexico Environmental Law Center is on that list, as is Joni Arends, Rachel Conn and Brian Shields. I did not perform an exhaustive comparison to the DP-1132 facility-specific list, however, in the interest of responding timely to the questions you posed at our last meeting. The general public notice list would not have received the PN-2 withdrawal, as it is not required under 20.6.2.3108.H NMAC. It is presumed that if those on the general public notice list are interested in a particular DP after receiving a PN-1 notice, the entity will either request to be on the facility-specific list for that facility or would submit comments, which would also place the entity on the facility-specific list. If you have been receiving PN-2 notifications for facilities for which you have not expressed an interest, please let us know and we will work to ensure that each notification is handled uniformly.

I trust that this answers the questions about public notice for the withdrawal of the PN-2 draft permit for DP-1132. Thank you again for bringing this to the Bureau's attention. Please do not hesitate to contact me with any additional questions or concerns.

Thank you,
JJP

Jennifer J. Pruett
Manager, Pollution Prevention Section
Harold Runnels Bldg.
1190 St. Francis Dr.
P.O. Box 5469
Santa Fe, NM 87502-5469
505-827-0652

From: [Jonathan Block](#)
To: [Pruett, Jennifer, NMENV](#)
Subject: Re: LANL DP-1132 PN-2 Draft Permit Withdrawal Questions about public notice
Date: Friday, June 13, 2014 3:55:26 PM

Hi, Jennifer:

Let's see if I can help here so you can highlight, copy and paste:

(1) Marian Naranjo, Honor Our Pueblo Existence (H.O.P.E.) She has to get two emails as she has problems, alternately, with both addresses, but she is the H.O.P.E. representative in CCW:

Mariann2@windstream.net

mariannnaranjo@icloud.com

(2) Beata Tsosie-Pena and Kathy Sanchez work at Tewa Women United and are using those addresses--they represent TWEA Women United as part of CCW:

Beata@TEWAwomenunited.org

Kathy@TEWAwomenunited.org

(3) Rachel Conn works at Amigos Bravos, Brian Shields is the Executive Director --they have work emails--and represent Amigos Bravos as part of CCW:

rconn@amigosbravos.org

bshields@amigosbravos.org

(4) J. Gilbert Sanchez is representing an environmental group from St. Ildefonso (but not the Pueblo government)--he uses his personal email--again, that is not always the best way to reach him, but it is what we have:

tewacowboy@hotmail.com

(5) Robert Gilkeson, Registered Geologist, is a consultant to H.O.P.E., CCNS and CCW--he has a private email

rhgilkeson@aol.com

I hope that make this a bit easier for you.

Have a good weekend!

Jon

On 6/13/2014 3:34 PM, Pruett, Jennifer, NMENV wrote:

Hi Jon,

I am trying to enter the emails on your list, which is complicated a little as they are listed by name and I must transcribe the email address. A few questions:

<!--[if !supportLists]-->1. <!--[endif]-->Can I assume that Rachel Conn is with Amigos Bravos, Beata Tsosie is with TEWA Women United, and that the rest of the people are on the list as individuals? (I have Joni already, with CCNS).

<!--[if !supportLists]-->2. <!--[endif]-->Could you please provide me with the name and/or organization associated with the email mariann2@windstream.net? If this is the same Marian Naranjo who has the icloud.com email?

These aren't earth-shaking matters, and can wait until your return if necessary, but I'd like to eventually get this list correct.

Thank you for your help,
JJP

Jennifer J. Pruett
Manager, Pollution Prevention Section
Harold Runnels Bldg.
1190 St. Francis Dr.
P.O. Box 5469
Santa Fe, NM 87502-5469
505-827-0652

From: Jonathan Block [<mailto:jblock@nmeic.org>]

Sent: Friday, June 13, 2014 11:38 AM

To: Joni Arends; Brian Shields; Rachel Conn; Kathy Sanchez; Beata Tsosie; J. Gilbert Sanchez; Mariann2@windstream.net; Marian Naranjo; Robert Gilkeson; Pruett, Jennifer, NMENV

Subject: Fwd: LANL DP-1132 PN-2 Draft Permit Withdrawal Questions about public notice

Good morning:

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Also, I think it would be helpful for people to take a look at the thoughtful and comprehensive investigation and summary below of Jennifer Pruett's work trying to clear up the notice issue. I called and let her know how much we appreciate this effort.

Jon

----- Original Message -----

Subject:LANL DP-1132 PN-2 Draft Permit Withdrawal Questions about public notice

Date:Fri, 13 Jun 2014 16:50:05 +0000

From:Pruett, Jennifer, NMENV <Jennifer.Pruett@state.nm.us>

To:Jonathan Block (jblock@nmelc.org) <jblock@nmelc.org>, Joni Arends (jarends@nuclearactive.org) <jarends@nuclearactive.org>

CC:Hower, Jennifer, NMENV <Jennifer.Hower@state.nm.us>, Schoeppner, Jerry, NMENV <jerry.schoeppner@state.nm.us>, Hall, John, NMENV <john.hall@state.nm.us>, Fullam, Jennifer, NMENV <Jennifer.Fullam@state.nm.us>

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Thank you,
JJP

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LANL Characterization Wells R-16 and R-16r require replacement because they are not reliable monitoring wells for LANL contaminants in groundwater travelling to the Buckman Well Field for the City of Santa Fe, Version June 29, 2014

By

Robert H. Gilkeson, Registered Geologist

Introduction. Figures 1 and 2 show the locations of multiple-screen well R-16 and single-screen well R-16r off of Laboratory property near the Rio Grande. Figure A.16-1. is the as-built construction of well R-16. The two wells are located on the rim of Canada del Buey approximately 17,500 feet east of the eastern boundary of MDA G, The purpose for well R-16 is described as follows in the LANL well R-16 completion report –

From the Abstract: .

“The primary purpose of this well is to provide water-quality, geochemical, hydrologic, and geologic information that would contribute to understanding the hydrogeologic setting beneath the Laboratory. In addition, this well was designed to monitor regional groundwater near potential contaminant release sites at Technical Area (TA)-54 and to act as a monitoring point between TA-54 and the Rio Grande” [emphasis added].

Figure 2 shows that well R-16 is located over three miles away from TA-54. The well was also installed as a sentry well to monitor for the travel of LANL contamination to the Buckman well field, an important water supply for Santa Fe that is located immediately east of the Rio Grande. See Figures 1 and 2. The following factors prevent well R-16 from meeting the stated objectives –

- The well is located miles away from the regulated units at TA-54 and does not meet the stated purpose of being “near potential contaminant release sites at TA-54”.
- The failure to install the well screens in the strata with high saturated hydraulic conductivity (Ksat) that are the fast pathways for the travel of contamination from LANL sources.
- The screened intervals are invaded with a large quantity of drilling fluids that have formed a new mineralogy with strong properties to mask detection of contaminants.
- Screen #1 is blocked by drill casing that was abandoned in the borehole because of a mistake in drilling operations.
- Screen #4 is surrounded by slough sediments rich in bentonite clay drilling mud that were washed down the borehole wall during well construction.
- Water samples are collected with the Westbay^R no-purge sampling system that collects stagnant water samples from the zone invaded with the drilling fluids.
- Rehabilitation of well R-16 is not feasible because of the overarching factor that the well screens are not installed in the fast pathway strata that are of critical importance for monitoring the travel of contamination.

Well R-16 does not produce reliable water samples for the detection of LANL contaminants. Well R-16 is not useful as a sentry well for the Rio Grande or the Buckman well field. Well R-16 does not produce reliable water quality data for decisions on the closure of the RCRA regulated units at TA-54. The only use for well R-16 is the measurement of water levels.

Fluid-Assisted Drilling Methods Prevented Identification of Perched Zones of Saturation and the Water Table of the Regional Zone of Saturation. The history of drilling the borehole of well R-16 is a good example of the often failure of the fluid-assisted drilling methods to identify perched zones of saturation and even the water table of the regional aquifer.

From page 14 of the LANL Well R-16 Completion Report:

"6.2 Groundwater Occurrence and Characteristics

It was anticipated that the regional water table at R-16 would be encountered at approximately 783 ft bgs in the Santa Fe Group, and no perched groundwater zones were predicted. Drilling was performed throughout the entire depth using either air-rotary methods with foam additives or conventional mud-rotary techniques, substantially reducing the ability to detect and observe perched groundwater zones, when they were present.

The regional water table was encountered on August 27, 2002, while drilling through relatively coarse-grained Santa Fe Group sediments. The increase in water production at the end of the discharge line was first observed when the depth of the borehole was at 867 ft bgs, with 11.75-in. drill casing lining the borehole to 729 ft bgs. The water level in the borehole stabilized at 621 ft bgs. No water samples were collected for chemical analysis during the drilling phase of operations. Drilling continued after the presence of regional groundwater was verified, using conventional mud-rotary and casing advance techniques, thus precluding observation of groundwater characteristics. On November 25, 2002, after well development but before hydrologic testing, the water level in the well was measured at 642 ft bgs."

The best information on the depth of the water table of the regional aquifer at the location of Well R-16 is the depth of 564 ft bgs measured in the single-screen Well R-16r that was installed adjacent to well R-16 as a replacement for the blocked screen in Well R-16. Note that during drilling the borehole for well R-16 with the mud-rotary methods, the first notice of the regional aquifer was not until drilling reached the depth of 867 ft bgs, a depth of greater than 300 ft below the water table.

Drilling Methods for Well R-16. An open borehole was drilled to a depth of 729 ft below ground surface (bgs) with the fluid-assisted air rotary method. Because of the danger of collapse of the open borehole, a decision was made to drill one diameter of retractable drill casing to the 729 ft depth. The drilling of only one diameter of drill casing to this depth in unstable strata was a mistake and the casing became seized and abandoned in the borehole blocking off the uppermost screen. Figure A.16-1 is the as-built construction of well R-16.

The mud-rotary drilling method was used for drilling an open borehole below the casing to the total depth of 1,287 ft bgs. The column of drilling mud in the borehole generated a hydraulic force of greater than 250 pounds per square inch for invasion of the drilling mud out into the geologic formations surrounding the borehole.

The fluids used for drilling the interval from 0 to 729 ft bgs include the following:

water	-----	35,800 gallons
bentonite clay	-----	20,000 pounds
organic drilling fluid	-----	100 gallons
organic drilling foam	-----	650 gallons
borehole stabilization materials	-----	400 pounds

The fluids used for drilling the interval from 729 ft to 1287 ft bgs include the following:

water	-----	38,350 gallons
bentonite clay	-----	31,100 pounds
organic drilling fluid	-----	30.5 gallons
borehole stabilization materials	-----	1,750 pounds

The greatest invasion of the drilling mud was into the aquifer strata with highest hydraulic conductivity (Ksat). The bentonite clay drilling mud and other drilling additives did not remain in solution. Instead, they formed a paste with a new mineralogy on the surfaces of the aquifer strata with strong properties to mask the detection of many of the chemical and radionuclide contaminants of concern for the buried wastes at TA-54.

The well development procedures used chemicals to disaggregate and disperse the mud cake outward into the geologic formations. From pages 19 of the LANL Well R-16 Completion Report:

On October 2, 2002, chemical treatment was applied to screens 2, 3, and 4 to assist in breaking down and removing the drilling wall cake. An acidic solution containing 30 lb. of AQUA-CLEAR™-MGA and 3 gal. of AQUA-CLEAR™-AE was mixed per 100 gal. of municipal water. Then 200 gal. of the mixture were injected into the full screen interval for each screen. Surging/bailing procedures resumed briefly at each screen. To enhance wall-cake breakdown and removal, a dispersant mixture containing 1.5 qt of AQUA-CLEAR™-PFD per 100 gal. of municipal water was injected at each screen. The screens were surged, and bailing resumed after the well was allowed to sit for two days. An additional 2485 gal. were bailed from the well (Table 8.1-1) during the chemical-treatment phase.

The RCRA guidance manual for construction of monitoring wells (US EPA, 1992) advises against the use of chemicals to disaggregate and disperse bentonite clay drilling muds outward into the aquifer strata a distance beyond recovery by well development methods. The record shows that the bentonite clay drilling muds and the organic drilling fluids have introduced a new mineralogy in the screened intervals in wells R-16 and R-16r.

Misplaced Screens in Well R-16. Additional well development methods cannot remove the new mineralogy present over a large region surrounding the screened intervals in well R-16. An overarching factor for why rehabilitation of well R-16 is not feasible is that the screened intervals are not installed in the strata with highest hydraulic conductivity (Ksat). The strata with highest Ksat are the fast pathways for lateral travel of contaminated groundwater away from LANL. From *Applied Hydrogeology* by Fetter (1994) –

“Heterogeneities in the aquifer can cause the pattern of the solute movement to vary from what one might expect in homogeneous beds. Because flowing groundwater always follows the most permeable pathways, those pathways will also have the most contaminant.”

Figures A.16-2 and A.16-3 present the Schlumberger borehole geophysics display of the Ksat of the geologic formations in the borehole for wells R-16r and R-16. The screened intervals in the wells are annotated on the Schlumberger logs. Figure A.16-3 shows that all of the screened intervals in well R-16 are misplaced. The Schlumberger log displays the strata with the highest Ksat to be in the depth interval of 628-666 ft bgs and within this zone the highest Ksat to be the 10 ft interval from 656 to 666 ft. A well screen was not installed in this important interval of aquifer strata.

Of special note is the low Ksat of the screened interval for screen #4. Another factor that prevents screen #4 from producing reliable and representative water samples is that the screen is not surrounded with clean filter pack sediments. Instead, the screen is surrounded with clayey and organic carbon rich slough sediments that were washed down the borehole wall during construction of the well.

Figure A.16-1. As-built construction, LANL characterization well R-16.

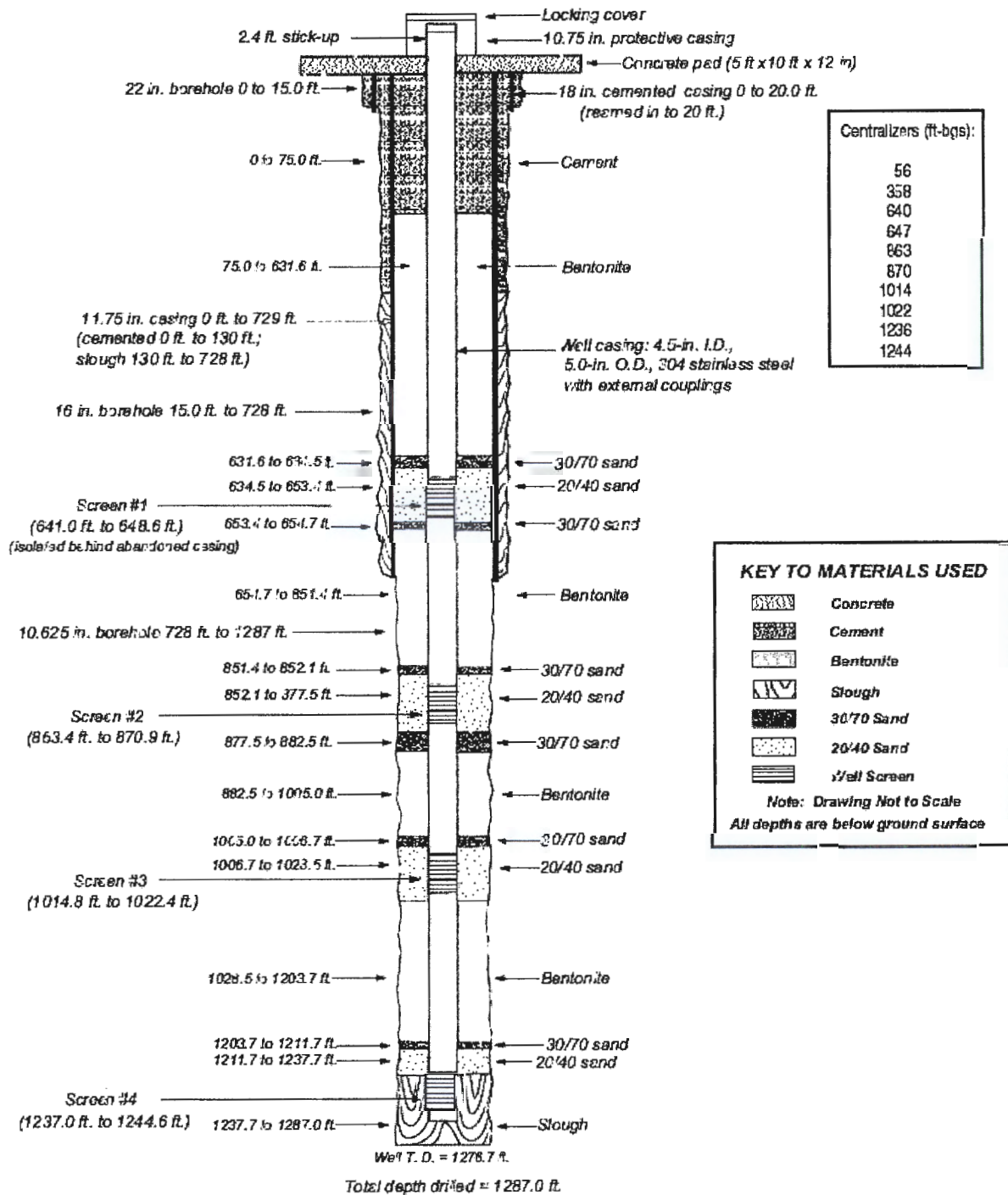
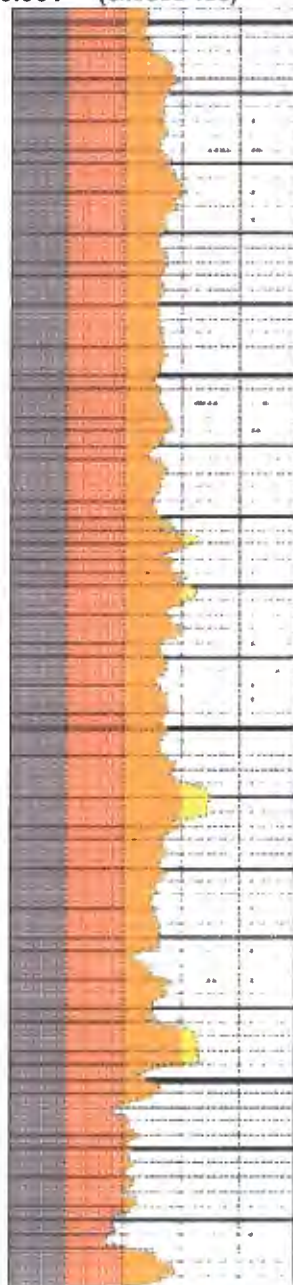


Figure A.16-2. Well R-16r Schlumberger Hydraulic Conductivity Log

Hydraulic conductivity (Ksat) increases from left to right on graph

0.001 (cm/sec 1e6) 1e07



-----Water Table at ~ 564 ft below ground surface

----- R-16r Well Screen from 600-617.6 ft

Pumping Test* had interference from drill air and foam and measured a spurious low Ksat of 7 ft/day

--- 617.6 ft *From the pumping test report- "Test data were affected profoundly by air trapped or dissolved in the formation. The air affected performance by clogging formation pores and entering the well and pump, resulting in very unusual data sets."

-----650 ft

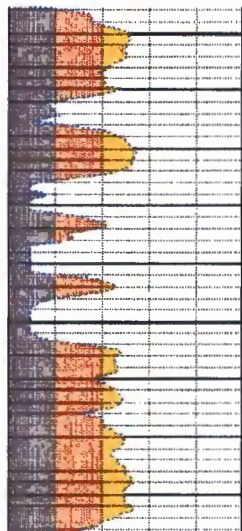
Schlumberger Geophysics maps the highest permeability in the Well R-16 borehole for strata in the depth interval of 628-666 ft bgs. In well R-16, a screen was not installed across the most permeable strata in the depth interval of 656 to 666 ft bgs.

Well R-16r was installed in a borehole drilled with the air rotary casing hammer drilling method to advance retractable drill casing. Drilling fluids include municipal water mixed with QUIK-FOAM® surfactant and EZ-MUD® polymer.

Figure A.16-3. Well R-16, Schlumberger Hydraulic Conductivity (Ksat)

Hydraulic conductivity (Ksat) increases from left to right on graph

0.001 (cm/sec 1e6) 1e07



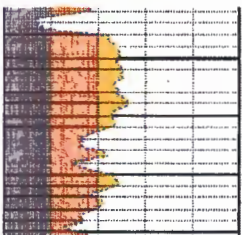
850 ft bgs

Screen #2, 863-871 ft – Installed across strata with a great range in permeability from clay to silty sand

K = 1.6 ft/day – LANL Synthesis Report

900 ft bgs

Well R-16 was installed in a borehole drilled with the mud-rotary drilling method that invaded the screened intervals with bentonite clay and organic fluids with strong properties to mask the detection of contamination.

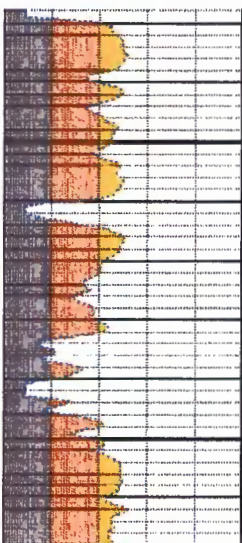


1000 ft

Screen #3, 1015-1022 ft,

K = 2 ft/day – LANL Synthesis Report

1030 ft



1180 ft

1200 ft

-----Screen #4, 1237-1245 ft – Installed across silty and clayey strata with low permeability, K = 1.6 ft/day – LANL Synthesis Report

- Also, Screen #4 is surrounded by Bentonite Clay Slough that was not cleaned out of the borehole. See Figure A-16-1.

Well R-16r. Well R-16r was drilled with fluid-assisted drilling methods that invaded the screened interval with a large quantity of organic drilling foam. The well development methods were unable to remove the foam. The foam interfered with the pumping test to measure the Ksat of the sediments in the screened interval. From the aquifer test report in the well R-16r completion report (Kleinfelder Project No. 48436, February 2006) –

“Test data were affected profoundly by air trapped or dissolved in the formation. The air affected performance by clogging formation pores and entering the well and pump, resulting in very unusual data sets.”

The air in the above discussion is actually the organic drilling foam that was not removed from the screened interval by the well development activities. The foam lowered the measured value of the Ksat for the screened interval.

The organic drilling foam is an excellent energy source for naturally occurring microbes in groundwater because of the combination of air and organic carbon. The foam has introduced chemical processes that have formed a new mineralogy in the screened interval.

Figure A.16-2 shows that the screen in well R-16r was not installed in the strata with highest Ksat. The strata immediately below the screen have a markedly higher Ksat.

Recommended Activities at LANL Single-Screen Well R-16r.

- Well R-16r requires replacement with a new single screen monitoring well drilled with air rotary casing advance drilling methods without organic drilling additives or bentonite clay muds. The screen in well R-16r shall be installed in the strata with high Ksat identified by the Schlumberger geophysics.

Recommended Activities at LANL Multiple-Screen Well R-16.

- Well R-16 requires replacement with a cluster of single-screen wells drilled with air rotary casing advance drilling methods without organic drilling additives or bentonite clay muds.
- The screens in the new single-screen wells shall be installed in the strata with high Ksat identified by the Schlumberger geophysics.

Please contact Robert H. Gilkeson with questions or comments.

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July 9, 2014

GROUND WATER QUALITY BUREAU RESPONSE TO ISSUES DISCUSSED
AT JUNE 2, 2014 DP-1132 MEETING

Governmental Occupation

When drafting and issuing Discharge Permits ("DP"s), the Ground Water Quality Bureau ("GWQB" or "Bureau") ensures that each permit is as protective of the ground water as possible for the benefit of all who may be impacted by such discharges, regardless of any identifying factor, including but not limited to gender, ethnicity, national origin, or tribal affiliation. The GWQB provides notice of proposed DPs to tribal and pueblo governments, affording them the opportunity to participate, provide comment and to request a formal tribal consultation.

Ground Water Monitoring

The Ground Water Quality Bureau is currently in the process of further investigating the monitoring network, and therefore needs more time to respond in detail to the concerns expressed by Communities for Clean Water et al. (who will be referred to collectively as "CCW" throughout this response, but the Bureau understands that not all commenters fall within that group). In general, the Bureau has reviewed the information CCW provided and offers the following:

1. Alluvial monitoring well network
 - a. Well MCO-3: The Bureau agrees that this well does not comply with Bureau well construction requirements. Los Alamos National Laboratory ("LANL")/ Los Alamos National Security ("LANS")/Department of Energy ("DOE") has proposed to replace this well with two alluvial wells in the general vicinity of well MCO3.
 - b. Well MCO-7: The Bureau agrees that this well does not comply with Bureau well construction requirements and will evaluate options.

- c. Well MCIO-6: Additional information is required to fully evaluate this well and data generated from it.
2. Regional monitoring well network – additional time is required to evaluate the regional groundwater monitoring network.

Closure Plans

The Bureau will review the closure requirements in the draft DP and revise as necessary to address CCW's concern that not enough detail is included in the DP. It is recommended that further discussion on this matter take place at the July 17 meeting.

NPDES Language

Please see the Bureau's response to Comment 17. If this does not answer Amigos Bravos' question posed during the meeting, the Bureau would like to discuss further on July 17 so that it can answer the question fully.

Comments on Pages 8 through 13 of the December 6, 2013 CCW Submittal

Comment 1. Response- There is no reference to or standard for Total Residual Chlorine ("TRC") in the draft DP-1132 as it is a drinking water standard found in the federal Safe Drinking Water Act and not a New Mexico ground water standard under 20.6.2.3103 NMAC, or a toxic pollutant as defined in 20.6.2.7.WW NMAC. Further, under drinking water sampling procedures, sampling for TRC is not taken from source water (i.e., un-treated water such as a domestic well) but is instead taken after treatment. The TRC limit in the NPDES permit is a Use-Specific Numeric Criteria (from 20.6.4.900.J(2) NMAC) to protect aquatic life (not present in ground water).

Comment 2. Response- The GWQB is reviewing definitions for "calibration" for discussion at the July 17 meeting. In regards to the "practice of engineering," the GWQB is looking into the issue further to determine if the change is allowable under the rules governing engineers working for federal facilities/employers in the State of New Mexico.

Comment 3. Response- The GWQB is looking into this issue further. It is possible that the definition of total polychlorinated biphenyls ("PCBs") does need to be revised.

Comment 4. Response- The language specifying that the discharge is occurring at Los Alamos National Laboratory is found in the second paragraph of the Introduction.

Comment 5. Response- a) Section 7 of the draft permit contains the requirement for verification of secondary containment for "all units and systems intended to convey, store, treat or dispose of liquid or semi-liquid waste streams" (which includes piping). This does not need to be reiterated in the Authorization Section; b) The GWQB will review whether to put the type of gas used in the Mechanical Evaporator System ("MES") in the permit; and c) The GWQB feels that the

description appropriately reflects the Solar Evaporative Tank System ("SET"), and therefore, the requested change cannot be made. Please note that there is a drive point system that will need to be installed as a method of leak detection before the SET can be used (Condition #26).

Comment 6. Response- The GWQB assumes that DOE will adhere to its internal guidance and standards in relation to seismic analysis when submitting plans and specifications. The GWQB will confirm with DOE that such analyses will occur or has occurred.

Comment 7. Response- The presence of a camera to support leak detection is not standard practice, would be overly burdensome, and would be not practical. The GWQB discussed this matter with the Petroleum Storage Tank Bureau, which stated that it is not aware of any such technology, nor does it believe there would be benefit added by utilizing a camera system.

Comment 8. Response- The GWQB is appreciative of the various diverse languages spoken by the residents of the communities surrounding LANL and always strives to ensure that posted signs are as effective as possible. In this case, the signs will only be viewed by employees and visitors escorted by employees due to the location of the facility. Therefore, the current signage should suffice.

- *Comment 9.* Response- The GWQB is investigating where the 50 gallon per mile standard came from. Based upon the outcome of its research, the GWQB will amend the language, if necessary.

- *Comment 10.* Response- The DP-1132 language currently states that "[the] Permittees shall inspect and measure the thickness of settled solids on an annual basis for all open units and systems that are designed to store or dispose of a liquid or semi-liquid through evaporation." The language was drafted to be broad to ensure that all monitoring points were encompassed. There will be no settled solids at the MES.

Comment 11. Response- If you read 10.b as a whole, the intent is that the visual portions of all synthetic liners used to store or dispose of liquids or semi-liquids must be inspected weekly. It is tied in to the overall weekly inspection requirement of 10.b. If you feel as though the language is confusing, please propose alternative language.

Comment 12. Response- Perchlorate is considered to be a toxic pollutant under 20.6.2.7.WW(36) NMAC. The GWQB used a lower perchlorate standard in the 2005 draft in anticipation of the U.S. Environmental Protection Agency ("EPA") promulgating a standard limit. However, the EPA never approved the standard, and so the GWQB could not use the proposed lower limit. The GWQB is still working to determine where the limit in the draft permit originated, and what data supports the limit. Note the National Pollutant Discharge Elimination System ("NPDES") permit for Outfall-051 only requires reporting of this constituent.

Comment 13. Response- The mercury limit in the draft permit is the current standard found in 20.6.2.3103.A(8) NMAC. Note the NPDES permit for Outfall-051 only requires reporting of this constituent.

Comment 14. Response- The zinc limit in the draft permit is the current standard found in 20.6.2.3103.B(9) NMAC. Note the NPDES permit for Outfall-051 only requires reporting of this constituent.

Comment 15. Response- The standard for "Radioactivity" (combined Radium-226 and Radium-228) is the current standard found in 20.6.2.3103.A(13) NMAC. 30 pCi/l is also the standard used in the NPDES permit for Outfall-051.

Comment 16. Response- No tritium limit was placed in the draft DP-1132 because there is no tritium standard in 20.6.2.3103 NMAC. Tritium is also not included in the NPDES permit for Outfall-051. The GWQB is reluctant to create an arbitrary standard for tritium to place in the DP. Additionally, the DP for this facility will be required regardless of whether the RLWTF is zero discharge, or not, and therefore there is no need for the inclusion of zero discharge language in the permit.

Comment 17. Response- This language in the permit was taken from the discharge permit exemption found in 20.6.2.3105.F NMAC. The GWQB will consider quoting the regulation word-for-word if that is clearer.

Comment 18. Response- The GWQB had originally planned to require a significantly shorter period of time for the installation of flow meters. However, LANL argued that, due to the technical challenges of the flow, the inability to "buy things off the shelf" for the facility, and the general bureaucracy involved, a realistic deadline would be 180 days. LANL's argument was convincing, and therefore, 180 days was placed in the permit. The GWQB suggests that CCW query LANL about this at the group meeting, and perhaps, after discussion, LANL would be willing to agree to reduce the timeframe for installation of the flow meters.

Comment 19. Response- The GWQB had originally planned to require a significantly shorter period of time for the calibration of the flow meters. However, once again LANL argued that, due to the length of time involved in the installation of the flow meters, a realistic deadline would also be 180 days. LANL's argument was convincing, and therefore, 180 days was placed in the permit. The GWQB suggests that CCW query LANL about this at the group meeting, and perhaps, after discussion, LANL would be willing to agree to reduce the timeframe for installation and calibration of the flow meters.

Comment 20. Response- The GWQB will amend the language so that there are specific dates for waste conveyed, as opposed to a time period.

Comment 21. Response- PCBs are toxic pollutants, as defined in 20.6.2.7.WW(39) NMAC. VI.B.25 currently requires that samples will be collected once a month at Outfall 051 and analyzed for all toxic pollutants. This is more frequent than the NPDES permit for Outfall 051, which requires PCBs to be sampled yearly. VI.B.25 also requires that samples will be collected analyzed quarterly for all toxic pollutants at the MES and SET.

Comment 22. Response- Public notice for each workplan, corrective action report, or proposal submitted for a discharge permit is not required under the regulations, nor has the GWQB ever placed such a provision in a permit. See also response to Comment 24.

Comment 23. Response- The GWQB will amend the language to incorporate this change.

Comment 24. Response- The GWQB cannot make the suggested amendment. The draft discharge permit requires LANL to propose a workplan for stabilization of the specific units in Section VI.42 of the permit. The GWQB will not require the workplan to be in the permit itself, as LANL has not yet stopped using these units. However, the draft permit outlines the elements that must be included in the workplan. This process (workplan proposal, GWQB review/approval, workplan implementation) is very typical and widely found in many GWQB discharge permits. The Bureau processes workplans in this matter because, at complex facilities, requiring closure workplans far in advance may not be practical due to the fact that there are too many unknown factors to accurately predict the specific details of such plans.

Comment 25. Response- Conveyance lines leading to these units and structures, and how they are to be "terminated, plugged, re-routed, or bypassed" is included in the workplan required for stabilization in Section VI.42.d. The GWQB will require that the workplan include these pipes.

LANL M.G. W/ CONCERNED CITIZENS
(INTERESTED PARTIES - IP)
07/17/14

- SEE SIGN-IN SHEET FOR ATTENDEES
- DOCUMENTS IN READING ROOM. LANL CONCERNED THAT FL DOES TOO MUCH & DO NOT WANT IN DP AS REQUIREMENT - THEY PROPOSE 12 DOCUMENTS
 - JP ☐ NOT PART OF ACT OR REG
 - ☐ ALL ARE PUB DOES HAVE NAMED
 - JOANNIE ☐ OVERSAY LANL TO POST DOCS
 - ☐ DON'T EXPECT NAMED TO BE IN MIDDLE
 - JERRY ☐ WE WANT PUSH FOR CONDITION
 - JENN F. ☐ WANTED CONDITION W/ CAVEAT THAT NOT ENFORCEABLE (PG 4 OF TABLE OF LANL COMMENTS, 12/12/13)
 - JOANNIE ☐ DO NOT WANT DANNY KATSMAN, LANL AT MEETING W/ LANL & IP
- GROUND WATER MONITORING
 - MCO-3
 - ☐ JERRY WELL WILL BE PROPERLY LOCATED & TO NAMED STDS.
 - ☐ BOB WANTS WELLS;
 - o OUTFALL
 - o REGIONAL
 - o PRECISED
 - ☐ JERRY o REGIONAL MORE COMPLICATED \Rightarrow LOOK FOR EARLY WARNING \Rightarrow AVOIDANCE. NOT A SOURCE PROTECT. PERMIT IS NOT ABOUT HISTORIC CONTAMINATION - PART OF CONSENT ORDER.

□ IN AGREEMENT W/ MCOB Replacement
- MCOB

□ JERRY O NOT PROBABLY CONSTATED
BUT IF SAMPLES ARE REPRESENTATIVE
⇒ MAY BE WISE TO KEEP

□ BOB O DISCHARGES TO OUTFALL AT
MORTENBACH CANYON ⇒ POTENTIAL FOR
RE-MOBILIZATION OF ~~THE~~ EXISTING
CONTAMINATION IN MORTENBACH CANYON

□ JOANNIE TALKS ABOUT INSTALLATION OF
IMPERMEABLE BARRIER, WHICH, SHE CLAIMS,
WILL GREAT REDUCTION (EARLY 2000s)

□ JERRY ASKS FOR RESUME W/ DATA
RELATIVE CONTAMINANTS IN SOIL

□ JOANNIE O SMU AT OUTFALL

□ RACHEL O CLAIMS SMU BOUNDARY WRONG -
CONTAINS OUTFALL FOR IP (STORMWATER)
NPDES (INDIVIDUAL)

□ JENN F. SAYS THEY HAVE GREAT DATA ON
CONTAMINANTS INTO SMU - NEED TO TALK TO
SURFACE WATER
OSI

□ RACHEL O INDUSTRIAL NPDES DISCHARGE IS
LARGE (WAS ?)

□ JERRY/BOB O WELL LOCATIONS OK & IF
SEE EXHIBIT ⇒ MOST WELLS DOWN GRADIENT
BG: WELLS ARE IMPROPER & WON'T CATCH. JS!
WE NEED DATA ON SOIL CONTAMINANTS.

□ JOANNIE O GEORGE RICE REPORT,
0.100, 200 → 40,000 GPD TO REMOBILIZE

(2)

Dunbar:

~~Jerry~~: Concerned about compartmentalization
of Department & other REGULATORY AGENCIES.

SEES AS ISOLATED & OBSTACLES

- JERRY & JENNIFER O WE ARE INTEGRATING
ACROSS OTHER programs - IT IS IMPORTANT
JENNIFER. try to DOWNTOWN.

- JERRY LOOK AT MCOF & CONSTITUTION CORRECTION
& IS IMPROVING Response. ALSO
LOOK AT CONTAMINANT REMEDIATION

- BOB & JENNIFER ⇒ JUST REPORT

• MCOF

- JERRY O SURVEILLANCE SCREEN, ⇒ USE
LOW FLOW TO CHARACTERIZE (PROG. 4)
WELL

○ NOT CLEAR FROM BOB'S REPORT
HOW FAR SCREEN IS SUBMERGED

- JENNIFER O INTERLUIS DATA ⇒
21+24
27 FT ABOVE TOP OF SCREEN. PG
A-11 OF BOB'S REPORT.

- BOB OBJECTS TO DRILLING W/ MVD &
ADDITIONAL CONTAMINANTS & THAT WELLS WERE NOT
DRILLED TO CORRECT ORDER REQUIREMENTS.
○ DISCUSSION OF TRENDS OF WELL
○ OBJECTION THAT THESE WELLS WERE
NEVER INTENDED TO BE MVS.

- JERRY MAKE ~~BETTER~~ DISTINCTION THAT
DO FOR EARLY DETECTION & MAY NOT
ADDRESS REGIONAL WELLS

□ JERRY O MOVES ON TO LEAK DETECTION
 FOR SET. ~~JENN E.~~ JENN E. ⇒ SET IS
 SUITABLE, BUT NATEO WANTS ASSURANCE ⇒
 LEAK DETECTION. EASY DETECTION
 BECAUSE DIFFICULT TO TRACE TO REGIONAL
 ○ LEAK DETECTION ARE ^(DATA POINTS) ISSUES W/
 moisture DETECTION & CAN BE
 SAMPLED.

REGION WELLS

- ROSS RH8 FOR RLWTF, BUT
WE RECOGNIZE LIMITATIONS OF THESE
WELLS.
- BUILDING 1 (RLWTF?) ~~OTHER~~
LOOK AT EASY WAY & INITIAL
PROTECTION, BUT REGIONAL WELLS NOT
THE ANSWER.
- JOANIE O HAS ISSUES W/ SECONDARY
CONTAINMENT W/ OVERDOSE STORAGE
TANKS (NOT SURE WHAT TANKS)
- JENN GULLAN DISCUSSES W/MAIN &
"position permission" VS HISTORIC CONTAMINATION
- JONI WANTS US TO HAVE L&L GET THEM
DRAWING / DESCRIPTION OF W/MAIN
- BRIAN ASKS ABOUT SEISMIC ACTIVITY &
SPILL. LOOK AT MONITORING IN TERMS
OF SEISMIC EVENT. =
- JERRY & JENN E ⇒ WOULD HAVE TO INSPECT
IT DO TIGHTNESS TESTING - WEEDY INSPECTOR &
EVENTS THAT COULD DEGRADE
 (4) - STRUCTURAL INTEGRITY.

- JENN & O WE DID REVIEW Emergency plan.

• CLOSURE & Emergency PLANS

- ~~LANL~~ ^{DP} OBJECTS to US REQUIRING ALSO REQUIREMENTS IN DP - WE JUST BORROW. LANL HAS SOPs & Emergency plans & they will provide, & WE REVIEW WHAT DO IF WHAT?
- JOHN O WANT MOST PROTECTIVE - LOOKED AT W/ HAZWASTE process. WANT PLAN TO PROTECT DOWN WIND & DOWN STREAM people
- BOB O CLAIMS THAT BUILDING / TREATMENT ARE NOT CUSTOMIZED TO ENVIRONMENTAL STANDARDS. BUSH I SIGNED ORDER TO HAVE ALL F&D FACILITIES meet STANDARDS. DID 100 M DESIGN - DID NOT HAPPEN.

- THEY DON'T INTEND TO COMPLY
- CCNS WILL SEND one OF BOB'S Report.

- JENN & O Anything For Continuity to ADDRESS GW protection w/o mentioning Seismic Event?

- MAREK O WHO MONITORS LANL & CCNS AS WATCH DOGS. ON SLIPPERY SLOPE

- RUTHY IS CONCERNED THAT WHOSE PICKING UP NOT BEING SEEN & PRECAUTIONS NOT BEING TAKEN.

- MARY CONCERNED THAT NOT SEEING BIG PICTURE
ABOUT DANGERS & IMPACTS. WANT HOLISTIC
APPROACH

- JENN F. PERSONAL PERSPECTIVE

- JP \Rightarrow HIRING POSITION FOR LAND
COORDINATOR & USING GENERAL POSITIONING
WORKING ON LAND ISSUES
ALWAYS

- BRIAN O THINGS FACILITY IS A DINOSAUR
SHOULD BE GONE.

- JP O JP HAS DATE TO REPLACE / STOP
USING OLD WITS (TOWNS)

- BRIAN O WHAT IS BOUNDARY OF FACILITY

JENN F
DESCRIBED
IN INTRO
& CONTAINS

☐ INHERIT LIES

☐ TREATMENT WITS

☐ OVERALL

☐ MET / EST

- CLOSURE (SMV OR NOT) MUST BE
RECORDED IN JP (OR CLOSURE PLAN)

Joni ☐ SMV IF RECEIVED WASTE BEFORE 1982

- JP ☐ NEED PREPARE PROPOSED LANGUAGE
IN CLOSURE PLAN BECAUSE OF FUTURE
CHANGES.

- Joni ☐ ONLY TWO HAZ WASTE CLOSURE
PLANS FOR _____, REST NEEDS TO
BE DETERMINED SMITH.

- BRIAN ☐ CLOSURE PLAN NOW DICTATES WHAT
GETS PUT IN

☐ CURRENT STRUCTURE \Rightarrow HOW TO PROTECT
GW / AREA AFTER CLOSURE

(6)

Board cont

- Wants public input into closure
 - Needs ^{closure} plan program in DP w/ PN
 - RACIAL \Rightarrow multicorps 1995 closure plan
 - BRIAN O covered about all of back- $\$$
 - Smith \Rightarrow Another 5 years.
 - JERRY O Agree to Board's concerns,
Court options \Rightarrow a
 - Currently AN OUTLINE IN DP & plan
to be prepared
 - BRIAN O thinks closure plan should be
part of DP w/ public comment
opportunity.
 - WHAT ABOUT closure permits (now?)
 - Timeline $\&$ SPIR2 / CREAT YF
 - Closure of components VS facility.
- JP ○ If unit must be kept \Rightarrow Stabilization

- 1) Close & stabilize ^{units present}
- 2) Close & stabilize units future
- 3) Close & ~~stabilize~~ for closure of
facility.

- JP
- This is 5 yr permit
 - NEED CAN ALWAYS REQUIRE MODIFICATION OF
DP
 - WORK REG $\&$ NPDES EXEMPTION.
 - JP O NOT THAT CLEAR
 - Look for NPDES EFF LIMITS BEING USED
IF report only (NO LIMIT) \Rightarrow we can regulate
- * \textcircled{f} want to see analysis of
NPDES limits VS SWGG - what
- 10230

o E.G. Copper Np125 Limit 10 (122 + 104)
600 \Rightarrow Exempt or not?

o Jerry \square Southern Np125 lower
Standard to 6000 STD

o Rachel wants to see REG (stand)
up if changed.

- JP Anything to request / comment on

o Bob 1999 was lead consultant \Rightarrow

look at \Rightarrow work done to characterize waterbody
B206 (PCA phase) characterization

o calibration of ENE JACS.

* o prioritized LULU proposal for Dene
point system for SET
comment 10

o ~~Sediment~~ Toxic pollutants

\Rightarrow Grazing pattern than Annually

for sediments. Jerry they 100

not accumulate sediments quickly

o comment #2)

Revised comment \Rightarrow ~~Specification~~

for flow paths \Rightarrow 3, Not Area

Discharge

o They will Query LULU for many
comments

o Rachel comment on PCB comments #3

Conjunct method - Not an EPA "Approved"
method (Good for historical rules). We
are looking at Conjunct vs Analytical
methods \square detection limits
(8) (5% degradation ~~3400~~)

next meeting: LAUL IN AUG

DD - another meet in 2-4 weeks

IP will talk about next meeting
if combined w/ LAUL.

LANL I TESTED PART 3 MEETING

07/17/14

NAME	ORG	PHONE	EMAIL
JOHN HALL	NMED-GWOB	827-1049	JOHN.HALL@STATE.NM.US
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Jennifer Pruett	"	827-0652	jennifer.pruett@state.nm.us
MARIAN NARANJO	HOPE/CCW	929-2151	mariann2@windstream.net
BRIAN SHIELDS	Amigos Bravos	575-758-3874	BSHIELDS@AMIGOSBRAVOS.ORG
Kathy Sanchez	TewaWomen United	505-363-7100	Kathy@tewawomenunited.org
Rachel Conn	Amigos Bravos/CCW	575-758-3874	rconn@amigosbravos.org
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JOAN BROWN	Partnership Earth Spirituality	266-6966	joan.kansas@swcp.com
Marlene Benotte	Partnership for Earth Spirituality	266-6966	marlene@swcp.com
Jennifer Fulla	NMED	476-4	jennifer.fulla@state.nm.us
HAROLD YOUNG	Indigenous (3021), CCW		

7/7/14 LANL/CCW mtg.

-DP requests for Electr. R-Room

LANL/DOE objects, wants to limit postings

Toni: This is in the category of something CCW can ask LANL about; CCW asks them to post w/ all HW, SW, AQB documents + in general, LANL will do that

Jerry: issue is whether it should be in the DP + subject to enf. + penalties

Meeting w/ LANL - CCW wld. prefer that Katzman not come - confrontational + doesn't listen (cd. They send ^{some} ~~200~~)

-GW Mon-Alternatives (GWQB 7/9/14 Response)

MCO. 3 (just DG of Outfall 51) we agree not properly constructed. LANL has proposed 2 additional wells.

can you alluv.

Gilkysen needs details on how to be constructed. wants mw @ outfall itself, bec. ~~here~~ there were decades of disch. @ outfall itself needs 1 well in the alluvium + proper investg. wheth. a perched zone or not

Jerry: regional issue complicated
Strategy for DP. Perhaps some mw deep that will work but our goal is early detection @ each fac.
if something let in alluvium, then more deeper

RG: historic contam. in GW

JB: not in this DP but covered in HWB + CD°

JS: need repl. of MCO.3 - they agree this is needed
MCO.7. we also agree that doesn't comply
we are reviewing sampling done @ well
if can demonstrate that getting regressed
samples, then we'll allow it; if
not, will req. repl.

RG: shd have wells all along Montezuma Canyon

JS: our goal is rel. detection

RG: DP allows rel. of large quant. of water, which
cld. re-mobilize contamin. + transport downstream
or thru canyon

JS - we will look @ possib. of repl. MCO.7 + perhaps
an additional well in M Canyon

Joni - new "barrier" @ R.1 + MCO.5 to stop anything
moving down canyon, but it failed + opened
new pathways; project done in early 2000s
Pat Longmire in charge of this
Jenny - new info - is there a report on this? so
we can know threat on re-mobil.?

Joni - HUSB has report on settling ponds downstream

Jenny - we are looking @ narrow part of canyon

Joni - they can get us info. on SMUS + other
data down the canyon; LANL's reg.
for alternative compl. for CWA-NPDES "IP"
(Stormwater Permit). Can't meet ^{Individ. Per} permit
reqmts so maps submitted show contamin. in camp.

^{Joni will send} Alternat. Compl. Reg. + CW's comments + PRB Report
SMA 7.9 is site
Joni: 12/6 comments had table of disch. to canyon
Jenny: his assumption was that this was und. NPDES + limited

Jerry: what was loading component in NPDES permit back then?

if contam. in new wells around MCO. 3, then ^{must investig. extent + magnitude}
if nothing above stds, then maybe no more

Jerry: wld this be regul. directed by HUSB and CD or by GWRB

RG: UMED needs to have histor. info. on bad wells

Jerry: is there existing data that shows loading in soils?

Joni: George Rice 2004 Report shows travel time to RGr. was 8 yrs, not "hundreds" LANL asser.

Jean Brown - why no coordin. w/ other Bureaus? Why do they never hear the whole coord. effort? Where is there a total approach, and why are these permits so isolated?

Fullam: GWRB has worked closely w/ HUSB + SWQB to ensure that everything is covered & doesn't slip thru cracks

Jerry: we do strive to coordin. w/ other programs take away fr. MCO. 7 - we will review if a usable well, review potential for re-mobilization

RG: only way to prove reliabil. of MCO. 7 is to replace it

Jerry - we agree This not an expens. reg. well not int. in a sci prog
MC10.6 - might be techniq. to get info. fr. this scenario
↳ profiling

RG: only good for long wells + long screen

Jerry - couldn't find anywhere in RG's report how far submerged, how long screen is

RG: will send report on this

Joni: Intellus p. 411
DB

27 ft. water above top of screen
27.1 - 29 ft. above (p. 411)

RG: all wells drilled w/ bentonite clay muds; HWB says this doesn't meet RCRA regmts but now all these wells are being used as RCRA mws

JS: asking about how tight formation + conditions

Joni: we can get info. to you, + many wells are improperly constr.

Regional system

Jerry: our concern is early warning system. If something shows up, then invest.

if something found in reg. then too late
SET so we want earlier warning (not respond well for SET reg. too late + meas. long ago actions)
proposal for drivepoints under ~~SET~~ SET w/ leak
we don't think reg. well appropriate

Fullan - very complex geology so don't determine where to put a mw - can't be sure it would catch anything
therefore came up w/ alternate mon. system

RG: very imp. to have angled bounings

Main fac.

Jerry - reg. well again not effect. bec. too deep + too late
- Chose existing wells that may or may not be DG
of fac. R. 46 + R. 60 are not idea

Fullan - Bldg 1 too big for soil moisture mon.
reg. wells unclear where to locate
46 + 60 were already there

RG: shouldn't have any reg. wells in DP bec. indigenous

Jerry: so wld it be ok to take reg. wells out of DP?
is there anything else we shd reg. in DP?

Fullam: DP has extra prev. meas. (2nd contract, admin. controls such as insp, RD)

what is likelihood of rel. getting outside Bldg + to G

Joni: problems w/ new holding tanks (fr. 55 to 50)
Could there be slant wells and these to detect releases?

Fullam: only new tanks she's aware of are new WMRM influent tanks
we need info. about what tanks she is talking about

Joni: they will take that question and consideration w/ like an overview fr. LANL (w/ map) of WMRM that shows specs. on influent tanks

Brian - Seismic activity - was it considered?

Fullam - she took seismic activity into concern + put other protective regmts into permit

Brian - if there was seismic actv, what wld. be best way to det. re

Fullam: for WMRM - visual insp, if any struct. integr. issues, must invest'g. + correct

leak detect + tightness test UG pipes anytime there is seismic activity

any annual tightness test?

Jerry in response to H. Trujillo: no seismic # trigger, wld be determ. by LANL engineers. Permit conding. base on weekly insp. or alarm
we didn't define what is a "sig. event" to trigger
the operator has an SOP + training to determine these

Fullam - this DP has an unusual regmt for an Emeg. Plan
Joni - they want to see the most protect. Emeg. Plan. w/ HWB, the were laughed @. ccw has pointed out problems w/ SOPs + Emeg. Plans. ^{+ AQB}

Joni wants emerg. plan to protect downstream + downstream com
RG: ~~for~~ fac. are far out of compl. w/ fed. ind. stds, for seismic or other regmts

Joni: Bush Exec. Order that exist. fac. not in compl. w/ fed. seismic stds must be brought up to stds

RG: LANC does not intend to bring up to stds or CFR regmt or Exec. O
Failure for emerg. planning. Report fr. RG on seismic activity + concealed fault will send report

Rachel: want cld. be added to DP that doesn't specifically mention seismic activity but gets @ same thing

m. Naraino: hurtful to hear about a permit for an activity that is so threatening + has been so harmful

Closure Plan

Shields: will historic spills be covered in DP cleanup?

Jeny: HSB reg. SMUs, Fullam says Bldg 1 may bec. a SMU, might not; might be closed und. permit

Conn: refl. in DP or clos. plan?

Jeny: in DP at least

JP: what does CCW want in Closure Plan

RG: It's a regulated unit + must be closed und. RCRA

Joni: But don't take out of DP

Fullam: what shd. be in DP to ensure protect. of GW
What specificity in DP for closure?

Shields: certain criteria for protect. GW shd be in place now bec. will dictate what kind of fac. is put there in the future (+ this will have to be caused by LANC in des. gov)

Shields - not super-detailed in terms of sampling, protecting
but how you are going to protect GW in the future
- nervous about DP want closure regmts in the
DP, bec. need ability for pub. to comment on Clos Pla
- there needs to be pub. notice + pub. comment on Clos Pla
Conn - This was also a part of Mdycorp DP
Shields concerned 180 days for LAAR to submit, then
back + forth for 5 yrs. w/ no Closure Pl.

Fullam - std DP lang. is very generic and broad. We
didn't want to hold up the whole DP w/ a lot
of back + forth on Clos. Plan

Terry: if we can get broad regmts: screening levee
trigger char + remed, removal of equip, under
lines/pipes

JP: Clos. Plan in DP general + to be submitted later,
which shall address @ a minimum / following....

Shields: Closure plan is a regmt of DP

Terry - possible defn. of modif. to incl. Closure Plan
which could allow pub. notice + comment

Asks ccw for list of things for closure,

Shields: timeline + id of any spills assoc. w/ fac.

JP: 3 steps ① cessation + stab. of specyf. units
② stab. of units ceased in future
③ when everything stopped perm.
closure (incl. Char, etc.)

Conn: additional clos. lang.: if changes in NRED under, can
req. modif. of DP

Conn ① pls. compare NPDES eff. limits to DP limits
SWQB will issue new NPDES permit before this
one is effect - do analysis

② If a const. C is high in NPDES, Conn thinks
WQC rules allow NMD to impose stricter limit

③ SWQB should clarify this language
Jenny - we will look @ legal issues

RE in 1990s he was in charge of investg. of RCRA Ph. I char. of
any contam. ben. Bldg. 1

Response of 7/9/14

Comment #5 - They don't know what drive point system is

Jenny: we'll provide what CML provided to us

Comment #7: CCW will talk to LANL + to PSTB + other experts

Comment #9: v concerned about 50 gals/mile - where did this
come from?

#10: since already man-GW guar., can they man.
settled sol. guaranty? Joni will ask LANL

Jenny - OSHA stds, sediments don't build up quickly

#18+19 - They are clip w/ their experts

#20: They appreciate request for data

#21: specification for flow path for rel. fr. SETHES
but no option for discharge

#24+25 - They want pipelines incl. in stabil.

CCW will query LANL sec. They want to make workplan
for cessation of spec. units pub + available
for pub. comment

Conn: #30 PCBs) analytical - congener method orig.

in DP. Fullam - congener good for historic
but problem w/ accuracy is detection
limit and needs request

Future process
NMD draft out by end of month, early Aug. Conn for total PCBs
Shields - maybe better to have a mtg. w/ all parties, then next draft

Join in NY week of Aug. 18 Brian can't be here

Sept. 8 Brian available
CHI Negot. so Jerry not avail. The whole week

JUL 24 2014

BUREAU



Environmental Protection Division
Environmental Compliance Programs (ENV-CP)
PO Box 1663, K490
Los Alamos, New Mexico 87545
(505) 667-0666

National Nuclear Security Administration
Los Alamos Field Office, A316
3747 West Jemez Road
Los Alamos, New Mexico, 87545
(505) 667-5794/Fax (505) 667-5948

Date: JUL 22 2014

Symbol: ENV-DO-14-0173

LAUR: 14-25258

Locates Action No.: N/A

Mr. Jerry Schoeppner, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Dear Mr. Schoeppner:

Subject: Discharge Plan DP-1132 Quarterly Report, Second Quarter 2014, TA-50 Radioactive Liquid Waste Treatment Facility

This letter from the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) is the second quarter 2014 Discharge Plan DP-1132 report for the Technical Area (TA) -50 Radioactive Liquid Waste Treatment Facility (RLWTF). Since the first quarter of 1999, DOE/LANS have provided the New Mexico Environment Department (NMED) with voluntary quarterly reports containing analytical results from effluent and groundwater monitoring.

During the second quarter of 2014, no effluent was discharged to either the National Pollutant Discharge Elimination System (NPDES) Outfall 051 or to the solar evaporative tank system (SET) at Technical Area (TA)-52; all effluent was evaporated on-site at the mechanical evaporator system (MES).

Quarterly Monitoring Results, Mortandad Canyon Alluvial Groundwater Wells

Table 1.0 presents the analytical results from sampling conducted at Mortandad Canyon alluvial well MCO-7 during the second quarter of 2014. No samples were collected from alluvial well MCO-3 because the well was damaged beyond repair during a flood event in September 2013. Detailed information on the condition of MCO-3 was submitted to the NMED in December 2013 (ENV-DO-13-0316). No samples were collected from alluvial wells MCO-4B and MCO-6 because there was insufficient water in the well for sampling. Samples from MCO-7 were submitted to GEL Laboratories LLC (GEL) for analysis.

All of the analytical results were below the New Mexico Water Quality Control Commission (NMWQCC) 3103 standards for nitrate-nitrogen (NO₃-N), fluoride (F), and total dissolved solids (TDS). Analytical results from the sampling of intermediate and regional aquifer wells in Mortandad Canyon can be accessed online at the Intellus New Mexico environmental monitoring data web site (<http://www.intellusnmdata.com>).

TA-50 RLWTF Effluent Monitoring Results

No final weekly composite (FWC) samples were collected during the second quarter of 2014 because no effluent was discharged to Mortandad Canyon.

No final monthly composite (FMC) samples were collected during the second quarter of 2014 because no effluent was discharged to Mortandad Canyon.

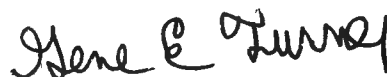
Please contact Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding this report.

Sincerely,



Alison M. Dorries
Division Leader
Environmental Protection Division
Los Alamos National Security LLC

Sincerely,



Gene E. Turner
Environmental Permitting Manager
Environmental Projects Office
Los Alamos Field Office
U.S. Department of Energy

AMD:GET:RSB/lm

Cy: James Hogan, NMED/SWQB, Santa Fe, NM, (E-File)
John E. Kielsing, NMED/HWB, Santa Fe, NM, (E-File)
Stephen M. Yanicak, NMED/DOE/OB, (E-File)
Hai Shen, NA-LA, (E-File)
Gene E. Turner, NA-LA, (E-File)
Eric L. Trujillo, NA-LA (E-File)
Carl A. Beard, PADOPS, (E-File)
Michael T. Brandt, ADESH, (E-File)
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Randal S. Johnson, DSESH-TA55, (E-File)
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*Discharge Plan DP-1132 Quarterly Report
2nd Quarter, 2014*

Table 1.0. Mortandad Canyon Alluvial Well Sampling, 2nd Quarter, 2014.

Sampling Location	Sample Field Prep (F/UF) ¹	Sample Date	Perchlorate (µg/L)	NO ₃ +NO ₂ -N (mg/L)	TKN (mg/L)	NH ₃ -N (mg/L)	TDS (mg/L)	F (mg/L)
MCO-3			Damaged ⁴	Damaged ⁴	Damaged ⁴	Damaged ⁴	Damaged ⁴	Damaged ⁴
MCO-4B		Dry ⁶	Dry ⁶	Dry ⁶	Dry ⁶	Dry ⁶	Dry ⁶	Dry ⁶
MCO-6		Dry ⁶	Dry ⁶	Dry ⁶	Dry ⁶	Dry ⁶	Dry ⁶	Dry ⁶
MCO-7	F	5/21/2014	12.1	1.2	0.16	0.031J	439	0.83
NM WQCC 3103 Groundwater Standards			NA²	10 mg/L³	NA²	NA²	1000 mg/L	1.6 mg/L

Notes:

¹F means the sample was filtered. UF means the sampled was not filtered.

²NA means that there is no NM WQCC 3103 standard for this analyte.

³The NM WQCC 3103 Groundwater Standard is for NO₃-N.

⁴Damaged means that the well was damaged beyond repair during a flood event in Mortandad Canyon in September 2013.

⁵J flag indicates an estimated detection. The result was greater than the Method Detection Limit (MDL) but less than the Reporting Limit (RL).

⁶Dry means that there was insufficient water in the well for sampling.

JUL 29 2014

BUREAU

**Environment Safety & Health**

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Date: **APR 23 2014**
Symbol: ADESH-14-020
LAUR: 14-22194

Ms. Erika Schwender, Director
Resource Protection Division
New Mexico Environment Department
Harold Runnels Building, Room N4065
1190 St. Francis Drive
P.O. Box 5469
Santa Fe, NM 87502

Dear Ms. Schwender:

Subject: Filing of Plans and Specifications, Radioactive Liquid Waste Treatment Facility Upgrade Project, Los Alamos National Laboratory, DP-1132

In accordance with Section 20.6.2.1202 of the New Mexico Administrative Code, *Filing of Plans and Specifications—Sewerage Systems*, the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) are submitting the 90% design plans and specifications (Enclosure 1) for the Radioactive Liquid Waste Treatment Facility's Upgrade Project (RLWTF UP) at Technical Area (TA)-50. This letter and Enclosure 1 also provide supplemental information to discharge permit application DP-1132 submitted by DOE/LANS on February 16, 2012.

The scope of the RLWTF Upgrade Project includes constructing a single-story reinforced concrete building, approximately 8,000 square feet in area and immediately adjacent to the existing RLWTF, to house the following:

- ✓ Processing equipment for treating low-level radioactive liquid waste,
- ✓ A control room,
- ✓ An analytical laboratory,
- ✓ Change rooms for operators,
- ✓ Two 10,000 gallon treated effluent tanks, and
- ✓ A separate utility building to house mechanical and electrical equipment.

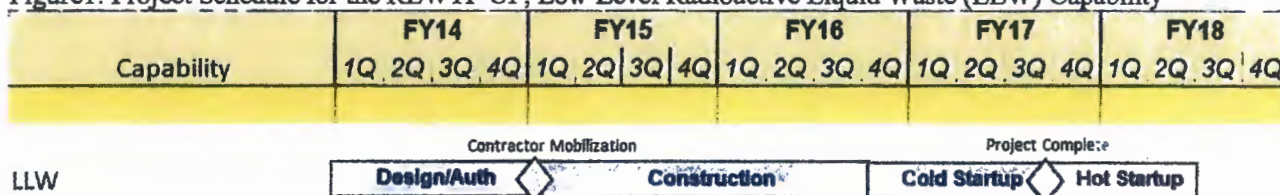
Ms. Erika Schwender
ADESH-14-020

- 2 -

The RLWTF UP is a "like-for-like" replacement of the low-level radioactive liquid waste treatment capability currently provided in the existing RLWTF. As such, the RLWTF UP will not result in any change to the (1) location of the discharge, (2) quantity or quality of the discharge, or (3) the character of water contaminants received, treated, or discharged.

The current project schedule for the RLWTF UP is presented in Figure 1. Once the hot startup period has concluded the existing low-level capability at the RLWTF (TA-50 Building 1) will be removed from service and the units stabilized in accordance with applicable discharge permit requirements.

Figure 1. Project Schedule for the RLWTF UP, Low-Level Radioactive Liquid Waste (LLW) Capability



In closing, while the reasons for implementing the RLWTF UP are multi-fold, the principal driver for the project is to begin migrating radioactive liquid waste treatment operations out of the existing 50-year old facility.

Please contact Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding this matter.

Sincerely,

Michael T. Brandt, DrPH, CIH
Associate Director
Environment, Safety, and Health
Los Alamos National Security LLC

Sincerely,

Gene E. Turner
Environmental Permitting Manager
Environmental Projects Office
Los Alamos Field Office
U.S. Department of Energy

MTB:GET:RSB/lm

Enclosure:

1. Compact Disc (CD) containing the RLWTF Upgrade Project 90% Design Plans and Specifications

Cy: James Hogan, NMED/SWQB, Santa Fe, NM, w/o enc.
John E. Kieling, NMED/HWB, Santa Fe, NM, w/o enc.
Steven M. Yanicak, NMED/DOE/OB, (E-File)
Hai Shen, NA-LA, w/o enc., (E-File)
Gene E. Turner, NA-LA, (E-File)

Cy (continued):

Eric L. Trujillo, NA-LA, (E-File)

Carl A. Beard, PADOPS, w/o enc., (E-File to aosburn@lanl.gov)

Michael T. Brandt, ADESH, w/o enc., (E-File to lindasalazar@lanl.gov)

Alison M. Dorries, ENV-DO, w/o enc., (E-File)

Terry J. Singell, PADWP, w/o enc., (E-File)

Robert C. Mason, TA55-DO, w/o enc., (E-File)

William H. Schwettmann, IPM, w/o enc., (E-File)

Leslie K. Sonnenberg, TA55-RLW, w/o enc., (E-File)

John C. Del Signore, TA-55 RLW, w/o enc., (E-File)

Randal S. Johnson, DSESH-TA55, w/o enc., (E-File)

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COPY



GROUND WATER
APR 23 2014
BUREAU

Environment Safety & Health
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(505) 667-4218/Fax (505) 665-3811

National Nuclear Security Administration
Los Alamos Field Office, A316
3747 West Jemez Road
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(505) 667-5794/Fax (505) 667-5948

Date: **APR 23 2014**
Symbol: ADESH-14-020
LAUR: 14-22194

Ms. Erika Schwender, Director
Resource Protection Division
New Mexico Environment Department
Harold Runnels Building, Room N4065
1190 St. Francis Drive
P.O. Box 5469
Santa Fe, NM 87502

Dear Ms. Schwender:

Subject: Filing of Plans and Specifications, Radioactive Liquid Waste Treatment Facility Upgrade Project, Los Alamos National Laboratory, DP-1132

In accordance with Section 20.6.2.1202 of the New Mexico Administrative Code, *Filing of Plans and Specifications—Sewerage Systems*, the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) are submitting the 90% design plans and specifications (Enclosure 1) for the Radioactive Liquid Waste Treatment Facility's Upgrade Project (RLWTF UP) at Technical Area (TA)-50. This letter and Enclosure 1 also provide supplemental information to discharge permit application DP-1132 submitted by DOE/LANS on February 16, 2012.

The scope of the RLWTF Upgrade Project includes constructing a single-story reinforced concrete building, approximately 8,000 square feet in area and immediately adjacent to the existing RLWTF, to house the following:

- ✓ Processing equipment for treating low-level radioactive liquid waste,
- ✓ A control room,
- ✓ An analytical laboratory,
- ✓ Change rooms for operators,
- ✓ Two 10,000 gallon treated effluent tanks, and
- ✓ A separate utility building to house mechanical and electrical equipment.

ENCLOSURE 1

Compact Disc (CD) containing the RLWTF Upgrade
Project 90% Design Plans and Specifications

ADESH-14-020

LAUR-14-22194

Date: April 23, 2014

1 of 3



First half of documents from
"LLW Specs" folder

SECTION 01 1100
SUMMARY OF WORK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. This specification contains references to related documents in each of the applicable sections. The related documents form a part of the basis of design for this activity to the extent specified in the applicable sections of this specification. Conflicts between the related documents and the requirements of this specification shall be brought to the attention of the Subcontract Technical Representative (STR) for resolution. Significant sections noted are not meant to negate the remainder of the specification, but to emphasize sections of greater importance.

1.2 SUMMARY

- A. The Subcontractor shall construct and install the structures, systems, and/or components (SSC) for the Radioactive Liquid Waste Treatment Facility Upgrade Project (RLWTF-UP) Low-Level Waste Subproject including the new LLW Treatment Building, the Low-Level Waste Utility Building, and associated exterior structures.
- B. The work site is located in Technical Area (TA)-50 of the Los Alamos National Laboratory (LANL) complex in Los Alamos, New Mexico.

1.3 RELATED SECTIONS

- A. Section 01 1116, "Work by Owner."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.5 STATEMENT OF WORK

- A. Work Included: The following items identify the major work elements to be provided by the Subcontractor:
 - 1. Until substantial completion, equipment under the care, custody, and control of the subcontractor and its sub-tiers shall be maintained in accordance with manufacturer requirements and documented for submittal.
 - 2. The provision and management of supervision, labor, equipment, materials, transportation, and services for procurement, receiving, handling, storage, protection, fabrication, installation, inspection, and testing to provide a ready to use facility in accordance with these Subcontract documents. Labor includes participation of the Subcontractor's employees in training and medical examinations required by the Subcontract.

3. The provision of temporary electrical power, as required, to meet the needs of construction and installation activities.
4. Performance of the following itemized list of major work elements (the list is intended to be broad in scope and is not all-inclusive):
 - a. Site demolition;
 - b. Final site preparation;
 - c. Underground utility work;
 - d. Building erection;
 - e. Plumbing installation;
 - f. Heating, ventilation, and air conditioning (HVAC) installation;
 - g. Electrical systems installation;
 - h. Communications systems installation;
 - i. Fire protection system installation;
 - j. Fire alarm system installation;
 - k. Radiation monitoring installation;
 - l. Installation of process tanks, equipment, and piping;
 - m. Controls system, conduit, and wiring installation;
 - n. Exterior improvements;
 - o. Disposal of construction waste;
 - p. Installation and testing of associated piping and conduit;
 - q. Pre-functional Tests – including, but not limited to, integrity testing; calibration, grooming, and alignment (CG&A) testing; and control system testing;
 - r. Scheduling and management of preliminary inspections and walk downs; and
 - s. All other work as described in the Subcontract documents.
5. Subcontractor interface requirements are identified in Attachment 1.
6. The relocation or provision of temporary utilities to support continued operation of other onsite facilities and systems.
7. Areas, features, and details identified on the drawings as "HOLD" are included in the scope of work.
8. Performance of the Pre-Functional Test.
9. Performance of the *National Electrical Code* (NEC) (NFPA 70) compliance inspection.
10. Provide personnel support during plant commissioning, as directed by the STR.

B. Work Not Included: (Reserved).

1.6 LANL FURNISHED EQUIPMENT

- A. See Section 01 1116, "Work by Owner."

1.7 LANL PERFORMED WORK

- A. See Section 01 1116, "Work by Owner."

1.8 TESTING, ACCEPTANCE, AND TURNOVER

- A. The Subcontractor, or its sub-tier contractor(s), shall inspect, test, calibrate, and perform loop functional testing of Instrumentation and Controls (I&C), construction tests required by the applicable codes, and tests identified in the subsequent sections of this specification.
- B. The Subcontractor, or its sub-tier contractor(s), who inspect, test, calibrate, and perform loop functional testing of I&C, shall demonstrate they are qualified to perform the work. They shall have a minimum of five years of related work experience and work history.
- C. The Subcontractor shall perform Pre-Functional Testing and Control System Functional Testing before turnover of SSCs to the STR. The Pre-Functional Testing, Control System Testing, and SSC turnover schedule shall be consistent with the Subcontract completion date in the Subcontract document.
 - 1. The Pre-Functional Testing shall confirm that equipment has been properly installed and connected in accordance with associated design documentation. The Pre-Functional Testing consists of integrity tests and CG&A tests.
 - a. The integrity testing shall be either hydro (water) or pneumatic (air) pressure tests performed in accordance with the applicable codes that confirm that equipment and piping can withstand pressures above normal operating pressures.
 - b. The CG&A testing shall consist of point-to-point verification of electrical and instrumentation wiring and connections, either visual or continuity tests and/or motor tests will be performed.
 - 2. Control System Functional Testing shall be performed to ensure that the control system software is functioning properly.
 - a. A software requirements specification will be derived from engineering specifications, operating manuals, piping and instrumentation diagrams (P&IDs), and other design documents. The software requirements will be cross-referenced to the specific software code indicating where each requirement is met.
 - b. The requirements shall also be cross-referenced to acceptance criteria that are testable criteria for meeting each requirement. The acceptance criteria will then be cross-referenced to specific steps in the test procedure where the criteria and requirements will be met. This will verify that the software is properly designed.
 - c. Integrated software testing will be conducted onsite for each process. As each requirement is successfully tested, it will be documented. Test exceptions will be documented and resolved with concurrence by the Architect/Engineer via the STR. A test

report consisting of the completed test plan, and any test exceptions, will be issued to complete the software validation.

3. After Subcontractor Pre-Functional Testing and/or Control System Functional Testing is completed, and approved on specific SSCs, the Subcontractor shall arrange for preliminary inspections and walk downs with the STR and RLWTF Operations personnel to establish the work items remaining and list exceptions. The Subcontractor shall provide a list of remaining work items before the preliminary inspections and walk downs. Any work items remaining and any exceptions will be documented on a punch list by the LANL STR. Work items and exceptions shall be scheduled and resolved.
4. The Subcontractor shall grant the STR and/or RLWTF Operations personnel reasonable access to the SSC during construction activities to support and witness the verification, turnover, and training activities.
5. The LANL STR reserves the right to witness any of the inspections, examinations, or tests specified to ensure that supplies and services conform to the specified requirements.
6. The purpose of the specified tests and inspections is to determine that each piece of installed equipment is in satisfactory condition to perform its intended function. It is the intent of these procedures to ensure that all workmanship and materials, and the manner and method of erection and installation conform to the manufacturer's instructions and all applicable standards.
7. Inspections shall be provided by the Subcontractor in order to verify compliance of the work to the drawings and specifications.
8. The Subcontractor shall schedule all testing with the LANL STR, and no testing of any kind shall be performed without the prior approval of the LANL STR.
9. The Subcontractor shall furnish all measuring and test equipment (M&TE) required for testing. The Subcontractor shall be responsible for providing such safety measures as are required for each test.
10. The Subcontractor shall prepare and submit for approval formal test reports for each completed test. The submittal form shall be provided by the LANL STR.

PART 2 PRODUCTS

- A. Not Used.

PART 3 EXECUTION

- A. Not Used.

RLWTF-UP Low Level Waste Subproject External Interface Descriptions.

F&OR Interface No.	Title and New Interface No. from P&ID	Description	
		Location	Physical Attributes
I1	LLW Feed IC-138	TA-50-250 (LLW Influent Storage Facility) feed piping	Tie-in is to existing 4-in./8 in. HDPE Pipe-in-Pipe. LANL Utilities and Infrastructures Group will make connection of Subcontractor line to existing line.
I2	Chemical Delivery	Delivery Truck at LLW Treatment Building doors	Receiving area for trucks with chemical drums. Chemicals include <u>sulfuric acid (93%)^(a)</u> , <u>sodium hydroxide (25%)^(a)</u> , <u>magnesium sulfate (25wt%)^(a)</u> , and <u>ferric sulfate (36wt%)^(a)</u> .
I3	Solid Waste Handling/ Transfer IC-118 IC-133 IC-153 IC-239	TA-50-1 (RLWTF-UP Drum Storage Area)	Staging area with sufficient room to enable a small forklift to move individual or palletized 55-gallon drums.
I4	Telecommunications	Telephone manhole PB50-001	Telecommunication Vault with Standard Phone Lines.
I5	Potable Water	North of building, water line at hydrant #793 Northeast of building, water line at hydrant #715	Tie-in to 8-in. piping.
I6	Natural Gas	Parallel to Pecos Drive	Tied into 90-lb/in. ² gauge natural gas main.
I7	Sewer	Existing Force Main Line West of TA-50-1	New lift station tied into existing 4-in. sanitary sewer force main.
I8	Electrical Switching Station ^(b)	TA-50-146 (northeast of TA-50-01)	13.2-kV power to switching station, four switches with two in use.
I9	Tee to Existing Effluent Discharge LLW-IC-152	Effluent discharge line, valve box east of TA-50-1	Flange at 4-in., single-walled HDPE running to new valve box with valves to ZLD tanks or NPDES outfall.
I10	Control Signals from Influent Storage Facility	TA-50-250 (LLW Influent Storage Facility PLC)	Existing ControlNet over Ethernet and Yellownet signals to be connected to a new media conversion device. Fiber optic to be run in existing conduit.

F&OR = Functional and Operational Requirement.

HDPE = high-density polyethylene.

LANL = Los Alamos National Laboratory.

LLW = low-level waste.

NPDES = National Pollution Discharge Elimination System.

P&ID = process and instrumentation diagram.

PLC = Programmable Logic Controller.

RLWTF-UP = Radioactive Liquid Waste Treatment Facility Upgrade Project.

TA = Technical Area.

ZLD = zero liquid discharge.

^(a)Chemicals shown on the P&ID are underlined in this table.^(b)The P&IDs do not show electrical systems.

END OF SECTION

SECTION 01 1116
WORK BY OWNER

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Los Alamos National Laboratory (LANL)-furnished equipment for Subcontractor installation [Government-furnished equipment (GFE)].
- B. LANL-furnished and installed equipment.
- C. LANL performed work.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 LANL-FURNISHED EQUIPMENT FOR SUBCONTRACTOR INSTALLATION (GFE)

- A. LANL will furnish as free issue Government-furnished equipment, identified in Contract documents as GFE, to be installed by the Subcontractor in the work or used in its performance.
- B. LANL will deliver GFE to the project site, except as noted in technical specification sections (e.g., CCN-4 may require the Subcontractor to receive material at the CCN-4 warehouse).
 - 1. Notify Subcontract Technical Representative (STR), in writing, 5 calendar days prior to desired date of delivery.
- C. Upon receipt, verify quantity and condition of GFE. Report any shortages or damages in writing to STR within 24 hours.
- D. Install or incorporate all GFE into the work, unless otherwise noted. Uncrate, assemble, perform all prestart-up activity, and place in operation all GFE as recommended by the manufacturer(s).

1.5 LANL-FURNISHED AND INSTALLED EQUIPMENT

- A. LANL will furnish and install equipment identified in Contract documents as "by LANL," and will coordinate work with the Subcontractor.

1.6 LANL PERFORMED WORK

- A. LANL will perform work identified in Contract documents as "by LANL," and will coordinate work with the Subcontractor.

PART 2 PRODUCTS

A. Not Used.

PART 3 EXECUTION

A. Not Used.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 01 1116, Rev. 1, dated April 14, 2008.

SECTION 01 2500
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.2 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 SUBMITTALS

- A. Provide submittals in accordance with the requirements of Exhibit I.

1.4 SUBSTITUTIONS

- A. "Or approved equal" is always implied after a brand name, patented process, or catalog number. The Subcontractor may substitute any brand or process approved as an equal by the specifying Architect/Engineer through the submittal and the Supplier Deviation Disposition Request (SDDR, see Exhibit D) process. The only exception is where "no substitution" is specified. See General Provision "Material and Workmanship."
- B. Non-Structural Systems and Components and Non-Building Structures
1. If the Subcontractor wants to substitute an "equal" architectural, mechanical, or electrical system or component, or non-building structure, the component/structure should also be reviewed by the design structural engineer for anchorage and support.
 - a. If and when approved, the design structural engineer shall make any necessary anchorage and support revisions to the construction specifications and drawings associated with the equal component/structure.
- C. Subcontractors shall use the SDDR form (See Exhibit D) to:
1. Notify LANS when the Subcontractor wants to propose changes to the subcontract unanticipated at time of award
 2. Notify LANS when a manufactured product does not meet subcontract requirements and to document the Subcontractor's proposed action together with their technical justification.
 3. Notify LANS upon failure to meet requirements of Design Agency reviewed Subcontractor submittal documents.
 4. Receive LANS disposition of the SDDR.
 5. Submittal of SDDRs from lower-tier subcontractors shall be through the Subcontractor.
 6. The SDDR is not a vehicle for addressing Requests for Information (RFI), Field Change Notices (FCNs), Field Change Requests (FCRs), or Design Revision Notices (DRNs).

7. LANS engineering actions and disposition statements do not relieve the Subcontractor from responsibility for the accuracy, adequacy, or suitability of the item being provided as defined in the subcontract, nor does it constitute a waiver of the terms of the subcontract.
8. Prior to approving any SDDR, LANS will consider whether:
 - a. There is a significant advantage to LANS in terms of cost/schedule or item performance.
 - b. The deviation will adversely affect important properties or functions of the item or the service."

PART 2 PRODUCTS

- A. Not Used.

PART 3 EXECUTION

- A. Not Used.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 01 2500, Rev. 1, dated April 14, 2008.

SECTION 01 3545
WATER DISCHARGE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Requirements of Subcontractor and LANL Subcontract Technical Representative (STR) when there is a planned or accidental discharge of water, including those not covered by a NPDES permit, Ground Water Discharge Plan, or approved Notice of Intent (NOI).

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 22 0816, "Disinfection of Potable Water Piping."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBCONTRACTOR REQUIREMENTS

- A. Discharges to Environment:
 - 1. Discharges shall not cause or have the reasonable potential to cause or contribute to a violation of a water quality standard.
 - 2. Employ Best Management Practices (BMPs) to prevent erosion from discharge of water.
 - 3. Chlorinated water used for disinfection shall be de-chlorinated with a neutralizing agent per Section 22 0816, "Disinfection of Potable Water Piping," prior to discharge. If discharge is not to a watercourse (e.g., flat ground), then total chlorine concentration shall be reduced to less than 1 ppm (part per million) – typically the same as that in the Safe Drinking Water Act.
 - 4. Discharges to a watercourse shall have a total chlorine concentration not greater than 0.011 mg/L (11 parts per billion). (This value is based on 1999 changes in the New Mexico stream standards that dropped chlorine limit from 1 ppm to 11 ppb.)
 - 5. For discharges of less than 5000 gallons, notify LANL STR at least 5 working days in advance of the planned discharge.
 - 6. For discharges of 5000 gallons or more, notify LANL STR at least 30 working days in advance of the planned discharge.
- B. Sanitary Sewer Discharges:
 - 1. Notify LANL STR prior to any discharge.
 - 2. Volumes greater than 1000 gallons shall not be discharged into the sanitary sewer systems without special approval by Sanitary Wastewater Operations Manager (665-7855) obtained via LANL STR.

3. Properly characterize discharges through LANL waste profile form (WPF) process and meet the TA-46 Wastewater Treatment Plant Waste Acceptance Criteria (WAC), Refer to <https://policy.lanl.gov/pods/policies.nsf/MainFrameset?ReadForm&DocNum=P930-1&FileName=P930-1.pdf> especially Attachment 16.
 - a. WAC limits for total chlorine concentration are 3 mg/L (3 ppm). De-chlorinate water used for disinfection in excess of 20 gallons with neutralizing agent per Section 22 0816, "Disinfection of Potable Water Piping," prior to discharge.
- C. Notify LANL STR immediately in the event of any accidental or unplanned discharge.

1.5 LANL SUBCONTRACT TECHNICAL REPRESENTATIVE REQUIREMENTS

- A. Discharges to the Environment:
 1. Keep a written record of each discharge by project. For planned discharges of less than 5000 gallons, notify the LANL Water Quality and RCRA Group (ENV-RCRA) five working days prior to the discharge. Following ENV-RCRA approval complete and return attached form "General Discharge Record" (Attachment 1) to Jacob Meadows (Email:jmeadows@lanl.gov or Fax: 665-9344) at ENV-RCRA. Discharges will be documented and submitted to NMED in LANL's Quarterly Discharge Report.
 2. For planned discharges of 5000 gallons or more, notify the LANL ENV-RCRA Group at least 30 working days in advance of the planned discharge. ENV-RCRA will review the proposed discharge to determine if submittal of an NOI is required. If required ENV-RCRA will develop and submit the NOI to NMED (NMED has up to 30 working days to respond). ENV-RCRA will coordinate with an ENV-EAQ review for potential impacts to critical habitat and Threatened and Endangered Species.
- B. Sanitary Sewer:
 1. Assist Subcontractor with characterizing discharges using LANL Waste Profile Form (WPF) process and meeting the TA-46 Wastewater Treatment Plant Waste Acceptance Criteria (WAC) described in Paragraph 1.3 above.
 2. Notify Sanitary Wastewater Operations Manager (665-7855) at least 5 working days in advance for approval of planned discharge into sanitary waste water system.
- C. Notify the LANL ENV-RCRA Group immediately in the event of any accidental or unplanned discharge.

PART 2 PRODUCTS

- A. Not Used.

PART 3 EXECUTION

- A. Not Used.

Notice of Intent to Discharge General Discharge Record

Location/TA: _____	Bldg: _____
Fire Hydrant / Pipe / Secondary Containment / Manhole #: _____	
FMU/User Group: _____	Contact Person: _____
Phone: _____	Pager: _____
Person Conducting Secondary Containment Drainage Activity: _____	
Date and Time of Discharge: _____ / _____ <input type="checkbox"/> AM <input type="checkbox"/> PM	
Duration of Discharge: _____	
ENV-RCRA Contact:	Mark Haagenstad (505-665-2014) or Jacob Meadows (505-606-0185) Facsimile: 505-665-9344
Description of Discharge: _____	
Volume of Discharge: _____	
Canyon Affected: _____	
SAMPLES TAKEN: <input type="checkbox"/> Yes <input type="checkbox"/> No	
Comments: _____	
Reviewed By: _____	
Printed Name, ENV-RCRA	Signature
Date	

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 01 3545, Rev. 4, dated December 23, 2009.

SECTION 01 4000 QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This section includes requirements for construction quality assurance and quality control driven, in part, by Los Alamos National Laboratory's (LANL's) *Engineering Standards Manual* (ESM) [STD-342-100 (formerly ISD 341-2), Chapter 16, "IBC Program"] and ESMC 17 Pressure Safety.
- B. Testing and inspecting services contracted by the Subcontractor are required to verify compliance with design and construction specifications and for production of standard products and the Special Inspection required by the 2009 *International Building Code* (IBC). LANL will perform oversight inspections of these services. None of these LANL Quality Assurance Services relieve the Subcontractor of responsibility for compliance with the Subcontract documents.
 - 1. Requirements for Subcontractor to provide quality assurance and quality control services may be supplemented by provisions of other sections.
 - 2. Other sections may contain quality assurance activities specific to those work results.
 - 3. Subcontractor is responsible to ensure that any activities subcontracted to lower-tier Subcontractors or agencies are contractually "passed-down" and Subcontractor shall ensure that their sub-tier entities follow these requirements.
- C. Examine and verify pressure systems meet ASME B31.3, B31.5, B31.8 and B31.9. Examiner, inspector, examination procedures per ASME B+PVC Section V, visual inspector for normal 341.4.1 Category M examinations, certificate 341.4.1(c).

1.2 RELATED SECTIONS

- A. Divisions 2 through 44 sections for task-specific test and inspection requirements.
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. See Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to LANL for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may

exceed the minimum within reasonable limits. Specified numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to LANL for a decision before proceeding.

1.5 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Qualification Data: Testing agencies specified in Paragraph 1.6 below shall be pre-approved by the LANL Building Official (LBO).
 - 1. Pre-qualification by the LBO is required where specified by the IBC or the *2009 International Existing Building Code (IEBC)*, such as special case components like post-installed anchors, which require compliance to the ICC-ES (ICC-ES.org) program including prequalification submittal to the LBO.
- B. Test and Inspection Plan (TIP): Include with overall project construction schedule or submit separate schedule within 30 days prior to commencement of the Work. Building upon any Architect/Engineer (A/E)-initiated Test and Special Inspection Plan (electronic file available), which includes special inspections and critical tests and inspections, add remaining tests and inspections required by specifications and standards in tabular form and include the following:
 - 1. Specification section number and title;
 - 2. Description, type, and periodicity of test and inspection;
 - 3. Applicable standards;
 - 4. Test and inspection methods;
 - 5. Number of tests and inspections required;
 - 6. Time schedule or time span for tests and inspections;
 - 7. Entity responsible for performing tests and inspections (e.g., LANL Inspector, LBO-approved Special Inspector, or Structural Engineer-of-Record);
 - 8. Requirements for obtaining samples; and
 - 9. Unique characteristics of each quality-control service.

LANL will review and may add additional inspections and hold points.

Subcontractor's TIP may be produced and maintained separately from the A/E's with written permission of the LANL Chief Inspector.
- C. Coordination by Subcontractor: Coordinate sequence of activities to accommodate required quality assurance and quality control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
 - 2. Distribute schedule to LANL, A/E, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

- D. Reports: Prepare and submit certified written Test and Inspection Reports that include the following:
1. Date of issue;
 2. Project title and number;
 3. Name, address, and telephone number of testing agency;
 4. Dates and locations of samples and tests or inspections;
 5. Names of individuals making tests and inspections;
 6. Description of the Work and test and inspection method;
 7. Identification of product and specification section;
 8. Complete test or inspection data;
 9. Test and inspection results and an interpretation of test results;
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting, if relevant;
 11. Comments or professional opinion on whether tested or inspected Work complies with the Subcontract requirements;
 12. Name and signature of responsible inspector; and
 13. Recommendations on retesting and re-inspecting.
 14. Listing of M&TE including serial number, and calibration date for all test equipment.
 15. Submit test and inspection records within 5 working days following completion of each quality control service.
- E. Licenses and Certificates: For LANL's records, submit copies of licenses, certifications, correspondence, records, and similar documents used to establish compliance with standards and regulations that pertain to performance of the Work.
- F. For IBC work, each Subcontractor and sub-tier responsible for the fabrication or erection of a main wind- or seismic-force-resisting system, designated seismic system, or a wind- or seismic-resisting component listed in the "Statement of Special Inspections" must submit a "Statement of Responsibility" per ESM (STD 342-100, Chapter 16, Section IP, Appendix H) to LANL as a submittal prior to the commencement of work.

1.6 QUALITY ASSURANCE

- A. Qualification requirements specified below establish the minimum qualification levels for the skills or organizations listed; individual specification sections specify additional requirements.
1. Designer: In accordance with ASME B31.3.
 2. Installer: A firm or individual with 5 years experience in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

3. Manufacturer: A firm with 5 years experience in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
 4. Fabricator: A firm with 5 years experience in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
 5. Steel Fabricator Qualifications: Firms performing structural fabrication subject to the IBC (Chapter 17) shall be pre-approved by the LBO. In cases where the desired fabricators are not LBO-approved, or with LBO permission, Subcontractor shall arrange for the IBC-related activities to be inspected during fabrication in the shop by an LBO-approved Special Inspector. As an alternative, LANL may provide Special Inspectors in-shop at Subcontractor's expense. Note: Special Inspection or shop approval not required for burning and cutting of mild steel (e.g., ASTM A 36/A 36M, *Standard Specification for Carbon Structural Steel*).
 6. Professional Engineer: A professional engineer who is legally qualified to practice in New Mexico and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installation of systems, assembly, or product design that is similar to those indicated for this Project in material, design, and extent.
 7. Testing Agency: An nationally recognized testing laboratory (NRTL), an national voluntary laboratory accreditation program (NVLAP), or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329, *Standard Specification for Agencies Engaged Construction Inspection and/or Testing*; and with additional qualifications specified in individual sections; and approved by the LBO per the ESM (STD-342-100, Chapter 16 Section IBC-TIA). Subcontractor shall utilize only LBO-approved testing agencies.
- B. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
1. Subcontractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mock-ups using installers who will perform same tasks for Project.
 - e. Build laboratory mock-ups at testing facility using personnel, products, and methods of construction indicated for the completed Work.

- f. When testing is complete, remove test specimens, assemblies, mock-ups, and laboratory mock-ups. Do not reuse products on Project.
 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality assurance service to LANL with copy to Subcontractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Subcontract documents.
- C. Mock-ups: Before installing portions of the Work requiring mock-ups, build mock-ups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 1. Build mock-ups in location and of size indicated.
 2. Notify LANL 7 days in advance of dates and times when mock-ups will be constructed.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Obtain LANL's approval of mock-ups before starting work, fabrication, or construction.
Allow 7 days for initial review and each re-review of each mock-up.
 5. Maintain mock-ups during construction in an undisturbed condition as a standard for judging the completed Work.
 6. Demolish and remove mock-ups when directed, unless otherwise indicated.

1.7 QUALITY CONTROL

- A. LANL Responsibilities: Where quality control services are indicated as LANL's responsibility, LANL will engage a qualified testing agency to perform these services.
 1. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Subcontract documents will be charged to Subcontractor, and the Subcontract Sum will be adjusted by Change Order.
- B. Subcontractor Responsibilities: Tests and inspections not explicitly assigned to LANL are Subcontractor's responsibility. Unless otherwise indicated, provide quality control services specified.
 1. Engage a qualified, LBO-approved, testing agency to perform quality control services.
 2. Subcontractor shall not employ the same entity engaged by LANL, unless agreed to in writing by LANL.
 3. Subcontractor shall pass quality requirements down to lower-tier Subcontractors and shall enforce such requirements.
 4. Notify LANL Subcontract Technical Representative (STR) at least 24 hours in advance of time when Work that requires testing or inspecting will be performed, unless otherwise indicated in individual sections.

5. Provide access to approved designs. The Subcontractor is responsible for providing inspectors with access to approved design
 6. Submit a certified written report within 5 working days, in duplicate, following completion of each quality control service.
 7. Testing and inspecting requested by Subcontractor and not required by the Subcontract documents are at Subcontractor's expense.
 8. Submit additional copies of each written report to LANL, when so directed.
 9. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in submittal requirements of Exhibit I.
- C. Retesting/Re-inspecting: Provide, at Subcontractor's expense, quality control services for retesting and re-inspecting, for replacement construction Work resulting from work that failed to comply with the Subcontract documents.
- D. Testing Agency Responsibilities (services retained by Subcontractor): Cooperate with A/E and Subcontractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify A/E, LANL STR, and Subcontractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Submit a certified written report of each test, inspection, and similar quality control service through Subcontractor.
 4. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 5. Do not release, revoke, alter, or increase the Subcontract document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Subcontractor.
- E. Associated Services (actions and efforts of Subcontractor): Cooperate with agencies performing required tests, inspections, and similar quality control services, and provide auxiliary services as requested. Notify agency in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.

1.8 SPECIAL INSPECTIONS

- A. Onsite Special Inspectors may be provided by LANL; if required for offsite steel fabrication as described elsewhere in this section, they are at Subcontractor's expense.
- B. Special Inspections will be conducted by LANL where indicated in individual specification sections and in accordance with the "Design Professional's Inspection Plan."

PART 2 PRODUCTS

- A. Not Used.

PART 3 EXECUTION

3.1 WORK

- A. Work shall only be accomplished to LANL-approved and controlled design and LANL-approved design media (specifications and drawings). This design, along with the Subcontract and applicable codes and standards included in the subcontract, specifications, and drawings shall be complied with and must be contractually "passed-down" to any sub-tier fabricators, testing agencies, or others Subcontractor or assigned by the Subcontractor. Work shall comply with the design processes and work processes described in the LANL Quality Assurance Program document or the LANL Quality Assurance-Procurement Quality (QA-PQ) approved Subcontractor Quality Assurance Program document.

3.2 ACCEPTABLE TESTING AGENCIES

- A. See LANL for listing (e.g., from Institutional Evaluated Suppliers List maintained by LANL QA-PQ Group internally: <http://int.lanl.gov/orgs/qa/pq/docs/iesl.pdf>).
Note: Failure to meet requirements may result in their removal from listing [ESM (STD-342-100, Chapter 16, Section IBC-TIA)].

3.3 REPAIR AND PROTECTION

- A. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
- B. Protect construction exposed by or for quality control service activities.
- C. Repair and protection are Subcontractor's responsibility, regardless of the assignment of responsibility for quality control services.
- D. Subcontractors must comply with all LANL standard procedures and processes as specified in the subcontract, including safety, quality (such as hold tags), environmental, and other signs, tags, warnings, etc. For building work, Subcontractors shall comply with the applicable requirements of the IBC (and IEBC, as applicable) as amended by LANL's ESM (STD-342-100, Chapter 16, Appendices A and B). Where the LANL standards including this section invoke the IBC, interpret to mean this LANL version of the Building Code.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 01 4000, Rev. 4, dated September 1, 2009.

SECTION 01 4200

ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

PART 1 GENERAL

1.1 ABBREVIATIONS AND ACRONYMS

AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturer's Association
AASHTO	American Association of State Highway and Transportation Officials
ABMA	American Bearing Manufacturers Association
acfm	actual cubic feet per minute
ACI	American Concrete Institution
ADA	Americans with Disabilities Act
A/E	Architect/Engineer
AF&PA	American Forest and Paper Association
AHA	American Hardboard Association
AISC	American Institute for Steel Construction, Inc.
AISI	American Iron and Steel Institute
AISI-NASPEC	American Iron and Steel Institute-North American Specification for the Design of Cold-Formed Steel Structural Members
AITC	American Institute of Timber Construction
AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute, Inc.
AOC	Area of Concern
APA	The Engineered Wood Association
ARI	Air-Conditioning and Refrigeration Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASNT	American Society of Nondestructive Testing
ASR	Alkali-Silica Reaction
ASSE	American Society of Safety Engineers
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
AWG	American wire gauge
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWS	American Welding Society
AWWA	American Water Works Association
B&PV Code	Boiler and Pressure Vessel Code
BHMA	Builders Hardware Manufacturers Association
BMP	Best Management Practice
CAM	continuous air monitoring
CAT	construction acceptance testing

CCT	correlated color temperature
CFR	Code of Federal Regulations
CG&A	calibration, grooming, and alignment
CGA	Compressed Gas Association
CISPI	Cast Iron Soil Pipe Institute
CMTR	Certified Material Test Report
CMU	concrete masonry unit
CoC	Certificate of Conformance
COTS	commercial off-the-shelf
CPG	<i>Comprehensive Procurement Guideline</i>
CPVC	chlorinated polyvinyl chloride
CRI	color rendering index
CWI	Certified-Welding Inspector
CWP	cold working pressure
CxA	Commissioning Authority
DHI	Door and Hardware Institute
DOE	U.S. Department of Energy
DWV	drain, waste, and vent
EMF	external mounting feet
EMI	electro-magnetic interference
EMT	electrical metallic tubing
ENV-RCRA	Water Quality & Hydrology Group (LANL)
EPA	U.S. Environmental Protection Agency
EPDM	ethylene propylene diene monomer
ERSS-RS	Remediation Services Group (LANL)
ES&H	environmental, safety, and health
ESM	Engineering Standards Manual
ESR	Evaluation Service Report
F&OR	Functional and Operational Requirement
FAT	Factory Acceptance Testing
FCC	Federal Communications Commission
FM	Factory Mutual
FMG	Factory Mutual Global
FRP	fiberglass-reinforced plastic
FSC	Forest Stewardship Council
FSS	Federal Supply Service
GFCI	ground-fault circuit interrupter
GFE	Government-furnished equipment
GSA	Government Service Administration
HEPA	high-efficiency particulate air
HDPE	high-density polyethylene
HID	high-intensity discharge
HMI	human-machine interface
HSA	Headed Steel Anchors
HVAC	heating, ventilation, and air conditioning

HVAC&R	heating, ventilation, and air conditioning, and Refrigeration
I&C	Instrumentation and Controls
IAPMO	International Association of Plumbing and Mechanical Officials
IBC	International Building Code®
ICBO	International Conference of Building Officials
ICC-ES	International Code Council Evaluation Service, Inc.
IEC	International Electrotechnical Commission
IECB	International Existing Building Code
IECC	International Energy Conservation Code
IEEE	Institute of Electrical and Electronics Engineers
IESL	Institutional Evaluated Suppliers List
IESNA	Illuminating Engineering Society of North America
IMC	intermediate metal conduit
ISA	International Society of Automation
ISEA	International Safety Equipment Association
ISO	International Organization for Standardization
LANL	Los Alamos National Laboratory
LATM	Los Alamos Transit Mix
LBO	LANL Building Official
LED	light-emitting diode
LLW	low-level waste
M&TE	measuring and test equipment
MCS	Monitoring and Control System
MCM	measurement in thousands of circular mils
MFMA	Metal Framing Manufacturers Association
ML	Management Level
MPI	Master Painters Institute™
MSDS	material safety data sheet
MSS	Manufacturers Standardization Society
NAIMA	North American Insulation Manufacturers Association
NCMA	National Concrete Masonry Association
NDE	nondestructive examination
NPDES	National Pollution Discharge Elimination System
NEBB	National Environmental Balancing Bureau
NEC	National Electrical Code®
NECA	National Electrical Contractors Association
NELMA	Northeastern Lumber Manufacturers Association
NEMA	National Electrical Manufacturers Association
NETA	InterNational Electrical Testing Association
NFPA	National Fire Protection Association
NGR	National Grading Rule
NHLA	National Hardwood Lumber Association
NIST	National Institute of Standards and Technology
NLGA	National Lumber Grades Authority
NMDOT	New Mexico Department of Transportation

NMED	New Mexico Environment Department
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
NPH	Natural Phenomena Hazards
NPS	Nominal Pipe Size
NPSH	Net Positive Suction Head
NPT	national pipe thread
NRCA	National Roofing Contractors Association
NRTL	nationally recognized testing laboratory
NSF	National Sanitation Foundation
NVLAP	national voluntary laboratory accreditation program
O&M	Operations and Maintenance
OS&Y	outside screw and yoke
P&ID	piping and instrumentation diagram
P&L	Pratt and Lambert
PC	Performance Category
PCB	polychlorinated biphenyls
pdf	portable document format
PIV	post indicator valve
PLC	programmable logic controller
PP	polypropylene
PQR	Procedure Qualification Record
PRS	Potential Release Site
PTFE	polytetrafluoroethylene
PTOE	Professional Traffic Operations Engineer
PVC	polyvinyl chloride
PVDF	polyvinylidene fluoride
QA-PQ	Quality Assurance-Procurement Quality
RFI	radio frequency interface
RGS	rigid-galvanized steel
RIS	Redwood Inspection Service
RLW	Radioactive Liquid Waste
RLWTF-UP	Radioactive Liquid Waste Treatment Facility Upgrade Project
RMC	rigid metal conduit
RNC	rigid non-metal conduit
RTD	resistance temperature detector
RTRP	reinforced thermosetting resin pipe
S4S	surfaced four sides
SBA	strong-base anion
SBS	Styrene-Butadiene-Styrene
scfm	standard cubic feet per minute
SCTE	Society of Cable Telecommunications Engineers
SDI	Steel Door Institute
SJI	Steel Joist Institute

SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SPCC	Spill Prevention Control & Countermeasures
SPIB	Southern Pine Inspection Bureau
SSHBC	Standard Specifications for Highway and Bridge Construction
SSC	structures, systems, and/or components
SSPC	Steel Structures Painting Council
SSS	Support Services Subcontractor
STR	Subcontract Technical Representative
SWMU	Solid Waste Management Unit
SWPP	Storm Water Pollution Prevention
SWQB	Surface Water Quality Bureau
SWWS	Sanitary Wastewater System
TA	Technical Area
TAB	Testing, Adjusting, and Balancing
TBD	to be determined
TCLP	Toxic Characteristic Leachate Procedure
TEFC	totally enclosed fan cooled
TFC	thin-film composite
TFE	polytetrafluoroethylene
THD	total harmonic distortion
TIP	Test and Inspection Plan
UL	Underwriters Laboratories, Inc.
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
U.S.C.	United States Code
V ac	volt alternate current
V dc	volt direct current
VDI/VDE	Verein Deutscher Ingenieure/Verband Deutscher Elektrotechniker
VFD	variable frequency drive
VOC	volatile organic compound
WCLIB	West Coast Lumber Inspection Bureau
WH	Warnock Hersey
WPF	Waste Profile Form
WPQR	Welding Procedure Qualification Record
WPS	Welding Procedure Specification
WWPA	Western Wood Products Association
ZLD	zero liquid discharge

1.2 DEFINITIONS

Access Panel: A removable and resealable panel used for interior access.

Actual Air: Air delivered at vacuum producer inlet. Flow rate is air measured in cubic feet per minute (cfm).

Airlock: A transition enclosure for material movement into and out of the glovebox that maintains the primary confinement. The term "transfer airlock" is sometimes used interchangeably with airlock. An airlock is sometimes purged with inert gasses.

Approved: When used to convey A/E's action on Subcontractor's submittals, applications, and requests, "approved" is limited to AE's duties and responsibilities as stated in the Conditions of the Contract.

Average Life: The time after which 50 percent will have failed and 50 percent will have survived under specified operating and starting condition.

Cementitious Material: Shall include all Portland cement, pozzolan, and fly ash.

Certificate of Conformance (CoC): A Supplier's certification that is traceable to the shipment, the items, or materials and states that the materials conform in all respects with the purchase order requirements. This certificate is signed, or otherwise authenticated, by the Supplier's authorized representative. The CoC is signed and authenticated by the responsible person within the manufacturing organization and certifies the conformance of all items shipped to purchase order requirements.

Certified Material Test Report (CMTR): A Supplier's certification, that is traceable to the material being supplied, that contains actual chemical analysis and mechanical properties. Each CMTR shall contain the following information as a minimum: 1) Product Description, 2) actual results of chemical analysis/mechanical testing in accordance with the provisions of the code, standard, and/or specification, 3) the specification and material grade, 4) traceability to the item tested (e.g., heat number, lot number, etc.), 5) name and address of manufacturer, 6) manufacturer's ASME certificate number and expiration date, 7) contract number and item number to which the report applies, and 8) signed by authorized representative of the manufacturer.

Contractor: LANS. If encountered in a specification used to subcontract DOE construction-type work to a Subcontractor as defined above, take to mean that third party.

Dovetail Anchor Slot: Galvanized steel, 22 gauge thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.

Field Quality Control Testing: Tests and inspections that are performed onsite for installation of the Work and for completed Work.

Firestopping (Through-Penetration Fire Stop System): An assembly of one or more materials, placed in an opening through a fire-rated barrier to arrest movement of fire, smoke, heat, and hot gases through the fire-rated barrier, to maintain the fire-resistant integrity of the fire-rated barrier in which it is installed.

Flashing Reglets: Galvanized steel, 22 gauge thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.

Form Release Agent: Colorless mineral oil which will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

Form Ties: Snap-off type, galvanized metal cone type with waterproofing washer free of defects that could leave holes larger than 1 in. in concrete surface.

Furnish: Supply and deliver to Project site, readying for unloading, unpacking, assembly, installation, and similar operations.

Government-Furnished Equipment (GFE): Term used in Contract documents to refer to LANL furnished property, products, or in general to describe any LANL-furnished equipment for Subcontractor installation.

ICC: Publisher of IBC and parent company of ICC-ES.

Indicated: Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

Install: Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, testing, protecting, cleaning, and similar operations.

Installer, Applicator, and Erector: Constructor or another entity engaged by Constructor as an employee, Subcontractor, or lower-tier Subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

Internal Pressure: A uniformly distributed internal pressure in tank, and is in addition to the normal varying pressure head due to depth of contained fluid.

Laboratory Vacuum Equipment: Equipment and accessories for laboratory or process facilities.

LANL Building Official: LANL's Authority for quality assurance aspects of the IBC, as detailed in LANL's *Engineering Standards Manual* [STD 342-100, (formerly ISD 341-2), Chapter 16, "IBC Program"].

Luminaire: A luminaire is a complete lighting unit including lamp(s) and parts required to distribute the light, position and protect the lamp(s), and connect the lamp(s) to the power supply.

Manufacturer: Company specializing in manufacturing the Products.

NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.

NVLAP: A National Voluntary Laboratory Accreditation Program operated by the National Institute of Standards and Technology (NIST).

Plain Concrete: Structural concrete with no reinforcement or with less reinforcement than the minimum amount specified for reinforced concrete. Specifications for plain concrete are presented in Section 03 3053, "Miscellaneous Cast-in-Place Concrete."

Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

Product Testing: Tests and inspections to establish product performance and compliance with industry standards that are performed by a NRTL, a NVLAP, or a testing agency qualified to conduct product testing and acceptable to the LBO.

Project Site: Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

Prototype Tests: A series of additional tests required to ensure that the manufacturing process that was used provides gloves that conform in all respects to the requirements of this specification. Prototype test results are required whenever a major change is made to the fabrication process, fabrication location, or company organization.

Provide: Furnish and install, complete and ready for the intended use.

Quality Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction comply with requirements.

Quality Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include Subcontract enforcement activities performed by LANL STR.

Regulations: Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

Reinforced Concrete: Structural concrete reinforced with no less than the minimum amounts of prestressing steel or nonprestressed reinforcement specified in ACI 318/ACI 318R (Chapters 1 through 21 and Appendices A through C).

Rough, Form-Finished Concrete: Plywood, lumber, metal, or other approved material.

Secondary Confinement: Secondary confinement is a structure erected around primary confinement for the purposes of creating a barrier to block migration of unanticipated and anticipated breaches of the primary confinement. Gloveboxes are secondary confinement in a tritium system or a wet chemistry SNM process where they isolate releases of radioactive materials when the process piping must be opened.

Smooth, Form-Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces.

Source Quality Control Testing: Tests and inspections that are performed at the source (i.e., plant, mill, factory, or shop).

Standard Air: Free air at 68 °F and 1 atmosphere (29.92 in. Hg) before compression or expansion and measured in standard cubic feet per minute.

Subcontract Technical Representative (STR): The LANL STR has technical and performance oversight of the Subcontractor's Scope of Work, including but not limited to engineering, procurement, safety, quality, schedule, and coordinated execution of the Work that is carried out by the Subcontractor. The STR has no authority to direct commercial or technical changes to the subcontract.

Subcontractor: The successful third party or the Offeror. A subcontractor to DOE (the individual or legal entity that has entered into an agreement with LANL for the delivery of goods, or services, necessary for the performance of the Contract).

System: The System shall consist of the fasteners (adhesive or mechanical), insulation board, reinforcing mesh, reinforcing trim, base and finish coats, with approved accessories sealants, backer rods, etc.

Testing Agency: An entity engaged to perform specific tests and/or inspections. Testing laboratory shall mean the same as testing agency.

Total harmonic distortion (THD): The root mean square (RMS) of all the harmonic components divided by the fundamental current.

VCR: Metal gasket face seal fitting manufactured by Crawford Fitting (Cajon series).

1.3 REFERENCES

To the extent specified elsewhere in these Contract Documents, comply with the requirements of the following standards and associations.

10 CFR 830, "Nuclear Safety Management," *Code of Federal Regulations*, as amended.

29 CFR 1910, "Occupational Safety and Health Standards," *Code of Federal Regulations*, as amended.

29 CFR 1926, "Construction Industry Regulations," *Code of Federal Regulations*, as amended.

40 CFR 59, "National VOC Emission Standards for Consumer and Commercial Products - Standardized Conditions," *Code of Federal Regulations*, as amended.

40 CFR 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," *Code of Federal Regulations*, as amended.

47 CFR 18, "Industrial, Scientific, and Medical Equipment," *Code of Federal Regulations*, as amended.

49 CFR 192, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards," *Code of Federal Regulations*, as amended.

2009 *International Building Code*, International Code Council, Inc., Whittier, California.

2009 *International Energy Conservation Code*®, International Code Council, Inc., Whittier, California.

2009 *International Existing Building Code*, International Code Council, Inc., Whittier, California.

13568-243-PDR-RF-002, *Geotechnical Engineering Study Radioactive Liquid Waste Treatment Facility (RLWTF) Technical Area-50 Los Alamos National Laboratories Los Alamos, New Mexico*, Revision A, prepared by AMEC Earth & Environmental, Inc., Albuquerque, New Mexico, for AECOM Services, Inc., Albuquerque, New Mexico.

60239831-EASO-001, *Facility Operations Analysis and Sequence of Operations for the A-50 Radioactive Liquid Waste Treatment Facility-Upgrade Project (RLWTF-UP) Low-Level Waste Subproject*, AECOM Technical Services, Inc., Richland, Washington.

60239831-PCAL-001, *LLW Bounding Material Balance*, AECOM Technical Services, Inc., Albuquerque, New Mexico.

AABC, Associated Air Balance Council, ACG Commissioning Guideline (2005) Commissioning Guideline.

AAMA 501.1, *Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure*, American Architectural Manufacturer's Association, Schaumburg, Illinois.

AAMA 508-07, *Voluntary Test Method and Specifications for Pressure Equalized Rain Screen Wall Cladding Systems*, American Architectural Manufacturer's Association, Schaumburg, Illinois.

- AASHTO M33, *Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)*, American Association of State Highway and Transportation Officials, Brampton, Ontario.
- AASHTO M153, *Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction*, American Association of State Highway and Transportation Officials, Brampton, Ontario.
- AASHTO T303, *Standard Method of Test for Accelerated Detection of Potentially Deleterious Expansion of Mortar Bars Due to Alkali-Silica Reaction*, American Association of State Highway and Transportation Officials, Brampton, Ontario.
- ABMA 9, *Load Ratings and Fatigue Life for Ball Bearings*, American Bearings Manufacturers Association, Washington D.C.
- ABMA 11, *Load Ratings and Fatigue Life for Roller Bearings*, American Bearings Manufacturers Association, Washington D.C.
- AC 156, *Acceptance Criteria for Seismic Qualification by Shake-Table Testing of Nonstructural Components and Systems*, International Code Council Evaluation Service, Inc., Whittier, California.
- AC 193, *Acceptance Criteria for Mechanical Anchors in Concrete Elements*, International Code Council Evaluation Service, Inc., Whittier, California.
- AC 308, *Acceptance Criteria for Post-installed Adhesive Anchors in Concrete Elements*, International Code Council Evaluation Service, Inc., Whittier, California.
- ACI 117, *Standard Specification Tolerances for Concrete Construction and Materials*, American Concrete Institution, Farmington Hills, Michigan.
- ACI 211.1, *Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete*, American Concrete Institution, Farmington Hills, Michigan.
- ACI 301, *Specifications for Structural Concrete*, American Concrete Institution, Farmington Hills, Michigan.
- ACI 305R, *Hot Weather Concreting*, American Concrete Institution, Farmington Hills, Michigan.
- ACI 306R, *Cold Weather Concreting*, American Concrete Institution, Farmington Hills, Michigan.
- ACI 306.1, *Standard Specification for Cold Weather Concreting*, American Concrete Institution, Farmington Hills, Michigan.
- ACI 308R, *Guide for Curing Concrete*, American Concrete Institution, Farmington Hills, Michigan.
- ACI 315, *Details and Detailing of Concrete Reinforcement*, American Concrete Institution, Farmington Hills, Michigan.
- ACI 318/ACI 318R, *Building Code Requirements for Structural Concrete (ACI 318-05) and Commentary (ACI 318R-05)*, American Concrete Institution, Farmington Hills, Michigan.
- ACI 347R, *Guide to Formwork for Concrete*, American Concrete Institution, Farmington Hills, Michigan.
- ACI 349, *Code Requirements for Nuclear Safety Related Concrete Structures (ACI 349-01)*, American Concrete Institution, Farmington Hills, Michigan.

ACI 355.2, *Qualification of Post-Installed Mechanical Anchors in Concrete and Commentary*, American Concrete Institution, Farmington Hills, Michigan.

ACI 530.1-05/ASCE 6-05/TMS 602-05, *Specification for Masonry Structures*.

ACI SP-66, *ACI Detailing Manual-2004*, American Concrete Institution, Farmington Hills, Michigan.

AFPA, *Manual for Wood Frame Construction*, American Forest and Paper Association, Washington, D.C.

AGS-G001-1998, *Guideline for Gloveboxes*, American Glovebox Society, Santa Rosa, California.

AHA A135.4, *Basic Hardboard*, American Hardboard Association, Palatine, Illinois.

AISC, *Code of Standard Practice for Steel Buildings and Bridges*, American Institute of Steel Construction, Chicago, Illinois.

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AISC, *Specification for Structural Joints*, American Institute of Steel Construction, Inc., Chicago, Illinois.

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- NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*, 2006 Edition, National Fire Protection Association, Quincy, Massachusetts.
- NFPA 285, *Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components*, National Fire Protection Association, Quincy, Massachusetts.
- NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*, National Fire Protection Association, Quincy, Massachusetts.

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SSPC-Paint 20, *Zinc-Rich Coating, Type 1 – Inorganic and Type II - Organic*, Society for Protective Coatings, Pittsburgh, Pennsylvania.

SSPC-Paint 25, *Zinc, Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel (Type I and Type II)*, Society for Protective Coatings, Pittsburgh, Pennsylvania.

SSPC-SP 2, *Hand Tool Cleaning*, Society for Protective Coatings, Pittsburgh, Pennsylvania.

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UL 5, *Surface Metal Electrical Raceways and Fittings*, Underwriters Laboratories, Inc., Northbrook, Illinois.

UL 6, *Rigid Metal Electrical Conduit*, Underwriters Laboratories, Inc., Northbrook, Illinois.

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UL 555S, *UL Standard for Safety Smoke Dampers-Fourth Edition*, Underwriters Laboratories, Inc., Northbrook, Illinois.

- UL 586, *UL Standard for Safety High-Efficiency, Particulate, Air Filter Units-Eighth Edition*, Underwriters Laboratories, Inc., Northbrook, Illinois.
- UL 651, *Schedule 40 and 80 Rigid PVC Conduit*, Underwriters Laboratories, Inc., Northbrook, Illinois.
- UL 723, *UL Standard for Safety Test for Surface Burning Characteristics of Building Materials-Tenth Edition*, Underwriters Laboratories, Inc., Northbrook, Illinois.
- UL 778, *UL Standard for Safety Motor-Operated Water Pumps-Fourth Edition*, Underwriters Laboratories, Inc., Northbrook, Illinois.
- UL 795, *UL Standard for Safety Commercial-Industrial Gas Heating Equipment-Sixth Edition*, Underwriters Laboratories, Inc., Northbrook, Illinois.
- UL 857, *Busways and Associated Fittings*, Underwriters Laboratories, Inc., Northbrook, Illinois.
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- UL 900, *UL Standard for Safety Air Filter Units-Seventh Edition*, Underwriters Laboratories, Inc., Northbrook, Illinois.
- UL 924, *Emergency Lighting and Power Equipment*, Underwriters Laboratories, Inc., Northbrook, Illinois.
- UL 935, *Fluorescent – Lamp Ballasts*, Underwriters Laboratories, Inc., Northbrook, Illinois.
- UL 943, *Ground-Fault Circuit-Interrupters*, Underwriters Laboratories, Inc., Northbrook, Illinois.
- UL 969, *Marking and Labeling Systems*, Underwriters Laboratories, Inc., Northbrook, Illinois.
- UL 1010, *Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations*, Underwriters Laboratories, Inc., Northbrook, Illinois.
- UL 1072, *Medium-Voltage Power Cables*, Underwriters Laboratories, Inc., Northbrook, Illinois.
- UL 1242, *Intermediate Metal Conduit*, Underwriters Laboratories, Inc., Northbrook, Illinois.
- UL 1479, *Standard for Fire Tests of Through-Penetration Firestops*, Underwriters Laboratories, Inc., Northbrook, Illinois.
- UL 1598, *Luminaires*, Underwriters Laboratories, Inc., Northbrook, Illinois.
- UL 1682, *Plugs, Receptacles, and Cable Connectors of the Pin and Sleeve Type*, Underwriters Laboratories, Inc., Northbrook, Illinois.
- UL 1715, *Fire Test of Interior Finish Material*, Underwriters Laboratories, Inc., Northbrook, Illinois.
- UL 1995, *UL Standard for Safety Heating and Cooling Equipment-Third Edition*, Underwriters Laboratories, Inc., Northbrook, Illinois.
- UL 2021, *UL Standard for Safety Fixed and Location-Dedicated Electric Room Heaters-Second Edition*, Underwriters Laboratories, Inc., Northbrook, Illinois.
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Voluntary Product Standard PS 2-04, *Performance Standard for Wood-Based Structural-Use Panels*, National Institute of Standards and Technology, Gaithersburg, Maryland for the U.S. Department of Commerce, Washington, D.C.

Voluntary Product Standard PS 20-05, *American Softwood Lumber Standard*, National Institute of Standards and Technology, Gaithersburg, Maryland for the U.S. Department of Commerce, Washington, D.C.

Voluntary Product Standard PS 51-71, *Hardwood and Decorative Plywood*, National Institute of Standards and Technology, Gaithersburg, Maryland for the U.S. Department of Commerce, Washington, D.C.

W-C-596, *Federal Specification – Qualification Information*, Federal Supply Service, Washington, D.C.

W-P-455A, *Federal Specification – Plate, Wall, Electrical UL*, Federal Supply Service, Washington, D.C.

W-S-896, *Federal Specification – Switches, Toggle and Lock, Flush Mounted (AC)*, Federal Supply Service, Washington, D.C.

WW-H-171E, *Federal Specification – Hangers and Supports, Pipe*, Federal Supply Service, Washington, D.C.

PART 2 PRODUCTS

A. Not Used.

PART 3 EXECUTION

A. Not Used.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 01 4200, Rev. 2, dated June 1, 2009.

SECTION 01 4444
OFFSITE WELDING & JOINING REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This section includes requirements for offsite welding and joining as required by other sections of the specification (e.g., items or assemblies fabricated specifically for LANL). This section is not applicable to manufactured commercial items ("off-the-shelf") where welding requirements are not subject to LANL approval, nor does it apply to mechanical joints (e.g., threaded, bolted or clamped).
- B. Pressure-retaining, code-stamped items shall only be welded on by organizations with the applicable ASME or National Board Certificate(s) of Authorization. Certificate holders are organizations that have been authorized by the ASME to perform various activities in accordance with the requirements of the *ASME Boiler and Pressure Vessel Code*.
- C. Onsite welding shall be in accordance with LANL Welding Program [*Engineering Standards Manual* (ESM) (ISD 342-2), Chapter 13, "Welding & Joining"], Section 01 4455, "Onsite Welding & Joining Requirements," for onsite welding, and applicable codes.
- D. The LANL Welding Program and General Welding Standards (GWSs) referenced are available here: http://engstandards.lanl.gov/ESM_Chapters.shtml#esm13.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 01 4455, "Onsite Welding & Joining Requirements."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

- A. The following documents shall be submitted and approved by LANL prior to the start of welding. Submit in accordance with the requirements of Exhibit I.
 - 1. Welding/Brazing/Bonding Procedure Specifications with the associated Procedure Qualification Records (PQRs)
 - 2. Welder/Brazer/Bonder Performance Qualification Records
 - 3. Weld Filler Material Control Procedure
 - 4. Filler Material – Certified Material Test Reports
 - 5. Heat Treatment Procedures (where applicable)
 - 6. Inspector qualification records
 - 7. Inspection Procedures

1.5 DESIGN

- A. Design of welded Structures, Systems and Components (SSC) shall meet the requirements of LANL ESM and or as a minimum identify applicable codes and standards including requirements of graded application. For welding activities that would normally fall outside the defined scope of specified national consensus codes and standards for fabrication and welding, such codes and standards shall be adopted and used to the extent possible
- B. Shop drawings must show weld symbols and requirements to define the work and enable design review and inspection.
- C. Applications that are not similar in materials or processes to a specified Code or Standard shall define and produce the following:
 - 1. Design basis (i.e., mechanical properties, part geometry, acceptance criteria);
 - 2. A method to verify that the welding procedure can produce acceptable welds;
 - 3. A method to demonstrate that the welder has the skill to produce sound welds in accordance with the specified welding procedure (reference LANL GWS 1-02, *Administrative Control of Welding and Brazing*, Paragraph 5.3.B);
 - 4. Identify methods and perform inspections, required to judge welds against predetermined acceptance criteria; and
 - 5. Provide documentation that these objectives have been defined and identified.

1.6 QUALIFIED PROCEDURES

- A. Welding shall be performed in accordance with properly qualified and approved welding procedure specifications (WPS) that have been qualified in accordance with applicable codes and standards:
 - 1. AWS/ANSI Standard Welding Procedures and documented prequalified welding procedures may be used as allowed by applicable codes and standards.

1.7 JOINING

- A. Solvent bonding, adhesive, and electro-fusion joints: When required by consensus codes and standards (e.g., ASME B31.3 and 49 CFR Part 192), joining shall be done by qualified personnel following approved procedures.

1.8 CERTIFIED PERSONNEL

- A. Welding and brazing shall be performed by certified welders and brazers who have demonstrated their welding brazing qualifications by test.

1.9 CONTROL OF CONSUMABLES

- A. Consumable welding materials shall be properly procured, received, stored, controlled, and issued to ensure weld quality and prevent use by unqualified personnel (reference LANL GWS 1-03).

1.10 WELDING INSPECTION

- A. Shall be performed by qualified personnel in accordance with applicable consensus codes and standards, such as AWS D1.1 and ASME B31 series, and as specified in design drawings and/or specifications in the absence of applicable codes and standards.
- B. Inspector Qualification/Certification – When inspectors are required to be qualified/certified by the referenced code and standard, submit qualification/certification records for:
 - 1. Visual Inspectors (for welding and bonding) and
 - 2. NDE Inspectors.
- C. Welding Inspections required by consensus codes and standards or design shall be documented. Welding Inspection Reports shall identify at least the following:
 - 1. Method, Type and extent of Inspection or test;
 - 2. Acceptance/rejection as based on the criteria specified by the design documents;
 - 3. Code or Standard used for acceptance and class, category, or service;
 - 4. Record attributes inspected and severity;
 - 5. Identification and location of welds inspected;
 - 6. MT&E – Identification and date of calibration expiration for measuring and test equipment used;
 - 7. Name and Date of person who performed the inspection; and
 - 8. Inspector's qualification level.
- D. Inspection Procedures - When inspection procedures are required by the referenced code and standard submit inspection procedures:
 - 1. NDE Procedure Qualification Records - When inspection procedures are required to be qualified by the referenced code and standard submit procedure qualification records
- E. Inspection results, including weld maps, shall be documented and provided within one day after completion of associated inspection work.
- F. When applicable codes and standards (i.e., ASME B31 series) specify two levels of inspection, the qualification of the owners inspector and inspections will be done by LANL as specified in ESM, Chapter 13, Volume 1, GWS 1-02 Para. 5.9 see: http://engstandards.lanl.gov/esm/welding/vol1/GWS%201-02_Procedure-R6.pdf.
- G. LANL reserves the right of access to all welding locations and to have its own qualified inspectors and personnel present during all welding activities.
 - 1. At least five working days notice is required prior to inspection and testing activities planned by the fabricator so that LANL can arrange for its staff's participation.
 - 2. Hold Points may be identified in the construction/fabrication schedule to allow for LANL's inspection activities.

1.11 SUBCONTRACTED WELDING

- A. Subcontracted welding activities shall have all specifications and drawing and their applicable requirements flowed down to any sub tier subcontractors who perform those activities.

PART 2 PRODUCTS

- A. Not Used.

PART 3 EXECUTION

- A. Not Used.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 01 4444, Rev. 0, dated September 1, 2009.

SECTION 01 4455
ONSITE WELDING & JOINING REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This section includes requirements for welding and joining on the LANL site as required by other sections of the specification, consensus codes and standards, and/or engineering design.
- B. Pressure-retaining code-stamped items shall only be welded on by organizations with the applicable ASME or National Board Certificate(s) of Authorization. Certificate holders are organizations that have been authorized by the ASME to perform various activities in accordance with the requirements of the *ASME Boiler and Pressure Vessel Code*.
- C. Offsite welding shall be in accordance with design documents, applicable codes and standards, and Section 01 4444, "Offsite Welding & Joining Requirements," for offsite welding.
- D. "Welding Checklist" – A "Welding Checklist" shall be completed prior to onsite welding to assure that the specific requirements for welding activities have been identified and addressed. The "Welding Checklist" can be found at:
<http://www.lanl.gov/orgs/eng/engstandards/esm/welding/vol1/GWS%201-03-Att-7-R3.pdf>

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 01 4444, "Offsite Welding & Joining Requirements."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

- A. The following documents shall be submitted and approved by LANL prior to the start of welding. Submit in accordance with the requirements of Exhibit I.
 - 1. Welding/Brazing/Bonding Procedure Specifications with the associated Procedure Qualification Records (PQRs).
 - 2. Welder/Brazer/Bonder Performance Qualification Records.
 - 3. Weld Filler Material Control Procedure.
 - 4. Filler Material – Certified Material Test Reports.
 - 5. Heat Treatment Procedures (where applicable).
 - 6. Inspector qualification records.
 - 7. Inspection Procedures.

1.5 DESIGN

- A. Design of welded structures, systems and components (SSC) shall meet the requirements of LANL ESM and as a minimum identify applicable codes and standards including requirements of graded application. For welding activities that would normally fall outside the defined scope of specified national

consensus codes and standards for fabrication and welding, such codes and standards shall be adopted and used to the extent possible.

- B. Shop drawings must show weld symbols and requirements to define the work and enable design review and inspection.
- C. Applications that are not similar in materials or processes to a specified code or standard shall define and produce the following:
 - 1. Design basis (i.e., mechanical properties, part geometry, acceptance criteria);
 - 2. A method to verify that the welding procedure can produce acceptable welds;
 - 3. A method to demonstrate that the welder has the skill to produce sound welds in accordance with the specified welding procedure (reference GWS 1-02, *Administrative Control of Welding and Brazing*, Paragraph 5.3.B);
 - 4. Identify methods and perform inspections, required to judge welds against predetermined acceptance criteria; and
 - 5. Provide documentation that these objectives have been defined and identified.

1.6 QUALIFIED PROCEDURES

- A. Welding and brazing shall be performed in accordance with LANL approved welding/brazing procedure specifications (WPS/BPS) that have been qualified in accordance with applicable codes and standards or design criteria:
 - 1. LANL-approved welding/brazing procedure specifications are located at: http://engstandards.lanl.gov/ESM_Ch13_specs.shtml.
 - 2. AWS/ANSI Standard Welding Procedure Specifications and written Prequalified Welding Procedure Specifications as allowed by applicable codes and standards may also be used if approved by the LANL Welding Program Administrator.

1.7 JOINING

- A. Solvent bonding, adhesive, and electro-fusion joints): When required by consensus codes and standards (e.g., ASME B31.3 and 49 CFR Part 192), joining shall be done by LANL qualified personnel following LANL approved procedures.

1.8 CERTIFIED PERSONNEL

- A. Welding and brazing shall be performed by LANL-certified welders and brazers who have demonstrated their welding/brazing skill by test at LANL.
- B. Current listing located at http://zirk.lanl.gov/Welding_Prod/engstandard.aspx.

1.9 CONTROL OF CONSUMABLES

- A. Consumable welding materials shall be properly procured, received, stored, controlled, and issued to ensure weld quality and prevent use by unqualified personnel.
- B. The procedure for procurement, storage, issue and control of consumables is found in LANL's ESM, Chapter 13, "Welding & Joining," Volume 1, General

Welding Standard (GWS) 1-03, "Welding & Brazing Material Procurement & Control."

- C. Filler material shall be procured with Certified Material Test Reports (CMTRs) traceable by heat/lot #:
 - 1. CMTRs shall meet the requirements of LANL Welding Program GWS 1-03, Attachment 5, "Filler Material Procurement, Table 1, Sch. I, Required Test," located at: <http://engstandards.lanl.gov/esm/welding/vol1/GWS%201-03-Att-5-R2.pdf>
- D. Filler materials shall be issued from approved locations by authorized personnel to qualified welders.
 - 1. Authorized filler material issue stations are listed at: http://zirk.lanl.gov/Welding_Prod/RO_FMAttendant.aspx.

1.10 WELDING INSPECTION

- A. Shall be performed by qualified personnel in accordance with applicable consensus codes and standards and as specified in the design documents.
- B. Inspector Qualification/Certification – Welding inspectors are required to be approved by LANL to perform visual and NDE inspection/examinations. LANL-approved inspectors can be found at: http://zirk.lanl.gov/Welding_Prod/RO_Inspector.aspx.
- C. Welding Inspections required by consensus codes and standards or design shall be documented. Welding inspection reports shall identify at least the following:
 - 1. Method, type, and extent of Inspection or test;
 - 2. Acceptance/rejection as based on the criteria specified by the design documents;
 - 3. Code or standard used for acceptance and class, category, or service;
 - 4. Record attributes inspected and severity;
 - 5. Identification and location of welds inspected;
 - 6. MT&E – Identification and date of calibration expiration for measuring and test equipment used;
 - 7. Name and date of person who performed the inspection; and
 - 8. Inspector's qualification level.
- D. Inspection Procedures – When inspection procedures are required by the referenced code and standards procedures shall be reviewed and approved by a LANL Level III inspector in the applicable inspection method:
 - 1. NDE Procedure Qualification Records – When inspection procedures are required to be qualified by the referenced code and standard procedure qualification records will be reviewed and approved by a LANL Level III inspector in the applicable inspection method.
- E. Inspection results, including weld maps, shall be documented and provided to the STR and project managers within one day after completion of associated inspection work.
- F. When applicable codes and standards specify two levels of inspection, the qualification of the owner's inspector and inspections will be done by LANL as

specified in ESM, Chapter 13, Volume 1, GWS 1-02 Para. 5.9 see:
http://engstandards.lanl.gov/esm/welding/vol1/GWS%201-02_Procedure-R6.pdf

- G. LANL reserves the right of access to all welding locations and to have its own qualified inspectors and personnel present during all welding activities.
 - 1. At least five working days notice is required prior to inspection and testing activities planned by the fabricator so that LANL can arrange for its staff's participation.
 - 2. Hold Points may be identified in the construction/fabrication schedule to allow for LANL's inspection activities.

1.11 SUBCONTRACTED WELDING

- A. Subcontracted welding activities shall have all specifications and drawings and their applicable requirements flowed down to any sub-tier who is to perform those welding activities.
- B. Requirements for subcontracted welding shall be identified in subcontract documents as outlined in GWS 1-09, *Control of Subcontracted Welding*.

1.12 RECORDS

- A. The following documents shall be collected and maintained in the project files:
 - 1. Welding/brazing/bonding procedure specifications used;
 - 2. Welder/brazer/bonder performance qualification records;
 - 3. Weld Material Requests (yellow copy);
 - 4. Heat treatment charts or records;
 - 5. Inspection reports;
 - 6. Inspector qualification records; and
 - 7. Inspection procedures.

PART 2 PRODUCTS

- A. Not Used.

PART 3 EXECUTION

- A. Not Used.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 01 4455, Rev. 0, dated September 1, 2009.

SECTION 01 5705
TEMPORARY CONTROLS AND COMPLIANCE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Erosion and Sediment Control.
- B. Storm Water Management.
- C. Site Stabilization.
- D. Spill Control and Response.
- E. Debris Control.
- F. Air Quality.
- G. Dust Suppression.
- H. Rodent Control.
- I. Environmental Restoration Sites.
- J. Hazardous Waste.
- K. Traffic Control.
- L. Water Discharge.
- M. Grading, Excavating and Trenching.
- N. Concrete Washout, Potholing, Directional Drilling.

1.2 RELATED SECTIONS

- A. Section 01 3545, "Water Discharge Requirements."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- C. Section 31 2000, "Earth Moving."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. For projects operating under a National Pollutant Discharge Elimination System (NPDES) permit:
 - 1. Submit all requested information for the storm water pollution prevention (SWPP) plan within 14 days after award of the contract. Submit information in sufficient format and detail as may be required by LANL for completion of the SWPP Plan, including the calculations required by the New Mexico Environmental Department (NMED) Surface Water Quality Bureau (SWQB) state certification of the proposed NPDES Permit NMR 150000 Sections 9.C.1.A.I AND 9.C.1.B: <http://www.nmenv.state.nm.us>. The completed SWPPP Plan shall be certified by both LANL and a

responsible corporate officer of the Subcontractor prior to the Notice of Intent (NOI) submittal. The Subcontractor shall submit the NOI to the EPA at least 7 days prior to start of any construction activities. The Subcontractor agrees to continue to submit such additional information to and otherwise cooperate and work with LANL to maintain/modify the SWPP Plan throughout the duration of this contract.

2. Construction activities shall not begin until at least 7 days after the United States Environmental Protection Agency (EPA) has acknowledged receipt of the complete NOI on their website at <http://www.epa.gov/npdes/stormwater/cgp> and the (EPA) has not delayed the authorization. The Subcontractor shall submit a complete NOI for review to LANL at least 20 days prior to start of construction. The SWPP Plan shall be completed and approved prior to submission of the NOI. Once LANL has reviewed and approved the NOI, the Subcontractor shall submit the NOI to the EPA at least 8 days prior to start of construction.
3. Following a review and approval by LANL, submit a Notice of Termination (NOT) to the EPA within 30 days after final stabilization of the site. Transfer of the site before final stabilization may be negotiated through LANL prior to termination of the contract.

B. New Mexico Environment Department Notice of Intent (NMED NOI):

1. The LANL Subcontract Technical Representative (STR) will contact the LANL Water Quality & RCRA Group (ENV-RCRA) at 665-0453 prior to the Subcontractor using fertilizer, hydraulically applied mulches, dust suppression additives, soil stabilizers, concrete washout, potholing fluids, directional drilling fluids, and other substances that are applied to the ground. ENV-RCRA will determine whether the substances will require a Notice of Intent (NOI) to Discharge be submitted to the New Mexico Environment Department (NMED). Provide information as necessary to obtain the NMED NOI.

C. Traffic Control Plan:

1. Submit a temporary traffic control plan and subsequent proposed changes to the plan to the LANL Traffic Engineer for review and approval.

PART 2 PRODUCTS

- A. Not Used.

PART 3 EXECUTION

3.1 EROSION AND SEDIMENT CONTROL

- A. Properly install Best Management Practices (BMPs) as shown on the drawings or identified in the SWPP Plan, prior to any earth disturbing activity.
- B. Maintain BMPs in accordance with SWPP Plan and manufacturer's recommendations or the LANL Guidelines for Best Management Practices (BMPs).
- C. When practical, implement permanent BMPs during the construction phase to meet the objectives of temporary sediment and erosion controls.

- D. Disturb only the minimum amount of soil necessary. Give special attention to protecting established vegetation.

3.2 STORM WATER MANAGEMENT

- A. Provide methods to control surface water as identified in the drawings or SWPP Plan to prevent damage to the Project, the site, and in adjoining areas.
- B. Use permanent storm water management controls (such as detention ponds, riprap, rock check dams, etc.) during the construction in place of temporary storm water management controls whenever practical.
- C. Ensure temporary and permanent storm water management controls are properly installed per drawings and the SWPP Plan. Maintain controls per drawings, the SWPP Plan, and manufacturer's installation recommendations.

3.3 SITE STABILIZATION

- A. Stabilize all disturbed areas with permanent stabilization measures. Do not leave any disturbed areas as barren soil. Final stabilization shall be accepted by LANL Utilities and Infrastructure Group (U&I) and ENV-RCRA. The LANL STR will contact LANL U&I at 665-0106 and ENV-RCRA at 665-0453 to schedule the final walk down and acceptance.
- B. Begin stabilizing disturbed areas no more than 14 days after construction activities have finally or temporarily ended in the area.
- C. If permanent stabilization is impracticable due to seasonal conditions then temporary stabilization measures shall be utilized.
- D. Do not apply fertilizer, hydraulically applied mulches, or soil stabilizers in watercourses.

3.4 SPILL CONTROL AND RESPONSE

- A. In the event of a spill, immediately notify the LANL STR who will contact LANL Emergency Operations (EO). The Subcontractor shall be responsible for remediation of any spill.
- B. Store all fuels, lubricants, chemical storage, material stockpiles, and other potential pollutants in a designated area on-site. Provide secondary containment and controls including berming lined with an impervious material, covering, or other appropriate BMPs. When aboveground petroleum storage capacity is greater than 1,320 gallons (including all equipment and containers 55 gallons or larger), notify the LANL STR who will contact ENV-RCRA at 665-0453 to initiate the development of a Spill Prevention Control and Countermeasure (SPCC) Plan.

3.5 DEBRIS CONTROL & SOILS MANAGEMENT

- A. Use good housekeeping practices to keep sites free of construction debris and trash. Provide containers for deposit of debris and trash.
- B. Do not drive or move any vehicle on any public road unless the vehicle is constructed, loaded, secured or covered in a manner that will prevent any of its load from dropping, sifting, leaking, or otherwise escaping (except when purposefully cleaning, maintaining, or sanding for traction).

- C. Securely fasten all load covers to vehicles prior to driving on public roads so that the covering does not come loose or become a hazard to others.
- D. Do not bury construction waste, sanitary waste, or trash on-site.
- E. Do not move soil or other material between Technical Areas (TAs) without first obtaining written approval from the receiving TA. Material must be clean of all contaminants before movement; all transferred soil must be characterized. See Paragraph 3.9C.
- F. Segregate all materials prior to sending material to the LANL Material Recycle Facility (MRF). The LANL STR will contact LANL Solid Waste Regulatory Compliance (ENV-RCRA) to obtain instruction on required sampling and documentation procedures. Material shall be clean of all contaminants.

3.6 AIR QUALITY

- A. The LANL STR will contact the LANL Ecology & Air Quality Group (ENV-EAQ) prior to the Subcontractor operating portable and stationary fuel burning equipment (e.g., generators, rock crushers, asphalt plants). Drivable equipment does not require notification of ENV-EAQ.
- B. The LANL STR will contact ENV-EAQ if the Subcontractor stores over 500 pounds of chemicals at the site.

3.7 DUST SUPPRESSION

- A. When applying potable water for dust control, ensure compliance with Section 01 3545, Water Discharge Requirements.
- B. Do not add additives to potable water for dust control until receiving approval. Notify the LANL STR who will contact ENV-RCRA. Comply with all conditions specified by ENV-RCRA and the applicable federal and state agencies. Apply all liquids in a manner that does not result in runoff.
- C. Do not apply dust suppression additives or other substances in watercourses.

3.8 RODENT CONTROL

- A. Do not use any pesticide (rodenticide) without the written approval of LANL. Comply with New Mexico Pesticide Control Act, Chapter 76, Article 4, Sections 1-39.

3.9 ENVIRONMENTAL RESTORATION SITE

- A. No storm water runoff or soil disturbance shall be allowed across a Potential Release Site (PRS), includes Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) that are identified in the contract documents.
- B. A PRS cannot be disturbed without LANL Waste and Environmental Support Project approval and oversight. The LANL STR will contact WES-DO. Any worker conducting work within the boundary of a PRS must be made aware, by the LANL STR, of the potential contaminants present in soils and other materials at the site and the potential hazards associated with those contaminants.
- C. Any soil or other material removed from a PRS boundary and not returned to the point of excavation must be managed, characterized, and disposed of by the Subcontractor in accordance with all applicable LANL waste management requirements including approved Waste Profile forms, waste accumulation areas,

etc., or if the project causes additional runoff to cross the site, install appropriate sediment & erosion controls prior to construction activities. Best Management Practices (BMPs) for the Storm Water Pollution Prevention (SWPP) Plan and/or soil erosion control must be in place for all projects prior to the start of any soil disturbing activities within a PRS to prevent potential contaminant migration.

3.10 HAZARDOUS AND MIXED WASTE

- A. Store, treat, and/or dispose of hazardous or mixed wastes in accordance with applicable laws and regulations, and LANL requirements.
- B. Register satellite accumulation areas or less than 90 days storage areas with LANL ENV-RCRA Group prior to storing, handling, treating, or disposing of hazardous or mixed waste.
- C. Contact the ENV-RCRA Group for more information on the management of hazardous or mixed waste, New Mexico special waste (such as petroleum contaminated soil, spills, chemical products, asbestos waste, infectious waste, etc.), PCBs, construction and demolition debris, and other types of solid waste. Guidance can be found in the LANL Waste Management Procedure P409 <https://policy.lanl.gov/pods/policies.nsf/MainFrameset?ReadForm&DocNum=P409&FileName=P409.pdf>.

3.11 TRAFFIC CONTROL

- A. A temporary traffic control plan shall be prepared by a registered Professional Engineer (PE) who is certified as a Professional Traffic Operations Engineer (PTOE). The detail shall be appropriate to the complexity of the work project and submit to the LANL Traffic Engineer via the STR for review and approval. The LANL Traffic Engineer shall approve any proposed changes in the temporary traffic control plan.
- B. The temporary traffic control plan shall start in the planning phase and continue through the design, construction, and restoration phases. The temporary traffic control plans and devices shall follow the principles set forth in the MUTCD, latest addition. Temporary traffic control plans may deviate from the typical applications described in the MUTCD based upon engineering judgment, to allow for conditions and requirements of a particular site.
- C. The temporary Traffic Control Plan shall address the safety of pedestrians and bicycles by providing an alternate, safe route.
- D. Traffic control devices shall be properly maintained during the project, including periodic cleaning and replacement of damaged devices. Inspection and maintenance of traffic control devices shall be in accordance with NMDOT Standard Specifications for Highway and Bridge Construction Section 618 – Traffic Control Management and performed by personnel certified through ATSSA, ACNM, or IMSA.

3.12 WATER DISCHARGE

- A. Follow Section 01 3545, "Water Discharge Requirements."

3.13 GRADING, EXCAVATING, AND TRENCHING

- A. Follow Section 31 2000, "Earth Moving."

3.14 CONCRETE WASHOUT, POTHOLING, DIRECTIONAL DRILLING

- A. Do not discharge substances to the ground until an NOI has been obtained. Once a substance is approved by NMED, follow all conditions of the NOI. Discharges must be documented to the LANL Water Quality Group.
- B. Washout of concrete waste will be performed with potable water within a defined area surrounded by a Triangular Silt Dike, compacted earth berm, or other appropriate control that acts as a continuous line barrier to prevent the runoff of washout material and the co-mingling of unset concrete with storm water or entry into a watercourse. Properly dispose of all hardened excess concrete following evaporation or infiltration of all liquid from the concrete waste confined within the defined area. Washout areas cannot be placed in or on PRS areas, watercourses, Treatment Storage Disposal Facilities, or stormwater drainages.
- C. Liquids from potholing activities must be placed within a defined area within the project site limits surrounded by a Triangular Silt Dike, compacted earth berm, or other appropriate control, until the liquids evaporate. Properly dispose of solids. Do not discharge polypropylene glycol, propylene glycol, ethylene glycol, or any other anti-freeze substance without contacting LANL to ensure all environmental requirements have been met. Potholing material may not be removed from the site; refer to Paragraph 3.5E.
- D. Directional-drilling mud must be placed within a lined retention pond until the liquids evaporate or immediately properly disposed of properly dispose of solids. Mud from drilling operations involving a SWMU or PRS must first be evaluated for contaminants before disposal occurs. Contact the LANL ENV-RCRA at 665-0453 for additional guidance.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 01 5705, Rev. 3, dated December 23, 2009.

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Transportation and Handling.
- C. Storage and Protection.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 PRODUCTS

- A. All parts and materials shall be new. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract documents.
- B. Provide interchangeable components of the same manufacture for components being replaced.
- C. Material exclusions include:
 - 1. No asbestos shall be used,
 - 2. No lead shall be used in the design unless it is fully encapsulated and identified with a permanent tag,
 - 3. No beryllium shall be present, and
 - 4. No equipment shall use or require the use of polychlorinated biphenyls (PCB).

1.5 TRANSPORTATION AND HANDLING

- A. Transport and handle Products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.
- C. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.6 STORAGE AND PROTECTION

- A. Store and protect Products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive Products in weather-tight, climate-controlled, enclosures in accordance with the manufacturer's requirements.

- D. For exterior storage of fabricated Products, place on sloped supports above ground.
- E. Provide offsite storage and protection when site does not permit onsite storage or protection.
- F. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.
- G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.
- J. Manually rotate shafts of rotating equipment (fans, pumps, cooling towers, etc.) weekly from time of arrival to start-up.

PART 2 PRODUCTS

- A. Not Used.

PART 3 EXECUTION

The following are unique requirements applicable to processing equipment with regards to the handling, storage, cleaning, and shipping of the processing equipment.

3.1 HANDLING REQUIREMENTS

- A. All equipment skids shall be designed to be moved with a forklift, with no modifications to the forklift or the equipment. All tanks shall be designed to be lifted into place with a crane or moved with a forklift.

3.2 STORAGE REQUIREMENTS

- A. Before packaging, all residual water present in the systems from acceptance testing shall be thoroughly drained and dried by purging oil-free, dry air through the system. All open pipe ends shall be sealed to prevent ingress of debris and vermin into the system. The assemblies shall be thoroughly cleaned to remove any dirt or dust that may have accumulated on the equipment during testing. Defects in the paint shall be "touched-up." Moving parts shall be secured to prevent movement during shipping.

3.3 CLEANING REQUIREMENTS

- A. Before assembly, and before preparing for shipment, all components shall be cleaned by flushing with clean water (or just air if deemed appropriate by the Seller) and blown clean and dry with compressed air to the extent that extraneous materials, such as those listed below, are not present:
 1. Metallic or other dusts (shop dust), chips, turnings, and weld splatter;
 2. Abrasive particles;
 3. Rust and other loose corrosion particles;
 4. Magnetic and liquid penetrant residues, dye check, etc.;
 5. Foreign material (i.e., paper, tape, plastic, sand, and wood);

- 6. Cutting oils;
- 7. Excess lubrication, grease, and oil; and
- 8. Marking dyes.

B. The fabrication traveler shall describe the cleaning and packaging steps taken.

3.4 SHIPPING REQUIREMENTS

- A. The Seller shall package equipment to protect items during shipping. Bracing structures shall be installed where items could be damaged or vibrate loose during transportation. All bracing must be clearly identified, both in the packaging instruction and by labeling on the outside of the equipment skids or tanks.
- B. Rigging sketches or a handling procedure shall be prepared by the Seller for items that require special handling. These sketches will identify weights, sling locations, balance points, methods of attachment, and other information necessary for safe handling.
- C. Packaging or preservative coatings shall be visually inspected after loading. Damaged areas shall be repaired. Items shipped with desiccants shall be inspected after loading to verify that seals are intact.
- D. Cushioning shall be used where protection from shock and vibration is required. Cushioning materials shall have sufficient strength to provide the required protection, shall exhibit no corrosive effect when in contact with the item being cushioned, and shall not readily support combustion.
- E. Temporary cushioning, blocking, bracing, or anchoring placed within an item for shipping protection that shall be removed before operation of the item, shall be identified by a warning(s) placed in a conspicuous manner to effect proper removal of the packing material.
- F. Blocking and bracing used for protection of the load shall prevent item movement and withstand thrust and impact applied in any direction. Blocking and bracing used in direct contact with the item being blocked shall not have a corrosive effect on the item.
- G. The weight, lifting points, or center of gravity indicated on the crate, skid, or package of major components shall be used to ensure proper handling during loading.
- H. Written instructions covering the location and stacking limits of the crates or boxes on the transport vehicle shall be specified, as appropriate. These instructions should be marked on the container.
- I. Precautions shall be taken to minimize marring of the finish of painted surfaces during handling and shipping, as practicable.
- J. Cables, slings, chain falls, etc., shall not be placed where they can cause damage to any component part. Mating surfaces, machined areas, etc., shall be avoided.
- K. All items shall be protected from the deleterious effects of shock, vibration, physical damage, moisture, salt spray, condensation, and weather during shipping, as applicable.

- L. Items shall be inspected for cleanliness before packaging. Dirt, oil, residue, metal chips, or other forms of contamination shall be removed. Any entrapped water shall be removed.
- M. All openings into items shall be capped, plugged, and sealed with materials which perform their intended function without causing deleterious effects on the equipment or its operation.
- N. Nonmetallic plugs and caps shall be brightly colored. Clear plastic caps or plugs are not to be used except when specified.
- O. Plugs or caps shall be prevented from falling into, or being pushed into, openings after installation and shall be secured to prevent accidental removal.
- P. Items subject to corrosion, either internal or external, shall be suitably protected.
- Q. Items packed in containers shall be blocked, braced, or cushioned to prevent physical damage.
- R. Instrumentation, electrical and electronic equipment, motors, and other electrical assemblies and equipment shall be packaged in a waterproof enclosure. This may be the enclosure the item will operate in. For items without waterproof enclosures, a vapor barrier shall be placed around the enclosure. In either case, the enclosure shall be able to exclude dirt and facilitate handling and marking of the item. Barrier materials shall be nonhalogenated if used in contact with austenitic stainless steels, shall be noncorrosive, shall not readily support combustion, and shall not be, otherwise, harmful to the item being packaged. Desiccants may be used inside the enclosure or vapor barrier.
- S. "Anchoring" of the item within a crate or on a skid means to adequately fasten the item during shipment and protect the item from potential damage as a result of rough handling. Bolting is preferred. When bolts are used for anchoring, the following criteria shall apply:
 - 1. If precision holes in the item are used for anchoring, properly fitting bolts shall be used to prevent marring or elongation of the holes.
 - 2. Items shall be marked to preserve identity during shipping, receiving, and storage per the following requirements:
 - a. Identification shall be stamped, etched, stenciled, or otherwise marked on the item or on tags affixed to the item;
 - b. The marking shall not be deleterious to the material nor violate any other section of this specification; and
 - c. When tags are employed, they shall be of material that will retain the marking and withstand weathering deterioration and other normal shipping and handling effects.

Items not specifically covered by these requirements shall be handled in accordance with sound material handling practices.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 01 6000, Rev. 1, dated April 14, 2008.

SECTION 01 7700
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Closeout Procedures.
- B. Final Cleaning.
- C. Adjusting.
- D. Instructions for Los Alamos National Laboratory (LANL) personnel.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 CLOSEOUT PROCEDURES

- A. Upon completion of the work, certify that:
 - 1. Contract documents have been reviewed;
 - 2. Work has been inspected for compliance with Contract documents;
 - 3. Work has been completed in accordance with the Contract documents;
 - 4. Equipment and systems have been tested as required, and are operational; and
 - 5. Work is completed and ready for final inspection.
- B. Should the Work be found to be incomplete or defective, LANL will notify the Subcontractor in writing, listing the incomplete or defective work.
- C. Subcontractor shall correct the deficiencies promptly, and notify LANL when the Work is ready for re-inspection.
- D. When the Work is determined to be acceptable, the Subcontract Technical Representative (STR) will request Subcontractor to make closeout submittals.

1.5 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. Clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, and vacuum carpeted and soft surfaces.
- C. Clean equipment and fixtures to a sanitary condition.
- D. Replace filters of operating water and air equipment.
- E. Clean debris from roofs, gutters, downspouts, and drainage systems.
- F. Clean Project site; sweep paved areas, and rake and clean landscaped surfaces.

- G. Remove waste and surplus materials, rubbish, and construction facilities from Project site.
- H. Replace lamps in light fixtures used during construction.
- I. Remove start-up screens and clean strainer.

1.6 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

1.7 INSTRUCTIONS FOR LANL PERSONNEL

- A. Prior to final inspection or acceptance, fully instruct LANL-designated operating and maintenance personnel in the operation, adjustment, and maintenance of equipment and systems.
- B. *Operating and Maintenance Manual* shall constitute the basis of instruction: Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance.
- C. Provide personnel skilled in the operation of equipment. Instructions for major equipment shall be provided by equipment manufacturers' representatives.

PART 2 PRODUCTS

- A. Not Used.

PART 3 EXECUTION

- A. Not Used.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 01 7700, Rev. 1, dated April 14, 2008.

SECTION 01 7839
PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Project Record Documents.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 31 2000, "Earth Moving."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 31 2000, "Earth Moving."

1.4 SUBMITTALS

- A. Submit the following in accordance with the requirements of Exhibit I:
 - 1. Deliver the Project Record Documents to the Los Alamos National Laboratory (LANL) Subcontract Technical Representative (STR). Submit electronic files and paper copies as specified in Paragraphs 1.6 and 1.7.
 - a. The LANL STR will deliver a set of the Project Record Documents to the LANL Records Center. All drawings must be signed originals.
 - 2. Transmit the Project Record Documents with a cover letter listing:
 - a. Date;
 - b. Project Title and Number;
 - c. Subcontractor's Name, Address, and Telephone Number;
 - d. Number and Title of each Record Document; and
 - e. Signature of Subcontractor or Authorized Representative.

1.5 MAINTENANCE OF DOCUMENTS

- A. During construction, maintain at project site a record copy of the following Project Record Documents:
 - 1. Construction drawings, floor plan(s) of record, roof plan(s) of record;
 - 2. Specifications;
 - 3. Amendments;
 - 4. Change orders and other modifications to the Contract;
 - 5. Reviewed shop drawings, product data, and samples;
 - 6. Field test records;
 - 7. Inspection certificates;
 - 8. Manufacturer's certificates;
 - 9. Specified installer/tradesman certificates;
 - 10. Storm Water Pollution Prevention Plan; and
 - 11. Submittals after A/E & STR review and approval.

- B. Store Project Record Documents (in Field Office) apart from other documents. Provide separate files, racks, and secure storage for Project Record Documents.
- C. Label and file Project Record Documents in accordance with section number listed in the "Table of Contents" of this specification. Label each document "PROJECT RECORD DOCUMENTS" in large, legible, printed letters.
- D. Maintain Project Record Documents in a clean, dry, and legible condition.
- E. Keep Project Record Documents available for periodic inspection by the LANL STR and other applicable parties.

1.6 RECORDING

- A. Use an erasable red pencil (not ink or indelible pencil) to clearly record information or changes on the drawings by graphic line and note, as required. Use an erasable yellow pencil to clearly mark all major components where constructed as shown.
- B. Use different colors for the overlapping changes if required for clarification.
- C. Record information concurrently with construction progress. Do not conceal any work until required information is recorded. Date entries reflecting change.
- D. Drawings: Legibly mark each item on the drawings to record actual construction, including:
 - 1. Measured depths of elements of foundation in relation to finish floor datum;
 - 2. Measured underground utility locations per Section 31 2000, "Earth Moving;"
 - 3. Surveyed actual building placement, referenced to LANL Lab-wide Network, indicating the origin of the New Mexico State Plane Coordinates;
 - 4. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of construction;
 - 5. Field changes of dimension and detail (approved by Design Revision Notice);
 - 6. Changes made by Contract modifications;
 - 7. Details not on original drawings; and
 - 8. References to related shop drawings and Contract modifications.
- E. Specifications: Legibly mark each item to record actual construction, including changes made by amendment and Contract modifications.

1.7 FINAL RECORD DOCUMENTS (AS-BUILTS)

- A. At completion of construction verify accurate transposition of all site information onto Final Record Documents and deliver the following to STR:
 - 1. Record Drawings – Provide stamped, dated, and signed Final Record Drawings in both reproducible (full-sized paper) and electronic media in accordance with the *LANL Drafting Standards Manual* (Section 200, "Drafting Requirements," Paragraph 215, "Electronic CAD File Conventions").
 - 2. Specifications – Provide single-sided paper copy and electronic copy, Microsoft Word 2003 or later versions, on CDs.
- B. Verify accurate transposition of all site information onto the Final Record Documents.

PART 2 PRODUCTS

- A. Not Used.

PART 3 EXECUTION

- A. Not Used.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 01 7839, Rev. 2, dated April 14, 2008.

SECTION 01 8116
FACILITY ENVIRONMENTAL REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Environmental Conditions.
- B. Design Loads.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 ENVIRONMENTAL CONDITIONS

- A. The Subcontractor shall design the facility for the following environmental conditions.
 - 1. Temperature:
 - a. Winter – 5 °F dry bulb and
 - b. Summer – 89 °F dry bulb, 60 °F wet bulb.
 - 2. Elevation: 7,500 ft.
 - 3. Barometric Pressure (average): 11.10 psia.
 - 4. Air Density: 0.057 lb/ft³.

1.5 DESIGN SEISMIC CONDITIONS

- A. Performance Category: PC-1.
- B. Design spectral response accelerations are:
 - 1. $S_{DS} = 0.75$ g (acceleration due to gravity),
 - 2. $S_{D1} = 0.64$ g (acceleration due to gravity),
 - 3. $T = 0.10$ sec, and
 - 4. $T_L = 6$ sec (ASCE 7-05, Figure 22-15).

PART 2 PRODUCTS

- A. Not Used.

PART 3 EXECUTION

- A. Not Used.

END OF SECTION

SECTION 01 9100
COMMISSIONING LLW PROJECT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. The Sub-contractor shall perform the functions described below under witness of the LANL Commissioning Agent (CxA) to:
 - 1. Follows the Project Commissioning Plan (Cx Plan), component test procedures, data sheets and system acceptance test procedures.
 - 2. Provides cost estimates of commissioning activities for budgetary planning.
 - 3. Works with the CxA in planning the sequence of scoped systems test activities for input into the Project schedule.
 - 4. Completes component/system installations in in the sequence detailed in the Project's commissioning schedule.
 - 5. Releases installed components and sub-systems in accordance with the LANL procedure on Project Turnover and Acceptance.
 - 6. Conducts electrical acceptance testing in accordance with requirements of LANL approved procedures, vendor instructions and Project specifications.
 - 7. Conducts pre-functional testing of fans, pumps, motors, dampers etc in accordance with the requirements of LANL procedures, vendor instructions and Project specifications.
 - 8. Conducts pre-functional and functional testing of utility, process, and facility system/building automated controls in accordance with the requirements of LANL specifications, sequence of operations, and vendor control requirements.
 - 9. Performs utility, process, and facility functional tests and/or integrated system tests as requested by the STR.
 - 10. The Sub-contractor is responsible for test deficiency tracking and resolution.
 - 11. Provide the services of a TAB Agency in accordance with Division 23.
- B. Chapter 15 of the LANL Engineering Standards Manual or other Specification Sections may require additional test and inspections that are in addition to this Specification; coordinate the tests required in this Section with any Test and Inspection Plan that may be developed for the Project.

1.2 DEFINITIONS

- A. Cx Plan – A high-level document that defines the Cx process, including roles, responsibilities, document requirements, and Cx test requirements. The Cx plan is not a test procedure. It provides the manner by which testing will be performed.
- B. Pre-Functional Test – The individual pieces of equipment are confirmed to be capable of performing in accordance with the specifications, drawings and manufacturer's requirements. This is documented in a component test data sheet

provided by and completed by the Commissioning Agent. The information recorded on the data sheet provides baseline data for future re-evaluation of the components or systems

- C. Functional Test – Testing of a component or subsystem against prescribed acceptance criteria, based on the owner’s project requirements, vendor documentation, or industry standards to ensure that the SSC’s functions and follows a prescribed sequence of operations according to the predetermined design requirements.
- D. System Acceptance Test – Tests conducted to verify performance of entire systems and multiple systems against a defined set of requirements and parameters. Examples of systems which typically require system acceptance tests are HVAC systems, process systems, critical capacity mechanical equipment and integrated operation of systems.
- E. Commissioning Test Procedure – Written detailed step-by-step protocol that defines the means and methods, personnel, and expectations for conducting tests on components, equipment, assemblies, systems and system interfaces. The procedure has provisions for verifying all relevant data, recording results, and identifying the requirements and responsibility for each test.
- F. Commissioning Final Report – The documentation package that summarizes the Cx plan, test procedures and results of the commissioning process, including the recorded performance of the various systems and components.

1.3 QUALITY ASSURANCE

- A. The Subcontractor shall have a testing program that meets or exceeds the requirements of ASHRAE or a national standard accepted by the LANL Commissioning Authority.
- B. The Subcontractor shall be an independent testing organization, which functions as an unbiased testing authority, professionally independent of the manufacturers, suppliers, and installers of the equipment or systems to be evaluated.
- C. The Subcontractor shall be regularly engaged in the testing of equipment devices, installations, and systems.
- D. The Subcontractor shall have a documented quality assurance program, documented qualification program, documented inspection and test and procedures.
- E. The Subcontractor shall have a test instrumentation calibration program, and test instruments used in commissioning shall be calibrated in accordance with LANL Procedure P330-2 Control and Calibration of Measuring and Test Equipment (M&TE), section 3.6.2, Calibrations Performed by Subcontractors.
- F. Subcontractor technician who performs component or site acceptance testing, inspection, calibration, and adjustments shall be a “CPMP Certified” as defined by ASHRAE or other national standard approved by the LANL Commissioning Authority.
 - 1. Technicians performing these tests and inspections shall be trained and experienced concerning the apparatus and systems being evaluated.

2. Technicians shall be capable of conducting the tests in a safe manner with complete knowledge of the hazards involved and the appropriate safety-related work practices.
3. Technicians shall be qualified to evaluate the test data and make a judgment on the serviceability of the specific equipment.

1.4 GRADED APPROACH

- A. Use the graded approach outlined in the following table to determine the level of rigor for acceptance testing:

Table 1 – Minimum Level of Rigor in Cx

Level of Rigor	Management Level	References
	ML-4	
PROGRAM-LEVEL REQUIREMENTS		
Commissioning Plan	R	<u>ESM Ch 15</u> AP-CMP-400
System Acceptance Test Procedures	R	<u>ESM Ch 15</u> AP-CMP-400
Test Review Board	O	<u>ESM Ch 15</u> AP-CMP-400
Test Summary Report	R	<u>ESM Ch 15</u> AP-CMP-400
Test Technician Qualification Program	R	<u>ESM Ch 15</u> AP-CMP-400
COMPONENT-LEVEL REQUIREMENTS		
Component-level test with results recorded on data sheets	R	<u>ESM Ch 15</u> AP-CMP-401
Electrical acceptance test and record on data sheets	R	<u>ESM Ch 7 D5000</u> <u>Section 26 0813</u> AP-CMP-401
Electrical control scheme verification and recorded on data sheets	R	<u>ESM Ch 15</u> AP-CMP-400
HVAC test, adjust, and balance (TAB)	R	<u>ESM Ch 6 D30HVAC</u> <u>Section 23 0593</u> AP-CMP-400
Instrument control loop verification and recorded on datasheets	R	<u>ESM Ch 15</u> AP-CMP-400
Rotating equipment mechanical baseline operating data (vibration, rotation, bearing temperatures) and record on data sheets	R	<u>ESM Ch 15</u> AP-CMP-401
Rotating equipment electrical baseline data (starting & running current, voltages, bearing temperatures) and record on data sheets	R	<u>ESM Ch 15</u> AP-CMP-401
Piping system cleanliness verification and recorded in a test procedure	R	<u>ESM Ch 15</u> AP-CMP-401
Process instrument calibration and recorded on data sheets	R	<u>ESM Ch 15</u> AP-CMP-401
Turnover and acceptance of SSC	R	AP-350-420
Vendor equipment factory acceptance test (FAT) and record on data sheets	R	<u>ESM Ch 15</u> AP-CMP-401
Vendor equipment field test and record on data sheets	R	<u>ESM Ch 15</u> AP-CMP-401

R = Required O = Optional and when appropriate

1.5 SUBMITTALS

- A. Subcontractor shall submit the following to the LANL STR in accordance with Project submittal procedures upon completion of testing:
 - 1. Pre-Functional Test recorded on signed and dated data sheets
 - 2. Functional Test Procedures signed and dated.

1.6 COORDINATION

- A. Schedule commissioning is an integral part of the construction schedule.

- B. The sub-contractor shall coordinate testing with the LANL Commissioning Agent by following the sequence of commissioning activities detailed in the project schedule.

1.7 FIELD QUALITY CONTROL

- A. The Sub-contractor is responsible for warranty of Structures, Systems and Components (SSC) until [project milestone] has been attained.
- B. The Sub-contractor is responsible for correcting test deficiencies and supporting any required re-test.

PART 2 PRODUCTS

2.1 TEST INSTRUMENTS

- A. Unless otherwise specified in the applicable division, the Subcontractor will furnish instruments required for pre-functional/functional acceptance testing.
- B. Test instruments used for commissioning shall be calibrated in accordance with section 1.3E of this specification.

PART 3 EXECUTION

3.1 GENERAL

- A. Perform component level test in accordance with the applicable specifications noted below:
 - 1. Electrical Acceptance Testing as required in Division 26 and LANL Approved project specific procedures developed by the Subcontractor/ETA.
 - 2. Mechanical Pre-Functional and Functional Testing in accordance with Divisions 22, 23, 33, 43, 44, Equipment Vendor Test Instructions, and LANL Approved test procedures developed by the Sub-Contractor. Testing shall be performed by the Sub-Contractor and witnessed by the CxA.
 - 3. Instrument and Controls Pre-Functional and Functional Testing in accordance with Divisions 25,40, Equipment Vendor Test Instructions, and LANL Approved project specific procedures developed by the Sub-Contractor. Testing shall be performed by the Sub-Contractor and witnessed by the CxA.
 - 4. HVAC Equipment Pre-Functional and Functional Testing and system Test and Balance in accordance with Division 23, Vendor Test Instructions, and LANL approved project specific procedures developed by the Sub-Contractor. Testing shall be performed by the Sub-Contractor and witnessed by the CxA.
 - 5. Promptly document and report to LANL STR any test deficiencies, equipment failures or test that do not meet acceptance criteria.
 - 6. The Subcontractor is responsible for tracking and correcting all deficiencies identified during commissioning.

7. The Sub-contractor shall re-test any SSC that did not pass pre-functional or functional testing.
8. Notify the LANL STR when equipment or systems are ready for turnover to operating status

END OF SECTION

SECTION 02 3000
SUBSURFACE INVESTIGATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. LANL-furnished soils investigation report.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

- A. None.

1.5 DESCRIPTION

- A. A soils investigation report titled Geotechnical Engineering Study, AMEC Project No. 7-517-000018, dated August 2, 2007, has been prepared for the Radioactive Liquid Waste Treatment Facility (RLWTF), Technical Area – 50 by AMEC Earth and Environmental, Inc., and is available from the Subcontract Administrator.
- B. Additional geotechnical information is provided in calculation 66355-001-08-XCAL-001, *Vertical/Horizontal Modulus Subgrade Reaction Calculation*, prepared by AMEC, is available from the Subcontract Administrator.
- C. Such information is not a warranty of subsurface conditions and may not reflect subsurface conditions over the entire proposed construction area. The Subcontractor shall be responsible for his/her interpretations and use of the information.
- D. The availability or use of the soils investigation report and logs of test borings shall not be construed as a waiver of the Subcontractor's duty to examine the site and the conditions affecting the work, and does not relieve the Subcontractor from the risk of soil or subsurface conditions which could reasonably be anticipated or from properly fulfilling the terms of the Subcontract.

PART 2 PRODUCTS

- A. Not Used.

PART 3 EXECUTION

- A. Not Used.

END OF SECTION

SECTION 02 4115
ELECTRICAL DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Removal of existing electrical equipment, wiring, and conduit in areas to be remodeled; removal of designated construction; dismantling, cutting and alterations for completion of the Work.
- B. Disposal of materials.
- C. Identification of utilities.
- D. Protection of items to remain as indicated on Drawings.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 LANL PERFORMED WORK

- A. None.

1.5 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Shop Drawings: Indicate demolition and location and construction of temporary work. Describe demolition removal procedures and schedule.
- B. Project Record Documents: Record actual locations of capped conduits and equipment abandoned in place.

1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of the National Electrical Code (NEC), OSHA, NFPA 70E – Standard for Electrical Safety in the Workplace, and LANL P101-13 – Electrical Safety Program.
- B. Each person performing electrical demolition shall be a "qualified person" as defined by NFPA 70E and the NEC.
- C. The following publications form a part of this specification to the extent referenced.
 - 1. Environmental Protection Agency (EPA).
 - a. 40 CFR Part 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions."
 - b. 40 CFR Part 273, "Standards for Universal Waste Management."

2. U.S. Department of Labor, Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR Part 1910.94, Subpart G, "Occupational Health and Environmental Control."
3. Department of Transportation (DOT):
 - a. 49 CFR Part 178, "Regulations for Shipping Container Specifications."

1.7 COORDINATION

- A. Conduct demolition to minimize interference with adjacent building areas.
- B. Coordinate and sequence demolition so as not to cause shutdown of operation of surrounding areas.
- C. Shut-down Periods:
 1. Arrange timing of electrical shut-down periods with the LANL Subcontract Technical Representative (STR). Do not shut down any utility without prior written approval.
 2. Keep shut-down period to minimum or use intermittent period as directed by the LANL STR.
 3. Maintain life-safety systems in full operation in occupied facilities, or provide notice minimum 3 days in advance.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."

2.2 MATERIALS AND EQUIPMENT

- A. Provide materials and equipment for patching and extending work as specified in the individual sections.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Before work begins on the demolition or salvage of electrical equipment, wiring, or systems:
 1. Inspect the site to identify any hazardous materials such as PCBs, asbestos, lead, mercury or other heavy metal, or toxic, flammable or explosive materials, or radioactive materials that may be handled, disturbed or removed. Typical locations of hazardous materials include:
 - a. Asbestos: Pipe insulation, electrical insulation
 2. Have the inspection results available at the worksite, including any drawings, plans or specifications, as appropriate, to show the locations of any hazardous substances.

3. Ensure that any hazardous materials found are safely contained or removed.
 4. During demolition work, if hazardous materials are discovered that were not identified in the initial inspection required above, stop work in the area and notify the STR. Do not resume work in the area until directed by the STR.
- B. Verify wiring and equipment indicated to be demolished serve only abandoned facilities.
 - C. Verify termination points and lockout-tagout device locations for services, circuits, and systems to be disconnected or removed.
 - D. Demolition Drawings are based on casual field observation and/or existing record documents. Report discrepancies to the STR before beginning demolition work.
 - E. Beginning of demolition work means Subcontractor accepts existing conditions.

3.2 PREPARATION

- A. Protect existing materials, appurtenances and equipment which are not to be demolished. Repair or replace existing materials, appurtenances and equipment, building exterior and interior, and landscaping altered or damaged during demolition work to match existing undisturbed conditions at no additional cost to LANL.
- B. Erect, and maintain temporary safeguards, including barricades, and similar measures, for protection of the public, LANL personnel, Subcontractor's employees, and existing improvements to remain.
- C. Maintain parking areas, driveways, exterior walkways, exit paths, and landscaping in a clean, undisturbed condition.
- D. Coordinate utility service outages with the LANL STR.
 1. Request underground utilities to be located and marked within and surrounding construction areas.
 2. All work on or near energized electrical utilities will be performed or supervised by LANL.
 3. Protect utilities indicated to remain, from damage.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Demolish, relocate, and extend existing electrical work to installations to accommodate new construction.
- B. Establish an electrically safe work condition in areas where electrical work is to be removed.
 1. Comply with LANL P101-13 Electrical Safety Program.
 2. Comply with LANL P101-3 Lockout/Tagout for Hazardous Energy Control. Disconnect or shut off service to areas where electrical work is to be removed. Properly lockout and tag disconnecting means. Verify zero-voltage before beginning demolition.

3. Disconnect, remove, and cap designated utility lines within demolition areas. Mark locations of disconnected utilities. Identify utilities and indicate capping locations on Project Record Documents.
- C. Investigate and measure the nature and extent of unanticipated items that conflict with intended function or design. Submit written report with accurate detailed information to the LANL STR. While awaiting instructions from the STR, rearrange selective demolition schedule as necessary to continue overall job progress without delay.
- D. Stop work and notify the LANL STR immediately if structure or other items to remain appear to be endangered. Do not resume work until directed by the STR.
- E. Remove demolished materials as work progresses.

3.4 DISPOSITION OF MATERIAL AND EQUIPMENT

- A. Unless indicated otherwise, material removed under this Subcontract which is not to be salvaged or reused in the Project shall become the property of the Subcontractor.
- B. Unless indicated otherwise, immediately remove demolished material from site. Do not store or permit debris to accumulate at the site. Dispose of materials legally off site. Do not burn or bury materials on site.
- C. Upon completion, clean the entire area of demolition residue satisfactory for the continuation of the Work. Remove temporary work.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 02 4115, Rev. 2, dated December 14, 2009.

SECTION 02 4119
SELECTIVE STRUCTURE DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Protection of existing materials.
- B. Disposal of materials.
- C. Identification of utilities.
- D. Demolition.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of capped utilities.

1.5 REGULATORY REQUIREMENTS

- A. Do not close or obstruct egress width to exits.
- B. Do not disable or disrupt building fire or life safety systems without 3 days prior written notice to the LANL Subcontract Technical Representative (STR).

PART 2 PRODUCTS

- A. Not Used.

PART 3 EXECUTION

3.1 PREPARATION

- A. Protect existing materials which are not to be demolished.
- B. Do not damage existing materials designated to be reused.
- C. Identify location of existing utilities.

3.2 DEMOLITION REQUIREMENTS

- A. Conduct demolition to minimize interference with occupied building areas.
- B. If existing structure appears to be in danger, cease operations and notify the STR immediately. Do not resume affected operations until directed by the STR.
- C. If hazardous or contaminated materials are discovered, cease operations immediately and notify STR for direction.
- D. Maintain protected egress and access to the work.

3.3 DEMOLITION

- A. Disconnect, remove, cap and identify designated utilities within demolition areas.
- B. Demolish in an orderly and safe manner.
- C. Remove demolished materials from site as work progresses and haul to the Los Alamos County Landfill. Upon completion of work, leave areas in clean condition.
- D. Do not burn or bury materials on site.
- E. Remove temporary work.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 02 4119, Rev. 1, dated April 23, 2008.

SECTION 03 1505
CAST-IN CONCRETE ANCHORS-HIGH CONFIDENCE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cast-in anchors for concrete.

1.2 RELATED SECTIONS

- A. Section 01 4000, "Quality Requirements."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I.

- A. Product specifications with recommended design values and physical characteristics for epoxy dowels.
- B. Manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

- A. Work identified in this section shall be done under a Quality Assurance Program (QAP), in accordance with Section 01 4000, "Quality Requirements."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver manufactured materials in original unopened packages, containers, or bundles with manufacturer's label intact and legible.
- B. Store materials off ground, under cover, and away from damp surfaces.
- C. Remove damaged, unlabeled, or unsatisfactory materials that do not meet this specification from the jobsite.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Fasteners and Anchors:
 - 1. Anchor Rod (ASTM F 1554, *Specification for Steel Anchor Bolts, Grade 36 or ASTM A 307, Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength, Grade A*);
 - 2. Carbon and Alloy Steel Nuts (ASTM A 563, *Standard Specification for Carbon and Alloy Steel Nuts*);
 - 3. Carbon Steel Washers (ASTM F 436, *Standard Specification for Hardened Steel Washers*);

4. Carbon Steel Threaded Rod (ASTM A 36/A 36M, *Standard Specification for Carbon Structural Steel* or ASTM A 193/A 193M, *Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service*, Grade B7); and
5. Epoxy Dowels HILTI-HIT-RE 500-SD for Adhesive Anchors and Rebar in Cracked and Uncracked Concrete.

2.2 CAST-IN ANCHORS

- A. Anchors, Bolts, Nuts, and Washers: Bolts and studs, nuts, and washers shall conform to ASTM F 1554, Grade 36; ASTM A 307, Grade A; ASTM A 563; and ASTM F 436; as applicable. Cast in headed anchors shall conform to AWS D1.1-10 Chapter 7 Type B. ASTM A29.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Cast-In-Place Bolts: Use templates to locate bolts accurately and securely in formwork.

3.2 FIELD QUALITY CONTROL

- A. Minimum anchor embedments shall be as shown on the drawings. Where not shown, use the manufacturer's standard embedment.

END OF SECTION

SECTION 03 1534

POST-INSTALLED CONCRETE ANCHORS PURCHASE – NORMAL CONFIDENCE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. The technical requirements for purchasing post-installed concrete anchors for Management Level (ML)-4 and Performance Category (PC)-1 structures, systems, and components (SSC). This specification applies to expansion, adhesive, undercut, and screw.
- B. The technical requirements for field installation and inspection of post-installed (PI) anchors (including anchor systems consisting of steel reinforcing bars/dowels and grout) in concrete for ML-4 and PC-1 SSCs. The inspection requirements of this Section do not apply to non-structural anchors (LANL definition).
- C. Does not cover cast-in-place anchors, design of post-installed anchorage, or purchase of tools or equipment required for installation or testing.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Definitions of anchors per ACI 355.2 (as amended by ICC AC 193) apply, and all notations are identical to those used in that document and in ACI 318 Appendix D. Where additional terms or notations are used, their definitions are included in this Section.
- C. Non-structural anchors, per Engineering Standards Manual (ESM) Chapter 5, Section II, Appendix A, and ESM Ch. 16, Section 16, IBC Program, are defined as follows and need only be designed and installed per the respective ICC ESR.
 - 1. Non-structural anchors are those that anchor PC-1 mechanical and electrical components with flexible connections between the components and associated distribution system (e.g., ductwork, piping, conduit, etc.), and can be categorized under one of the following conditions:
 - a. Mounted at 4 ft or less above a floor level and weigh 400 lb or less, or
 - b. Weigh 20 lb or less, or
 - c. Weigh 5 lb/ft or less if the component(s) is a distribution system.
- D. ACI 355.2, *Qualification of Post-Installed Mechanical Anchors in Concrete*.
- E. ACI 355.4, *Qualification of Post-Installed Adhesive Anchors in Concrete (ACI 355.4) and Commentary*.
- F. ACI 318, *Building Code Requirements for Structural Concrete and Commentary*.
- G. ASTM A 36, *Standard Specification for Carbon Steel*.

- H. ASTM A 193, *Standard Specification for Alloy-Steel Bolting Materials for High-Temperature or High Pressure Service and Other Special Purpose Applications.*
- I. ASTM A 615, *Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.*
- J. ASTM B633, *Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.*
- K. ASTM C 928, *Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs.*
- L. ASTM E 488, *Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.*
- M. ASTM E 1512, *Standard Specification for Testing Bond Performance of Bonded Anchors.*
- N. ASTM F 436, *Standard Specification for Hardened Steel Washers.*
- O. DOE-STD-1021, *Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components.*
- P. IBC, *International Building Code.*
- Q. ICC ES Reports, Other ICC Documents, International Code Council Evaluation Services Reports (ESRs).*
- R. ICC ESR-1545, *Hilti HSL-3 Carbon Steel Metric Heavy Duty Concrete Anchors in Concrete (August 2005 or later).*
- S. ICC ESR-1546, *Hilti HDA Carbon Steel and Stainless Steel Metric Undercut Anchors in Concrete (November 2005 or later).*
- T. ICC ESR-1917, *Hilti Kwik Bolt TZ Carbon and Stainless Steel Anchors in Concrete (September 2005 or later).*
- U. ICC ESR-2322, *Hilti HIT-RE 500-SD Adhesive Anchor Systems (November 2007 or later).*
- V. ICC ESR-3027, *Hilti Kwik HUS-EZ Carbon Steel Screw Anchors for Use in Cracked and Uncracked Concrete (December 2010 or later).*
- W. ICC AC 193, *Acceptance Criteria for Mechanical Anchors in Concrete Elements.*
- X. ICC AC 308, *Acceptance Criteria for Post-installed Adhesive Anchors in Concrete Elements.*

* The ESR's Scope must include citation for IBC 2009.

1.4 SUBMITTALS

Provide the following submittals in accordance with the requirements of Exhibit I:

A. Verification Documents:

The following verification documentation shall be submitted by the Supplier for any anchors not in Table 2.1, "Approved Anchors":

1. Submit the ICC-ES Evaluation Report (ESR) for each product.
2. Submit technical documentation of the product, including, but not limited to: anchor design strength in shear and tension, minimum spacing and

edge distances, anchor dimensions, materials and coatings used, installation instructions, and all required design parameters.

3. For chemical anchors, also submit information on adhesives, including, but not limited to: elevated temperature versus load capacity effects (80 to 350 °F), fire resistance, radiation effects, sunlight exposure effects, adverse chemical reactions, storage instructions, missing system, injection systems, mixing ratios, gel time, setting time, shelf life, and hole cleanliness requirements.
4. For chemical anchors, also submit threaded rod or deformed reinforcing bar information as applicable, including geometry, shape, material properties, and any special requirements.
5. Submit shipping, handling, and packaging procedures as described in Paragraph 1.6 of this section.
6. Submit cleaning and coating documentation for review.
7. Submit Quality Assurance Program to meet requirements of Paragraph 1.5 of this section.
8. Certificates of Compliance certifying that the anchors meet the requirements of this specification.

1.5 QUALITY ASSURANCE

- A. All material shall be procured as commercial material. The same quality assurance requirements shall be passed down to any lower-tier subcontractor.
- B. The design (and installation) shall be in full compliance with the "Conditions of Use" section of applicable ICC-ESR reports. Any departures must be acknowledged via a formal variance in accordance with ESM Chapter 1 Section Z10.
- C. The inspection, testing, and documentation requirements for same contained herein are the responsibility of the Subcontractor installing PI anchors (i.e., versus the PI-anchor inspection requirements contained in a project's Statement of Special Inspections, which is the responsibility of the LANL Special Inspector).
 1. To reduce delays and potentially redundant LANL inspection effort, notify LANL Inspectors at least 24 hours prior to any Subcontractor installation, inspection, or testing activities associated with Special Inspection and treat such tasks as hold/witness points.

1.6 PACKAGING, SHIPPING, HANDLING, AND STORAGE

- A. Establish and maintain controls for material handling and storage during fabrication and preparation for shipment to prevent damage and deterioration.
- B. Prior to packaging an item, remove dirt, oil residue, water, metal chips, or other contamination.
- C. If nuts, washers, sleeves, and anchors are packaged and shipped unassembled, any components that are damaged during handling, shipping, and storage, or that don't fit properly (upon assembly during anchor installation), shall be replaced at no cost to LANL.
- D. Bolting of different types and/or different sizes shall be packaged separately.

PART 2 PRODUCTS

2.1 ANCHORS

- A. Anchor types including nuts and washers: expansion, adhesive, and undercut and their intended Natural Phenomena Hazards (NPH) Performance Category.
- B. Anchors not listed in Table 2.1 but allowed by other LBO-approved Master or project-specific spec sections may be used, and shall be inspected per the LBO acceptance report (typically ESR, but may be LANL-specific document).

Table 2.1. Approved Anchors.

Anchor Type	Manufacturer	Product Name	Acceptance Report	NPH Performance Category
Expansion:				
Drop-in	Not Allowed	N/A	N/A	N/A
Heavy-Duty Sleeve	Hilti	HSL-3	ESR-1545	PC-1
Wedge	Hilti	Kwik Bolt TZ	ESR-1917	PC-1
Adhesive	Hilti	HIT-RE 500-SD	ESR-2322	PC-1
Undercut	Hilti	HDA	ESR-1546	PC-1
Screw	Hilti	Kwik HUS-EZ	ESR-3027	PC-1

2.2 SUPPLY ANCHOR PRODUCTS OF THE FOLLOWING TYPES

- A. Mechanical anchors: undercut, expansion (drop-in, heavy-duty sleeve, wedge), and screw anchors.
- B. Bonded or adhesive anchor systems: chemical anchors.
- C. All material shall be commercial material.
- D. All anchors shall have a current ICC-ES Evaluation Service Report that contains recommended design capacities. Load tests used in the ICC ES Reports shall be performed in accordance with ICC AC 193 and ASTM E488 for mechanical anchors; AC 308; and ASTM E1512 for adhesive anchors.
- E. Provide carbon steel or stainless steel anchors as specified. Submit documentation of materials used.
- F. Outdoor anchors, or those used in a moist environment, shall be of a material, or possess a protective coating, compliant with the associated Condition of Use in the respective ICC-ES Report.
- G. Anchor head shall be stamped, or otherwise permanently marked, with the total anchor length of a length code that can be related to the total anchor length.
- H. Anchor head, nut, or washer shall not be marked with a letter "Q" or be marked with the color blue. If the letter "Q" is contained in the length code, those anchors shall be excluded from use.
- I. Drypack mortar: Packaged, dry, rapid-hardening concrete or mortar in accordance with ASTM C928; 7-day strength of 4,000 psi.
- J. Concrete reinforcing steel (rebar /dowel): ASTM A 615, grade 60 deformed bars.

2.3 TEST AND INSPECTIONS

- A. The Supplier is responsible for performing inspections, as necessary to ensure compliance with all material and documentation requirements identified in this section. Documentations of inspections will be available to LANL if requested.
- B. LANL Representative shall have the option of inspecting anchors for finish, workmanship, and dimensional tolerances before any shipment is made.
- C. Materials that are not properly marked, have poor workmanship, are corroded, have defective threads, or are improperly documented shall be rejected.

PART 3 EXECUTION

3.1 INSTALLERS

- A. Implement and document a training and/or qualification program for installers. Installers must be made fully familiar with the manufacturer's installation procedures, additions from the associated ESRs, and additional requirements as noted in this Section (follow most stringent).

3.2 EXAMINATION/SITE VERIFICATION OF CONDITIONS

- A. The use of anchors shall be restricted to the applications and installations defined in the design drawings. Construction aids are exempt from this requirement.
- B. Anchors may only be installed in 14-day or older concrete that has attained its minimum specified design strength.
- C. Anchors may only be installed in sound concrete. Surfaces showing obvious distress by way of porosity, disintegration, carbonation and cracks over 0.02 inches in width and 12 inches or longer and within the distance of the embedment depth shall be reported to the Engineer of Record (EOR) for evaluation.
- D. Anchors must not be drilled into the bottom of precast and post-tensioned T-beam stems. Drilling into the sides of the T-beam stems shall be specifically pre-approved by the EOR. Strand-cutting/nicking is prohibited.

3.3 PREPARATION

- A. Use of a rebar locator or drilling pilot holes is recommended to establish the rebar pattern before drilling in congested areas. Pilot holes shall be drilled with a carbide-tip bit to avoid rebar damage.
- B. For safety, consider drill bits/drills that automatically shut off when the bit hits metal, particularly in older construction for which electrical configuration is not well-documented.
- C. Rebar cutting is only permitted with pre-approval by the EOR. Multi-cutting of the same bar is considered as one cut. Rebar approved to be cut must be shown on as-built drawings at completion of Project.
- D. Rebar will be considered to be cut if:
 - 1. For #4 through #7 – Cuts, nicks, or drill into bar body is greater than 1/16"
 - 2. For #8 and larger – Cuts, nicks, or drill into bar body is greater than 1/8"

- E. When installing anchors through cut rebar, the anchoring mechanism shall be located at least two anchor diameters clear beyond the cut rebar.

3.4 INSTALLATION

- A. Each anchor must be installed in the location, at the spacing, and with the embedment depth and edge distance(s) indicated on the project drawings, and in accordance with, in priority order, 1) this Section, 2) the ESR, 3) the manufacturer's installation instructions.
- B. Obtain and comply with LANL Form 2074, Penetration Permit.
- C. Drill holes and install anchors in accordance with the ESR.
- D. Clean drilled holes of chips, dust, loose material, and water prior to anchor installation. The hole diameters and depths shall be as those required by the ESR. Verify depth of the concrete member before drilling holes. The embedment depth of the anchor must be in accordance with the ESR and the project drawings. Contact the EOR if these requirements conflict.
- E. Anchors must be installed perpendicular to the concrete surface within a 5 degree tolerance. Post-installation verification of this criterion may be satisfied by visual inspection to verify proper seating of the nut and washer. When an anchor is replaced with an anchor of diameter one size larger, maintain the spacing requirements of the original size anchor.
- F. In areas where concrete has been removed, the minimum anchor embedment must be measured from the surface of sound concrete.
- G. Unless otherwise noted on project drawings, use the spacing requirements per the ESR.
- H. Bending and welding of post-installed anchors, except grouted anchors, are not permitted.
- I. The nut thread engagement for the anchors (studs) shall be such that the bolt threads are flush with or project beyond the outside face of the nut when completely installed.
- J. Nuts and washers for anchors that are lost or damaged during installation shall be replaced with manufacturer's specified component or equivalent as pre-approved by the EOR.
- K. Flat washers supplied with anchors shall be used in all cases except where details of the design drawings specify the use of another washer under the nuts. A washer may be trimmed to clear interferences. The trimmed edge shall not be closer than 7/8 of the bolt diameter from the center of the washer (ref. ASTM F436).
- L. Do not damage the length identification code on the head of the anchor. Anchor projection may be cut off subject to pre-approval by the EOR and documentation of the location, embedment, and length code on a LANL inspection report by a LANL Construction Inspector prior to cutting.
- M. Unused adhesive anchors shall be cutoff flush with the surface of the concrete. Unused mechanical anchors shall be driven in and cut-off flush. Cut-off anchors shall be considered an abandoned unrepaired hole for future anchor spacing requirements.

- N. The center-to-center distance between a new hole and an exploratory or unused hole or an abandoned cut-off anchor shall not be less than three times the diameter of the larger hole or 1" of clear concrete between the holes, whichever is greater, unless approved by the EOR. When exploratory or unused holes are repaired (ref. Paragraph 3.7A) and the repair material has attained the strength of the surrounding concrete, the center-to-center distance shall not be less than 1.5 times the diameter of the larger hole or 1" of clear concrete between holes, whichever is greater, unless approved by the EOR.
- O. Anchors may be installed in the upper and lower flutes of metal decking, as indicated on project drawings. Edge distance(s), embedment depth, spacing, etc. must be in accordance with the ESR. Contact the EOR if any of these requirements conflict with project drawings. If an installation requires the use of an attachment plate that spans deck ribs then the space between the decking and attachment plate must not be filled with grout or concrete or any other material except that spray-applied fire-resistive materials are permitted.
- P. Exercise care to avoid bending anchors to match baseplate holes, or loosening of anchors by prying sideways after tightening. Also ensure that the cone nut of an undercut anchor does not become loose from the stud during the setting or tensioning operation.
- Q. Anchors that must be tensioned (via torque or direct tension) in order to be properly set /installed must not be used with leveling nuts placed under mounting plates (in order to preclude interference with pretensioning of the anchor).
- R. Relocating holes within baseplate: The baseplate with bolts may be relocated no more than 1" in any direction with respect to the attachment principal axis, unless otherwise noted on the engineering drawings.
- S. Installation-related devices (e.g., torque wrenches, hammer drills, manufacturer's setting tools, etc.) must be calibrated and controlled in accordance with LANL standards P 330-2, Control and Calibration of Measuring and Test Equipment (M&TE)] or equivalent.

3.5 INSPECTION

- A. Visually inspect anchors in order to verify and document that they have been installed in accordance with Articles 3.4 and 3.5 as applicable. Attributes requiring inspection are those shown in Table 3.1 plus any additional attributes imposed by this Section and the EOR. These attributes must be identified in the inspection report documentation.
- B. If visual inspection reveals that the installed anchor does not meet the requirements of this section, the anchor shall be relocated as permitted by this Section, or shall be removed and replaced by another anchor, or referred to the EOR for evaluation.

Table 3.1. Required Inspection Attributes.

For attribute definitions / details above and beyond footnote contents, refer to ESR, manufacturer's installation instructions, and, where indicated in parenthesis, previous portions of this Section.					
Inspection Attribute		Wedge and Screw	Heavy Duty Sleeve	Adhesive	Undercut
1	Anchor / Anchor system ¹ type / description	✓	✓	✓	✓
2	Anchor / Anchor element dimensions	✓	✓	✓	✓
3	Concrete type (normal- vs. light-weight) ²	✓	✓	✓	✓
4	Concrete compressive strength ²	✓	✓	✓	✓
5	Concrete thickness ²	✓	✓	✓	✓
6	Anchor spacing(s)	✓	✓	✓	✓
7	Edge distance(s)	✓	✓	✓	✓
8	Adhesive expiration date			✓	
9	Drill and/or drill bit type, size, power, etc. ³	✓	✓	✓	✓
10	Drilled hole cleaning (3.4.C)	✓	✓	✓	✓
11	Drilled hole dimensions	✓	✓	✓	✓
12	Steel deck hole dia. ≤ concrete hole dia. + 1/8" ⁴	✓			
13	Adherence to manufacturer's installation instructions	✓	✓	✓	✓
14	Anchor embedment	✓	✓	✓	✓
15	Minimum installation torque	✓	✓		
16	Maximum installation torque			✓	✓
17	Anchor perpendicular to concrete (3.4.D)	✓	✓	✓	✓
18	Nut thread engagement (3.4.H)	✓	✓	✓	✓

¹Applies to both anchor element (i.e., steel threaded rod, reinforcing bar / rebar dowel, or insert) AND adhesive material.

²Refer to project drawings if not obvious or somehow otherwise known with certainty.

³Refer to ESR for requirements associated with hole (for anchor / rod / rebar / insert) drilling / coring.

⁴Applies to installation in the soffit of concrete-on-steel-deck assemblies.

NOTE: Attributes 1-9 are visually inspected prior to the start of the anchor installation process, 10-16 are verified during the process, and 17-18 are verified after the process is complete.

3.6 DOCUMENTATION

A. Installation Inspection Record

- The Installation Inspection Record shall contain the information listed in Table 3.1.

3.7 REPAIR/RESTORATION

A. Repair abandoned holes with material specified in Paragraph 2.1. Anchors installed near an abandoned repaired or unrepaired hole must be located as specified in Paragraph 3.4M. The repair material shall have strength greater than or equal to that of the surrounding concrete.

B. When anchors are not installed properly, the following repairs may be undertaken:

- Remove the defective anchor, redrill hole and install the same diameter anchor if the integrity of surrounding concrete has not been disturbed.

2. For cases where excessive slippage upon torquing is experienced, or usage of the same hole is not possible, fill the existing hole with approved material as specified in Paragraph 2.1 and relocate the anchor location as specified in Paragraph 3.4M.
- C. If breakout of concrete around the anchor occurs during installation, the EOR must develop an appropriate repair. The EOR must be contacted to evaluate the damage and repair method. Local spalling of the concrete around the anchor, up to a maximum depth of 1/4 inch, is not considered a concrete breakout failure.
- D. Mislocated anchors may be cut flush with concrete surface, and need not be removed if they do not interfere with subsequent installations.
- E. Mislocated anchors or anchors installed for temporary applications may be left in place. Those anchors that must be removed to accommodate other attachments, aesthetics or safety of personnel, may be removed completely, or abandoned in place by cutting off beneath the surface after chipping the concrete 1" minimum, and patching with approved material (Paragraph 2.1). Mislocated anchors that will be covered by a baseplate or an attachment may be cut off flush with the concrete. In the event that an anchor must be removed from the hole and a new anchor installed, the removal and installation of the new anchor shall be in accordance with the manufacturer's specifications. The wedges of anchors that are "lost" during anchor removal may be abandoned in place. The abandoned hole or removed concrete shall be filled with approved material.
- F. Removal of installed anchors for inspection or replacement may be performed using Bolt Extractor manufactured by Drillco Devices Ltd. or an equivalent.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 03 1534, Rev. 4, dated April 23, 2012.

SECTION 03 3001
REINFORCED CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Formwork, shoring, bracing, and anchorage.
- B. Concrete reinforcing and accessories.
- C. Cast-in-place concrete.
- D. Control, expansion, and contraction joint devices associated with concrete work.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 01 4455, "Onsite Welding & Joining Requirements."
- C. Section 03 3053, "Miscellaneous Cast-in-Place Concrete."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Definitions
 - 1. "Cementitious material" as used herein shall include all Portland cement, pozzolan, fly ash, [ground iron blast-furnace slag, and silica fume].
 - 2. Reinforced concrete is structural concrete reinforced with no less than the minimum amounts of prestressing steel or non-prestressed reinforcement specified in ACI 318 Chapters 1 through 21 and Appendices A through C.
 - 3. Plain concrete is structural concrete with no reinforcement or with less reinforcement than the minimum amount specified for reinforced concrete. Specifications for plain concrete are presented in Section 03 3053, "Miscellaneous Cast-in-Place Concrete."
 - 4. Engineer-of-record and Architect/Engineer are synonymous and indicate the responsible engineer for the overall design of the facility or project.
- C. All concrete work, products and materials shall conform to ACI 301 and other specific referenced publications and standards except where otherwise specified herein. The submittals listed in the attached Submittal Tables are those specific submittals that the subcontractor shall provide to LANL.

1.4 SUBMITTALS

- A. Provide submittals in accordance with the requirements of Exhibit I. See Attachment 1 for the list of submittals.

1.5 QUALITY ASSURANCE

- A. Unless stated otherwise herein, the work shall comply with the most stringent of the following documents: the version of ACI-318 and ACI 301 referenced by the applicable edition of the IBC that the project/job is required to comply with; and

the latest versions of CRSI Manual of Standard Practice and Placing Reinforcing Bars, ACI Manual of Concrete Practice, ANSI/ASTM A 184, and DOE O 414.1.

- B. The work shall be subject to inspection at all times by the Contractor and Contractor's Independent Testing Agency for the purpose of determining that the work is properly executed in accordance with this specification. Failure to detect defective workmanship or material during any interim inspection shall not constitute acceptance of workmanship and materials.
- C. Acquire cement, aggregate, and fly ash from same source as used to produce the specific mix design for all work. Formally notify LANL of any material source changes prior to concrete delivery including the test agency test documentation. The subcontractor must provide LANL a certificate of conformance (C of C) prior to the initial delivery that confirms the source of the constituents, that tests confirm compliance, and that these sources are the same for the mix design testing and the delivered mix.
- D. The subcontractor shall use ACI 305R when concreting during hot weather, or 306R during cold weather, to develop the required hot / cold weather plan. See Paragraph 3.8 for details of plan and plan development.
- E. Testing Agency Qualifications: Testing agencies that perform concrete related testing shall be nationally accredited in accordance with ASTM C 1077 and testing agencies that perform reinforcing steel testing shall meet ASTM E 329. For field and laboratory testing agencies and testing personnel request approval by the LANL Building Official, or designee, in accordance with the provisions of the IBC and the LANL Engineering Standards Manual Chapter 16.
- F. Reinforcing steel shall comply with the provisions of ASTM A 615 and ASTM A 706 (as applicable) In addition, the rebar fabricator shall maintain Heat Number Traceability for all rebar to assure heat numbers for the rebar are traceable to the rebar delivered. These heat numbers (or lot numbers if they correlate to the heat numbers on the CMTR documentation) must be identified on the tags attached to the rebar bundles and traceable to the associated CMTR(s). Once the tags on the rebar bundles are confirmed to match the associated CMTRs by the appropriate receiving inspection; the bundles may be broken and the rebar located as required. Note: Unless specifically authorized by the government, foreign reinforcing steel is not allowed.
- G. The batch plant must be certified (and maintain current certification) under the NRMCA (National Ready Mix Concrete Association) process.
- H. Devices used for acceptance or testing, including all levels of sub-tiers, must be calibrated within recognized tolerances specified by the engineer-of record and calibrated to NIST or other recognized national standards. The devices must be suitably marked for traceability to the calibration documentation with recalibration due dates marked on each device. The users must maintain a usage log and identify any "as-found/as-received" out of tolerance devices to the appropriate LANL STR within 3 working days along with where the device(s) were used.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver concrete until vapor barrier, forms (including confirmation of approved calculations for formwork when required), reinforcement, embedded items, chamfer strips, and any other prerequisites specified in the job specific "Test and Inspection Plan" are in place and ready for concrete placement. Job

site storage of materials shall be in accordance with ACI 301. Protect materials from contaminants such as grease, oil, and dirt. Ensure materials can be accurately identified after bundles are broken and tags removed.

- B. Inspection/Documentation Verification Hold Point: Product and raw material inspection shall be performed at time of delivery to site receiving area and prior to off-loading and incorporation into the work. Verify conformance with specified requirements and project environmental, safety and health (ES&H) and radiological requirements through inspection of material, shipping documentation, material safety data sheets (MSDS) documentation, data sheets, test documentation and other shipping manifest information. Material not passing inspection shall be marked and prevented from entering the site or placed in an off-site quarantine area until the inspection and verification process is satisfactorily completed.
 - 1. Reinforcement: Store reinforcement of different sizes and shapes in separate piles on racks raised above the ground (to avoid excessive rusting). Protect from contaminants such as grease, oil, and dirt. Ensure bar sizes can be accurately identified after bundles are broken and tags removed. Painting on reinforcement must be approved in writing by the engineer-of-record.
- C. Definitions
 - 1. Certificate of Conformance (C of C): A document signed or otherwise authenticated by an authorized individual certifying the degree to which items or services meet specified requirements.
 - 2. Certified Material Test Report (CMTR). A written and signed document that is approved by a qualified party and contains data and information that attests to the actual properties of an item and the actual results of all required tests.
 - 3. National Institute of Standards and Testing (NIST).

PART 2 PRODUCTS AND MATERIALS

2.1 GENERAL

- A. All concrete work, projects and materials shall conform to applicable provisions of ACI 301 except as otherwise specified herein.

2.2 FORM MATERIALS AND ACCESSORIES

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints
 - 1. Plywood, metal, or other approved panel materials.
 - a. Metal form surfaces shall not contain irregularities, dents, or sags.
 - b. Exterior-grade plywood panels, suitable for concrete forms, complying with APA PS 1, and as follows:
 - 1) High-density overlay, Class 1 or better.
 - 2) Medium density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 - 3) Structural 1, B-B or better; mill oiled and edge sealed.
 - 4) B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

- c. AHA A135.4, hardboard for smooth form lining.
- 2. Prefabricated forms.
 - a. Preformed Steel Forms: Minimum 16 gauge matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
 - b. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.
 - c. Pan Type: Glass fiber of size and profile required.
 - d. Tubular Column Type: Round, spirally wound laminated fiber material, surface treated with release agent, non-reusable, of sizes required.
 - e. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set; 2 inch thick.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Form Ties: Snap-off type, metal cone type with waterproofing washer free of defects that could leave holes larger than 1 in. in concrete surface.
- D. Form Release Agent: Colorless mineral oil which will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
- E. Corners: Chamfered, wood strip type; $\frac{3}{4}$ x $\frac{3}{4}$ in. size.
- F. Dovetail Anchor Slot: Galvanized steel, 22 gauge thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- G. Flashing Reglets: Galvanized steel, 22 gauge thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- H. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- I. Waterstops: Polyvinyl chloride, minimum 1750 psi tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, maximum possible lengths, ribbed profile, preformed corner sections. Waterstop shall be installed in accordance with the manufacturer's recommendations for installation. A C of C from the manufacturer is required as confirmation that the waterstops meets the requirements in this paragraph.

2.3 REINFORCING AND ACCESSORIES

- A. Reinforcing Steel: ASTM A 615, Grade 60 and ASTM A 706 deformed bars and stirrups; and ties. Manufacturer's CMTRs are required for each delivery and they must be traceable to the reinforcing steel tag bundles via the lot or heat number. Once the documentation is confirmed to be adequate and traceable by the responsible receiving inspection personnel, the bundles may be broken and no

further traceability is required. Other construction materials such as, pre-stress strands, Form Savers, cadwelds, mechanical splices, etc. must be supported by ICC evaluation reports showing full compliance to the applicable IBC code of record for the project.

Note: When Reinforcing steel is authorized to be welded, a welding procedure must be utilized that has been approved by the EOR and the LANL-Welding POC.

- B. Welded Steel Wire Fabric: ASTM A 185 Plain type in flat sheets
- C. Locate and install reinforcing splices as indicated on Drawings.
- D. Welding of reinforcing bars will be permitted only with approval of LANL. Welding, if approved, shall conform to ACI 301 Sect. 3 and AWS D.1.4 and shall meet the requirements of Section 01 4455, "Onsite Welding & Joining Requirements." Filler material CMTRs are required. Reinforcing steel cannot be used for filler metal, gap filler, lightning grounding, or other uses that involve welding.
- E. Chairs, Bolsters, Bar Supports, Spacers: Size and shape for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture. Special chairs, bolsters, bar supports, spacers adjacent to weather exposed concrete surfaces to be plastic coated steel type; size and shape as required. Note: concrete "dobie" blocks used to hold up and position rebar must have documentation to show that they are at least the PSI compression strength of the concrete used for the placement.
- F. Tie Wire: Minimum 16 gauge annealed type.

2.4 CONCRETE MATERIALS

- A. Cement: ASTM C 150, Type I or Type II.
- B. Fine and Coarse Aggregates: Conform to ASTM C 33.
- C. Water: Potable water that is clean and not detrimental to concrete.
- D. Fly Ash: Conform to ASTM C 618, type F. Fly ash, 20% to 30% of combined weight of fly ash and cement shall be used for the LANL standard concrete mix. For alternate acceptable means of reducing ASR, see Paragraph 2.7B.

2.5 ADMIXTURES

- A. Air Entrainment: Conform to ASTM C 260.
- B. Chemical: Conform to ASTM C 494.

2.6 ACCESSORIES

- A. Bonding Agent: Polymer resin emulsion.
- B. Vapor Barrier: 6 mil clear polyethylene film of type recommended for below grade application.
- C. Joint Filler: ASTM D 1751; asphalt impregnated fiberboard or felt.

2.7 CONCRETE MIX

A. Standard Mix Design

1. The standard mix design for LANL shall contain from 20% to 30% by weight of total cementitious material Type F fly ash conforming to ASTM C 618 for mitigating the deleterious effects of alkali-silica reaction in concrete that is common with the silicious nature of aggregates found in northern New Mexico. Pre-approved mix designs shown in 2.7.H may be used as long as the materials, their sources, and their properties remain constant and as long as the aggregate correction factor is verified by testing per ASTM C 231.

B. Alternate Mix Designs

1. Alternate means for mitigating alkali-silica reaction, including use of ground slag, silica fume, or lithium compound admixtures will be acceptable if appropriate tests and documentation are submitted (per the Submittal Attachment) in advance to LANL and approved. Note: Mix designs intended to provide more flexibility than the ranges (e.g., slump, air-content, water cement ratio, etc.) must obtain a formal variance to the specification.

- a. Where aggregates are provided which are demonstrated through appropriate tests to have acceptable reactivity levels (i.e., less than 0.1%), mix designs may be provided without the fly ash required by Paragraph 2.7A.1. Test required is ASTM C 1260 (or other pre-approved alternate).
- b. Demonstrate acceptable ASR resistance for concrete with fly ash using ASTM C 1567 (i.e., less than 0.1%).
- c. Select proportions for normal weight concrete in accordance with ACI 301, proportioning on the basis of previous field experience or trial mixtures method, for

f_{cr} = the larger of:

$$f_{cr} \geq f'_c + 1.34s, \text{ or}$$

$$f_{cr} \geq f'_c + 2.33s - 500, \text{ where:}$$

f_{cr} = required average compressive strength of concrete mix design, psi

f'_c = specified design compressive strength of concrete, psi

s = standard deviation, psi

If a suitable record of tests is not available to establish a standard deviation, use the following:

$$f_{cr} \geq f'_c + n, \text{ where:}$$

n = additional required strength, psi, for a specified f'_c :

n = 1000 psi for f'_c = less than 3000 psi.

n = 1200 psi for f'_c = 3000 to 5000 psi.

n = 1400 psi for f'_c = over 5000 psi.

- d. Concrete Mix Designs shall be original work performed by the supplier's testing agency (pre-approval of the testing agency by the LANL Building Official is required). Mix designs extrapolated from pre-selected data are not permitted. Configuration mix designs -- i.e., those already in use by the supplier -- are also not permitted, except for those shown in 2.7.H. All mix designs will be established through the process of trial batch determination of the compressive strengths at the various water-cement ratio trial points for each concrete class, and shall adhere to the requirements of this section.
- e. Trial design batches, mixture proportioning studies, and testing requirements for various classes and types of concrete specified shall be the responsibility of the Subcontractor. Mixture proportions shall be based on compressive strength (as noted above) as determined by test specimens fabricated in accordance with ASTM C 192 and tested in accordance with ASTM C 39. Samples of all materials used in mixture proportioning studies shall be representative of those proposed for use in the project and shall be accompanied by the manufacturer's or producer's test report indicating compliance with these specifications. Trial mixtures having proportions, consistencies, and air content suitable for the work shall be made based on methodology described in ACI 211.1. Note that the use of fly ash may require an increase of air entraining admixture to attain specified air content of concrete. The trial mixture shall use at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required on the project. The maximum water-cement ratio required will be based on equivalent water-cement ratio calculations as determined by the conversion from the weight ratio of water to cement plus pozzolan, [silica fume,] and ground granulated blast-furnace slag by weight equivalency method. Laboratory trial mixture shall be designed for maximum permitted slump and air content. Each combination of materials proposed for use shall have a separate trial mixture, except accelerators or retarders can be used without separate trial mixtures. The temperature of concrete in each trial batch shall be reported. For each water-cement ratio, at least three test cylinders for each test age shall be made and cured in accordance with ASTM C 192 and tested in accordance with ASTM C 39 for 7 and 28 days. From these results, a curve shall be plotted showing the relationship between water-cement ratio and strength for each set of trial mix studies. In addition a curve shall be plotted showing the relationship between 7 and 28 day strengths.

C. Provide concrete meeting the following criteria:

- 1. Exterior concrete exposed to freezing and thawing.
 - a. Minimum compressive strength, f'_c : 4,000 psi @ 28 days.
 - b. Maximum nominal aggregate size: 0.75 in.
 - c. Maximum water / cement ratio: 0.45

- d. Slump: 4 inch
 - e. Air content: 6 percent.
2. Exterior concrete to be pumped, exposed to freezing and thawing⁽¹⁾..
- a. Minimum compressive strength, f'_c : 4,000 psi @ 28 days.
 - b. Maximum nominal aggregate size: 0.75 in.
 - c. Maximum water / cement ratio: 0.38.
 - d. Slump: 6 inch at discharge of truck.
 - e. Slump: 3 to 7 ½ inch at pump discharge.
 - f. Air content: 6 percent.

Note (1): In addition to meeting slump criteria at pump discharge, Paragraph 3.10C herein requires strength, temperature, and air-content criteria to be met at pump discharge (i.e., samples for testing are taken at the placement-end of the pipe / hose). This requirement does not change / alter the ACI tolerances for the criteria (i.e., the tolerances apply to test results on samples taken at the placement-end of pipe / hose). For example, test results from 4.5% to 7.5% for air content will be deemed acceptable since the criteria is 6% and the ACI tolerance is $\pm 1.5\%$.

3. Interior concrete not exposed to freezing and thawing.
- a. Compressive strength, f'_c : 4,000 psi @ 28 days.
 - b. Maximum nominal aggregate size: 0.75 in.
 - c. Maximum water/cement ratio: 0.44.
 - d. Slump: 4 inch
 - e. Air content: 3 percent.
- D. In designing concrete mixes with fly ash and ASR aggregates, consider effects on workability, set times, times for strength development and curing, and other characteristics. Make appropriate adjustments in construction activities, for example, times for removing forms or shoring.
- E. Use accelerating admixtures in cold weather only when submitted and approved as a constituent of the design mix prior to use. Use of admixtures will not relax cold-weather-placement requirements.
- F. Do not use calcium chloride as an admixture.
- G. Use set-retarding admixtures during hot weather only when submitted and approved as a constituent of the design mix prior to use.
- H. Pre-approved Concrete Design Mixes (Ref: Amec Project No. 4-519-003279). These mix designs can be used as long as material properties remain constant. Submit (per the Submittal Attachment) source documentation and component analyses to verify compliance of the batching materials used for pre-approved mix design.
1. LATM Mix No. 19 -- Exterior, 4000 psi concrete, 4" slump, 5% air (use aggregate correction factor of 0.3 for ML-3 and ML-4 concrete)⁽⁵⁾, 20% fly ash (Proportions per CY):
- a. Type I-II Cement: Gcc Rio Grande, Tijeras 656 lbs
 - b. Class F, Fly Ash: Salt River Materials, 4-Corners 164 lbs
 - c. Water 295 lbs
 - d. Washed Concrete Sand: El Guique Quarry 1079 lbs
 - e. Sz#67 Coarse Aggregate: El Guique Quarry 1630 lbs

- f. Water Reducer: Mb poly heed 997 41 oz⁽¹⁾
- g. Air Entraining Agent: MB Micro Air 8.2 oz⁽²⁾
- 2. LATM Mix No. 44 -- Exterior, 4000 psi concrete to be pumped, 6" slump, 5% air (use aggregate correction factor of 0.3 for ML-3 and ML-4 concrete)⁽⁷⁾, 20% fly ash (Proportions per CY)⁽⁶⁾:
 - a. Type I-II Cement: Gcc Rio Grande, Tijeras 656 lbs
 - b. Class F, Fly Ash: Salt River Materials, 4-Corners 164 lbs
 - c. Water 295 lbs
 - d. Washed Concrete Sand: El Guique Quarry 1079 lbs
 - e. Sz#67 Coarse Aggregate: El Guique Quarry 1630 lbs
 - f. Water Reducer, Mb poly heed 997 57.4 oz⁽¹⁾
 - g. Air Entraining Agent: MB Micro Air 8.2 oz⁽²⁾
- 3. LATM Mix No. 21 -- Interior, 4000 psi concrete, 4" slump, 3% air (use aggregate correction factor of 0.3 for ML-3 and ML-4 concrete)⁽⁵⁾, 20% fly ash (Proportions per CY):
 - a. Type I-II Cement: Gcc Rio Grande, Tijeras 520 lbs
 - b. Class F, Fly Ash: Salt River Materials, 4-Corners 130 lbs
 - c. Water 280 lbs
 - d. Washed Concrete Sand: El Guique Quarry 1243 lbs
 - e. Sz#67 Coarse Aggregate: El Guique Quarry 1750 lbs
 - f. Water Reducer: Mb poly heed 997 25.7 oz⁽³⁾
 - g. Air Entraining Agent: MB Micro Air 4.6 oz⁽⁴⁾

Note (1): Temperature and slump variation may require adjustment in dosage within the range of 24.6 fl oz / cy to 57.4 fl oz / cy.

Note (2): Temperature and slump variation may require adjustment in dosage within the range of 1.025 fl oz / cy to 12.3 fl oz / cy.

Note (3): Temperature and slump variation may require adjustment in dosage within the range of 19.5 fl oz / cy to 45.5 fl oz / cy.

Note (4): Temperature and slump variation may require adjustment in dosage within the range of 0.8 fl oz / cy to 9.75 fl oz / cy.

Note (5): When this mix is used in an ML-1 or ML-2 application, the aggregate correction factor must be determined by testing in accordance with ASTM C 231.

Note (6): Paragraph 3.10C herein requires strength, slump and air-content criteria to be met at pump discharge (i.e., samples for testing are taken at the placement- end of the pipe / hose). This requirement does not change / alter the ACI tolerances for the criteria (i.e., the tolerances apply to test results on samples taken at the placement- end of pipe / hose). For example, test results from 3.5% to 6.5% for air content will be deemed acceptable since the criteria is 5% and the ACI tolerance is $\pm 1.5\%$.

PART 3 EXECUTION

3.1 GENERAL

- A. Work shall conform to applicable provision of ACI 301 unless otherwise specified herein.

- B. Mix, test, and deliver concrete, along with test records in accordance with ASTM C 94. Concrete acceptance for slump shall be based on testing in accordance with ASTM C 94 and compared to the requirements established in the design documents.
- C. For ML-3/4 concrete, adding water in the field is only permitted if the ready-mix producer held back water at the batch plant and the slump after transport is less than that specified in the design documents. Care shall be taken to avoid exceeding the water-cement ratio. To adjust for measuring technique accuracy, the amount of water that can be added shall be reduced by 10% from the maximum calculated water-holdback volume. In addition, mixing water added in the field to adjust slump is permitted only when the water measuring device used is as follows:
 - 1. A LANL approved measuring device; or
 - 2. The ready-mix truck sight glass may be used if the following conditions are met:
 - a. The trucks must have a current NRMCA certification
 - b. There must be a pass (i.e. "P") entry on the NRMCA Fleet Inspection Reporting Spreadsheet - Truck Mixers under Section/Column 5.1.6, Water Gauge or Meter. The aforementioned spreadsheet shall be part of a current NRMCA certification of the ready-mix producer and its facilities and its trucks.

3.2 EXAMINATION

- A. Verify lines, levels, and centers before proceeding with formwork. Ensure that dimensions agree with the Drawings. Verify "Square" for slabs, floors, and walls. "Square" specifically means a 90 degree corner or connection, whether horizontal or vertical, such as a floor, wall or ceiling. Note: all required preliminary activities, such as geotechnical and soil compaction/moisture testing, must be confirmed in order to be considered completed.
- B. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.
- C. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- D. Do not use wood formwork more than three times for concrete surfaces to be exposed to view. Do not patch formwork.
- E. Verify that concrete cover for reinforcement conforms to the drawings and to Paragraph 3.4C below.

3.3 FORMWORK

- A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.
- B. Erect formwork, shoring and bracing to achieve design requirements and maintain tolerances in accordance with requirements of ACI 301 and ACI 347 (or more stringent design requirements). Camber structural slabs and beams in

accordance with ACI 301. Contact surfaces of the formwork should be carefully installed to produce neat and symmetrical joint patterns, unless otherwise specified. Joints should be vertical or horizontal and, where possible, should be staggered to maintain structural continuity.

- C. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- D. Arrange and assemble formwork to permit dismantling, stripping and removal of remaining principal shores. Do not damage concrete during stripping.
- E. Align joints and make watertight. Keep form joints to a minimum.
- F. Obtain approval from the Engineer-of-Record for all construction joint locations not shown on the drawings and before framing openings (in structural members) which are not detailed on Drawings.
- G. Provide chamfer strips on external corners of beams, joists, columns, and walls.
- H. Apply form release agent prior to placement of reinforcing steel, anchoring devices, and embedded items.
- I. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.
- J. Do not apply form release agent where concrete surfaces receive special finishes or applied coverings which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.
- K. Provide formed openings where required for items to be embedded in or passing through concrete work.
- L. Locate and set in place items which cast directly into concrete.
- M. Clean formed cavities of debris prior to placing concrete. Clean and remove foreign matter as erection proceeds.
- N. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- O. Install waterstops continuous without displacing reinforcement.
- P. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- Q. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.
- R. During cold weather, remove ice and snow from within forms. Do not use deicing salts or water to clean out forms. Use compressed air or other means to remove foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- S. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and other imposed loads without excessive deflection or creep. Perform form removal in accordance with the recommendations of ACI 347.

- T. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- U. Store removed forms in manner to avoid any damage to form surfaces that will later be in contact with fresh concrete. Discard damaged forms.
- V. After formwork removal, place construction or equipment loads on reinforced concrete only after cylinder break results indicate strengths meet specified requirements. Exceptions to this requirement must be approved in writing by the engineer of record.

3.4 REINFORCING PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Do not displace or damage vapor barrier.
- C. Maintain minimum concrete cover around reinforcing as follows:

Row	Item	Minimum cover, in.
1	Slabs and Joists: Top and Bottom bars for dry conditions – No. 11 bars and smaller No. 14 and 18 bars	3/4 1-1/2
2	Formed Concrete Surfaces Exposed to Earth/Water Weather. No. 5 bars and smaller, W31 or D31 wire and smaller No. 6 through No. 18 bars, W45 or D45 wire	1-1/2 2
3	Formed Beams and Columns: Dry conditions – Primary reinforcement, stirrups, spirals and ties Exposed to earth, water, weather	1-1/2 See Row 2
4	Walls: Dry Conditions – No. 11 bars and smaller No. 14 and 18 bars Exposed to earth, water, weather	3/4 1-1/2 See Row 2
5	Footings and Base Slabs: At formed surfaces and bottoms bearing on concrete workmat At unformed surfaces and bottoms in contact with earth Top of footings	2 3 See Row 1

3.5 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush, pressure washing, or other acceptable means to fully remove any laitance*. When new concrete is to be bonded to existing concrete, ensure that a "roughened" surface exists in accordance with ACI 318, Ch. 11 (i.e., intentionally roughened to a full amplitude of approximately 1/4 inch). When authorized by the engineer-of-record, apply bonding agent in accordance with the manufacturer's recommendations.

**Laitance is a weak layer of cement and aggregate fins on a concrete surface that is usually caused by an overwet mixture, overworking the mixture, improper or excessive finishing or combination thereof.*

- B. In locations shown on the design drawings where new concrete is to be dowelled to existing work, unless noted otherwise on the design drawings, drill holes in

existing concrete; insert steel dowels to the specified depth and pack solid with non-shrink grout that meets or exceeds the concrete minimum strength.

- C. Prior to placement of concrete, ensure that the Project Geotechnical Investigation report has been read and understood, soils inspections have been performed with satisfactory results, and soils testing documentation has been completed and the results are satisfactory.

3.6 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301. Consolidate concrete by internal vibration per ACI 309R; whichever is more stringent, unless otherwise directed by the engineer-of-record.
- B. Notify the LANL STR a minimum of 24 hours prior to commencement of concrete operations.
- C. Ensure that reinforcement, inserts, embedded parts, formed joint fillers, joint devices, and formwork are not disturbed during concrete placement.
- D. Install vapor barrier under interior slabs on grade. Lap joints minimum 6 in. and seal watertight by sealant applied between overlapping edges and ends or taping edges and ends.
- E. Repair vapor barrier damaged during placement of concrete reinforcing.
- F. Install joint filler, primer and sealant in accordance with manufacturer's instructions.
- G. Separate slabs on grade from vertical surfaces with ¼ in. thick joint filler.
- H. Extend joint filler from bottom of slab to within ¼ in. of finished slab surface.
- I. Install joint devices in accordance with manufacturer's instructions.
- J. Place concrete continuously between predetermined expansion, control, and construction joints.
- K. Unless noted otherwise on the design drawing(s), screed floors and slabs on grade level, maintaining surface flatness of maximum 1/4 inches in 10 ft.

3.7 CONCRETE FINISHING

- A. Provide formed concrete surfaces to be left exposed with smooth rubbed finish.
- B. Finish concrete floor surfaces in accordance with ACI 301.
 - 1. Finishes shall meet the requirements of ACI 301 Section 5.3.4.2.
 - 2. Tolerances for floors, slabs, and floor finishes shall be confirmed by measuring in conformance with ACI 301 Section 5.3.4.3.
- C. Wood-float surfaces which will receive tile with full bed setting system.
- D. Steel trowel surfaces which will receive carpeting, resilient flooring, seamless flooring, or thin set tile.
- E. Steel trowel surfaces which are scheduled to be exposed.
- F. Provide a broom finish on exterior sidewalks and paving.
- G. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1/8 in. per foot, minimum.

3.8 CURING AND PROTECTION

A. General

1. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury.
2. When concrete must be placed in cold weather as defined by ACI 306R, or hot weather as defined in this specification, the Subcontractor must develop a detailed "Cold-Weather Implementation Plan" / "Hot-Weather Implementation Plan" (as applicable) and obtain the project's engineer-of-record (EOR) approval. This approval shall account for those recommendations addressed in ACI-305R or 306R and ACI-308 (curing) as appropriate and any elements required for worker safety. This cold-weather plan shall cover:
 - a. the production;
 - b. transportation;
 - c. placement;
 - d. protection;
 - e. curing (ACI-308); and
 - f. temperature monitoring of concrete during cold weather; in the submittal, include procedures to be implemented upon abrupt changes in weather conditions or equipment failures.

Do not begin hot or cold weather concreting until these procedures have been approved by the Engineer of Record and submitted to and approved by the LANL STR (Subcontractor Technical Representative).

Note: ACI 301 applies for any conditions not specifically addressed by one of the standards / guides noted.

3. Protection may be removed when the concrete surface temperature is within 20°F of the ambient temperature measured with a calibrated measuring device.

B. Hot Weather Applications

1. These practices (ACI 305R) shall be used when ambient daytime temperature at any time at the job-site is 80 degrees F or more.
2. Use the project-approved "Hot-Weather Implementation Plan" (Paragraph 3.8A) for implementation.

C. Cold Weather Applications

1. Use the project-approved "Cold-Weather Implementation Plan" (Paragraph 3.8A) for implementation.

3.9 CONTROL/CONTRACTION JOINTS

- #### A.
- While the concrete is still plastic (i.e., within several hours after placement), provide joints in slabs at no more than 10 feet on center in each direction. The depth of each joint will be at least one-quarter of the slab thickness, but not less than 1 inch.

3.10 FIELD QUALITY CONTROL

- #### A.
- Provide a certified testing agency to perform field testing in accordance with ACI 301. Testing laboratory certification may be obtained through AASHTO or

another nationally recognized accreditation service as allowed by ASTM C 1077. National accreditations must be specific to the specific facility and/or mobile unit. The engineer-of-record and the LANL Building Official, or designee must approve the test agency prior to performance of any work. See LANL Engineering Standards Manual (ESM) Chapter 16 for additional details/requirements.

1. Testing agencies for performing testing services on concrete materials shall meet the requirements of ASTM C 1077.
 2. Field testing of concrete shall be performed by an ACI Certified Concrete Field Testing Technician – Grade I.
 3. Laboratory testing of concrete shall be done by ACI-Certified concrete laboratory technician-grade 1 or equivalent per ASTM C 1077
- B. Inform the LANL STR 48 hours in advance of field testing to allow for witnessing of testing.
- C. The Testing Agency shall perform the following tests and collect strength cylinders on one batch in every 50 cu. yds. of concrete placed or once a day when less than 50 cu. yds. is placed. Samples for Acceptance Testing are to be taken at the discharge from the transit mixer (and into a wheel barrow per ASTM C 172.), except when using concrete pumps or conveyors to transport concrete to its final placement location. When pumps or conveyors are used, the samples for acceptance tests shall be taken at the end of the pipe or last conveyor belt. Pumping of concrete should follow ACI 304.2R and belt conveying ACI-304.4R. Note: The tests below shall always be performed whenever concrete test specimens are taken. All concrete is to be tested.
1. Sample concrete in accordance with ASTM C 172.
 2. Record temperature of concrete in accordance with ASTM C 1064.
 3. Perform slump test in accordance with ASTM C 143.
 4. Perform air content test in accordance with ASTM C 231, pressure method.
 5. Perform density testing in accordance with ASTM C 138 when required by ASTM C 94.
 6. Take 4 concrete strength test cylinders in accordance with ASTM C 31.
- D. The Testing Agency shall test the strength test cylinders in accordance with ASTM C 39 at 7 days and 28 days. Strength test cylinders must be picked-up at the job site between 8 and 48 hours after molding.
- E. Coordinate the sequencing of concrete construction to schedule LANL concrete special inspection per the requirements of IBC Chapter 17. Provide 48 hour notification to schedule special inspectors.

3.11 CONCRETE ACCEPTANCE CRITERIA

- A. Fresh Concrete
1. Temperature - Less than 90 degrees F.
 2. Slump - per Paragraph 2.7. Note: Slump that is lower than the minimum slump may be placed when the LANL inspector determines that the concrete is workable and can be vibrated. (This does not authorize low slump for other reasons such as concrete being placed beyond the time

limit.) The LANL inspector will note the low slump in the inspection report but will not generate an NCR unless the concrete strength report indicates that it is unacceptable.

3. Air content - per Paragraph 2.7 . Note: High air-content beyond the specified range becomes a factor that can impact strength but not durability. The LANL inspector will note the high air-content the inspection report but will not generate an NCR unless the concrete strength report indicates that it is unacceptable.
4. Drum revolution counter: 300 maximum revolutions within 1-1/2 hours after initial mixing for Central-Mixed concrete or 100 to 300 revolutions within 1-1/2 hours after initial mixing for shrink-mixed and truck-mixed concrete.

B. Strength

1. Concrete strength is satisfactory if the average of all sets of 3 consecutive strength test results equal or exceed the specified 28 day strength f'_c and no individual strength test result falls below the specified 28 day strength f'_c by more than 500 psi.

C. Appearance

1. Free from honeycombs, embedded debris, and dimensional variance beyond ACI 301 and its references.

D. Construction requirements

1. Conforming to required lines, details, dimensions and tolerances specified for construction.

3.12 DEFECTIVE CONCRETE

A. Defective concrete is concrete not conforming to acceptance criteria in Paragraph 3.11.

1. NOTE: At the discretion of LANL Building Official, concrete that has not been placed in accordance with the applicable portions of Paragraph 3.8 can be considered defective due to the potential for such concrete to not be durable (e.g., concrete that is not placed properly in 'cold/hot weather' is subject to poor long-term performance, etc.).

B. Do not accept or place defective concrete that is not in conformance with acceptance criteria. Return the fresh concrete to the supplier.

C. Replace defective concrete not meeting strength criteria, at Subcontractor's expense. The Subcontractor may, at its expense, evaluate the concrete's in-place strength by testing 3 core samples for each strength test where LANL cured cylinders were more than 500 psi below f'_c in accordance with ACI 301 and ASTM C 42. Fill core holes in accordance with ACI 301.

D. Replace defective concrete not meeting appearance criteria, at Subcontractor's expense. The STR may allow repair of defective concrete at Subcontractor's expense.

E. Replace concrete not in conformance with details, tolerances, and other construction requirements at Subcontractor's expense.

- F. Concrete that has been determined to be potentially defective regarding durability (ref. Paragraph 3.12A.1) will either be replaced at Subcontractor's expense, or tested (to try to prove concrete will be durable) at Subcontractor's expense.
1. If Subcontractor chooses to test the concrete in question, the test method will be ASTM C 457. If the test results indicate a maximum air-void spacing factor (\bar{L}) of 0.008, on average, and with no single value exceeding 0.010, the concrete will be considered to have been proven to be durable. Otherwise, the concrete will be replaced at Subcontractor's expense.

Submittal Tables

Subcontractor is responsible for full compliance to all of ACI 301 and this specification. The submittals listed in these Submittal Tables (and any others in the body of the specification) are those specific submittals that LANL must receive from the Subcontractor.

Other potential submittals associated with the various codes and standards and required by the engineer of record remain the responsibility of the Subcontractor.

The items below must be submitted by the Construction Subcontractor to the LANL STR within the time frame noted in the "timeframe" column to the right of the submittal item. The submittal time frames may be adjusted for individual projects by Subcontract or the LANL STR. The LANL STR will obtain the review and approval of the engineer-of-record and any other authority and notify the Subcontractor after approval is granted for each submittal.

In addition, the Subcontractor must schedule and manage any sub-tiers to ensure that the proper approach and scheduling is used to obtain all necessary approvals and tests of concrete constituents that make up new mix designs.

Table 1.A submittals are always required.

The submittal reviews should be generally consistent with the following schedule:

1. 2 days for the STR to give the submittal to the A/E.
2. 10 days for the A/E to approve the submittal.
3. 2 days for the STR to return the approved submittal.
4. 5 - 10 days for the Subcontractor to act on the approval.
5. 5 days for the Subcontractor to correct any submittals for re-review followed by a 5-day review period.

(A mature process will take approximately 5 weeks if the submittal is not returned unapproved).

Note 1: Additional items may need to be added for nuclear or radiological projects or specialty construction (i.e., high-density concrete, self-consolidating concrete, etc.).

Note 2: The term "engineer-of-record" is synonymous with the term "architect/engineer (i.e., as applicable to project in question)."

Note 3: Source: Requirement source is ACI 301-05 unless noted otherwise.

Table 1.A. Submittals Always Required.

No.	Submittal	Timing	Source
General			
A-01	Documentation that testing agencies have been accepted by the engineer-of-record <u>before performing any testing work</u> .	4 months before performing any work. Includes A/E acceptance and LANL LBO acceptance.	1.6.3.1
A-02	Documentation that testing agencies have been approved by the LANL Building Official (LBO) <u>prior to performing any work</u> . <u>Important note:</u> This also applies to subtier concrete fabricators and batch plants. This places a premium on planning to assure that the testing agencies are properly approved before all of the required concrete constituent / material testing is begun to support any alternate mix design(s) which have to be submitted for LANL engineering approval 30 days before using the concrete mix. The best alternative is to choose from the list of LBO-approved test agencies from Chapter 16 of the ESM (Engineering Services Manual). Using a testing agency on the approved list will save time by having the LBO approval in advance and then there is only the engineer-of-record's (EOR) approval to obtain.	2 months before performing any work. Note: LANL will normally require that the Subcontractor hire the test agency(s). If LANL provides the test agency(s) then this submittal only applies to the Subcontractor when they contract the EOR	IBC Chapter 17 and ESM Chapter 16
A-03	Documentation that quality control program of the concrete supplier is accepted by A/E.	3 months before the initial placement.	1.6.3.2.f
A-04	The testing agency shall report test and inspection results that pertain to the Work to the <u>engineer-of-record</u> , construction Subcontractor, and <u>concrete supplier</u> within 7 days after tests and inspections are performed. For timing for submittals to LANL in column to the right.	Within 2 days for the initial slump and air content and within 7 days for each specified break report sequence (i.e., 7, 14, and 28 day breaks).	1.6.4.1.c
A-05	Data on form-facing materials proposed for smooth-form finish if not specified in the design media: <ul style="list-style-type: none"> • Rough-form finish on concrete surfaces not exposed to public view; and • Smooth-form finish on concrete surfaces exposed to public view. 	15 work days (or 3 weeks) before form installation.	2.2.1.1
A-06	Data on formwork release agent or formwork liners.	15 work days (or 3 weeks) before form work installation start	2.1.2.1.f and spec. 2.2.D
A-07	Design calculations per ACI 347 indicating arrangement of forms, sizes and grades of supports (lumber), panels, and related components (design forms for full liquid static head of concrete). Formwork drawings showing details of formwork including: joints, supports, studding and shoring, and sequence of form and shoring removal, prepared by or under supervision of a Professional Engineer detailing fabrication, assembly, and support of formwork. For shoring and re-shoring methods proposed for floor and roof slabs, spandrel beams, and other horizontal concrete members, Drawings and calculations prepared by or under supervision of a Professional Engineer.	15 working days before formwork installation begins	Specification and ACI 301-10, Paragraph 2.1.2.2.a and b

Table 1.A. Submittals Always Required.

No.	Submittal	Timing	Source
A-08	Submit engineer-of-record approved "Cold-Weather Plan" prior to placing concrete in cold weather		Specification 3.8.A
A-09	Data and sample of expansion joint materials (sealer and filler)	15 work days (or 3 weeks) before form work installation start	ACI 301 2.1.2.2.d
A-10	Data sheet on waterstop and splices	15 work days (or 3 weeks) before form work installation start	ACI 301 2.1.2.2.e
A-11	Alternative locations and details for formed construction and contraction joints.	1.5 months before form work installation	ACI 301 2.1.2.1.b
A-12	Product data on admixtures, materials for coring concrete, vapor retarder and barriers, epoxy bonding compound.		
Reinforcing Material			
A-13	Rebar manufacturer's certified test report (CMTRs) traceable to the heat# or test identification # on the shipping tags.	15 work days (or 3 weeks) before the planned shipment date	ACI 301 3.1.1.1a; codes; and ASTM A 615 / ASTM A 706
A-14	Shop drawings indicating bar sizes, spacing, locations, piece numbers, and quantities of reinforcing steel and welded wire fabric, bending and cutting schedules, supporting and spacing devices. Identify all lap splice lengths	1 month before re-reinforcement placement	ACI 301, 3.1.1.1.b
A-15	List of splices and request to use splices not indicated in Subcontract Documents.	1 month before re-reinforcement placement	ACI 301, 3.1.1.1.c
A-16	Request to use mechanical splices not shown on the project drawings. In addition, submit the ICC Evaluation Report(s) showing the requested mechanical splices to meet the requirements of ACI 318/ACI 355.2 for the IBC year edition applicable for the project. ACI 301-2005 paragraph 3.1.1.1.d and ACI 355.2 Section 12 requiring objective evidence that ICC, the evaluation agency, has approved the mechanical splice for use under IBC 2009.	1 month before re-reinforcement placement	ACI 301, 3.1.1.1.d; ACI 355.2
A-17	Request and procedure to field bend or straighten reinforcement partially embedded in concrete.	15 work days (or 3 weeks) before placement of reinforcement	ACI 301, 3.1.1.1.f and 3.3.2.8
A-18	Submittal to obtain engineer-of-record approval to field-cut reinforcing steel.	15 work days (or 3 weeks) before cutting any reinforcing steel	ACI 301, 3.3.2.9
A-19	CMTRs for each rebar delivery traceable to the rebar bundle tags. Must be included with delivery of the rebar at the site.	Upon receipt	Specification 1.5.F
A-20	When rebar is to be welded, filler material CMTRs. Rebar welding must be pre-approved by LANL.	15 work days (or 3 weeks) before welding	Specification 2.3.B and D
A-21	Certified copies of CMTRs for reinforcing and other construction materials such as, pre-stress strands, Form Savers, cadwelds, etc. Mechanical splices must be supported by ICC evaluation reports showing full compliance to the applicable IBC code of record for the project.	At receiving inspection	Specification 2.3.B

Table 1.A. Submittals Always Required.

No.	Submittal	Timing	Source
Concrete and Concrete Materials –Spec (Pre-Approved) Mix Designs			
A-22	Source documentation and component analyses to verify compliance of concrete batch materials to the pre-approved mix design. The laboratory test reports shall include manufacturers' certified material test report(s) and all other tests for cement, fly ash, aggregates, and admixtures. Provide maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained versus sieve size.	Prior to first concrete placement for either of the two pre-approved LATM exterior concrete	Specification Paragraph 2.7H
A-23	Test reports of aggregate correction factor determination per ASTM C 231.]	Prior to first concrete placement	ASTM C 231
Concrete and Concrete Materials – Alternate Mix Designs			
	Reminder: The LANL Building Official must approve the Test Agency (ies) prior to performing the necessary tests. The engineer-of-record must also approve all test agencies and those test result submittals required by ACI 301.		ESM Chapter 16
A-24	<p>Mix design for each strength and type of concrete to LANL's Chief Civil/Structural engineer for approval. A complete list of materials including type; brand; source and amount of cement, fly ash, pozzolans, ground slag, and admixtures; and applicable reference specifications shall be included in the mix design submittal. In addition, the documentation provided shall include cementitious materials producers' names, and plant locations; and, for aggregates, types, pit, quarry locations, producer's names, gradings, and properties required by ASTM C 33. Except for admixtures and water, test results confirming conformance with applicable specifications shall not be more than 90 days old. Test results for aggregate soundness, abrasion, and reactivity may be older than 90 days, but not older than 1 year, provided test results for the other properties specified in ASTM C 33 indicate that the aggregate quality has not changed.</p> <p>Note that the use of fly ash may require an increase of air entraining admixture to maintain air content of concrete within specified levels. Provide mix proportion data using at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required. If source material changes, resubmit mix proportion data using revised source material. No material shall be provided unless proven by trial mix studies to meet the requirements of this specification, and approved in writing by LANL. Clearly indicate where each mix design will be used when more than one mix design is submitted. Submit additional data regarding concrete aggregates if the source of aggregate changes. In addition, copies of the fly ash, [silica fume], and pozzolan test results shall be submitted. The approval of fly ash, [silica fume], and pozzolan test results shall have been within 6 months of submittal date. Obtain acknowledgement of LANL's approval of the concrete mix design prior to concrete placement. Note, design mixes intended to provide more flexibility than the stated ranges [slump, air content, water cement ratio, etc.] must obtain a formal variance to the specification.</p> <ol style="list-style-type: none"> 1. Submit separate mix design for: <ol style="list-style-type: none"> a. Each concrete strength b. Each specified or range of air content c. Each specified or range of slump d. Each nominal maximum aggregate size 	30 days prior to use of the concrete mix	03 3001 2.7 and ACI 301 4.1.2.3

Table 1.A. Submittals Always Required.

No.	Submittal	Timing	Source
	<ul style="list-style-type: none"> e. Concrete to be pumped f. Concrete with identifiable admixtures <p>2. Include the following information with each design:</p> <ul style="list-style-type: none"> a. Quantity of Water b. Type, brand, certification, and quantity of cement c. Source, certification, and quantity of each nominal maximum size of aggregate d. Type, brand, sources, certification and quantity of admixture, if used e. Type, source, certification and quantity of fly ash f. Water/cement ratio g. Air-content h. Slump i. Aggregate-correction factor to meet ASTM C 231. <p>3. Test Reports for each design:</p> <ul style="list-style-type: none"> a. Concrete mix tests including strength in accordance with ACI 301, ASR resistance for mix (in accordance with ASTM C 1260 (C1567 w/ fly ash) or AASHTO T 303-00), air content, weight and yield (ASTM C 138). b. All mix designs (except pre-approved LATM mix designs –see Paragraph 2.7H) shall be tested for durability in accordance with ASTM C 666. c. Copies of laboratory test reports showing that the mix has been successfully tested to produce concrete with the properties specified and that mix will be suitable for the job conditions. The laboratory test reports shall include manufacturer's certified material test and all other tests for cement, fly ash [slag], [silica fume], aggregates, and admixtures. Provide maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Test reports shall be submitted along with any new concrete mix design. Obtain approval from LANL before concrete placement. d. Fly ash and other pozzolans: ASTM C 618. e. Ground blast furnace slag, where used, ASTM C 989. f. Aggregates, petrographic analysis, ASTM C 295 and potential ASR use ASTM C 1260 (with no additives such as fly ash) or one of several other ASTM tests for ASR (ASTM C 227, ASTM C 289, ASTM C 1293, or ASTM C 1567). g. Unless otherwise stated, the time restrictions associated with the above tests shall comply with ACI 301. 		
A-25	Mixture proportions and characteristics: Evidence that mixture proportions conform to the requirements of 4.2.2 for cementitious material content, water-to-cementitious material ratio, slump, nominal maximum size of coarse aggregate, air content, admixtures, and chloride-ion concentration, as well as compressive strength and yield.	Approximately 15 work days (or 3 weeks) before the planned placement	ACI 301 4.1.2.1

Table 1.A. Submittals Always Required.

No.	Submittal	Timing	Source
A-26	<p>Method and test data used to establish mixture proportions: Several different methods can be used to select mixture proportions to produce the necessary placeability, density, strength, and durability of the concrete. Field experience of concrete mixtures previously used under similar conditions provides the best assurance that the proposed concrete mixture can be used satisfactorily and will have the specified properties. If there is no field experience, ACI 211.1 provides guidance for selection of the initial quantities of materials based on material properties and specified concrete properties. When a field test record is not available, ACI 211.1 recommends that mixture characteristics be checked by trial batches in the laboratory or in the field. Blending aggregates to meet criteria for a combined grading is another proportioning method that can be used. Listed below are some of the different procedures that have been used to determine proportions of blended aggregates:</p> <ul style="list-style-type: none"> • Combined fineness modulus; • 8 to 18% retained on each of the standard sieves; • Coarseness factor chart; and • 0.45 power chart. <p><u>When one of the above or other similar proportioning methods is used, submit the specific combined grading to which aggregate is to be blended, along with the tolerances for control.</u> This proportioning method also requires concrete characteristics to be checked by trial batches.</p>	Approximately 15 work days (or 3 weeks) before the planned placement	ACI 301 4.1.2.2, 4.2.3.4.a
A-27	Materials, mixture proportions, and field strength-test data used for proportioning.	To support mix design sequence	ACI 301, 4.1.2.4.
A-28	Requests for adjustments to mixture proportions.	Two weeks before use in a placement	ACI 301 4.1.2.6
A-29	Evaluation and test results required in 4.2.2.1 verifying the adequacy of concrete to be placed in floors if the cementitious materials content is less than the minimum specified in Table 4.2.2.1 of ACI 301 [2005].	15 days before the initial placement.	ACI 301 4.1.2.7
Handling, Placing, and Constructing			
A-30	<p>Test and inspection records. Note: This applies to the Subcontractor when the test agency reports to them contractually.</p>	Within 30 days after the placement	ACI 301 5.1.2.1.a
A-31	Description of conveying equipment.	15 days before the initial placement.	ACI 301 5.1.2.2.b
A-32	Proposed method of measuring concrete surface temperature changes.	15 days before the initial placement.	ACI 301 5.1.2.1.b
A-33	Proposed method for removal of stains, rust, efflorescence, and surface deposits.	15 days before performing the work	5.1.2.2.b
A-34	Qualifications of finishing Subcontractor and flatwork finishers (ACI flatwork certification).	15 days before the initial placement.	ACI 301 5.1.2.1.c
A-35	Shop drawings of placing, handling, and constructing methods.	15 days before the initial placement.	ACI 301 5.1.2.1.d
A-36	Advance notification of forthcoming placement. Arrange for tests and inspection to be properly coordinated.	48 hours notice for first placement and 24 hours for all other placements	ACI 301 5.1.2.1.e

Table 1.A. Submittals Always Required.

No.	Submittal	Timing	Source
A-37	Request for acceptance of pre-placement activities to ensure the pre-placement activities are properly inspected, if necessary.	48 hours notice before placement	ACI 301 5.1.2.1.f.
A-38	Proposed wet-weather protection activities.	48 hours notice before placement	ACI 301 5.1.2.2.c, 5.3.2.1.a
A-39	Bonding agents other than cement grout for two-course slabs.	15 days before the initial placement.	ACI 301 5.1.2.3.b and spec. 2.6.A
A-40	<p>Batch Tickets</p> <ol style="list-style-type: none"> 1. Two legible copies of the batch ticket for each load of concrete to LANL's STR, field engineer, or inspector. 2. Conform to the requirements for batch tickets in accordance with ASTM C 94. Include the following information: <ol style="list-style-type: none"> a. Name of ready-mix batch plant. b. Serial number of ticket. c. Date. d. Truck number. e. Name of purchaser. f. Specific designation of job (name and location). g. Specific class or designation (pre-approved design mix number) of the concrete in conformance with that employed in job specifications. h. Amount of concrete in cubic yards (or cubic meters). i. Time loaded or of first mixing of cement and aggregates. j. Water added by receiver of concrete and his initials. Note: any water added to the truck must also be witnessed by the LANL field engineer or inspector. k. Reading of revolution counter at the end of concrete placement. l. Type and amount of cement. m. Type and amount of admixtures. n. Class and amount of coal fly ash, raw or calcined natural pozzolans [grade, brand and amount of ground granulated blast-furnace slag]. o. Information necessary to calculate the total mixing water. Total mixing water includes free water on the aggregates, water, and ice batched at the plant, and water added by the truck operator from the mixer tank (must be witnessed by LANL representative). p. Maximum size of aggregate. q. Weights of fine and coarse aggregate. r. Water /cement ratio s. Amount of water that can be added at the jobsite without exceeding the water/cement ratio. t. Signature or initials of ready-mix representative. <p>(1) Record on each, and time of placement.</p>	<p>At the completion of each day's concrete placement(s)</p> <p>At the completion of each days concrete placement(s)</p>	03 3001

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 03 3001, Rev. 5, dated April 23, 2012.

SECTION 03 3053
MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Concrete sidewalks, drive pads, and median pavement.
- B. Concrete curb and gutters.
- C. Concrete for fence posts and bollards.
- D. Concrete thrust blocks on utility lines

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 03 3001, "Reinforced Concrete."
- C. Section 31 2000, "Earth Moving."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Material certifications documenting compliance with the New Mexico Department of Transportation (NMDOT) Standard Specifications for Highway and Bridge Construction (SSHBC) including any Supplemental or Interim Specifications (i.e., latest specs), exclude NMDOT Division 100, General Provisions, and any other references to METHOD OF MEASUREMENT, to BASIS OF PAYMENT, and for pay factor determination. Guidance: Document(s) at http://dot.state.nm.us/content/dam/nmdot/Plans_Specs_Estimates/2007_Specs_for_Highway_and_Bridge_Construction.pdf
- B. Design mix of each class of concrete.
- C. Laboratory test reports for design mix for concrete.
- D. Test Reports of Concrete Field Testing.
- E. Batch tickets.

1.5 QUALITY ASSURANCE

- A. Perform work, materials and construction requirements, in accordance with the NMDOT SSHBC, Section 608, Sidewalks, Drive Pads, and Concrete Median Pavement and NMDOT SSHBC Section 609, Curb and Gutter.
- B. Furnish and place concrete in conformance to the NMDOT Supplemental SSHBC Section 510.

1.6 JOB CONDITIONS

- A. Do not place concrete when base surface temperature is less than 40 °F.
- B. Perform concrete washout, trucks and mixers, in a designated and controlled area to prevent the runoff of washout material and the co-mingling of unset concrete with storm water. Properly dispose of all hardened concrete.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide materials and construction requirements for forms, concrete, joints, and required accessories conforming to NMDOT SSHBC Section 608, Sidewalks, Drive Pads, and Concrete Median Pavement and NMDOT SSHBC Section 609, Curb and Gutter.

2.2 ACCESSORIES

- A. Joint Fillers shall be preformed and conform to the requirements of AASHTO M 33 or M153.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify compacted, treated base is ready to support concrete and imposed loads.
- B. Verify grades and elevations of base are correct.
- C. Verify forms are set to the required grade and alignment and extend to the required depth.

3.2 PLACING CONCRETE

- A. Notify the LANL Subcontract Technical Representative (STR) a minimum of 24 hours prior to commencement of concreting operations.
- B. Ensure that reinforcement, inserts, embedded parts, fence posts, formed joint fillers, joint devices, and formwork are not disturbed during concrete placement.
- C. Concrete shall be placed in the forms in one layer. The concrete shall be consolidated with an approved vibrator, and the surface shall be finished to grade with a strike off.
- D. Install joint fillers, primer and sealant in accordance with manufacturer's instructions.
- E. Install joint devices in accordance with manufacturer's instructions.
- F. Place concrete continuously between predetermined expansion, control, and construction joints.
- G. Concrete Finishing
 - 1. The surface shall be finished true to grade and section with a wood float or darby to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. Sidewalks shall receive a scored surface produced by brooming with a fiber-bristle brush in a direction transverse to that of the traffic, followed by edging.

2. All slab edges, including those at formed joints, shall be finished with an edger having a radius of 1/4 inch.
3. Finished surfaces shall not vary more than 1/4 inch from the testing edge of a 10-foot straightedge.
4. Slope top of concrete fence post bases to provide positive drainage.
5. Finish thrust blocks to the extent where surface voids are eliminated.

3.3 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury.
- B. Use all applicable practice and recommendations: for hot weather concrete application, from ACI 305R; for cold weather concrete applications from ACI 306R; for curing from ACI 308.

3.4 FIELD QUALITY CONTROL

- A. Provide a certified testing agency to perform field testing in accordance with ACI 301. Testing laboratory certification may be provided by Cement and Concrete Reference Lab (CCRL).
 1. Testing agencies for performing testing services on concrete materials shall meet the requirements of ASTM C 1077.
 2. Field testing of concrete shall be performed by an ACI Certified Concrete Field Testing Technician – Grade I.
- B. Notify the LANL STR 48 hours in advance of field testing to allow for witnessing of testing.
- C. The Testing Agency shall perform the following tests and collect strength cylinders on one batch in every 50 cu. yds. of concrete placed or once a day when less than 50 cu. yds. is placed.
 1. Record temperature of concrete in accordance with ASTM C 1064.
 2. Perform slump test in accordance with ASTM C 143.
 3. Perform air content test in accordance with ASTM C 231, pressure method.
 4. Take 4 concrete strength test cylinders in accordance with ASTM C 31.
- D. The Testing Agency shall test the strength test cylinders in accordance with ASTM C 39 at 7 days and 28 days.
- E. Concrete to be used for nonstructural purposes that comprises an aggregate of less than 2 cu. yds. (i.e., per project) does not require field testing provided the concrete is mixed per manufacturer's instructions or approved mix design parameters. For the purposes of this testing exclusion, "nonstructural" will be taken to mean concrete on or below the ground surface that will not adversely affect Life Safety and does not require a structural design. Examples of such concrete that meet this definition of nonstructural include sidewalks, curbs and gutters, thrust blocks, valve boxes and test box collars, post and pole anchorage when under 8' tall, and manhole collars in non-vehicle-traffic-bearing areas.

3.5 DEFECTIVE CONCRETE

- A. Defective concrete is concrete not conforming to strength requirements, not being free from excessive cracking, discoloration, form marks, tool marks, honeycombs, embedded debris, or otherwise non-consistent with the overall appearances of the work.
- B. Do not accept or place defective concrete that is not in conformance with acceptance criteria. Return the fresh concrete to the supplier.
- C. Replace defective concrete not meeting appearance criteria, at Subcontractor's expense. The STR may allow repair of defective concrete at Subcontractor's expense.
- D. Replace concrete not in conformance with details, tolerances, and other construction requirements at Subcontractor's expense.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 03 3053, Rev. 4, dated April 29, 2008.

SECTION 03 4100
PRECAST STRUCTURAL CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Precast structural concrete.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.3 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 01 4444, "Offsite Welding & Joining Requirements."
- C. Section 01 4455, "Onsite Welding & Joining Requirements."
- D. Section 03 1505, "Cast-In-Place Concrete Anchors," for placing connection anchors in concrete.
- E. Section 03 3001, "Reinforced Concrete," for cast-in-place concrete topping slab.
- F. Section 07 9200, "Joint Sealants" for elastomeric joint sealants and sealant backings.

1.4 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.5 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design precast structural concrete, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Provide precast structural concrete units and connections capable of withstanding the following design loads within limits and under conditions per ASCE 7-05, ACI 318-08 Chapter 16, PCI MNL-120 and indicated:
 - 1. Dead Loads: 21.5PSF + weight of precast units.
 - 2. Concrete Topping Load: 50PSF.
 - 3. Roof Live Loads: 30PSF.
 - 4. Equipment Live Load: Actual weight of equipment, as indicated on the drawings.
 - 5. Snow Loads: $P_f = 16.2\text{PSF}$, $P_g = 16.0\text{PSF}$. Include unbalanced loads due to snow drift.

6. Wind Loads: As required by ASCE 7-05 for uplift, with the following criteria:
 - a. $V=90\text{MPH}$
 - b. Exposure C
 - c. $I_w=1.0$
 - d. $q_h=23.55\text{PSF}$
7. Load combinations per IBC 2009, 1605.2.1.
8. Design precast structural concrete framing system and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live-load deflection, shrinkage and creep of primary building structure, and other building movements. Maintain precast structural concrete deflections within limits of ACI 318 (ACI 318M).
 - a. Thermal Movements: Allow for in-plane thermal movements resulting from annual ambient temperature changes of minus 18 to plus 102 deg F.
9. Fire-Resistance Rating: Select material and minimum thicknesses to provide indicated fire rating.
10. Topping slab is designed as a part of the lateral force resisting system (LFRS). The topping slab is designed to be non-composite with the precast double tees.

1.6 SUBMITTALS

- A. Product Data: For each type of product indicated.
 1. Data for aggregates shall indicate source, and shall include a list of non-reactive aggregate sources tested to date from the New Mexico State Materials Bureau, and ASR test data to support the inclusion on the list.
- B. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.
- C. Shop Drawings: Include member locations, plans, elevations, dimensions, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement. Detail fabrication and installation of precast structural concrete units.
 1. Indicate joints, reveals, and extent and location of each surface finish.
 2. Indicate separate face and backup mixture locations and thicknesses.
 3. Indicate welded connections by AWS standard symbols. Show size, length, and type of each weld.
 4. Detail loose and cast-in hardware, lifting and erection inserts, connections, and joints.
 5. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
 6. Indicate tendon profile, supports, and locations.
 7. Include and locate openings larger than by 10 inches (250 mm).

8. Indicate location of each precast structural concrete unit by same identification mark placed on panel.
 9. Indicate locations and magnitude of prestressing forces
 10. Indicate relationship of precast structural concrete units to adjacent materials.
 11. Indicate estimated camber for precast slabs with concrete toppings.
 12. Indicate shim sizes and grouting sequence.
 13. Provide handling procedures, erection sequence, and for special conditions provide temporary bracings and shoring plan.
 14. Design Calculations: as required to demonstrate full compliance with the code of record, including but not limited to strength design and serviceability for members and connections, for fabrication, transit, erection, construction, and final in place loads.
 15. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.
- D. Delegated-Design Submittal: For precast structural concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- E. Qualification Data: For installer, fabricator, testing agency, and ready mix provider, as per section 1.8, provide evidence of PCI and NRMCA Certification, and compliance with the requirements of IBC and LANL ESM Chapter 16.
- F. Welding certificates.
- G. Material Certificates: For the following, from manufacturer:
1. Cementitious materials.
 2. Reinforcing materials and prestressing tendons.
 3. Admixtures.
 4. Bearing pads.
 5. Structural-steel shapes and hollow structural sections.
- H. Material Test Reports: For aggregates.
- I. Source quality-control reports.
- J. Field quality-control reports. Concrete break test data shall be in compliance with LANL Specifications and LANL ESM-SDT-342-100. Jack calibration records shall be in accordance with MNL-116-5.2.7.

1.7 CLOSE-OUT SUBMITTALS

- A. Maintenance Data: For Precast Structural Concrete
- B. Warranties:
1. Submit copy of the Precast Structural Concrete manufacturer's warranty covering materials.

2. Submit copy of the Precast Structural Concrete warranty covering workmanship.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm that assumes responsibility for engineering precast structural concrete units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
 1. Participates in PCI's Plant Certification program and is designated a PCI-certified plant as follows:
 - a. Group C, Category C4 - Prestressed Deflected Strand Structural Members.
- B. Concrete shall be provided by a batch plant certified (and maintain current certification) under the NRMCA (National Ready Mix Concrete Association) process.
- C. Installer Qualifications: An experienced precast concrete erector who, before erection of precast concrete, has retained a "PCI-Certified Field Auditor" to conduct a field audit of a project installed by erector in Category S1 - Simple Structural Systems and who produces an Erectors' Post Audit Declaration, according to PCI MNL 127, "PCI Erector's Manual - Standards and Guidelines for the Erection of Precast Concrete Products."
- D. Testing Agency Qualifications: Testing agencies that perform concrete related testing shall be nationally accredited in accordance with ASTM C1077 and testing agencies that perform reinforcing steel testing shall meet ASTM E329. For field and laboratory testing agencies and testing personnel request approval by the LANL Building Official, or designee, in accordance with the provisions of the IBC and the LANL Engineering Standards Manual Chapter 16.
- E. Design Standards: Comply with ACI 318 (ACI 318M) and design recommendations in PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of precast structural concrete units indicated.
- F. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products."
- G. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D1.1/D.1.1M, "Structural Welding Code - Steel."
 2. AWS D1.4, "Structural Welding Code - Reinforcing Steel."
- H. Preinstallation Conference: Conduct conference at the job site.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Support units during shipment on nonstaining shock-absorbing material in same position as during storage.
- B. Store units with adequate bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.

1. Store units with dunnage across full width of each bearing point unless otherwise indicated.
 2. Place adequate dunnage of even thickness between each unit.
 3. Place stored units so identification marks are clearly visible, and units can be inspected.
- C. Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses that would cause cracking or damage.
- D. Lift and support units only at designated points shown on Shop Drawings.

1.10 COORDINATION

- A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Fabricators: Subject to compliance with requirements, [provide products by one of the following] [available fabricators offering products that may be incorporated into the Work include, but are not limited to, the following]:
1. Coreslab Structures, 2800 2nd St. Sch. P.O. Box 1609, Albuquerque, NM 87103 (505)-247-3725
 2. Ferreri Concrete Structures Inc., 6151 Chappell Rd., Albuquerque, NM 87113, (505)-344-8823.
 3. Castillo Prestress, 6 Lopez Loop, Belen, NM 87002, (505)864-0238.

2.2 MOLD MATERIALS

- A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.
1. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
- B. Surface Retarder: Chemical set retarder, capable of temporarily delaying final hardening of newly placed concrete mixture to depth of reveal specified.

2.3 REINFORCING MATERIALS

- A. Reinforcing steel must come from a CRSI certified plant.
- B. All reinforcing steel must be traceable to manufacturer approved Certified Material Test Reports (CMTR's).
- C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- D. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars, assembled with clips.

- E. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from [as-drawn steel] [galvanized-steel] wire into flat sheets.
- F. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
- G. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.

2.4 PRESTRESSING TENDONS

- A. Pretensioning Strand: ASTM A 416/A 416M, Grade 250 (Grade 1720) or Grade 270 (Grade 1860), uncoated, 7-wire or ASTM A 886/A 886M, Grade 270 (Grade 1860), indented, 7-wire, low-relaxation strand.
- B. Unbonded Post-Tensioning Strand: ASTM A 416/A 416M, Grade 270 (Grade 1860), uncoated, 7-wire, low-relaxation strand.
 - 1. Coat unbonded post-tensioning strand with post-tensioning coating complying with ACI 423.6 and sheath with polypropylene tendon sheathing complying with ACI 423.6. Include anchorage devices and coupler assemblies.

2.5 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I, or I/II, gray, unless otherwise indicated.
 - 1. For surfaces exposed to view in finished structure, mix gray with white cement, of same type, brand, and mill source.
- B. Supplementary Cementitious Materials:
 - 1. Fly Ash: ASTM C 618, Class F, with maximum loss on ignition of 3 percent.
 - 2. Metakaolin Admixture: ASTM C 618, Class N.
 - 3. Silica Fume Admixture: ASTM C 1240, with optional chemical and physical requirement.
 - 4. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- C. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33, with coarse aggregates complying with Class 5M. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
 - 1. Alkali-Silica Reactivity: Aggregates shall be considered "non-reactive" by the New Mexico State Bureau of Materials, as evident by the inclusion of the aggregate source on the list provided by the Bureau of non-reactive aggregate sources tested to date.
 - 2. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.
 - a. Gradation: Uniformly graded.
 - 3. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand of same material as coarse aggregate unless otherwise approved by the A/E.

- D. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.
- E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.
 - 1. Water-Reducing Admixtures: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
 - 5. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 7. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M.
- G. Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

2.6 STEEL CONNECTION MATERIALS

- A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.
- B. Carbon-Steel-Headed Studs: ASTM A 108, AISI 1018 through AISI 1020, cold finished, AWS D1.1/D1.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 116.
- C. Carbon-Steel Plate: ASTM A 283/A 283M.
- D. Carbon-Steel Castings: ASTM A 27/A 27M, Grade 60-30 (Grade 415-205).
- E. High-Strength, Low-Alloy Structural Steel: ASTM A 572/A 572M.
- F. Carbon-Steel Structural Tubing: ASTM A 500, Grade B.
- G. Wrought Carbon-Steel Bars: ASTM A 675/A 675M, Grade 65 (Grade 450).
- H. Deformed-Steel Wire or Bar Anchors: ASTM A 496 or ASTM A 706/A 706M.
- I. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A 563 (ASTM A 563M); and flat, unhardened steel washers, ASTM F 844.
- J. High-Strength Bolts and Nuts: ASTM A 325 (ASTM A 325M) or ASTM A 490 (ASTM A 490M), Type 1, heavy hex steel structural bolts; heavy hex carbon-steel nuts, ASTM A 563 (ASTM A 563M); and hardened carbon-steel washers, ASTM F 436 (ASTM F 436M).
 - 1. Do not zinc coat ASTM A 490 (ASTM A 490M) bolts.

- K. Zinc-Coated Finish: For exterior steel items and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A 123/A 123M or ASTM A 153/A 153M.
 - 1. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5 times phosphorous content to 0.09 percent.
 - 2. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035B or SSPC-Paint 20.
- L. Shop-Primed Finish: Prepare surfaces of nongalvanized-steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 3, and shop apply lead- and chromate-free, rust-inhibitive primer, complying with performance requirements in MPI 79 according to SSPC-PA 1.
- M. Welding Electrodes: Comply with AWS standards.
- N. Double-Tee Stem Anchor Channels: Provide Halfen Double-Tee Stem Anchor, part number HDT9100 or HDT9100-120 as required by the drawings, standard finish.
- O. Precast Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install precast structural concrete units.

2.7 BEARING PADS

- A. Provide one of the following bearing pads for precast structural concrete units as recommended by precast fabricator for application:
 - 1. Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, 50 to 70 Shore, Type A durometer hardness, ASTM D 2240; minimum tensile strength 2250 psi (15.5 MPa), ASTM D 412.
 - 2. Random-Oriented, Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer. 70 to 90 Shore, Type A durometer hardness, ASTM D 2240; capable of supporting a compressive stress of 3000 psi (20.7 MPa) with no cracking, splitting, or delaminating in the internal portions of pad. Test 1 specimen for every 200 pads used in Project.
 - 3. Cotton-Duck-Fabric-Reinforced Elastomeric Pads: Preformed, horizontally layered cotton-duck fabric bonded to an elastomer; 80 to 100 Shore, Type A durometer hardness, ASTM D 2240; complying with AASHTO's "AASHTO Load and Resistance Factor Design (LRFD) Bridge Specifications," Division II, Section 18.10.2; or with MIL-C-882E.

2.8 GROUT MATERIALS

- A. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time.

2.9 CONCRETE MIXTURES

- A. Prepare design mixtures for each type of precast concrete required.
 - 1. All design mixtures must have a minimum of 20% fly ash. Provide test reports for ASR resistance for mix in accordance with ASTM C 1260 (C1567 w/ fly ash) or AASHTO T 303-00.
 - 2. Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
 - 3. Limit use of fly ash to 25 percent replacement of portland cement by weight and granulated blast-furnace slag to 40 percent of portland cement by weight; metakaolin and silica fume to 10 percent of portland cement by weight.
- B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.
- C. Design mixtures must be pre-approved for use by the New Mexico Department of Transportation for precast prestressed concrete.
- D. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 116 when tested according to ASTM C 1218/C 1218M.
- E. Normal-Weight Concrete Mixtures: Proportion by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 5000 psi (34.5 MPa).
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
- F. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 116.
- G. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.
- H. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.
- I. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.10 MOLD FABRICATION

- A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.
 - 1. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during concrete placement. Coat form liner with form-release agent.

- B. Maintain molds to provide completed precast structural concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.
 - 1. Form joints are not permitted on faces exposed to view in the finished work.
 - 2. Edge and Corner Treatment: Uniformly chamfered.

2.11 FABRICATION

- A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
 - 1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."
- B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast structural concrete units to supporting and adjacent construction.
- C. Cast-in reglets, slots, holes, and other accessories in precast structural concrete units as indicated on the Contract Drawings.
- D. Cast-in openings larger than 10 inches (250 mm) in any dimension. Do not drill or cut openings or prestressing strand without the A/E's approval.
- E. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement:
 - 1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcement exceeds limits specified, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.
 - 2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
 - 3. Place reinforcing steel and prestressing strand to maintain at least 3/4-inch (19-mm) minimum concrete cover. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
 - 4. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.
- F. Reinforce precast structural concrete units to resist handling, transportation, and erection stresses.
- G. Prestress tendons for precast structural concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 116:

1. Delay detensioning or post-tensioning of precast, prestressed structural concrete units until concrete has reached its indicated release compressive strength as required by design or 3500 psi minimum, as established by test cylinders cured under same conditions as concrete.
 2. Detension pretensioned tendons either by gradually releasing tensioning jacks or by heat cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.
 3. If concrete has been heat cured, detension while concrete is still warm and moist to avoid dimensional changes that may cause cracking or undesirable stresses.
 4. Protect strand ends and anchorages with bituminous, zinc-rich, or epoxy paint to avoid corrosion and possible rust spots.
 5. Protect strand ends and anchorages with a minimum of 1-inch- (25-mm-) thick, nonmetallic, nonshrink, grout mortar and sack rub surface. Coat or spray the inside surfaces of pocket with bonding agent before installing grout.
- H. Comply with requirements in PCI MNL 116, Division 4 and in this section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
- I. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units.
- J. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 116 4.17.
- K. Comply with ACI 306.1 procedures for cold-weather concrete placement.
- L. Comply with PCI MNL 116 procedures for hot-weather concrete placement.
- M. Identify pickup points of precast structural concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast structural concrete unit on a surface that will not show in finished structure.
- N. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units as required by design or 3500 psi minimum, as established by test cylinders cured under same conditions as concrete.
- O. Discard and replace precast structural concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 116 and meet the A/E's approval.

2.12 FABRICATION TOLERANCES

- A. Fabricate precast structural concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL 116 Division 7 and Appendix B product dimension tolerances.

2.13 COMMERCIAL FINISHES

- A. Standard Grade: Normal plant-run finish produced in molds that impart a smooth finish to concrete. Surface holes smaller than 1/2 inch (13 mm) caused by air bubbles, normal color variations, form joint marks, and minor chips and spalls are permitted. Fill air holes greater than 1/4 inch (6 mm) in width that occur more than once per 2 sq. in (1300 sq. mm). Major or unsightly imperfections, honeycombs, or structural defects are not permitted. Limit joint offsets to 1/8 inch (3 mm).
- B. Screed or float finish unformed surfaces. Strike off and consolidate concrete with vibrating screeds to a uniform finish. Hand screed at projections. Normal color variations, minor indentations, minor chips, and spalls are permitted. Major imperfections, honeycombing, or defects are not permitted.
- C. Smooth, steel trowel finish unformed surfaces. Consolidate concrete, bring to proper level with straightedge, float, and trowel to a smooth, uniform finish.
- D. Apply roughened surface finish according to ACI 318 (ACI 318M) 11.6.9 to precast concrete units that will receive concrete topping after installation. Interface shall be roughened to a full amplitude of 1/4 in.

2.14 SOURCE QUALITY CONTROL

- A. Testing Agency: Subcontractor will engage a qualified testing agency to evaluate precast structural concrete fabricator's quality-control and testing methods.
 - 1. Allow testing agency and Owner's Special Inspector access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with testing agency and provide samples of materials and concrete mixtures as may be requested for additional testing and evaluation. The work shall be subject to inspection at all times by the testing agency and Owner's Special inspector for the purpose of determining that the work is properly executed in accordance with this specification. Failure to detect defective workmanship or material during any interim inspection shall not constitute acceptance of workmanship and materials.
- B. Testing: Test and inspect precast structural concrete according to PCI MNL 116 requirements.
- C. Strength of precast structural concrete units will be considered deficient if units fail to comply with ACI 318 (ACI 318M) requirements for concrete strength.
- D. If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 (ACI 318M) requirements, employ a qualified testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42/C 42M.
 - 1. A minimum of three representative cores will be taken from units of suspect strength, from locations directed by the A/E.
 - 2. Cores will be tested in an air-dry condition.
 - 3. Strength of concrete for each series of 3 cores will be considered satisfactory if average compressive strength is equal to 5000 psi and no single core is less than 4250 psi.

4. Test results in compliance with 1.6 I will be made in writing on same day that tests are performed, with copies to the A/E, Contractor, and precast concrete fabricator. Test reports will include the following:
 - a. Project identification name and number.
 - b. Date when tests were performed.
 - c. Name of precast concrete fabricator.
 - d. Name of concrete testing agency.
 - e. Identification letter, name, and type of precast concrete unit(s) represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.
- E. Patching: If core test results are satisfactory and precast structural concrete units comply with requirements, clean and dampen core holes and solidly fill with same precast concrete mixture that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.
- F. Defective Units: Discard and replace precast structural concrete units that do not comply with requirements, including strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to A/E approval. The A/E reserves the right to reject precast units that do not match approved samples, sample panels, and mockups.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Do not install precast concrete units until supporting, cast-in-place, building structural framing has attained minimum allowable design compressive strength or until supporting steel or other structure is complete.

3.2 INSTALLATION

- A. Install clips, hangers, bearing pads, and other accessories required for connecting precast structural concrete units to supporting members and backup materials.
- B. Erect precast structural concrete level, plumb, and square within specified allowable tolerances. Provide temporary structural framing, supports, and bracing as required to maintain position, stability, and alignment of units until permanent connection.
 1. Install temporary steel or plastic spacing shims or bearing pads as precast structural concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
 2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.

3. Remove projecting lifting devices and grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.
- C. Connect precast structural concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.
 1. Do not permit connections to disrupt continuity of roof flashing.
- D. Field cutting of precast units is not permitted without approval of the A/E.
- E. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units.
- F. Welding: Comply with applicable Specifications Section 01-4444, Section 01-4455, AWS D1.1/D1.1M and AWS D1.4 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
 1. Protect precast structural concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.
 2. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and apply a minimum 4.0-mil- (0.1-mm-) thick coat of galvanized repair paint to galvanized surfaces according to ASTM A 780.
 3. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and reprime damaged painted surfaces.
 4. Remove, reweld, or repair incomplete and defective welds.
- G. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.
- H. Grouting: Grout connections and joints and open spaces at keyways, connections, and joints where required or indicated on Shop Drawings. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled.
 1. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces.
 2. Fill joints completely without seepage to other surfaces.
 3. Trowel top of grout joints on roofs smooth and uniform. Finish transitions between different surface levels not steeper than 1 to 12.
 4. Place grout end cap or dam in voids at ends of hollow-core slabs.
 5. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.
 6. Keep grouted joints damp for not less than 24 hours after initial set.

3.3 ERECTION TOLERANCES

- A. Erect precast structural concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135-00.

- B. Minimize variations between adjacent slab members by jacking, loading, or other method recommended by fabricator and approved by the A/E.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections.
- B. Testing Agency: Subcontractor will engage a qualified testing agency to perform tests and inspections.
- C. Field welds will be visually inspected and nondestructive tested according to ASTM E 165 or ASTM E 709. High-strength bolted connections will be subject to inspections.
- D. Testing agency will report test results promptly and in writing to Contractor, Subcontractor and the A/E.
- E. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.
- F. Additional testing and inspecting, at Subcontractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- G. Prepare test and inspection reports.

3.5 REPAIRS

- A. Repair precast structural concrete units if permitted by the A/E.
 - 1. Repairs may be permitted if structural adequacy, serviceability, durability, and appearance of units has not been impaired.
- B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet (6 m).
- C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.
- D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.
- E. Remove and replace damaged precast structural concrete units that cannot be repaired or when repairs do not comply with requirements as determined by the A/E.

3.6 CLEANING

- A. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.
- B. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
 - 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's written recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges,

and rinse with clean water. Protect other work from staining or damage due to cleaning operations.

2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION

SECTION 04 2220
REINFORCED UNIT MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Concrete masonry units, reinforcement, anchorage, mortar, grout, and accessories.

1.2 SECTION DOES NOT INCLUDE

- A. Section does not include inspection, testing, verification, etc. These items are addressed in the Engineer of Record's Statement of Special Inspections (EOR's SSI) located in the *Test and Special Inspection Plan for the TA-50 Radioactive Liquid Waste Treatment Facility – Upgrade Project (RLWTF-UP) Low-Level Waste Subproject (60239831-TPLN-001)*.

1.3 RELATED SECTIONS

- A. Section 01 4000, "Quality Requirements."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- C. Section 01 6000, "Product Requirements."
- D. Section 01 7700, "Closeout Procedures."
- E. Section 07 9200, "Joint Sealants," sealant and backing material at joints.

1.4 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. American Concrete Institute:
 - 1. ACI 530, *Building Code Requirements for Masonry Structures*.
 - 2. ACI 530.1, *Specification for Masonry Structures*.
 - 3. IBC, Chapter 21, "International Building Code, Masonry."
- C. ASTM International:
 - 1. ASTM A 153, *Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware*.
 - 2. ASTM A 307, *Standard Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength*.
 - 3. ASTM A 580, *Standard Specification for Stainless Steel Wire*.
 - 4. ASTM A 615, *Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement*.
 - 5. ASTM A 706, *Standard Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement*.
 - 6. ASTM A 951, *Standard Specification for Masonry Joint Reinforcement*.

7. ASTM C 90, *Standard Specification for Loadbearing Concrete Masonry Units*.
 8. ASTM C 129, *Standard Specification for Nonloadbearing Concrete Masonry Units*.
 9. ASTM C 140, *Standard Test Methods of Sampling and Testing Concrete Masonry Units*.
 10. ASTM E 84, *Test Method for Surface Burning Characteristics of Building Materials*.
 11. ASTM E 119, *Standard Test Methods for Fire Tests of Building Construction and Materials*.
- D. National Fire Protection Association:
1. NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*.
- E. Underwriters Laboratories, Inc.:
1. UL 723, *Tests for Surface Burning Characteristics of Building Materials*.

1.5 PERFORMANCE REQUIREMENTS

- A. Concrete Masonry Compressive Strength (f'm): 1,500 psi; determined by unit strength method.
1. Concrete Masonry Units: 1,900 psi minimum net area compressive strength.

1.6 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Shop Drawings: Indicate bars sizes, grades, spacings, locations, reinforcement quantities, bending and cutting schedules, supporting and spacing devices for reinforcement.
- B. Product Data: Submit data for masonry units, joint devices, wire and bar reinforcement, wall ties, admixtures, anchors and other accessories.
- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.7 QUALITY ASSURANCE

- A. Work identified in this section shall be done under a Quality Assurance Program (QAP) in accordance with Section 01 4000, "Quality Requirements."
- B. Perform work in accordance with IBC, Chapter 21 and, as amended therein, ACI 530 and ACI 530.1, Level B Quality Assurance. If conflicts arise between the aforementioned documents and this section, notify the EOR / Structural POC via the STR.
- C. Field Quality Control: As required in EOR's SSI.
- D. Fire Rated Construction: Rating as indicated on Drawings.
1. Tested Rating: Determined in accordance with ASTM E 119.
 2. Prescriptive Rating: Determined in accordance with applicable code.

- E. Surface Burning Characteristics:
 - 1. Foam Insulation: Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E 84.
- F. Apply label from agency approved by authority having jurisdiction to identify each foam plastic insulation insert.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 6000, "Product Requirements" – Product storage and handling requirements.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Cold Weather Requirements: In accordance with ACI 530.1, Article 1.8C, when either the ambient temperature or the temperature of masonry units is less than 40 °F (4 °C).
- B. Hot Weather Requirements: In accordance with ACI 530.1, Article 1.8D, when ambient temperature is greater than 100 °F (38 °C), or ambient temperature is greater than 90 °F (32 °C) with wind velocity greater than 8 mph.

1.10 COORDINATION

- A. Coordinate masonry work with installation of window and door anchors.

PART 2 PRODUCTS

2.1 COMPONENTS

- A. Hollow Load Bearing Concrete Masonry Units (CMU): ASTM C 90; normal weight.
- B. Solid Load-Bearing Concrete Masonry Units (CMU): ASTM C 90; normal weight.
- C. Concrete Masonry Unit Size and Shape: Nominal modular size of 16 x 8 x 8 inches. Furnish special units for 90 degree corners, bond beams, lintels.

2.2 ACCESSORIES

- A. Joint Reinforcement: ASTM A 951; truss type; steel; 0.148 inch diameter side rods with 0.148 inch diameter cross ties; hot-dip galvanized.
- B. Reinforcing Steel: ASTM A 615, deformed billet bars, uncoated finish.
- C. Strap Anchors: bent steel shape; ASTM A 153, Class B hot-dip galvanized.
- D. Wall Ties: ASTM A 153, Class B hot-dip galvanized.
- E. Anchor Rods: ASTM A 307; Grade A; headed; complete with washers and heavy hex nuts; galvanized finish.
 - 1. Hot-Dipped Galvanizing: ASTM A 153, Class B.
 - 2. Mill Galvanizing: ASTM A 641.
- F. Mortar and Grout:
 - 1. Mortar: Conform to ASTM C 270, Type S, and conform to proportion specifications of IBC Table 2103.8(1).

- 2. Grout: Conform to IBC Paragraph 2103.12
 - a. Coarse Grout: For grouting spaces with minimum 4 inches dimension in every direction.
 - b. Fine Grout: For grouting other spaces.
- G. Steel Lintels: type, grade, and size as indicated on Drawings, ASTM A 153, Class B hot-dip galvanized.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify field conditions are acceptable and are ready to receive work.
- B. Verify items provided by other sections of work are properly sized and located.
- C. Verify built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied to other sections.
- B. Furnish temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent support.
- C. Unless otherwise required, do not wet concrete masonry units prior to laying.

3.3 INSTALLATION

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form bed and head joints of uniform thickness.
- C. Unless otherwise required, construct masonry in running bond pattern.
- D. Placing And Bonding:
 - 1. Lay solid masonry units in full bed of mortar, with full head joints.
 - 2. Lay hollow masonry units with face shell bedding on head and bed joints.
 - 3. All units shall be placed while mortar is soft and plastic
 - 4. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
 - 5. Remove excess mortar as work progresses.
 - 6. Interlock intersections and external corners.
 - 7. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment is required, remove mortar and replace.
 - 8. Perform job site cutting of masonry units with proper tools to assure straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
 - 9. Cut mortar joints flush where wall tile is scheduled, cement parging is required, resilient base is scheduled, or bitumen dampproofing is applied.

10. Isolate masonry from vertical structural framing members with movement joint as indicated on Drawings.
 11. Isolate top of masonry from horizontal structural framing members and slabs or decks with compressible joint filler.
 12. For grouted masonry, in-between grout pours, form a horizontal construction joint by stopping all wythes at the same elevation and with the grout stopping a minimum of 1-1/2 inches below a mortar joint, except at the top of a wall. Where bond beams occur, the grout pour shall be stopped a minimum of 1/2 inch below the top of the masonry.
- E. Joint Reinforcement And Anchorage:
1. Install horizontal joint reinforcement 16 inches oc.
 2. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
 3. Place joint reinforcement continuous in first and second joint below top of walls.
 4. Lap joint reinforcement ends minimum 6 inches .
 5. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- F. Lintels:
1. Install loose steel lintels over openings.
 2. Install reinforced unit masonry lintels over openings where steel lintels are not scheduled or indicated.
 3. Openings Up To 42 inches Wide: Place two No. 4 reinforcing bars 1 inch from bottom web.
 4. Openings From 42 inches Up To 78 inches Wide: Place two, No. 5 reinforcing bars 1 inch from bottom web.
 5. Openings Over 78 inches: Reinforce openings as indicated on Drawings.
 6. Do not splice reinforcing bars.
 7. Support and secure reinforcing bars from displacement.
 8. Place and consolidate grout fill without displacing reinforcing.
 9. Allow masonry lintels to attain specified strength before removing temporary supports.
 10. Maintain minimum 8 inch bearing on each side of opening.
- G. Grouted Components:
1. Reinforce bond beam with 2, No. 4 bars, 1 inch from bottom web.
 2. Reinforce pilaster as shown on the drawings.
 3. Lap splices in accordance with ACI-530, Section 2.1.9.7.1. Lap splice lengths are provided in drawing schedule.
 4. Support and secure reinforcing bars from displacement.
 5. Place and consolidate grout fill without displacing reinforcing.

6. At bearing locations, fill masonry cores with grout for minimum 12 inches either side of opening.
- H. Reinforced Masonry:
1. Lay masonry units with cells vertically aligned and clear of mortar and unobstructed.
 2. Place reinforcing, reinforcement bars, and grout as indicated on Drawings.
 3. Splice reinforcement as indicated on Drawings.
 4. Support and secure reinforcement from displacement.
 5. Place and consolidate grout fill without displacing reinforcing.
 6. Place grout in accordance with ACI 530.1.
- I. Control And Expansion Joints:
1. Install control and expansion joints at the following maximum spacings, unless otherwise indicated on Drawings:
 - a. Exterior Walls: 20 feet on center and within 24 inches on one side of each interior and exterior corner.
 - b. Interior Walls: 30 feet on center.
 - c. At changes in wall height.
 2. Do not continue horizontal joint reinforcement through control and expansion joints.
 3. Install preformed control joint device in continuous lengths. Seal butt and corner joints.
 4. Size control joint in accordance with Section 07 9200 for sealant performance.
 5. Form expansion joint by omitting mortar and cutting unit to form open space.
- J. Built-In Work:
1. As work progresses, install built-in metal door and glazed frames, fabricated metal frames, window frames, anchor bolts, plates, other items to be built-in the work and furnished by other sections.
 2. Install built-in items plumb and level.
 3. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout or mortar. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
 4. Do not build in materials subject to deterioration.
- K. Cutting And Fitting:
1. Cut and fit for chases, pipes, conduit, sleeves and grounds. Coordinate with other sections of work to provide correct size, shape, and location.

2. Obtain Architect/Engineer's approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.
- L. Parging:
1. Dampen masonry walls prior to parging.
 2. Scarify each parging coat to ensure full bond to subsequent coat.
 3. Parge masonry walls in two uniform coats of mortar to total thickness of 3/4 inch.
 4. Steel trowel surface smooth and flat with maximum surface variation of 1/8 inch per ft.
 5. Strike top edge of parging at 45 degrees.

3.4 ERECTION TOLERANCES

- A. Maximum Variation from Alignment of Pilasters: 1/4 inch.
- B. Maximum Variation from Unit to Adjacent Unit: 1/16 inch.
- C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- F. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.
- G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.
- H. Maximum Variation for Steel Reinforcement:
 1. Install reinforcement within the tolerances specified in ACI 530.1 for foundation walls.
 2. Plus or minus 1/2 inch when distance from centerline of steel to opposite face of masonry is 8 inches or less.
 3. Plus or minus 1 inch when distance is between 8 and 24 inches.
 4. Plus or minus 1-1/4 inch when distance is greater than 24 inches.
 5. Plus or minus 2 inches from location along face of wall.

3.5 CLEANING

- A. Section 01 7700, "Closeout Procedures" – Final cleaning.
- B. Remove excess mortar and mortar smears as work progresses.
- C. Replace defective mortar. Match adjacent work.
- D. Clean soiled surfaces with non-acidic solution that does not harm masonry or adjacent materials. Consult masonry manufacturer for acceptable solutions.
- E. Use non-metallic tools in cleaning operations.

3.6 PROTECTION OF FINISHED WORK

- A. Protect exposed external corners subject to damage. Provide this protection without damaging completed work.
- B. Protect base of walls from mud and mortar splatter.
- C. Protect masonry and other items built into masonry walls from mortar droppings and staining caused by mortar. This includes keeping expansion-joint voids clear of mortar.
- D. Protect tops of masonry work with waterproof coverings secured in place without damaging masonry. Provide coverings where masonry is exposed to weather when work is not in progress.
- E. Do not apply uniform loads for at least 12 hours, or concentrated loads for at least 72 hours, after masonry is constructed.

3.7 SCHEDULES

- A. Exterior Wall: Exterior single wythe of reinforced concrete masonry units.
- B. Interior Fire Walls: Single-wythe reinforced concrete masonry units, 8 inch nominal thickness, to two-hour fire assembly rating.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 04 2220, Rev. 0, dated September 18, 2008.

SECTION 05 1000
STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Requirements for structural steel used in building construction, including shop-applied finishes and field-applied touchup, and grout under base plates.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

LANL approval is required for submittals with a "REQD" designation; submittals not having a "REQD" designation are for Subcontractor's Quality Control system, information only, or as otherwise designated.

- A. Submit the following in accordance with the requirements of Exhibit I:

1. Certificates of Compliance:

- | | | |
|----|---------------------------------|-------|
| a. | Steel | REQ'D |
| b. | Bolts, nuts, and washers | REQ'D |
| c. | Qualifications for shop welding | REQ'D |
| d. | Non-shrink grout | |
| e. | Galvanizing | |

2. Certified Material Test Reports:

- | | | |
|----|-----------------------------|-------|
| a. | Welding electrodes and rods | REQ'D |
|----|-----------------------------|-------|

3. Shop Drawings, Specifications, and Procedures:

- | | | |
|----|--|-------|
| a. | Erection Plan, including description of temporary supports | REQ'D |
| b. | Fabrication drawings, including description of connections | REQ'D |
| c. | Welding Procedures and Procedure Qualification Records | REQ'D |

4. Product Data:

- | | | |
|----|--|--|
| a. | Shop primer (include test report on dry- or wet-film thickness, depending on manufacturer's recommendations) | |
| b. | Non-shrink grout | |

1.5 QUALITY ASSURANCE

- A. Per LANL Engineering Standards Manual, Chapter 16, Section IBC-GEN, off-site fabrication of framing for buildings must be inspected by a LANL-Building-Official-approved Special Inspector, or shop-approved through Section IBC-FAB.

B. Drawing Requirements

1. Submit fabrication drawings for approval prior to fabrication. Prepare per AISC 303 and AISC 326.
2. Drawings must not be reproductions of Subcontract drawings.
3. Include complete information for the fabrication and erection of the structure's components, including the location, type, and size of bolts, welds, member sizes and lengths, connection details, blocks, copes, and cuts.
4. Use AWS A2.4 standard welding symbols.
5. Shoring and temporary bracing must be designed and sealed by a registered professional engineer and submitted for record purposes, with calculations, as part of the drawings.
6. Member substitutions of details shown on the Subcontract drawings must be clearly highlighted on the fabrication drawings.
7. Explain the reasons for any deviations from the Subcontract drawings.

C. Certifications

1. Erection Plan
 - a. Submit for record purposes. Indicate the sequence of erection, temporary shoring and bracing, and a detailed sequence of welding, including each welding procedure required.
2. Welding Procedures and Qualifications (Field)
 - a. Field welding will be done using LANL Welding Procedure Specifications (WPS) meeting the requirements of AWS D1.1 and AWS D1.8 (as applicable) for the processes and materials that will be used for welding.
 - b. Field welders will be certified at LANL by LANL with certification stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the individual certifying the qualification tests.
 - 1) Welders will be current as shown in the LANL Welder database.
3. Welding Procedures and Qualifications (Shop)
 - a. Prior to shop welding, submit Welding Procedure Specifications (WPS) meeting the requirements of AWS D1.8 (as applicable) for the processes and materials that will be used for welding.
 - b. Prior to shop welding, submit certification for each welder stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the qualification tests.
 - 1) If the qualification date of the welding operator is more than one-year old, the welding operator's qualification certificate must be accompanied by a current certificate by the welder attesting to the fact that he has been engaged in welding

since the date of certification, with no break in welding service greater than 6 months.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle structural steel:
 - 1. With equipment of adequate capacity.
 - 2. Without overstressing or permanently deflecting material.
 - 3. Without damaging finish.
- B. Deliver manufactured materials in original unopened packages, containers, or bundles with manufacturer's label intact and legible.
- C. Store materials off ground, under cover, and away from damp surfaces.
- D. Remove damaged, unlabeled or unsatisfactory materials which do not meet this specification from the job site.

PART 2 PRODUCTS

2.1 STEEL

- A. Structural Steel (Shapes, Plates Bars, and Threaded Rods)
 - 1. ASTM A 36, $F_y = 36$ ksi
- B. High-Strength Structural Steel
 - 1. Low-Alloy Steel
 - a. ASTM A 992
- C. Steel Pipe
 - 1. ASTM A53, Grade B, weight class STD.
- D. Hollow Structural Steel (HSS) / Structural Steel Tubing
 - 1. ASTM A500, Grade B.

2.2 BOLTS, NUTS, AND WASHERS

Provide the following unless otherwise indicated

- A. Structural Steel
 - 1. Common Bolts: ASTM A 307, Grade A.
 - 2. Nuts: ASTM A 563.
 - 3. Washers: ASTM F 436.
- B. High-Strength Structural Steel and HSS
 - 1. Bolts: ASTM A 325.
 - 2. Nuts: ASTM A 563.
 - 3. Washers: ASTM F 436.
- C. Foundation Anchorage
 - 1. Bolts/Rods: ASTM F 1554, Grade 36 anchor rods.
 - 2. Nuts: ASTM A 563.
 - 3. Washers: ASTM F 436.

2.3 STRUCTURAL STEEL ACCESSORIES

A. Welding Electrodes and Rods

1. AWS D1.1 Table 3.1.
2. AWS D1.8, Paragraphs 6.3 and 6.4 (i.e., all subparagraphs, as applicable).

B. Non-Shrink Grout

1. ASTM C 1107, with no ASTM C 827 shrinkage. Grout must be nonmetallic.

C. Welded Shear Stud Connectors

1. AWS D1.1-10 Chapter 7, Type B shear stud connectors made from ASTM A 29 material.

2.4 SHOP PRIMER

A. Perform finishing work in accordance with:

1. AISC Specification for Structural Steel Buildings Load and Resistance Factor Design Specification for Structural Steel Buildings, as applicable.
2. Steel Structures Painting Council
3. Prepare surfaces in accordance with SSPC-SP 2 or SSPC-SP 3.
4. Paint in accordance with the requirements of SSPC-PA 1. Apply one coat of specified primer, minimum.
5. Provide 1.5-mils-thick paint system of specified primer, measure in accordance with SSPC-PA 2.

2.5 GALVANIZING

- ### A.
- ASTM A 123 or ASTM A 153, as applicable, unless specified otherwise galvanize after fabrication where practicable.

2.6 FABRICATION

A. Markings

1. Prior to erection, identify members by a painted erection mark.
 - a. Connecting parts assembled in the shop for reaming holes in field connections must be match-marked with scratch and notch marks.
 - b. Do not locate erection markings on areas to be welded or on surfaces that will be exposed in the completed structure.
 - c. Do not locate match markings in areas that will decrease member strength or cause stress concentrations. Affix embossed tags to hot-dipped galvanized members.

B. Shop Primer

1. Do not prime steel surfaces embedded in concrete, surfaces to receive sprayed-on fireproofing, or surfaces within 0.5 inch of the toe of the welds prior to welding (except surfaces on which metal decking is to be welded).

C. Fireproofing Coated Surfaces

1. Clean and prepare surfaces to receive sprayed-on fireproofing coatings per the manufacturer's recommendations.

- D. Surface Finishes
 - 1. ASME B46.1 maximum surface roughness of 125 for bearing surfaces, unless indicated otherwise.
- E. Drainage Holes
 - 1. Drill adequate 1/2 inch drainage holes to eliminate water traps but not affect the structural integrity. Indicate locations on the detail drawings.

PART 3 EXECUTION

3.1 FABRICATION

- A. Fabrication per the applicable provisions of AISC 360. Fabricate and assemble in the shop to the greatest extent possible. The fabricating plant must be inspected and approved per Paragraph 1.5A.
- B. Compression joints depending on contact bearing must have a surface roughness not in excess of 500 micro inches as determined by ASME B46.1. Ends must be square within the tolerances for milled ends specified in ASTM A6.
- C. Prepare structural steelwork, except surfaces of steel to be encased in concrete, surfaces to be field welded, surfaces to be fireproofed, and contact surfaces of friction-type high-strength bolted connections for painting per RCSC Spec and primed with the specified paint.

3.2 ERECTION

- A. Erect structural steel per OSHA 29 CFR Part 1926, Subpart R-Steel Erection.
- B. Erect structural steel per the applicable provisions of AISC 360 Chapter M; and AISC 303, Sections 1 and 7.
 - 1. Erection plan must be reviewed, stamped and sealed by a licensed structural engineer.

3.3 CONNECTIONS

- A. Except as modified in this section, connections not detailed must be designed per AISC 360.
 - 1. Build connections into existing work.
 - 2. Do not tighten anchor bolts set in concrete with impact torque wrenches.
 - 3. Punch, subpunch and ream, or drill bolt holes perpendicular to the surface of the member.
 - 4. Bolts, nuts, and washers must be clean of dirt and rust, and lubricated as specified by the respective manufacturers.
- B. Bolts
 - 1. ASTM A 307 and ASTM A 325 bolts must be tightened to "snug tight."
 - a. "Snug tight" is achieved with a few impacts of an impact wrench, or the full effort of an ironworker using a spud wrench.
 - b. If firm contact of joint plies cannot be obtained with snug tight, contact LANL for further instructions.
 - c. Bolts that have been previously tensioned must not be reused.

3.4 GAS CUTTING

- A. Use of gas-cutting torch in the field for correcting fabrication errors will not be permitted on any major member in the structural framing.
- B. Use of a gas cutting torch will be permitted on minor members not under stress only after approval has been obtained from LANL.

3.5 WELDING

- A. AWS D1.1. Provide AWS D1.1 qualified welders, welding operators, and tackers.
- B. The Subcontractor must develop and submit the Welding Procedure Specifications (WPS) for all shop welding, including welding done using prequalified procedures.
 - 1. Welding Procedure Specifications, both prequalified and qualified, must be submitted for approval.
- C. Field welding will use LANL WPS's by welders tested and certified by LANL at LANL.

3.6 GALVANIZING REPAIR

- A. Provide as indicated or specified.
 - 1. Galvanize after fabrication where practicable.
 - 2. Repair damage to galvanized coatings using ASTM A 780 zinc rich paint for galvanizing damaged by handling, transporting, cutting, welding, or bolting.
 - 3. Do not heat surfaces to which repair paint has been applied.

3.7 FIELD QUALITY CONTROL

- A. Perform field tests, and provide labor, equipment, and incidentals required for testing.
 - 1. LANL must be notified in writing of defective welds, bolts, nuts, and washers within 7 working days of the date of inspection.
- B. Welds
 - 1. Visual Inspection
 - a. Furnish the services of AWS-certified welding inspectors for fabrication and erection inspection and testing and verification inspections.
 - b. All welds must be visually inspected to AWS D1.1 Paragraph 6.9 and Table 6.1 category specified in drawings or specifications
 - c. Welding inspectors must visually inspect and mark welds, including fillet weld end returns.
 - 2. Non-Destructive Testing
 - a. Where welding of doubler plates, continuity plates, or stiffeners has been performed in the k-area, the web shall be tested for cracks using magnetic particle testing (MT). The MT inspection area shall include the k-area base metal within 3 in. (75 mm) of

the weld. The MT shall be performed no sooner than 48 hours following completion of the welding.

- b. Ultrasonic testing (UT) shall be performed on 100% of CJP groove welds in materials 5/16 in. (8 mm) thick or greater. Ultrasonic testing in materials less than 5/16 in. (8 mm) thick is not required. Weld discontinuities shall be accepted or rejected on the basis of criteria of AWS D1.1/D1.1M Table 6.2. Magnetic particle testing shall be performed on 25% of all beam-to-column CJP groove welds. The rate of UT and MT is permitted to be reduced in accordance with Sections J6.2g and J6.2h, respectively.
- c. At the end of welds where weld tabs have been removed, magnetic particle testing shall be performed on the same beam-to-column joints receiving UT as required under Section J6.2b. The rate of MT is permitted to be reduced in accordance with Section J6.2h. MT of continuity plate weld tabs removal sites is not required.
- d. Reduction of Percentage of Ultrasonic Testing - The reduction of percentage of UT is permitted to be reduced in accordance with AISC 360 Section N5.5e, except no reduction is permitted for demand critical welds.
- e. Reduction of Percentage of Magnetic Particle Testing - The amount of MT on CJP groove welds is permitted to be reduced if approved by the EOR and LBO Chief Welding Inspector. The MT rate for an individual welder or welding operator is permitted to be reduced to 10%, provided the reject rate is demonstrated to be 5% or less of the welds tested for the welder or welding operator. A sampling of at least 20 completed welds for a job shall be made for such reduction evaluation. Reject rate is the number of welds containing rejectable defects divided by the number of welds completed. This reduction is prohibited on welds in the k-area, at repair sites, backing removal sites, and access holes.

C. High-Strength Bolts

1. Inspection by Subcontractor

- a. Inspect high-strength bolted connections per RCSC Spec, Section 9.
- b. Inspect proper preparation, size, gaging location, and acceptability of welds; identification marking; operation and current characteristics of welding sets in use; and calibration of torque wrenches for high-strength bolts.

2. Testing

- a. LANL has the option to perform nondestructive tests on the installed bolts to verify compliance with pre-load bolt tension requirements.
- b. The test locations and amount / extent of testing will be selected by LANL.

D. Testing for Embrittlement

1. ASTM A 143 for steel products hot-dip galvanized after fabrication.

3.8 GROUTING

- A. Fill voids between steel and concrete with grout.
- B. Install grout in conformance with manufacturer's instructions.
- C. Press edges of grout to a 1-to-1 slope.
- D. Cure grout for 7 days, or according to the manufacturer's recommendations.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 05 1000, Rev. 2, dated September 3, 2008.

SECTION 05 2100
STEEL JOIST FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Joists and Accessories.
- B. Accessories and Fittings.
- C. Bedding Mortar.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 05 1000, "Structural Metal Framing."
- C. Section 09 9100, "Painting."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

LANL approval is required for all submittals.

- A. Submit the following in accordance with the requirements of Exhibit I:
 - 1. Shop drawings
 - a. Steel Joists
 - 2. Certificates
 - a. Accessories
 - b. Welder Qualification
 - 3. Test Reports
 - a. Erection Inspection
 - b. Welding Inspections

1.5 GENERAL REQUIREMENT

- A. Steel joists are designated on the drawings in accordance with the standard designations of the Steel Joist Institute (SJI). Joists of other standard designations or joists with properties other than those shown may be substituted for the joists designated provided the structural properties are equal to or greater than those of the joists shown and provided all other specified requirements are met.

1.6 DELIVERY AND STORAGE

- A. Handle, transport, and store joists in a manner to prevent damage affecting their structural integrity. Store all items off the ground in a well drained location protected from the weather and easily accessible for inspection and handling.

1.7 QUALITY ASSURANCE

A. Drawing Requirements

1. Submit steel joist framing drawings. Show joist type and size, layout in plan, and erection details including methods of anchoring, framing at openings, type and spacing of bridging per SJI specification, requirements per LANL Welding Standards for field welding, and details of accessories as applicable.

B. Certification Requirements

1. Prior to welding, submit certification for welder qualification, welding operation, and tacker, stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the qualification tests.

PART 2 PRODUCTS

2.1 JOISTS AND ACCESSORIES

- A. Steel joists shall conform to the applicable SJI specification(s) for the joist series indicated.

2.2 ACCESSORIES AND FITTINGS

- A. Accessories and fittings, including supplementary framing, joist-leg extensions, end supports, and bridging, shall be in accordance with the applicable SJI specification(s) for the joist series indicated.

2.3 BEDDING MORTAR

- A. Damp-pack bedding mortar shall consist of 1 part cement and 2-1/2 parts fine aggregate having water content such that a mass of mortar tightly squeezed in the hand will retain its shape but will crumble when disturbed.

2.4 PAINTING

A. Shop Painting

1. Clean and prime joists and accessories in accordance with SSPC PS 14.01, using only Type I, "Red Oxide Paint." For joists which will be finish painted under Section 09 9100, "Painting," the primer paint shall be limited to a primer which is compatible with the specified finish paint.

PART 3 EXECUTION

3.1 INSTALLATION

A. Handling and Erection

1. Installation of joists shall be in accordance with the applicable SJI specification(s) for the joist series indicated. Joists shall be handled in a manner to avoid damage. Damaged joists shall be removed from the site, except when field repair is approved and such repairs are satisfactorily made in accordance with the manufacturer's recommendations. Joists shall be accurately set, and end anchorage shall be in accordance with the applicable SJI specification(s) for the joist series indicated. Joist bridging and anchoring shall be secured in place

prior to the application of any construction loads. Any temporary loads shall be distributed so that the carrying capacity of any joist is not exceeded. Loads shall not be applied to bridging during construction or in the completed work.

B. Welding

1. Shall be in accordance with AWS D1.1 as required for the necessary/applicable welding.

C. Bearing Plates

1. Bearing plates shall be provided with full bearing after the supporting members have been plumbed and properly positioned, but prior to placing superimposed loads. The area under the plate shall be damp-packed solidly with bedding mortar, except where non-shrink grout is indicated on the drawings. Grout shall be as specified in Section 05 1000, "Structural Metal Framing."

3.2 PAINTING

A. Touch-Up Painting

1. After erection of joists touch-up connections, corroded and field-welded areas, and areas of abraded shop coat, with paint of the same type used for the shop coat.

B. Field Painting

1. Paint joists requiring a finish coat in conformance with the requirements of Section 09 9100, "Painting."

3.3 VISUAL INSPECTIONS

A. Erection Inspection shall be per AWS D1.1, Section 6.

1. Perform erection inspection and field-welding inspections with AWS-certified welding inspectors.
2. Welding inspectors shall visually inspect and mark welds.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 05 2100, Rev. 2, dated May 1, 2008.

SECTION 05 3123
STEEL ROOF DECKING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Steel roof deck system.

1.2 RELATED SECTIONS

- A. Section 01 4000, "Quality Requirements."
B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Certificates of Compliance for:
1. Steel deck conforming to the requirements of the AISI-NASPEC.
 2. Provide certified copies of Mill Test Reports for steel deck; self-drilling, self-tapping screws (mechanical fasteners); and weld electrodes. Reports shall include heat lot tracing, chemical analysis, and physical properties.
 3. Weld in accordance with AWS D1.3 for welders who will perform field welding.
- B. Shop drawings including the following information:
1. Materials furnished including accessories,
 2. Splices and connections, and
 3. Erection plan.
- C. Catalog data for:
1. Metal deck;
 2. Self-drilling, self tapping screws (mechanical fasteners); and
 3. Touch-up paint.
- D. Inspection Reports:
1. Ensure that inspections performed in support of welding are fully documented. Use Weld Inspectors that have a current Certified-Welding Inspector (CWI) certification in accordance with AWS QC-1 and LANL *Engineering Standards Manual* (ISD 342-100, Chapter 13) for welding performed on LANL property.
- E. Checklist:
1. Prior to welding being performed on LANL property, LANL *Engineering Standards Manual* (ISD 342-100, Chapter 13, Volume 1, Section 1-03 Attachment #7) shall be filled out by the Subcontractor and approved by a

CWI. This requirement does not relieve the Subcontractor(s) of other applicable provisions of Chapter 13 not specially identified herein.

- F. Test data and design calculations to provide documentation of performance for mechanical fasteners.

1.5 DESIGN REQUIREMENTS

- A. Design steel roof deck in accordance with the American Iron and Steel Institute-*North American Specification for the Design of Cold-Formed Steel Structural Members* (AISI-NASPEC).

1.6 QUALITY ASSURANCE

- A. Work identified in this section shall be done under a Quality Assurance Program (QAP) in accordance with Section 01 4000, "Quality Requirements."
- B. Conform to AISI-NASPEC.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle metal roof deck:
 - 1. With equipment of adequate capacity,
 - 2. Without overstressing or permanently damaging material, and
 - 3. Without damaging finish.
- B. Deliver manufactured materials in original unopened packages, containers, or bundles with manufacturer's label intact and legible.
- C. Store materials off the ground, under cover, and away from damp surfaces.
- D. Remove damaged, unlabeled, or unsatisfactory material which does not meet this specification from the jobsite.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Steel Deck
 - 1. Provide sheet steel, for deck which is required to be galvanized, conforming to ASTM A 653, Grade 33, with a minimum yield strength of $F_y = 33,000$ psi with G90 galvanized coating.
 - 2. Deck type, profile, and section properties are shown on the drawings. The information stated, establishes minimum acceptable values. Alternate sections, profiles and/or designs may be submitted for approval.
- B. Primer
 - 1. Provide touch-up primer conforming to SSPC-Paint 20, Type 1, inorganic, for galvanized surfaces.
- C. Welding Materials
 - 1. Provide welding materials in accordance with AWS D1.3 for type of materials being welded.
 - 2. Provide 14-gage weld washers, where required.

D. Mechanical Fasteners

1. Provide Hilti X-ENP-19 fasteners (ICC ESR-2197) for deck attachment to structure.
2. #10 x 3/4" Min HWH or HHWH, Self-drilling steel screws conforming to C1513-10R Requirements (ICC ESR-2196) for sidelap attachment.

E. Accessories

1. Provide steel accessories, which are a standard item of the steel deck manufacturer, fabricated with steel of the same type and finish as the deck.
2. Provide manufacturer's standard flute closure of closed cell foam rubber, 1 in. thick, to fit selected deck profile.

2.2 FABRICATION

- A. Shop fabricate decking and accessories to exact lengths and shapes.
- B. Fabricate deck sheets to be formed identically and so each sheet registers smoothly with adjacent sheets.
- C. A CWI shall inspect all welds in accordance with AWS D1.3 (Section 6.9) and LANL *Engineering Standards Manual* (ISD 342-100, Chapter 13) for welding performed on LANL property.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Erect metal decking in accordance with AISI-NASPEC.
- B. Erect metal decking in accordance with the approved erection drawing and in accordance with the manufacturer's instructions.
- C. Welding
 1. Perform welding in accordance with AWS D1.3.
 2. Provide weld washers for deck in accordance with manufacturer's requirements.
 3. Weld in accordance with the diaphragm requirements stated on the drawings.
 4. Avoid burning through the deck while field welding to supports.
- D. Mechanical Fasteners
 1. Install connections with mechanical fasteners in accordance with the manufacturer's instructions and the approved erection drawings.
- E. Provide 4-in. minimum bearing on masonry support members. Align and level on supports.
- F. Reinforce holes that interrupt more than 1 rib.
- G. Install accessories shown on the approved erection drawings.
- H. Seal deck joints, lap ends, and penetrations with sealant.

3.2 CLEAN-UP AND FINISH TOUCH-UP

- A. After erection, remove weld spatter, grease, and oil from the decking.
- B. Immediately after welding the deck in place, touch-up welds, burned areas, and surface coating damage. Use prime paint specified in PART 2 of this section.

END OF SECTION

SECTION 05 4000
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Non-load bearing formed steel stud interior wall framing and formed steel joist, purlin framing and bridging.

1.2 RELATED SECTIONS:

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Product Data: Submit data on standard framing members; describe materials and finish, product criteria, limitations.
- B. Shop Drawings:
 - 1. Indicate component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners, and accessories or items required of related Work.
 - 2. Indicate stud and ceiling joist layout.
 - 3. Describe method for securing studs to tracks and for bolted and welded framing connections.
- C. Manufacturer's Installation Instructions: Submit special procedures, perimeter conditions requiring special attention.
- D. Mill Certifications: Submit mill certifications for steel delivered to site. Certify steel bare metal thickness in 0.001 inch, yield strength, tensile strength, total elongation in 2 inch or 8 inch gauge length, chemical analysis, and galvanized coating thickness.

1.5 SUSTAINABLE DESIGN SUBMITTALS

- A. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify source and origin for salvaged and reused products.
 - b. Certify recycled material content for recycled content products.
 - c. Certify source for local and regional materials and distance from Project site.
 - 2. Indoor Air Quality Certificates:
 - a. Certify volatile organic compound content for each interior paint and coating.

- B. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.

- 1. Provide cost data for the following products:

- a. Salvaged products.
 - b. Reused products.
 - c. Products with recycled material content.
 - d. Local and regional products.

1.6 QUALITY ASSURANCE

- A. Furnish framing materials in accordance with SSMA - Product Technical Information.
- B. Sustainable Design Requirements:
 - 1. Recycled Content Materials: Furnish materials with recycled content.
 - 2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.
 - 1. Current member of Steel Stud Manufacturers Association.
- B. Installer: Company specializing in performing Work of this section with minimum 3 years experience.
- C. Form, fabricate, provide, and connect components in accordance with NAAMM ML/SFA 540 - Lightweight Steel Framing Systems Manual.

1.8 COORDINATION

- A. Coordinate placement of components within stud framing system specified in Paragraph 3.2.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver to project site in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade. Store off the ground in a dry ventilated space or protect with impervious covering. Protect metal framing units from rusting and damage.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Regulatory Requirements: Building Code Requirements
 - 1. All construction and installation shall comply with AISI General, AISI Header, AISI Truss, AISI WSD as well as the requirements stated herein. Should a conflict arise between AISI requirements and those stated herein, contact the LANL Subcontract Technical Representative (STR).

2.2 MATERIALS

A. Cold-Formed Metal Framing

1. Cold-Formed Metal Framing: ASTM C 955.

B. Framing Components

1. Steel Sheet: ASTM A 1003; Structural Grade, Type H, painted metallic coated.
 - a. Grade: ST50H
 - b. Coating: G40
2. Studs: Steel sheet, formed to channel shape, punched web.
3. Track: Steel sheet, formed to channel shape; same width as studs, tight fit, solid web.

C. ACCESSORIES

1. Bracing, Furring, Bridging: As indicated on drawings.

D. FASTENERS

1. Self-drilling, Self-tapping Screws, Bolts, Nuts, and Washers: Steel, hot dip galvanized.
2. Anchorage Devices: Power actuated.
3. Welding: In conformance with AWS D1.1 and AWS D1.3.

2.3 FINISHES

A. Shop Primer: Prime Paint.

B. Touch-Up Primer: Match shop primer.

1. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with GC-03.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify building framing components are ready to receive Work.
- B. Verify rough-in utilities are in proper location.

3.2 ERECTION OF STUDS

- A. Align floor and ceiling tracks; locate to wall and partition layout. Secure in place with fasteners by welding at maximum 24 inches oc. Coordinate installation of acoustic sealant with floor and ceiling tracks.
- B. Place studs at 16 inches oc; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using clip and tie, fastener, welding method.
- C. Construct corners using minimum three studs. Double stud wall openings, door jambs, and window jambs.
- D. Coordinate placement of insulation in multiple stud spaces after erection.

- E. Install intermediate studs above and below openings to align with wall stud spacing.
- F. Install studs with deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
- G. Attach cross studs or furring channels to studs for attachment of fixtures anchored to walls.
- H. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- I. Touch-up field welds and damaged primed surfaces with primer to match shop coating.

3.3 ERECTION OF JOISTS

- A. Install framing components.
- B. Make provisions for erection stresses. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.
- C. Place joists at 16 inches oc; not more than 2 inches from abutting walls. Connect joists to supports using fastener or welding method.
- D. Set ceiling joists parallel and level, with lateral bracing and bridging.
- E. Locate joist end bearing directly over load bearing studs or install load distributing member to top of stud track.
- F. Install web stiffeners at reaction points.
- G. Touch-up field welds and damaged primed surfaces with primer to match shop coating.

3.4 ERECTION TOLERANCES

- A. Maximum Variation from Indicated Position: 1/4 inch.
- B. Maximum Variation of Members from Plane: 1/4 inch in 10 feet or less, 1/2 inch maximum.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 05 4000, Rev. 2, dated September 24, 2009.

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Shop fabricated metal fabrications.
 - 1. Rough hardware.
 - 2. Ladders.
 - 3. Ladder safety cages.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 01 4455, "Onsite Welding and Joining Requirements."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Aluminum Association:
 - 1. AA DAF45 - Designation System for Aluminum Finishes.
- C. American Architectural Manufacturers Association:
 - 1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
 - 2. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
 - 3. AAMA 2604 - Voluntary specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
 - 4. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- D. American Ladder Institute:
 - 1. ANSI-ASC A14.3 - American National Standard for Ladders – Fixed – Safety Requirements.
- E. American Society of Mechanical Engineers:
 - 1. ASME B18.2.1 - Square and Hex Bolts and Screws (Inch Series).
- F. American Society of Testing and Materials:
 - 1. ASTM A 36 - Standard Specification for Carbon Structural Steel.
 - 2. ASTM A 47 - Standard Specification for Ferritic Malleable Iron Castings.
 - 3. ASTM A 48 - Standard Specification for Gray Iron Castings.
 - 4. ASTM A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

5. ASTM A 123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
6. ASTM A 153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
7. ASTM A 240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
8. ASTM A 269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
9. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.
10. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
11. ASTM A 312 - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
12. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
13. ASTM A 354 - Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.
14. ASTM A 479 - Standard Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels.
15. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
16. ASTM A 501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
17. ASTM A 554 - Standard Specification for Welded Stainless Steel Mechanical Tubing.
18. ASTM A 563 - Standard Specification for Carbon and Alloy Steel Nuts.
19. ASTM A 568 - Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
20. ASTM A 572 - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
21. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
22. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
23. ASTM A 780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings.
24. ASTM A 992 - Standard Specification for Structural Steel Shapes.

25. ASTM A 1008 - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low Alloy, High-Strength Low Alloy With Improved Formability, Solution Hardened, and Bake Hardenable
 26. ASTM A 1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low Alloy, High-Strength Low Alloy With Improved Formability, and Ultra-High Strength.
 27. ASTM B 26 - Standard Specification for Aluminum-Alloy Sand Castings.
 28. ASTM B 85 - Standard Specification for Aluminum-Alloy Die Castings.
 29. ASTM B 177 - Standard Guide for Engineering Chromium Electroplating.
 30. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 31. ASTM B 210 - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes.
 32. ASTM B 211 - Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire.
 33. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 34. ASTM B 695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
 35. ASTM D 1187 - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
 36. ASTM F 436 - Standard Specification for Hardened Steel Washers.
 37. ASTM F 844 - Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.
 38. ASTM F 1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
- G. American Welding Society:
1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
- H. Federal Specification:
1. FS A-A-1925A - Shield, Expansion (Nail Anchors).
 2. FS FF-S-92 - Screw, Machine, Slotted, Cross-Recessed or Hexagon Head.
 3. FS FF-S-111 - Screw, Wood.
 4. FS FF-W-84 - Washers, Lock (spring).
 5. FS TT-P-645B - Primer, Paint, Zinc-Molybdate, Alkyd Type.
- I. Green Seal:
1. GS-11 - Paints and Coatings.
- J. International Code Council:
1. IBC - International Building Code
 2. ICC-ES - International Code Council, Evaluation Services

- K. National Association of Architectural Metal Manufacturers:
 - 1. NAAMM AMP 500-505 - Metal Finishes Manual.
- L. Occupational Safety and Health Administration:
 - 1. 29 CFR 1910.27 - Fixed Ladders.
- M. Steel Structures Painting Council:
 - 1. SSPC A - Good Painting Practice Steel Structures Painting Manual.
 - 2. SSPC PA 1 - Shop, Field, and Maintenance Painting of Steel.
 - 3. SSPC Paint 15 - Steel Joist Shop Primer/Metal Building Primer.
 - 4. SSPC Paint 20 - Zinc-Rich Coating Type I Inorganic and Type II Organic.
 - 5. SSPC SP 1 - Solvent Cleaning.
 - 6. SSPC SP 2 - Hand-Tool Cleaning.
 - 7. SSPC SP 3 - Power Tool Cleaning.
 - 8. SSPC SP 7 - Brush-Off Blast Cleaning.

1.4 ACTION / INFORMATIONAL SUBMITTALS

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- B. Catalog data describing each manufactured metal item.
- C. Certificate of Compliance for:
 - 1. Steel ladders
 - 2. Fall arrestors.

1.5 QUALITY ASSURANCE

- A. Codes and Standards: Comply with the provisions of the following, except as otherwise indicated. Where conflicts occur, comply with the more stringent requirements
 - 1. 29 CFR 1910.27
- B. Fabricator Qualifications: Firm experienced in successfully producing metal fabrications similar to that shown on the drawings, with sufficient production capacity to produce required units without causing delay in the work
- C. All materials used shall be free of lead, and asbestos fibers.
- D. Use of damaged items is prohibited except by specific written authorization of LANL STR.
- E. Welding Certifications:
 - 1. AWS D1.1/D1.1M, Structural Welding Code — Steel;
 - 2. AWS D1.2/D1.2M, Structural Welding Code — Aluminum; and
 - 3. AWS D1.6, Structural Welding Code — Stainless Steel

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle metal items:
 - 1. With equipment of adequate capacity.
 - 2. Without overstressing or permanently deflecting material.
 - 3. Without damaging finish.
- B. Deliver manufactured material in original unopened packages, containers, or bundles with manufacturers label intact and legible.
- C. Store materials off ground, under cover, and away from damp surfaces.
- D. Remove damaged unlabeled or unsatisfactory materials which do not meet this specification from job site.

1.7 FIELD OR SITE CONDITIONS

- A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit, by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.
 - 1. Where field measurements cannot be made without delaying the work, guarantee dimensions and proceed with fabrication of products without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to guaranteed dimensions.
 - 2. Allow for trimming and fitting.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide steel sections and plate conforming to ASTM A 36.
- B. Provide steel tubing conforming to ASTM A 500, Grade B.
- C. Provide steel pipe conforming to ASTM A 53, type E or S, Grade B.
- D. Provide aluminum sections conforming to ASTM B 221, 6061-T6 alloy, mill finish.
- E. Provide aluminum plates conforming to ASTM B 209, 6061-T6 alloy, mill finish.
- F. Provide standard bolts conforming to ASTM A 307.
- G. Provide high strength bolts conforming to ASTM A 325.
- H. Provide nuts conforming to ASTM A 563, type and grade as specified in ASTM A 307 and ASTM A 325.
- I. Provide flat and beveled washers conforming to ASTM F 436.
- J. Provide prevailing torque type self locking nuts conforming to IFI - 100, Grade A, zinc coated.
- K. Provide spring type lock washers conforming to ANSI B27.1 .L.
- L. Provide welding materials in accordance with AWS D1.1 and AWS D1.2 for materials being welded.
- M. Provide general use primer conforming to FS TT-P-31, red; for shop application and field touch-up.

- N. Provide touch-up primer for galvanized surfaces conforming to FS TT-P-641.
- O. Provide primer for aluminum to be in contact with steel conforming to FS TT-P 645.
- P. Provide grout conforming to the following:
 - 1. Non-shrink type, pre-mixed compound consisting of non-metallic aggregates, cement, water reducing, and plasticizing additives, capable of developing a minimum Compressive strength of 7,000 psi at 28 days.
- Q. Provide expansion type concrete anchors conforming to FS S-325 Type II
- R. Provide Headed Steel Anchors as manufactured by TRW Nelson Division type H4L or Approved equally.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design ladders, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.3 MATERIALS

- A. Fasteners and Welding Materials
 - 1. General:
 - a. Provide zinc-coated fasteners for exterior use or where built into exterior walls.
 - b. Provide the fasteners and welding materials indicated for use in stainless steel and aluminum work.
 - c. Suspect/counterfeit bolts will not be accepted and will be replaced at the Subcontractor's expense.
 - 2. Bolts: Regular hexagon head type, ASTM A 307; Grade A or B.
 - a. Nuts: ASTM A 563 heavy hex type.
 - b. Washers: ASTM F 436, Type 1.
 - 3. Lag bolts: Square head type, ASME B18.2.1.
 - 4. Machine screws: FS FF-S-92B.
 - 5. Wood screws: Flat head carbon steel, FS FF-S-111D.
 - 6. Plain washers: Round, carbon steel, ASTM F 844
 - 7. Expansion-type nail anchors: Anchors complying with FS A-A-1925A.
 - 8. Lock washers: Helical spring type, carbon steel, FS FF-W-84A.
 - 9. Special fasteners: Split nuts, indicator washers and others, as indicated.

10. For use in stainless steel work
 - a. Bolts, nuts, and washers: ASTM A 354.
11. For use in aluminum work
 - a. Bolts, nuts, and washers: Steel, galvanized.

2.4 FABRICATION, GENERAL

- A. Form metal fabrications from materials of size, thickness, and shapes indicated, but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.
- B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
- C. Allow for thermal movement resulting from maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.
 1. Temperature change (Range): 100 deg F.
- D. Shear and punch metals cleanly and accurately.
- E. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- F. Remove sharp or rough areas on exposed traffic surfaces.
- G. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- H. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- I. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- J. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.
- K. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

2.5 FINISHES

- A. General: Comply with NAAMM AMP 500 – 505 for recommendations relative to application and designations of finishes.

- B. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- C. Finish metal fabrications after assembly.
- D. Primer Materials:
 - 1. Touch-up primer: Match shop primer.
- E. Finish Materials
 - 1. Factory applied finishes – steel
 - a. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
 - b. Do not prime surfaces in direct contact with concrete or where field welding is required.
 - c. Prime paint items with one coat except where galvanizing is specified.

2.6 SHOP FINISHING METHODS

- A. General: Shop-paint uncoated surfaces of metal fabrications, except those to be embedded in concrete or masonry or to receive sprayed-on fireproofing, surfaces and edges to be welded, and galvanized surfaces, unless otherwise indicated. Comply with requirements of SSPC PA 1 for shop painting.
- B. Galvanizing: For those items indicated for galvanizing, apply zinc-coating by the hot-dip process in compliance with the following requirements
 - 1. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forced shapes, plates, bars, and strip 0.0299-inch thick and heavier.
 - 2. ASTM A 153 for galvanizing iron and steel hardware.
- C. Surface Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below.
 - 1. Remove oil, grease and similar contaminants in accordance with SSPC SP-1.
 - 2. Remove loose rust, scale, spatter, slag and other deleterious materials in accordance with SSPC A, utilizing the following methods as required:
 - a. SSPC SP-2
 - b. SSPC SP-3
 - c. SSPC SP-7
- D. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide dry film thickness of not less than 3.0 mils. Use painting methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Apply 2 coats of paint to surfaces that are inaccessible after assembly or erection.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine the areas and conditions under which metal fabrication items are to be installed. Notify the STR in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer and STR.

3.2 PREPARATION

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site. Prepare primed steel items to bare metal and aluminum where site welding is required.
- B. Center nosings on tread widths with noses flush with riser faces and tread surfaces.
- C. Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.

3.3 INSTALLATION

- A. General
 - 1. Fastening to in-place construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.
 - 2. Cutting, fitting, and placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
 - 3. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.
 - 4. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop-welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
 - 5. Field welding:
 - a. Field weld components indicated on drawings. shop drawings.
 - b. Perform field welding in accordance with Section 01 4455, "Onsite Welding and Joining Requirements."

6. Corrosion protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint or zinc-molybdate primer.
7. Obtain approval of LANL STR prior to site cutting or making adjustments not scheduled.
8. After erection, touch up welds, abrasions, and damaged finishes with prime paint to match shop finishes.

3.4 FIELD QUALITY CONTROL

- A. Welding: Inspect welds in accordance with Section 01 4455, "Onsite Welding and Joining Requirements."

3.5 ADJUSTING AND CLEANING

- A. Touch-Up Painting of Steel Items: Immediately after erection, clean field welds, bolted connections, abraded areas of shop paint, and paint-exposed areas with same material as used for shop painting to comply with SSPC PA 1 requirements for touch-up of field-painted surfaces.
 1. Apply by brush or spray to provide a minimum dry-film thickness of 3.0 mils.
- B. For galvanized surfaces, clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 05 5000, Rev. 3, dated April 23, 2012.

SECTION 05 5213
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes steel pipe railings, balusters, and fittings; and handrails covered handrails.

1.2 RELATED SECTIONS:

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. ASTM International:
 - 1. ASTM A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 2. ASTM A 123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 3. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- C. American Welding Society:
 - 1. AWS D1.1 - Structural Welding Code - Steel.
- D. Green Seal:
 - 1. GS-11 - Environmental Criteria for Anti-Corrosive Paints.
- E. International Code Council
 - 1. IBC – International Building Code
- F. National Association of Architectural Metal Manufacturers:
 - 1. NAAMM AMP 500-505 - Metal Finishes Manual.
- G. National Ornamental & Miscellaneous Metals Association:
 - 1. NOMMA Guideline 1 - Joint Finishes.
- H. The Society for Protective Coatings:
 - 1. SSPC PA 1 - Shop, Field, and Maintenance Painting of Steel.
 - 2. SSPC Paint 15 - Steel Joist Shop Primer/Metal Building Primer.

3. SSPC Paint 20 - Zinc-Rich Coating, Type I - Inorganic and Type II - Organic.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination

1. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
2. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

B. Scheduling

1. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily without consulting structural engineer of record to ensure his/her performance requirements are satisfied.

1.5 SUBMITTALS

A. Action Submittals / Informational Submittals. Submit the following in accordance with the requirements of Exhibit I.

1. Product data: For the following:
 - a. Manufacturer's product lines of mechanically connected railings.
 - b. Railing brackets.
 - c. Paint products.
2. Shop drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

1.6 FIELD OR SITE CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

B. Code Requirements:

1. Opening limitations. Open guards shall have balusters or ornamental patterns such that a 4-inch diameter sphere cannot pass through any opening up to a height of 34 inches. From a height of 34 inches to 42 inches above the adjacent walking surfaces, a sphere 8 inches in diameter shall not pass.
2. The triangular openings formed by the riser, tread, and bottom rail at the open side of a stairway shall be of a maximum size such that a sphere of 6 inches in diameter cannot pass through the opening.

3. At elevated walking surfaces for access to and use of electrical, mechanical or plumbing systems or equipment, guards shall have balusters or be of solid materials such that a sphere with a diameter of 21 inches cannot pass through any opening.
 4. In areas that are not open to the public within occupancies in IBC Group I-3, F, H, or S, balusters, horizontal intermediate rails, or other construction shall not permit a sphere with a diameter of 21 inches to pass through any opening.
- C. Thermal Movements of Exterior Railings: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

PART 2 PRODUCTS

2.1 STEEL RAILING SYSTEM MATERIALS

- A. Use pipe conforming to ASTM A 500, Grade B, Schedule 40.
- B. Make rails and posts of 1 ½ inch outside diameter steel pipe minimum, or per drawings, with welded joints.
- C. Use cast steel fittings, elbows, T shapes, wall brackets, escutcheons, etc.
- D. Provide mountings for casting in concrete, embedding in masonry or mounting to drywall partitions, as shown on Drawings.
- E. Use flush, countersunk screws or bolts, consistent with design of railing system.
- F. Use concealed splice connectors.
- G. Apply SSPC 15, type 1, red oxide shop primer.

2.2 FABRICATION

- A. Fit and shop assemble components in largest practical sizes for delivery to site.
- B. Fabricate components with joints tightly fitted and secured. Furnish spigots and sleeves to accommodate site assembly and installation.
- C. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- E. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations not encouraging water intrusion.

- F. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- G. Accurately form components to suit stairs and landings, to each other and to building structure.
- H. Accommodate for expansion and contraction of members and building movement without damage to connections or members.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete embedded in masonry with setting templates, to appropriate sections.

3.3 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Anchor railings to structure with anchors.
- C. Field weld anchors as indicated on shop drawings. Touch-up welds with primer. Grind welds smooth.
- D. Assemble with spigots and sleeves to accommodate tight joints and secure installation.

3.4 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

3.5 ADJUSTING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

3.6 PROTECTION

- A. Protect final finishes of railings from damage during construction period with temporary protective coverings. Remove protective coverings at time of Substantial Completion.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 05 5213, Rev. 1, dated April 23, 2012.

SECTION 05 5350
GRATINGS AND FLOOR PLATES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal bar gratings.

1.2 RELATED SECTIONS

- A. Section 03 1550, "Post Installed Concrete Anchors – Installation and Testing."
- B. Section 01 4444, "Offsite Welding and Joining Requirements."
- C. Section 09 9100, "Painting."

1.3 REFERENCES

- A. ASTM International:
 - 1. ASTM A 36, *Standard Specification for Carbon Structural Steel*.
 - 2. ASTM A 123, *Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products*.
 - 3. ASTM A 653, *Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process*.
 - 4. ASTM A 666, *Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar*.
 - 5. ASTM A 1011, *Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength*.
 - 6. ASTM B 211, *Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire*.
 - 7. ASTM B 221, *Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes*.
- B. American Welding Society:
 - 1. AWS A2.4, *Standard Symbols for Welding, Brazing, and Nondestructive Examination*.
 - 2. AWS D1.1, *Structural Welding Code - Steel*.
 - 3. AWS D1.2, *Structural Welding Code - Aluminum*.
- C. Green Seal:
 - 1. GS-11, *Paints and Coatings*.
- D. National Association of Architectural Metal Manufacturers:
 - 1. NAAMM MBG 531, *Metal Bar Grating Manual*.
 - 2. NAAMM MBG 532, *Heavy Duty Metal Bar Grating Manual*.

- E. SSPC: The Society for Protective Coatings:
 - 1. SSPC, *Steel Structures Painting Manual*.
 - 2. SSPC SP 1, *Solvent Cleaning*.
 - 3. SSPC SP 10, *Near-White Blast Cleaning*.
 - 4. SSPC Paint 15, *Steel Joist Shop Paint*.
 - 5. SSPC Paint 20, *Zinc-Rich Primers (Type I - Inorganic and Type II - Organic)*.

1.4 ACTION/ INFORMATIONAL SUBMITTALS

- A. Submittals will be in accordance with the requirements of Exhibit I.
- B. Product Data. For the following:
 - 1. Metal bar gratings.
- C. Shop Drawings. Indicate details of gratings, component supports, anchorage, openings, perimeter construction details, and tolerances. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- D. Mill Certificates. Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.
- E. Paint compatibility Certificates. From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
- F. Delegated-Design Submittal. For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- G. Qualification Data. For qualified professional engineer.
- H. Manufacturer's Installation Instructions. Submit special requirements of opening, perimeter framing.

1.5 QUALITY ASSURANCE

- A. Metal Bar Grating Standards. Comply with NAAMM MBG 531, "Metal Bar Grating Manual and NAAMM MBG 532, "Heavy-Duty Metal Bar Grating Manual."
- B. Qualifications. Design gratings under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of New Mexico.

1.6 FIELD CONDITIONS

- A. Field Measurements. Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers. Subject to compliance with requirements, provide products by one of the following:
1. Alabama Metal Industries Corporation; a Gibraltar Industries Company.
 2. All American Grating.
 3. BarnettBates Corporation.
 4. Borden Metal Products (Canada) Limited.
 5. Fisher & Ludlow; Division of Harris Steel Limited.
 6. Grating Pacific, Inc.
 7. IKG Industries; a division of Harsco Corporation.
 8. Marwas Steel Co.; Laurel Steel Products Division.
 9. Ohio Gratings, Inc.
 10. Seidelhuber Metal Products; Division of Brodhead Steel Products.

2.2 DESCRIPTION

- A. Sustainability Characteristics
1. Recycled Content of Steel Products. Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

2.3 PERFORMANCE/ DESIGN CRITERIA

- A. Delegated Design. Design gratings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance. Gratings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
1. Walkways and elevated Platforms Other Than Exits: Uniform load of 60 lbf/sq. ft.
 2. Maximum Spacing Between Bars: To restrict pedestrian shoe heels. 3/8 inch.
 3. Limit deflection to L/240 or 1/4 inch, whichever is less.
- C. Seismic Performance. If gratings are to be installed in a location(s) that requires resistance to / transmission of seismic loads then they must be designed for such in accordance with LANL ESM Ch. 5

2.4 MATERIALS

- A. Ferrous Metals
1. Steel Plates, Shapes, and Bars: ASTM A 36
 2. Steel Bars for Bar Gratings: ASTM A 36 or steel strip, ASTM A 1011 or ASTM A 1018.

3. Wire Rod for Bar Grating Crossbars: ASTM A 510
- B. Aluminum
1. Aluminum, General: Provide alloy and temper recommended by aluminum producer for type of use indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
 2. Extruded Bars and Shapes: ASTM B 221, alloys as follows:
 - a. 6061-T6 or 6063-T6, for bearing bars of gratings and shapes.
 - b. 6061-T1, for grating crossbars.
 3. Aluminum Sheet: ASTM B 209, Alloy 5052-H32.
- C. Fasteners
1. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - a. Provide stainless-steel fasteners for fastening aluminum.
 - b. Provide stainless-steel steel fasteners for fastening stainless steel.
 2. Steel bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A with hex nuts, ASTM A 563; and where indicated, flat washers.
 3. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.
 4. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
 - a. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
 5. Plain Washers: Round, ASME B18.22.1.
 6. Lock Washers: Helical, spring type, ASME B18.21.1.
- D. Miscellaneous Materials
1. Welding Rods and Bare Electrodes. Select according to WPS for metal alloy that is welded.
 2. Bituminous Paint. Cold-applied asphalt emulsion complying with ASTM D 1187.

2.5 FABRICATION

- A. Shop Assembly. Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

- C. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.
- D. Fit exposed connections accurately together to form hairline joints.
- E. Fabricate cutouts in grating sections for penetrations of sizes and at locations indicated. Cut openings neatly and accurately to size. Edge-band openings with bars having a thickness not less than overall grating thickness at contact points.
- F. Where gratings are pierced by pipes, ducts, and structural members, cut openings neatly and accurately to size and weld strap collar not less than 1/8 inch thick to the cut ends. Divide panels into sections only to extent required for installation where grating platforms and runways are to be placed around previously installed pipe, ducts, and structural members.
- G. Welding. Comply with Specification Section 01 4444, "Offsite Welding and Joining Requirements."
- H. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.
 - 1. Fabricate toeplates to fit grating units and weld to units in shop unless otherwise indicated.
 - 2. Fabricate toeplates for attaching in the field.
 - 3. Toeplate Height: 4 inches unless otherwise indicated.
- I. Metal Grating Fabrication
 - 1. Fabricate grates to accommodate design loads.
 - 2. Bolt joints of intersecting metal sections.
 - 3. Fabricate support framing for openings.
 - 4. Top Surface: Serrated.
- J. Grating Frames and Supports
 - 1. Frames and Supports for Metal Gratings: Fabricate from metal shapes, plates, and bars of welded construction to sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter and weld connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.
 - a. Unless otherwise indicated, fabricate from same basic metal as gratings.
 - b. Equip units indicated to be cast into concrete with integrally welded anchors. Unless otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inch thick by 8 inches long.
 - 2. Galvanize steel frames and supports in the following locations:
 - a. Exterior.
 - b. Interior.

2.6 FINISHES

A. Primer Materials

1. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
 2. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic.
- B. Steel Finishes
1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 2. Finish gratings, frames, and supports after assembly.
 3. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153 for steel and iron hardware and with ASTM A 123 for other steel and iron products.
 4. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
 5. Shop prime gratings, frames and supports not indicated to be galvanized unless otherwise indicated.
 6. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning." requirements indicated below:
 - a. Exterior Items: SSPC-SP/NACE No.3, "Commercial Blast Cleaning."
 - b. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - c. Items Indicated to Receive Primers Specified in Division 09 Section "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - d. Other Items: SSPC-SP 7/NACE No. 4, "Bush-off Blast Cleaning."
 7. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify opening sizes and dimensional tolerances are acceptable.
- B. Verify supports and anchors are correctly positioned.

3.2 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.
- D. Fit exposed connections accurately together to form hairline joints.
 - 1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- E. Attach toeplates to gratings by welding at locations indicated.
- F. Post Installed Anchors: Comply with Specification Section 03 1550, "Post Installed Concrete Anchors – Installation and Testing."
- G. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.3 FRAME INSTALLATION

- A. Place frames in correct position, plumb and level.
- B. Mechanically cut galvanized finish surfaces. Do not flame cut.
- C. Anchor by bolting through saddle clips.
- D. Set perimeter closure flush with top of grating and surrounding construction.
- E. Secure to prevent movement.

3.4 INSTALLING METAL BAR GRATINGS

- A. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.
- B. Attach removable units to supporting members with type and size of clips and fasteners indicated or , if not indicated, as recommended by grating manufacturer for type of installation conditions shown.
- C. Attach nonremovable units in supporting member by welding where both materials are same; otherwise, fasten by bolting as indicated above.

3.5 INSTALLING EXPANDED-METAL GRATINGS

- A. General: Comply with manufacturers' written instructions for installing gratings.
- B. Place units with straight edge of bond up and with long direction of diamond-shaped openings parallel to direction of span.
- C. Attach removable units to supporting members by bolting at 6-inch intervals.
- D. Attach nonremovable units to supporting members by welding unless otherwise indicated. Space welds at 6-inch intervals.
- E. Attach aluminum units to steel supporting members by bolting at 6-inch intervals.

- F. Butt edges parallel to long direction of diamond-shaped openings and weld at every second bond point. Place individual grating sections so diamonds of one piece are aligned with those of adjacent sections.

3.6 ERECTION TOLERANCES

- A. Conform to NAAMM MBG 531.
- B. Maximum Space Between Adjacent Sections: 1/4 inch.
- C. Maximum Variation From Top Surface Plane of Adjacent Sections: 1/8 inch.

3.7 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 9100, "Painting."
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded area and repair galvanizing to comply with ASTM A 780.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 05 5350 Rev. 2, dated January 20, 2010.

SECTION 06 1000
ROUGH CARPENTRY

GENERAL

SECTION INCLUDES

Framing with dimension lumber.

Wood nailers.

Fasteners and metal framing anchors.

RELATED SECTIONS

Section 01 4000, "Quality Requirements."

Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

Product Data: Submit manufacturer's product data for each distinct product specified.

Material certificates for dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use, and design values approved by American Institute of Timber Construction's (AITC) American Lumber Standards Committee's Board of Review.

Wood treatment data as follows, including chemical treatment manufacturer's warranty and instructions for handling, storing, installing, finishing and disposal of treated materials:

1. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
2. For waterborne-treated products, include statement that moisture content of treated materials was reduced to levels indicated before shipment to Project site.
3. For fire-retardant-treated wood products, include certification by treating plant that treated materials comply with specified standard and other

requirements as well as data relative to bending strength, stiffness, and fastener-holding capacities of treated materials.

QUALITY ASSURANCE

Work identified in this section shall be done under a Quality Assurance Program (QAP) in accordance with Section 01 4000, "Quality Requirements."

Single-Source Responsibility for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product from one source and by single producer.

DELIVERY, STORAGE, AND HANDLING

Deliver wood products bundled or crated to provide adequate protection during transit and job storage, with required grade marks clearly identifiable. Inspect wood products for damage upon delivery. Remove and replace damaged materials.

Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks, and under temporary coverings.

For lumber and plywood pressure-treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

Protect sheet materials during handling to prevent breaking of corners and damage to surfaces.

PRODUCTS

LUMBER, GENERAL

Lumber Standards: Comply with Voluntary Product Standard PS 20, *American Softwood Lumber Standard* and with applicable grading rules of inspection agencies certified by AITC's American Lumber Standards Committee's Board of Review. Lumber design values are to comply with ASTM D 245 and ASTM D 2555.

Inspection Agencies: Inspection agencies, and their grading rules include the following:

Northeastern Lumber Manufacturers Association (NELMA).

Standard Grading Rules.

National Lumber Grades Authority (NLGA) (Canadian).

Standard Grading Rules.

Redwood Inspection Service (RIS).

Standard Specifications for Grades of California Redwood Lumber.

Southern Pine Inspection Bureau (SPIB)

Standard Grading Rules for Southern Pine Lumber.

West Coast Lumber Inspection Bureau (WCLIB).

No. 17 Standard Grading Rules for West Coast Lumber.

Western Wood Products Association (WWPA).

Western Lumber Grading Rules.

Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps and provide grade-compliance certificates issued by inspection agency.

Where nominal sizes are indicated, provide actual sizes required by Voluntary Product Standard PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.

Provide dressed lumber, surfaced four sides (S4S), unless otherwise indicated.

Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-in. nominal thickness or less, unless otherwise indicated.

WOOD-PRESERVATIVE-TREATED MATERIALS

General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPAC2 (lumber) and AWPAC9 (plywood). Mark each treated item with Quality Mark Requirements of inspections agency approved by AITC's American Lumber Standards Committee's Board of Review.

For exposed items indicated to receive stained finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

Pressure treat aboveground items with waterborne preservatives to minimum retention of 0.25 lb/ft³. After treatment, kiln-dry lumber and plywood to maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:

Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

Wood framing members less than 18 in. above grade.

Wood floor plates installed over concrete slabs directly in contact with earth.

Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to minimum retention of 0.40 lb/cu. ft.

Complete fabrication of treated items before treatment, where possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

FIRE-RETARDANT-TREATED MATERIALS

General: Where fire-retardant-treated wood is indicated, comply with applicable requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of Underwriter Laboratory (UL), U.S. Testing, or Timber Products Inspection, Inc.

Interior Type A: For interior locations, use chemical formulation that produces treated lumber and plywood with the following properties under conditions present after installation:

Bending strength, stiffness, and fastener-holding capacities are not reduced below values published by manufacturer of chemical formulation under elevated temperature and humidity conditions simulating installed conditions when tested.

No form of degradation occurs due to acid hydrolysis or other causes related to treatment.

Contact with treated wood does not promote corrosion of metal fasteners.

Exterior Type: Use for exterior locations, and where indicated.

Inspect each piece of treated lumber or plywood after drying, and discard damaged or defective pieces.

DIMENSION LUMBER

General: If not indicated on Contract documents, provide dimension lumber of any species and grades indicated for applicable use category listed in table below. Lumber shall comply with AITC's American Lumber Standards Committee's National Grading Rule (NGR) provisions of inspection agency applicable to species.

Product (Nominal Dimension)	Grade	Use
Structural Light Framing: 2 to 4 in. thick 2 to 4 in. wide	Select Structural No. 1 No. 2 No. 3	Structural applications where highest design values are needed in light framing sizes.
Light Framing: 2 to 4 in. thick 2 to 4 in. wide	Construction Standard Utility	Where high-strength values are not required, such as wall framing, plates, sills, cripples, and blocking.
Stud: 2 to 4 in. thick 2 in. and wider	Stud	Optional all-purpose grade designed primarily for stud uses, including bearing walls.
Structural Joists and Planks: 2 to 4 in. thick 5 in. and wider	Select Structural No. 1 No. 2 No. 3	Intended to fit engineering applications for lumber nominal 5 in. and wider, such as joists, rafters, headers, beams, trusses, and general framing.

Species and grades must meet or exceed the following values, unless indicated otherwise on Contract documents.

Fb (extreme fiber stress in bending): Minimum 850 psi.

E (modulus of elasticity): Minimum 1,300,000 psi.

Exposed Framing: Refers to dimension lumber which is not concealed by other work, and is indicated to receive stained, painted, and or natural finish.

Provide material hand-selected from lumber of species and grade indicated for type of use, for uniformity of appearance, and freedom from characteristics that would impair finish appearance.

MISCELLANEOUS LUMBER

General: Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.

Fabricate miscellaneous lumber from dimension lumber of sizes indicated, and into shapes shown on Contract documents.

Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.

Grade and Species: For dimension lumber sizes, provide No. 3 or Standard grade lumber per AITC's American Lumber Standards Committee's NGRs of any species. For board-size lumber, provide No. 3 Common or Standard grade per WWPA of any species.

WOOD-BASED STRUCTURAL-USE PANELS, GENERAL

Structural-Use Panel Standards: Panel thickness, grade, veneer qualities and group number or span rating, shall be as shown on Drawings, and in accordance with recommendations of APA. Comply with Voluntary Product Standard PS 1 for plywood panels, and Voluntary Product Standard PS 2 for products not manufactured under Voluntary Product Standard PS 1 provisions.

Panels which have any edge or surface permanently exposed to weather shall be classed Exterior Grade.

Panel thickness, grade, and group number or span rating shall be at least equal to that shown on Drawings.

Application shall be in accordance with recommendations of APA.

Trademark: Factory-mark each structural-use panel with APA trademark evidencing compliance with grade requirements.

FASTENERS

General: Provide fasteners of size and type indicated that comply with requirements specified.

Where rough carpentry work is exposed to weather, in ground contact, or in areas of high relative humidity, provide fasteners with hot-dip, zinc-coating per ASTM A 153/A 153M.

Nails, Wire, Brads, and Staples: ASTM F 1667.

Wood Screws: ASME B18.6.1.

Lag Bolts: ASME B18.2.1.

Bolts: Steel bolts complying with ASTM A 307, Grade A with ASTM A 563 hex nuts and, where indicated, flat washers.

METAL FRAMING ANCHORS

General: Provide galvanized steel framing anchors of structural capacity, type, and size indicated, with allowable design loads as published by manufacturer that meet or exceed those indicated.

Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation, structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.

EXECUTION

INSTALLATION, GENERAL

Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.

Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

Apply field treatment complying with AWWPA M4 to cut surfaces of preservative-treated lumber and plywood.

Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with IBC Table 2304.9.1, Fastening Schedule.

WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

Install wood grounds, nailers, blocking, and sleepers where shown, and where required for screening or attaching other work. Form to shapes shown and cut as required for true line and level of attached work. Coordinate locations with other work involved.

Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

Install permanent grounds of dressed, preservative-treated, key-beveled lumber not less than 1-1/2 in. wide, and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 06 1000, Rev. 1, dated May 1, 2008.

SECTION 06 2000
FINISH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Finish carpentry items.
- B. Hardware and attachment installation.
- C. Wood trim and moldings installation.
- D. Job-built shelving and cabinets.

1.2 RELATED SECTIONS

- A. Section 01 4000, "Quality Requirements."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- C. Section 09 9100, "Painting."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Shop drawings of architectural woodwork indicating component profiles, fastening methods, jointing details, and accessories at a minimum scale of 1-1/2 in. equals 1 ft.
- B. Catalog data for hardware and specialty items.

1.5 QUALITY ASSURANCE

- A. Work identified in this section shall be done under a Quality Assurance Program (QAP) in accordance with Section 01 4000, "Quality Requirements."

1.6 PROJECT CONDITIONS

- A. Protect materials and work from moisture damage.
- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
- C. Coordinate the work with plumbing, electrical rough-in and installation of associated components.

PART 2 PRODUCTS

2.1 LUMBER MATERIALS

- A. Softwood lumber: PS 20, AWI Custom grade, average moisture content of 4-9 percent.
- B. Hardwood lumber: AWI Custom grade, average moisture content of 4-9 percent, vertical grain, suitable for transparent finish.

2.2 PANEL PRODUCTS

- A. Softwood plywood: PS 1, AWI Custom grade, with particleboard core material.
- B. Hardwood plywood: AWI Custom grade, with particleboard core and red oak face veneer.
- C. Particleboard: AWI standard Medium density with Type 1 water-resistant adhesive, of grade to suit application, sanded faces.
- D. Hardboard: Standard grade, untempered, smooth one side.

2.3 OVERLAYS – HIGH PRESSURE LAMINATES

- A. Plastic laminate: NEMA GP50, 0.050 in. thick, for horizontal surfaces, NEMA GP28, 0.028 in. thick, for vertical surfaces, matte finish faces.
- B. Backing sheet: NEMA LD-3 BK20, 0.020 in. thick, undecorated sheet.
- C. Adhesives (non-toxic, formaldehyde free) as recommended by plastic laminate manufacturer.

2.4 ACCESSORIES

- A. Plastic laminate self-edge trim on plastic laminate faced panels.
- B. Matching wood veneer tape on hardwood faced panels.
- C. Plastic edge trim; extruded flat shape, smooth surface finish, self locking serrated tongue, of width to match panel, color as selected, on painted softwood panels.
- D. Clear, heat strengthened, 1/4-in., safety glass for wall cabinet doors.
- E. Fasteners of size and type to suit application.
- F. Concealed joint fasteners of threaded steel.

2.5 HARDWARE

- A. Cabinet and casework hardware to conform to ANSI/BHMA A156.9, Grade 1. Hardware finishes as designated in ANSI/BHMA A156.18.

2.6 FABRICATION

- A. Fabricate products to AWI Custom grade standards for Flush Overlay design.
- B. When necessary to cut and fit, provide materials with ample allowance for cutting. Provide trim, if required, for scribing and cutting.
- C. Apply plastic laminate finish in full, uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners.
- D. Apply plastic laminate backing sheet to reverse side of plastic laminate finished surfaces.
- E. Apply self-edging to exposed panel edges.
- F. Casework and cabinet hardware to be furnished by the casework/cabinet manufacturer.

2.7 SHOP FINISHING OF WOOD FACED CABINETS

- A. Painted Finish: Apply 1 coat of primer and 2 coats of semi-gloss acrylic latex enamel as specified in Section 09 9100, "Painting."
- B. Natural Finish: Apply sanding sealer, stain and 2 coats of satin polyurethane as specified in Section 09 9100, "Painting."

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify adequacy of backing and support framing.
- B. Set and secure materials and components in place, plumb and level.
- C. Verify mechanical, electrical and building items affecting work of this section are in place and ready to receive this work.

3.2 INSTALLATION

- A. Set and secure materials and components in place, plumb and level.
- B. Carefully scribe work abutting other components, with maximum gaps of 1/32 in. Do not use additional overlay trim to conceal larger gaps.

3.3 ERECTION TOLERANCES

- A. Maximum variation from true position is 1/16 in.
- B. Maximum offset from true alignment with abutting materials is 1/32 in.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 06 2000, Rev. 1, dated May 1, 2008.

SECTION 07 1113
BITUMINOUS DAMPPROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cold-applied water-based emulsified asphalt dampproofing for exterior below-grade concrete and masonry surfaces.

1.2 RELATED SECTIONS

- A. Section 01 4000, "Quality Requirements."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- C. Section 07 2100, "Thermal Insulation,"

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Product Data: Manufacturer's technical bulletins and MSDS on each product.
- B. Application Data: Manufacturer's application instructions including environmental requirements.

1.5 LANL PERFORMANCE REQUIREMENTS

- A. Asphalt dampproofing materials shall comply with Volatile Organic Compound (VOC) requirements of the U.S. EPA Architectural Coatings Rule.
- B. Brush, roller and spray applied short fibered solvent-based asphalt dampproofing shall comply with ASTM D 4479, Type 1.
- C. Trowel applied long fibered solvent-based asphalt dampproofing shall comply with ASTM D 4586, Type 1.
- D. Solvent-based asphalt primer shall comply with ASTM D 41.
- E. Cut-back solvent-based asphalt mastic used as primer shall comply with ASTM D 4479, Type 1.
- F. Cut-back water-based asphalt emulsion used as primer shall comply with ASTM D 1227, Type 3.
- G. Reinforcing Fabric shall comply with ASTM D 1668.

1.6 QUALITY ASSURANCE

- A. Work identified in the section shall be done under a Quality Assurance Program (QAP) in accordance with Section 01 4000, "Quality Requirements."
- B. Perform work in accordance with National Roofing Contractors Association (NRCA) *Waterproofing and Dampproofing Manual*.
- C. Manufacturer's Qualifications: Company with minimum 15 years experience in manufacturing specified products.
- D. Applicator Qualifications: Company with minimum of 5 years experience in application of specified products on projects of similar size and scope, and is acceptable to product manufacturer.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Ensure that environmental conditions meet manufacturer's requirements when handling, storing, and applying bituminous materials.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Water-Based Emulsified Asphalt: Provide cold-applied, water-based, asbestos-free, fibered, bentonite clay emulsified-asphalt compound suitable for application as a protective coating for exterior concrete and masonry below-grade surfaces. Dampproofing materials shall be flexible, quick-drying, and be able to span small surface holes and hairline cracks.
 - 1. Acceptable Spray/Roller/Brush Applied Asphalt Emulsion:
 - a. Hydrocide 700B Asphalt Emulsion, by Degussa Building Systems
 - b. HE789 Fibered Asphalt Emulsion, by the Henry Company
 - c. Sealmastic Type II Emulsion, by W.R. Meadows, Inc.
 - d. 220AF Fibered Emulsion Damp Proofing, by Karnak Waterproofing Products
 - 2. Acceptable Primer/Cut-Back Mastic:
 - a. HE788 Non-Fibered Emulsion, by the Henry Company
 - b. Hydrocide 600 Asphalt Emulsion, by Degussa Building Systems
 - c. Sealtight Spray-Mastic, by W.R. Meadows, Inc.
- B. Protection Board: Provide rigid insulation board as specified in Section 07 2100, "Thermal Insulation," to a depth of 36 in. below grade. Apply 1/2-in.-thick bitumen-impregnated hardboard to surfaces below the rigid insulation board.
- C. Reinforcing Fabric: Stable, durable, acid and heat resistant, and not susceptible to rot or decay. Provide manufacturer's recommended woven mesh fabric made of yarns or flexible glass filaments.
 - 1. Acceptable Fabrics:
 - a. HE183 Yellowglass Fabric, by the Henry Company
 - b. Sonoshield Reinforcing Fabric, by Degussa Building Systems
 - c. No. 31 Reinforcing Fabric, by Karnak Waterproofing Products

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that surfaces to be dampproofed are in good repair, clean, and conform to dampproofing manufacturer's requirements.
- B. Verify items which penetrate surfaces to receive dampproofing are securely installed.
- C. Verify that environmental conditions at time of application are within parameters specified by dampproofing manufacturer.

3.2 PREPARATION

- A. Protect adjacent surfaces not to receive dampproofing.
- B. Surfaces shall be free of dirt, residues, water-repellent compounds, and other foreign matter. All holes, cracks, and recessed joints in concrete or concrete block shall be filled with cement mortar to provide a smooth, clean surface without depressions or projections. Wire brush surfaces a minimum of 4 in. from both sides of fine cracks and corners. Fill vertical cold joints flush with surface, using sealant compatible with asphalt dampproofing.
- C. Prior to application, dampen surfaces with water in accordance with manufacturer's instructions.

3.3 APPLICATION

- A. Exterior Below-Grade Dense Surfaces: For dense concrete surfaces not subject to hydrostatic pressure.
 - 1. Spray/Brush Application: Apply two coats of asphalt damp proofing by wide soft-bristle/fiber brush, long nap roller, or standard heavy-duty spray equipment. Apply first coat keeping brush strokes in a single directions. Apply second coat keeping brush strokes at a right angle to the first coat. Allow first coat to dry per manufacturer's instructions before applying second coat. Comply with wet film thicknesses and application rates specified in manufacturer's data.
 - 2. Fill all crevices and grooves, ensuring that coating is continuous and free from breaks and pinholes. Carry coating over exposed top and outside edge of footing. Spread around all joints, grooves, and slots and into all chases, corners, reveals, and soffits. Bring coating to finished grade.
- B. Exterior Below-Grade Porous Surfaces. Concrete block/masonry surfaces – alternate techniques are equally effective – base selection on local preference and availability of equipment.
 - 1. Two-Coat System: Apply over the entire prepared surface, a coat of compatible primer or asphalt dampproofing material cut back as recommended by manufacturer. Apply to recommended wet film thickness and application rate. Following manufacturer's recommended drying time apply one coat of trowel-grade asphalt dampproofing material as specified for dense surfaces. Allow to set a minimum of 24 hours prior to backfilling.

3.4 PROTECTION BOARD INSTALLATION

- A. Place protection board directly against membrane; butt joints.
- B. Adhere protection board to tacky dampproofing surface.
- C. Scribe and cut boards around projections, penetrations and interruptions.

3.5 BACKFILLING

- A. Backfilling: Install protection board as specified above. Place backfill not sooner than 24 hours nor later than seven days, after application of asphalt dampproofing materials. Do not rupture or damage the film or displace the coating or membranes.

3.6 CLEANUP

- A. Solvent-Based: Tools and other equipment shall be thoroughly cleaned with paint thinner or mineral spirits, taking necessary precautions when handling combustible materials.
- B. Water-Based: Fresh coating can be removed with soap and water. Remove dried dampproofing material using paint thinner or mineral spirits. Clean hands with waterless hand cleaners.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 07 1113, Rev. 1, dated May 5, 2008.

SECTION 07 2100
THERMAL INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Mineral-wool blanket insulation.
- B. Sound Attenuation Blanket insulation.
- C. Rigid Perimeter Insulation.
- D. Vapor retarders.

1.2 RELATED SECTIONS

- A. Section 01 4000, "Quality Requirements."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. See Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 ACTION SUBMITTALS / INFORMATION SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Product Data: For each type of product indicated.
- B. Manufacturer's Certifications: Submit manufacturer's representative certification that the proposed products comply with specified requirements, and are compatible with each other and substrates for the intended applications.
- C. Product test reports.
- D. Research/evaluation reports.
- E. Material Safety Data Sheets (MSDS): Submit MSDS for each adhesive product.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
 - 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to project site before installation time.
 - 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

1.6 QUALITY ASSURANCE

- A. Work identified in the section shall be done under a Quality Assurance Program (QAP) in accordance with Section 01 4000, "Quality Requirements."
- B. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products complying with requirements without delaying progress of the work.
- C. Installer Qualifications: Engage an experienced installer, with not less than 2 years experience and certification by the manufacturer, as an approved installer who has completed building insulation applications similar in material, design and extent to that indicated for projects that have resulted in construction with a record of successful in-service performance.

1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of insulation under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside the limits permitted by insulation manufacturer.
 - 2. When insulation is or is likely to become wet due to rain, frost, condensation or other causes.

PART 2 PRODUCTS

2.1 PERFORMANCE / DESIGN CRITERIA

- A. Fire Test Response Characteristics: Provide insulation and related materials with fire-test-response characteristics to be determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface Burning Characteristics: ASTM E 84.
 - 2. Flame spread 25; smoke developed 50 maximum.
- B. Assembly Sound Transmission Rating (ASTM E 90): STC 44 minimum.

2.2 RIGID PERIMETER BOARD INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dow Chemical Company (The).
 - b. Owens Corning,
 - 2. Insulation Value: The R value shall be a minimum of .5 per inch.
 - 3. Board Size: 1-1/2 in. thick with shiplap edges.
 - 4. Recycle Content: Minimum 75 percent pre-consumer (post-industrial) content.

2.3 MINERAL-WOOL BLANKET INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Fibrex Insulations Inc.
 - 2. Owens Corning.
 - 3. Roxul Inc.
 - 4. Thermafiber.
- B. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
- C. Reinforced-Foil-Faced, Mineral-Wool Blanket Insulation: ASTM C 665, Type III (reflective-faced), Class A (faced surface with a flame-spread index of 25 or less per ASTM E 84); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.
- D. Recycled Content: Minimum 75 percent pre-consumer (post-industrial) content.

2.4 VAPOR RETARDERS

- A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils thick with maximum permeance ration of 0.13 perm.
- B. Vapor Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacture for sealing joints and penetrations in vapor retarder.

2.5 INSULATION FASTENERS

- A. Adhesively attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
 - b. Gemco; Spindle Type.
 - 2. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 - 3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inches in diameter; length to suit depth of insulation indicated.
- B. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle, capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Gemco; 90-Degree Insulation Hangers.
 - 2. Angle: Formed from 0.030-inch thick, perforated, galvanized-carbon-steel sheet with each leg 2 inches square.

3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter, length to suit depth of insulation indicated.
- C. Insulation-Retaining Washers: Self-Locking washers formed from 0.016-inch thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AGM Industries, Inc.; RC150.
 - b. Gemco; Dome-Cap.
 2. Product ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations.
 - a. Where indicated.
- D. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of 1 inch between face of insulation and substrate to which anchor is attached.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Gemco; Clutch Clip.
- E. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the work include, but are not limited to, the following:
 - a. AGM Industries, Inc.; TACTOO Adhesive.
 - b. Gemco; Tuff Bond Hanger Adhesive.

2.6 ADHESIVES

- A. Adhesive for Bonding Insulation: Provide insulation manufacturer's recommended low-volatile organic compound (VOC) adhesives capable of bonding insulation to substrates indicated without damaging or corroding either insulation or substrates. Applicable VOC limits include, but are not limited to:
1. Contact Adhesive: Not to exceed 80 grams per liter (less water).
 2. Special purpose contact Adhesive: Not to exceed 250 grams per liter (less water).
 3. Multipurpose Construction Adhesive: Not to exceed 70 grams per liter (less water)
 4. Plastic Foam Adhesive: Not to exceed 50 grams per liter (less water).
- B. For adhesive applications not listed above, VOC content of adhesives shall not exceed 250 grams per liter (less water).

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that conditions comply with requirements of Contract documents.
- B. Verify that related work to be performed before installation of insulation within indicated spaces has been completed.
- C. Verify that substrates are in satisfactory condition to receive insulation.
 - 1. Masonry substrates: Verify that masonry materials have dried sufficiently and have attained optimum moisture content.
- D. Do not proceed with installation of insulation until all unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances harmful to insulations or vapor retarders, including removal of projections that might puncture vapor retarders, or interfere with insulation attachment.
- B. Close off openings in cavities receiving poured-in-place insulation to prevent the escape of insulation. Provide screens where openings must be maintained for drainage or ventilation.

3.3 INSTALLATION OF BELOW-GRADE INSULATION

- A. On vertical footing and foundation wall surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
 - 1. If not otherwise indicated, extend insulation a minimum of 36 inches below exterior grade line.
 - 2. Protect below-grade insulation on vertical surfaces from damage during back-filling, by application of protection board. Set in adhesive in accordance with recommendation of insulation manufacturer.
 - 3. Cut insulation neatly as required to fit tightly around obstructions.
- B. On horizontal surfaces under slabs, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
 - 1. If not otherwise indicated, extend insulation a minimum of 36 inches in from exterior walls.

3.4 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive mastic, or sealant as recommended by insulation manufacturer.

- C. Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
 5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
 6. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
 - a. Exterior Walls: Set units with facing placed toward exterior of construction.
 - b. Interior Walls: Set units with facing placed toward areas of high humidity.
- D. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu.ft.

3.5 ACOUSTICAL INSULATION INSTALLATION

- A. Installation of Insulation in Ceilings for Sound Attenuation
1. Where glass-fiber blankets are indicated for sound attenuation above ceilings, install blanket insulation over entire ceiling area in thickness indicated. Extend insulation 48 inches on either side of partitions.
- B. Acoustical insulation installation at sound rated assemblies.
1. Install insulation where indicated in sound rated assemblies in accordance with manufacturer's recommendations and ASTM E 90. Maintain acoustical rating of assembly.

3.6 INSTALLATION OF VAPOR RETARDERS

- A. Place vapor retarders on side of construction indicated on drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

- B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs.
 - 1. Before installing vapor retarders, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
 - 2. Firmly attach vapor retarders to metal framing and solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.
- C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.
- D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

3.7 CLEANING

- A. Remove all excess materials from the job site and leave the areas insulated ready for other trades.
- B. Prevent disposal of insulation scraps by reuse in ceiling and wall areas or other locations out of view.
- C. Remove all unusable excess materials from the job site and leave the areas insulated ready for other trades.

3.8 PROTECTION

- A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 07 2100, Rev. 2, dated January 19, 2010.

SECTION 07 4113
METAL ROOF PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Standing seam metal roof panels.
- B. Metal soffit panels.
- C. Gutters and downspouts.
- D. Associated flashings, gaskets, and sealant.
- E. Snow guards.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 07 6200, "Sheet Metal Flashing and Trim," for field formed Flashings, and other sheet metal work not part of metal roof panel assemblies.

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Conference: Conduct conference at the RLWTF Upgrade Project Low-Level Waste Subproject
 - 1. Meet with LANL STR, Engineer of Record, testing and inspecting agency representative, metal roof panel installer, metal roof panel manufacturer's representative, deck purlin and rafter installer, and installers whose work interfaces with or affects metal roof panels including installers of roof accessories and roof-mounted equipment.
 - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review methods and procedures related to metal roof panel installation, including manufacturer's written instructions.
 - 4. Examine deck substrate purlin and rafter conditions for compliance with requirements, including flatness and attachment to structural members.
 - 5. Review structural loading limitations of deck purlins and rafters during and after roofing.
 - 6. Review flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
 - 7. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.

8. Review temporary protection requirements for metal roof panel assembly during and after installation.
9. Review roof observation and repair procedures after metal roof panel installation.
10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.5 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Submit the following in accordance with the requirements of Exhibit I.
- B. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of roof panel and accessory.
- C. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, side-seam and endlap joints, panel profiles, corners, anchorages, trim, flashing closures, and accessories; and special details. Distinguish between factory-and field-assemble work.
- D. Samples: For each type of exposed finish required.
- E. Manufacturer Certificates: Signed by manufacturer certifying that roof panels comply with performance requirements specified in "Performance Requirements" Article.
 1. Submit evidence of meeting performance requirements.
- F. Product Test Reports
- G. Product Test Reports for roof panels, indicating that panels comply with solar reflectance index requirement, a minimal of 78.

1.6 CLOSE OUT SUBMITTALS

- A. Maintenance Data.
- B. Warranty: As specified herein.

1.7 QUALITY ASSURANCE

- A. Qualifications
 1. Metal Roof Manufacturer
 - a. Company specializing in manufacturing products specified in this section.
 - b. Supply a list of projects, completed in Southwest, where specified material has been in place and performing successfully for a period of not less than 5 years.
 2. Applicator
 - a. Company specializing in performing the Work of this section with documented experience and "certified" by material manufacturer as an applicator and maintenance company. As a minimum, Applicator must have successfully completed 5 projects using the specified or similar materials. Applicator must provide LANL's Subcontract Technical Representative (STR) with a written record identifying these

projects with the name and address of purchasers of the service and location of work performed, if requested.

- B. Fire-Resistance Ratings: Where indicated, provide metal roof panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
 - 2. Combustion Characteristics: ASTM E 136.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.
- B. Unload, store and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

1.9 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit metal roof panel work to be performed according to manufacturer's written instructions and warranty requirements.
- B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

1.10 COORDINATION

- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
- B. Coordinate metal roof panels with rain drainage work, flashing, trim, and construction of decks, purlins and rafters, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

- A. Furnish 20 year manufacturer warranty for sheet metal roofing against structural failure, fastener seal loss, corrosion and water penetration.
- B. Furnish 20 year manufacturer warranty for metal finish against fading, chipping, chalking, and blistering.

PART 2 PRODUCTS

2.1 DESCRIPTION

A. Regulatory Requirements

1. *2009 International Building Code.*

B. Sustainability Characteristics

1. Energy Performance: Provide roof panels with solar reflectance index not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.
2. Provide data indicating color and SR1 value.

2.2 PERFORMANCE REQUIREMENTS

A. Perform Work per SMACNA Architectural Sheet Metal Manual and NRCA Roofing and Waterproofing Manual where details are not provided or identified in the Subcontract documents.

B. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of roof area when tested according to ASTM E 1680 at the following test-pressure difference:

1. Test-Pressure Difference: Negative 1.57 lbf/sq.ft.

C. Water Penetration: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:

1. Test-Pressure Difference: 20 percent of positive design wind pressure, but not less than 6.24 lbf/sq.ft. and not more than 12.0 lbf/sq.ft.

D. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.

E. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL90.

F. FMG Listing: Provide metal roof panels and component materials that comply with requirements in FMG 4471 as part of a panel roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

1. Fire/Windstorm Classification: Class 1A-90.
2. Hail Resistance: SH.

G. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592.

1. Wind Loads: Determine loads based on the following minimum design wind pressures:
 - a. See structural sheets for wind parameter design.
2. Roof Live loads: 30 lbf/sq.ft.
3. Snow load based on ground snow load – 16 psf.

4. Deflection Limits: Metal roof panel assemblies shall withstand wind and snow loads with vertical deflections no greater than 1/180 of the span.
- H. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes. Base calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F, material surfaces.

2.3 PANEL MATERIALS

- A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 1. Recycled content: Provide steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
 2. Zinc-coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.
 3. Exposed Coil-Coated Finish:
 - a. 2-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
 - b. Provide selection from all colors that meet or exceed SR1 of 78.
 4. Concealed Finish: Manufacturer's standard white or light-colored acrylic or polyester backer finish.
- B. Panel Sealants:
 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch wide and 1/8 inch thick.
 2. Joint Sealant: ASTM C 920; as recommended in writing by metal roof panel manufacturer.
 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.4 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: 30 to 40 mils thick minimum, consisting of slip-resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
 2. Low Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
 3. Seams shall be lapped in accordance with Manufacturers recommendations.
 4. Underlayment shall be approved for 90 days (minimum) of exposure to UV and weather penetration.

5. Products subjected to compliance with requirements, provide one of the following:
 - a. Aqua Block 50 bg IMETCO of Norcross, Georgia, or approved equal.

2.5 MISCELLANEOUS METAL FRAMING

- A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G40 (Z120) hot-dip galvanized hot-dip galvanized] or coating with equivalent corrosion resistance unless otherwise indicated.
- B. Hat-Shaped, Rigid Furring Channels:
 1. Nominal Thickness: 0.025 inch.
 2. Depth: As indicated.
- C. Cold-Rolled Furring Channels: Minimum 1/2-inch wide flange.
 1. Nominal Thickness: 0.064 inch.
 2. Depth: 3/4 inch.
 3. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with nominal thickness of 0.040 inch.
 4. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch diameter wire, or double stand of 0.048-inch diameter wire.
- D. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, and depth required to fit insulation thickness indicated.
 1. Nominal Thickness: 0.025 inch.

2.6 MISCELLANEOUS MATERIALS

- A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

2.7 STANDING-SEAM METAL ROOF PANELS

- A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Basis of Design: IMETCO TwinLok mechanically seamed metal roof 22-gauge galvanized steel. 2-inch standing seam, heavy concealed clips, 12 inch widths, lengths continuous without seams.
 2. Profile: 2-inch vertical rib, seamed as indicated on the drawings

3. Material: Zinc-coated (galvanized)-steel sheet, 0.022 inch nominal thickness.
4. Clips: Floating to accommodate thermal movement.
 - a. Material: Metallic-coated steel.
5. Joint Type: As standard with manufacturer.

2.8 METAL SOFFIT PANELS

- A. General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.
- B. Metal Soffit Panels:
 1. Basis of Design: IMETCO FW-Series concealed fastener panel with interlocking seams or approved equals.
 2. Finish: Match finish and color of metal roof panels.
 3. Sealant: Factory-applied with interlocking joint.
 4. Profile: Flush.
 5. Material: Same as roof panels.
 6. Panel Coverage: 12 inches.
 7. Panel Height: 1 inch.

2.9 ACCESSORIES

- A. Roof panel accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
 1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
 2. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1 inch thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
 3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
- B. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum 0.018 inch thick. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

- C. Gutters: Formed from same material roof panels. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96 inch long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a minimum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match metal roof panels.
- D. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot-long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.

2.10 SNOW GUARDS

- A. Snow Guards: Prefabricated, noncorrosive units designed to be installed without penetrating metal roof panels, and complete with predrilled holes, clamps, or hooks for anchoring.
 - 1. Surface-Mounted, Metal, Stop-Type Snow Guards: Cast-aluminum stops designed for attachment to pan surface of metal roof panel using construction adhesive, silicone or polyurethane sealant, or adhesive tape.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the work include, but are not limited to, the following:
 - 1) Alpine Snow Guards, Division of Vermont Slate & Copper Services.
 - 2) Berger Bros. Co.
 - 3) Polar Blox.

2.11 FABRICATION

- A. Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal roof panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weathertight and minimize noise from movements within panel assembly.
- D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of the Work.

- B. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
- C. Examine solid roof sheathing to verify that sheathing joints are supported by framing of blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
- D. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.
- E. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.
- B. Miscellaneous Framing: Install subpurlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written instructions.
 - 1. Soffit Framing: Clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.3 UNDERLAYMENT INSTALLATION

- A. Install flashings to cover underlayment to comply with requirements specified in Section 07 6200, "Sheet Metal Flashing and Trim."

3.4 METAL ROOF PANEL INSTALLATION

- A. Standing Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
 - 1. Install clips to supports with self-tapping fasteners.
 - 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 - 3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
- B. Metal Soffit Panels: Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing:
 - 1. Flash and seal panels with weather closures where metal soffit panels meet walls and at perimeter of all openings.

3.5 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 - 2. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
 - 3. Provide elbows at base of downspouts to direct water away from building.
 - 4. Snow Guard Installation
 - a. Stop-Type Snow Guards: Attach snow guards to metal roof panels with adhesive, sealant, or adhesive tape, as recommended by manufacturer. Do not use fasteners that will penetrate metal roof panels.
 - b. Provide snow guards, at locations indicated on drawings.

3.6 CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.
- B. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.7 MAINTENANCE

- A. Fall Protection
 - 1. Ladder Stops: Provide a ladder stop/tie-off device at eave/gutter areas to prevent temporary ladders from sliding laterally until tied-off devices at eave/gutter area to prevent temporary ladders from sliding laterally until tied-off, and to provide a point for ladder tie-off. Device (e.g. bracket, strap) must be of material and construction visually and galvanically compatible with roof system, and nonrusting. Roof access locations will be determined by LANL Facility Operations Manager via the STR.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 07 4113, Rev. 3, dated February 18, 2010.

SECTION 07 4216
INSULATED CORE METAL WALL PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Mineral wool core vertical metal wall panel assembly with integral reveals, formed segmented joints, related trim and accessories.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 07 6200, "Sheet Metal Flashing and Trim."
- C. Section 07 9200, "Joint Sealants."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide metal wall panel system meeting performance requirements as determined by application of specified tests by a qualified testing agency on manufacturer's standard assemblies.
- B. System Performance: Meet the following performance requirements when tested in accordance with AAMA 508-07, including a horizontal joint, with an imperfect vapor barrier:
 - 1. Air Infiltration: Maximum 0.06 cfm/ft² per ASTM E 283 at a static-air-pressure difference of 6.24 lbf/ft², using minimum 10- by 10-ft test panel that includes horizontal and vertical joints.
 - 2. Water Penetration, Static Pressure: No uncontrolled water penetration per ASTM E 331 at a minimum static differential pressure of 15 lbf/ft² using minimum 10- by 10-ft test panel that includes horizontal and vertical joints.
 - 3. Water Penetration, Dynamic Pressure: No uncontrolled water penetration per AAMA 501.1 at a minimum static differential pressure of 15 lbf/ft², using minimum 10- by 10-ft test panel that includes horizontal and vertical joints.
- C. System Performance, Alternate Configuration: Meet performance requirements in Paragraph above utilizing separate air and water barrier membrane on rigid backup.
- D. Water Absorption: Maximum 1.0 percent absorption rate by volume when tested according to ASTM C 209.

- E. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated, per ASTM E 72:
 - 1. Seismic Performance: Comply with ASCE 7-05, Section 9, "Earthquake Loads."
- F. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction.
- G. Interior Classification: The flame spread and smoke development class for this panel system shall be Class A in accordance with ASTM E 84 or UL 723.

1.5 QUALITY ASSURANCE

- A. Manufacturer/Source: Provide metal wall panel system and panel accessories from a single manufacturer.
- B. Manufacturer Qualifications: Approved manufacturer listed in this section with minimum 10 years experience in manufacture of similar products in successful use in similar applications.
 - 1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
 - a. Product data, including certified independent test data indicating compliance with requirements. Include detailed data indicating compliance with AAMA 508.07 performance specified in this section.
 - b. Samples of each component.
 - c. Project references: Minimum of 5 installations not less than 5 years old, with Owner and Architect contact information.
 - 2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.
 - 3. Approved manufacturers must meet separate requirements of Paragraph 1.6.
- C. Wall Systems Installer Qualifications: Experienced Installer with minimum of 5 years experience with successfully completed projects of a similar nature and scope, and employing workers trained by manufacturer to install products of this section.
- D. Testing Agency Qualifications: Qualify in accordance with requirements of ASTM E 329.
- E. Adhesion Test: Prior to delivery of composite wall panel system, perform test on adhesives and sealants per ASTM D 3359. Test each adhesive and sealant utilizing specified panel finish.
 - 1. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as specified in Section 07 9200, "Joint Sealants."

- F. Fire Performance Characteristics: Provide metal composite wall systems with the following fire-test characteristics determined by indicated test standard as applied by UL or other testing and inspection agency acceptable to authorities having jurisdiction.
1. Surface-Burning Characteristics: Provide metal composite wall system panels with the following characteristics when tested per ASTM E 84.
 - a. Flame spread index: 25 or less.
 - b. Smoke developed index: 450 or less.
 2. Fire Performance of Insulated Wall: Class 1 wall panel per ANSI/FMG 4880.
 3. Room Corner Test: NFPA 286 or UL 1715.
 4. Intermediate Scale Multistory Fire Test: Representative mockup tested per NFPA 285.

1.6 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Shop Drawings: Provide shop drawings prepared by manufacturer or manufacturer's authorized dealer. Include full elevations showing openings and penetrations. Include details of each condition of installation and attachment. Provide details at a minimum scale 1-1/2-in./ft of all required trim and extrusions needed for a complete installation.
1. Indicate points of supporting structure that must coordinate with composite wall panel system installation.

1.7 PRODUCT TEST REPORTS

- A. Provide products and reports that meet the ICC-ES Evaluation Service listing.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect products of composite wall panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage.
1. Deliver, unload, store, and erect composite wall panel system and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.
 2. Flawed material shall not be installed.

1.9 WARRANTY

- A. Special Manufacturer's Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal wall panel assemblies that fail in materials and workmanship within two years from date of Substantial Completion.
- B. Special Panel Finish Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace wall panels that evidence deterioration of finish within 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Insulated Core Metal Wall Panel System: Factory mineral wool core, horizontal and vertical wall panel system consisting of an exterior metal face sheet with interior metal liner panel, bonded to factory mineral wool core in thermally-separated profile, utilizing no glues or adhesives, and with factory sealed tongue-and-groove and pressure-equalized rainscreen-designed vertical joint, attached to supports using concealed fasteners.

2.2 MANUFACTURERS

- A. Basis of Design: CENTRIA, 6-in. Versashield Insulated Core Metal Wall Panels run vertically on the interior walls of the LLW Process Area. Provide basis of design product, or equal in all respects.
 - 1. CENTRIA Architectural Systems; Moon Township, PA 15108-2944.

2.3 PANEL MATERIALS

- A. Metallic-Coated Steel Face Sheet: Coil-coated, ASTM A 755/A 755M.
 - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90, structural quality.
 - 2. Face Sheet Thickness: Minimum 0.030 in./22 gauge, flat.
 - 3. Surface: Smooth.
 - 4. Fluoropolymer Two-Coat Corrosion and Abrasion Resistant System: 3.0 mil barrier coat primer with 0.8 mil 70 percent PVDF fluoropolymer color coat.
 - a. Basis of Design: CENTRIA Versashield.
 - 5. Color: Centria Prismatic™ series colors, #393 off white.

2.4 INSULATION FOR PANEL CORES

- A. 6" mineral wool.

2.5 METAL WALL PANEL ACCESSORIES

- A. Metal Wall Panel Accessories, General: Provide complete metal wall panel assembly incorporating trim, and inside corners. Provide manufacturer's factory-formed clips, shims, closure strips, and caps for a complete installation. Fabricate accessories in accordance with the SMACNA *Architectural Sheet Metal Manual*.
- B. Formed Trim: Match material, thickness, and color of metal wall panel face sheets.
- C. Extrusion Trim: Provide manufacturer-provided extruded trim for the following locations and as indicated on drawings:
 - 1. Base trim.
 - 2. Panel installation perimeter.
 - 3. Opening perimeters.
- D. Fasteners: Concrete fasteners shall be 1/4- by 6-in. Titen concrete screws Simpson No. TTN 25600H.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Preinstallation Meeting: Conduct preinstallation meeting at site attended by Owner, Architect, manufacturer's technical representative, and other trade contractors.
 - 1. Coordinate building framing in relation to composite wall panel system.
 - 2. Coordinate window, door and louver, and other openings and penetrations of composite wall panel system.
- B. Examine metal wall panel system substrate with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal wall panels.
- C. Framing: Inspect framing that will support metal wall panels to determine if support components are installed as indicated on approved shop drawings. Confirm presence of acceptable framing members at recommended spacing to match installation requirements of metal wall panels.
 - 1. Maximum deviations acceptable:
 - a. 1/4-in. in 20 ft vertically or horizontally from face plane of framing.
 - b. 1/2 in. maximum deviation from framing face plane on any building elevation.
 - c. 1/8 in. in 5 ft.
- D. Openings: Verify that window, door, louver and other penetrations match layout on shop drawings.
- E. Correct out-of-tolerance work and other deficient conditions prior to proceeding with metal wall panel system installation.

3.2 METAL WALL PANEL SYSTEM INSTALLATION

- A. General: Install metal wall panel system in accordance with approved shop drawings and manufacturer's recommendations. Install metal wall panels in orientation, sizes, and locations indicated. Anchor metal wall panels and other components securely in place. Provide for thermal and structural movement
- B. Attach panels to metal framing using recommended clips, screws, fasteners, sealants, and adhesives indicated on approved shop drawings.
 - 1. Fasten metal wall panels to structure with concealed clips at each joint at location, spacing as recommended by manufacturer.
 - 2. Dissimilar Materials: Where elements of metal wall panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.

3.3 ACCESSORY INSTALLATION

- A. General: Install metal wall panel accessories with positive anchorage to building and weather-tight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install related sheet metal trim per requirements of Section 07 6200, "Sheet Metal Flashing and Trim."

2. Install components required for a complete metal wall panel assembly, including trim, copings, corners, seam covers, fillers, closure strips, and similar items.
3. Comply with performance requirements and manufacturer's written installation instructions.
4. Provide concealed fasteners except where noted on approved shop drawings.
5. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.4 CLEANING AND PROTECTION

- A. Remove temporary protective films. Clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.
- B. Replace damaged panels and accessories that cannot be repaired by finish touch-up or minor repair.
- C. Provide Maintenance Data.

END OF SECTION

SECTION 07 5213.13

ATACTIC-POLYPROPYLENE-MODIFIED BITUMEN ROOFING, COLD-APPLIED

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Two-ply atactic-polypropylene (APP) modified bituminous membrane roofing, cold applied.
- B. Hybrid roofing system that combines built-up ply sheets with APP-modified bituminous membrane.
- C. Roof insulation.
- D. Cover board.
- E. Roof walkway pads.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Roofing Conference: Conduct conference at TA-63.
 - 1. Meet with LANL STR, LANL's insurer if applicable, testing and inspecting agency representative, roofing installer, roofing system manufacturer's representative, deck installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 3. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 5. Review structural loading limitations of roof deck during and after roofing.
 - 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
 - 7. Review governing regulations and requirements for insurance and certificates if applicable.
 - 8. Review temporary protection requirements for roofing system during and after installation.
 - 9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Roof insulation,
 - 4. Manufacturer's published specifications, base flashing details, for the specified system.
 - 5. Submit Material Safety Data Sheets on all roofing materials to be used.
- B. Shop Drawings: Provide plan section, elevation and perspective drawings as necessary to depict all flashing and project conditions on the project, including but not limited to the following:
 - 1. Roof system and base flashing configuration.
 - 2. Penetration details.
 - 3. Termination details.
 - 4. Fastening patterns.
 - 5. Tapered insulation design.
- C. Selection Samples: For each product specified, two samples representing manufacturer's full range of available colors and types.
- D. Verification Samples: For each finish product specified, two samples representing actual product, color and finish.
- E. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in Paragraph 2.2.
 - 1. Submit evidence of complying with performance requirements.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.
- G. Research/Evaluation Reports: For components of membrane roofing system, from the ICC-ES.
- H. Manufacturer's Instructions:
 - 1. Manufacturer's published installation instructions and methods.
- I. Qualification Data: For qualified Installer.

1.6 SUBMITTALS

- A. Product Test Reports for Credit SS 7.2, indicating that roof materials comply with Solar Reflectance Index of at least 78.
- B. Product Data for adhesives and sealants, including printed statement of VOC content, that complies with South Coast Air Quality Management District Rule 31168 effective date July 1, 2005 and Amendment January 7, 2005.
- C. Submit manufacturer's documentation of Energy Star labeled roofing materials.

1.7 CLOSE-OUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.
- B. Warranties:
 - 1. Submit copy of the membrane manufacturer's warranty covering materials.
 - 2. Submit copy of the Roofing Subcontractor's warranty covering workmanship.

1.8 QUALITY ASSURANCE

- A. Apply roofing system by an approved Subcontractor authorized prior to bid by the roof membrane manufacturer. Prior to bid, the Roofing Subcontractor must have completed a minimum of 500 roofing squares of APP membrane in the Southwest. To qualify for this requirement, the completed membrane must have met all conditions to obtain material and labor warranty and must be performing successfully.
- B. Membrane manufacturer to provide a list of projects, completed in the Southwest, where the specified membrane has been in place and performing successfully for a period of not less than five (5) years. A minimum of 500 roofing squares must have been installed to meet this requirement.
- C. Do not deviate from this specification or the approved shop drawings without prior written approval by the manufacturer and the LANL Subcontract Technical Representative (STR).
- D. Code Requirements: Meet the requirements of the following recognized code approval or testing agencies. These requirements are minimum standards and no roofing work will commence without written documentation of the system's compliance.
 - 1. Underwriters Laboratories (UL) Class A membrane.
 - 2. Factory Mutual (FM) 1-90 uplift rating, as indicated on Contract Documents per FM Approval Standard No. 4470.
- E. Energy Star Roof Compliance: Proposed roofing system will be Energy Star Roof-compliant and roofing materials will be Energy Star labeled.
- F. For new installations, ponding must not occur in accordance with NRCA Roofing and Waterproofing Manual good roof design practice, which dictates that there will be no ponding water present 48-hours after rainfall.
- G. There will be no more than 20 patches per 10,000 SF on new construction.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation
- B. Deliver roofing materials to the site in original containers, with factory seals intact
- C. Store pail goods in their original undamaged containers in a clean, dry location within their specified temperature range.
- D. Store roll goods on end on pallets in a clean, dry, protected area. Do not double stack modified bitumen products.
- E. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply

with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

- F. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.10 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.
 - 1. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, substrate board, and other components of membrane roofing system.
 - 2. Warranty Period: 20 years from date of substantial completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Performance Roof Systems, Inc. Specification No. -12X-FRDC.
 - 2. Johns Manville Corporation Specification No. 2CIN-CA.

2.2 PERFORMANCE / DESIGN CRITERIA

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
- C. Perform work in accordance with all federal, state and local codes.
- D. Exterior Fire Test Exposure: Provide a roofing system achieving a UL Class rating for roof slopes indicated on the Contract Drawings.
 - 1. UL Class A rating.

- E. Windstorm Classification: Provide a roofing system which will achieve the required uplift resistance as calculated in accordance with the most current revision of ASCE 7 or as listed in the current FM Approval Guide.
 - 1. 90 psf of uplift resistance.
- F. FM Rating: Provide a roofing system which will achieve the following rating as listed in the current FM Approval Guide.
 - 1. FM 1-90.
- G. Foam Plastic Insulation: Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E 84.
- H. Other Insulation: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E 84.
- I. Energy Performance: Provide roofing system with initial Solar Reflectance Index not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.
- J. Energy Performance: Provide roofing system that is listed on DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
- K. Energy Performance: Provide roofing system with initial Solar Reflectance not less than 0.70 and Thermal Emittance not less than 0.75 when tested according to Cool Roof Rating Council's CRRC-1.
- L. Manufacturer's Requirements
 - 1. Except as modified and supplemented herein, follow the Roofing Manufacturer's and other materials manufacturer's catalogs, general and special requirements, and specific application recommendations.
 - 2. With respect to methods of installation, industry practices apply only when these specifications do not address the matter.
- M. Slopes and Underlying Materials
 - 1. Use materials which are proper for the slopes and for the underlying material to which the other materials are attached.
- N. Roof Membrane: Mineral-surfaced, Atactic-Polypropylene (APP) modified-bitumen capsheet, ply sheet, and base sheet, and cold-applied adhesive, UL Class A, Roofing Manufacturer's 20-year type system.
- O. Bituminous Flashings
 - 1. Composition base flashings consisting of:
 - a. Ply of modified-bitumen base sheet,
 - b. Ply of mineral-surfaced modified-bitumen flashing sheet, and
 - c. Modified-bitumen flashing cement or cold-applied adhesive.
 - 2. Roof drain flashings consisting of:
 - a. Three-course flashing of woven glass fabric and modified-bitumen flashing cement,
 - b. Modified-bitumen membrane base sheet and ply sheet in adhesive,

- c. Primed metal sump flashing in modified-bitumen flashing cement, and
 - d. One ply of modified-bitumen ply sheet and modified-bitumen flashing cement.
- 3. Flange Strip-ins
 - a. One-ply, using modified-bitumen base sheet and modified-bitumen flashing cement.

2.3 MATERIALS

A. Roof Insulation

- 1. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes and suitable for application, of thicknesses indicated and that produces FM Approvals-approved roof insulation.
- 2. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt of glass-fiber mat facer on both major surfaces.
- 3. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/2 inch per 12 inches (1:24) unless otherwise indicated.
- 4. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
- 5. Provide manufacturer-approved adhesives to attach board insulation to concrete deck.

B. Cover Board

- 1. Cover Board: ASTM C 728, perlite rigid board substrate, 1/2 inch as approved by the roof manufacturer.

C. Insulation Accessories

- 1. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.
- 2. Modified Asphaltic Insulation Adhesive: Insulation manufacturer's recommended modified asphaltic, asbestos-free, cold-applied adhesive formulated to attach roof insulation to substrate or to another insulation layer.
- 3. Insulation Cant Strips: ASTM C 728, perlite insulation board.
- 4. Wood Nailer Strips: Comply with requirements in Section 06 6100, "Rough Carpentry."
- 5. Tapered Edge Strips: ASTM C 728, perlite insulation board.
- 6. Substrate Joint Tape: 6- or 8-inch wide, coated, glass-fiber joint tape.

D. Roofing Base and Ply Sheets

- 1. Smooth-surfaced, APP Modified-bitumen Base Sheet: ASTM D 6223, Type II, Grade S:
 - a. Performance Roof Systems, Inc. Derbigum XPS.

- b. Johns Manville Corporation Tricor™ S.
- E. Modified Bitumen Cap Sheet
 - 1. Mineral-surfaced, APP Modified-bitumen Capsheet and Flashing Sheet: ASTM D 6223, Type II, Grade G, fire resistant; color white:
 - a. Performance Roof Systems, Inc. Derbicolor XPS FR.
 - b. Johns Manville Corporation Tricor™ M FR.
- F. Cold-applied Adhesive:
 - 1. Performance Roof Systems, Inc. Permastic.
 - 2. Johns Manville Corporation MBR Cold Application Adhesive.
- G. Modified-bitumen Flashing Cement:
 - 1. Performance Roof Systems, Inc. Perflash.
 - 2. Johns Manville Corporation MBR Flashing Cement.
- H. Flashing System:
 - 1. Performance Roof Systems, Inc. Perflash.
 - 2. Johns Manville Corporation, Permaflash.
- I. Bitumen:
 - 1. Asphalt Bitumen: ASTM D 312
 - a. Type III SEBS Asphalt.
- J. Concrete Primer: As recommended by the roofing manufacturer.
- K. Mineral Granules: Size and color and die lot to match membrane and flashing sheets; manufactured or supplied by the Roofing Manufacturer.
- L. Roof Walkway Pads
 - 1. Mineral-surfaced, Atactic-Polypropylene, Modified-bitumen Capsheet: ASTM D 6223, Type II, Grade G, fire resistant; color white.
 - a. Performance Roof Systems, Inc. Derbicolor XPS FR.
 - b. Johns Manville Corporation Tricor™ M FR.
 - 2. Cold-applied Adhesive:
 - a. Performance Roof Systems, Inc. Permastic.
 - b. Johns Manville Corporation MBR Cold Application Adhesive.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of insulation and roofing systems:
 - 1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
 - 2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thickness of insulation.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to insulation and roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 PROTECTION AND CLEANING

- A. Comply with roofing system manufacturer's written instructions for installing roof insulation.
- B. Nailer Strips: Mechanically fasten 4-inch nominal width wood nailer strips of same thickness as insulation perpendicular to roof deck at the spacing recommended by the manufacturer.
- C. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of roofing membrane system with vertical surfaces or angle changes more than 45 degrees.
- D. Install tapered insulation under area of roofing to conform to slopes indicated.
- E. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
 - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- F. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or more, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
 - 1. Where installing composite and non-composite insulation in two or more layers, install non-composite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
- G. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- H. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- I. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
 - 1. Prime surface of concrete deck with asphalt primer at rate of 3/4 gal./100 ft² and allow primer to dry.
 - 2. Set each layer of insulation in a solid mopping of hot roofing asphalt applied within plus or minus 25 deg F of equiviscous temperature.

3. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
4. Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3.4 COVER BOARD INSTALLATION

- A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints a minimum of 6 inches in each direction from joints of insulation below. Loosely butt cover boards together and adhere to roof deck. Tape joints if required by roofing system manufacturer.
 1. Fasten cover boards according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
 2. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.
 3. Apply hot roofing asphalt to underside, and immediately bond cover board to substrate.

3.5 ROOFING MEMBRANE INSTALLATION, GENERAL

- A. Install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendation in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing" and as follows:
 1. Deck type: Concrete precast tees.
 2. Adhering Method: L (cold-applied adhesive).
 3. Base Sheet: One
 4. Number of Glass-Fiber Base-Ply Sheets: One.
 5. Number of APP-Modified Asphalt Sheets: One.
 6. Surfacing Type: M (mineral-granule-surfaced cap sheet).
- B. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel.
- C. Where roof slope exceeds 1/2 inch per 12 inches (1:24) install roofing membrane sheets parallel with slope.
 1. Backnail roofing membrane sheets to nailer strips substrate according to roofing system manufacturer's written instructions.
- D. Cooperate with testing agencies engaged or required to perform services for installing roofing system.
- E. Coordinate installation of roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
 1. At end of each day's work, provide tie-offs to cover exposed roofing membrane sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt, with joints and edges sealed.
 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.

3. Remove and discard temporary seals before beginning work on adjoining roofing.
- F. Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating joints, entering building, or damaging roofing system components or adjacent building construction.

3.6 BASE-PLY SHEET INSTALLATION

- A. Install base sheets according to roofing system manufacturer's written instructions starting at low point of roofing system. Align base sheets without stretching. Extend sheets over and terminate beyond cants
 1. Shingle side laps of base sheets uniformly to ensure that required number of base sheets covers substrate at any point. Shingle in direction to shed water.
 2. Embed each base sheet in a continuous void-free mopping of hot roofing asphalt to form a uniform membrane without base sheets touching.

3.7 APP-MODIFIED BITUMINOUS MEMBRANE INSTALLATION

- A. Install modified bituminous roofing membrane cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:
 1. Adhere to substrate in cold-applied adhesive.
 2. Torch apply to substrate.
 3. Unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer.
- B. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.
 1. Repair tears and voids in laps and lapped seams not completely sealed.
 2. Apply roofing granules to cover exuded bead at laps while bead is hot.
- C. Install roofing membrane sheets so side and end laps shed water.

3.8 FLASHING AND STRIPPING INSTALLATION

- A. Install base flashing over cant strips and other sloped and vertical surfaces, at roof edges, and at penetrations through roof; secure to substrates according to roofing system manufacturer's written instructions, and as follows:
 1. Prime substrates with asphalt primer if required by roofing system manufacturer.
 2. Backer Sheet Application: Mechanically fasten backer sheet to walls or parapets. Adhere backer sheet over roofing membrane at cants in cold-applied adhesive.
 3. Backer Sheet Application: Adhere backer sheet to substrate in cold-applied adhesive at rate required by roofing system manufacturer.
 4. Flashing Sheet Application: Adhere flashing sheet to substrate in flashing cement at rate required by roofing system manufacturer.

- B. Extend base flashing up walls or parapets a minimum of 8 inches above roofing membrane and 4 inches onto field of roofing membrane.
- C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
 - 1. Seal top termination of base flashing with a strip of glass-fiber fabric set in asphalt roofing cement.
- D. Install roofing membrane cap-sheet stripping where metal flanges and edgings are set on membrane roofing according to roofing system manufacturer's written instructions.
- E. Metal Counter Flashing: Cover all vertical base flashings with metal counter flashing to form a continuous water shedding surface over the top of membrane flashing. Extend metal counter flashing a minimum of 3 inches over the top of the membrane flashing.
- F. Metal Face Securement: Install hook strips (cleats) on all metal extending over roof edges (coping metal, gravel stop/eave strip, perimeter curb metal, etc.) in accordance with recommendations in the NRCA Roofing and Waterproofing Manual. Appropriate provision must be made in accessory metal to allow for expansion and contraction of the metal sections without interrupting the integrity of the waterproofing assembly.
- G. Roof Drains: Set 30-by-30-inch square metal flashing in bed of roofing-manufacturer-approved asphaltic adhesive on completed roofing membrane. Cover metal flashing with roofing membrane cap-sheet stripping and extend a minimum of 6 inches beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.
 - 1. Install stripping according to roofing system manufacturer's written instructions.

3.9 COATING INSTALLATION

- A. Apply coating to roofing membrane and base flashings according to manufacturer's written instructions, by spray, roller, or other suitable application method to provide a dry film thickness of not less than 20 mils.

3.10 WALKWAY INSTALLATION

- A. Walkway Pads: Install walkway pads in cold-applied adhesive, using units of size indicated, or if not indicated, of manufacturer's standard size according to walkway manufacturer's written instructions.
- B. Walkway strips: Install walkway cap sheet strips over roofing membrane using same application method as used for roofing membrane cap sheet.

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and to prepare test reports.
- B. Test Cuts: Test specimens will be removed to evaluate problems observed during quality-assurance inspections of roofing membrane as follows:
 - 1. Approximate quantities of components within roofing membrane will be determined according to ASTM D 3617.

2. Test specimens will be examined for interplay voids according to ASTM D 3617 and to comply with criteria established in Appendix 3 in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."
 3. Repair areas where test cuts were made according to roofing system manufacturer's written instructions.
- C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
1. Notify LANL STR 48 hours in advance of date and time of inspection.
- D. Roofing system will be considered defective if it does not pass tests and inspections.
1. Additional testing and inspecting, at Construction Subcontractors expense will be performed to determine if replaced or additional work complies with specified requirements.

3.12 PROTECTING AND CLEANING

- A. Do not leave installed insulation exposed to weather. Cover and waterproof immediately after installation.
1. Temporarily seal exposed insulation edges at the end of each day by lapping roofing membrane over edge to form a seal. Remove seal when Work resumes.
 2. Remove installed insulation that has become wet or damaged and replace the new insulation material.
- B. Protect insulation from traffic with protective covering materials during and after installation.
- C. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to LANL STR.
- D. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial completion and according to warranty requirements.
- E. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.
- F. Maintain job site in a clean, orderly fashion, and free of debris. Store materials and equipment so operations of building are not interrupted.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 07 5213.13, Rev. 0, dated March 8, 2010.

SECTION 07 6200
SHEET-METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Furnishing and installing sheet metal flashing and trim.

1.2 SECTION DOES NOT INCLUDE

- A. Flashing integral with membrane roofing or waterproofing systems (base flashing).
- B. Flashing integral with prefabricated roof accessories and equipment.
- C. Wood blocking, nailers, edge strips, and battens

1.3 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4000, "Quality Requirements."
- C. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- D. Section 01 6000, "Product Requirements."
- E. Section 07 9200, "Joint Sealants."

1.4 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.5 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Catalog Data: Submit manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.
- B. Samples for Initial Selection Purposes: Submit manufacturer's color charts and texture variations for specified sheet materials to be exposed as finished surfaces.

1.6 QUALITY ASSURANCE

- A. Work identified in the section shall be done under a Quality Assurance Program (QAP) in accordance with Section 01 4000, "Quality Requirements."
- B. Quality Standard: Fabricate and install sheet metal work in accordance with Sheet Metal and Air Conditioning Contractor's National Association, Inc. (SMACNA) "Architectural Sheet Metal Manual," unless specifically indicated otherwise.
- C. Wind Resistance: Fabricate and install flashings at edges of roof in accordance with FMG Loss Prevention Data Sheet 1 - 49 for specified wind zone. Ensure that substrate construction is also in compliance.

1.7 QUALIFICATIONS

- A. Fabricator: company specializing in sheet metal work with minimum 6 years documented experience.
- B. Installer: Engage an experienced installer who has completed flashing, sheet metal, and trim work similar in material design, and extent to that indicated for projects that have resulted in construction with a record of successful in-service performance.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with Section 01 6000, "Product Requirements."
- B. Stack material to prevent twisting, bending, and abrasion. Slope metal sheets to ensure drainage and provide weather-tight and ventilating covering.
- C. Prevent contact with materials causing discoloration or staining.
- D. White rust on galvanized metal is not allowed.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Comply with Section 01 2500, "Substitution Procedures."

2.2 MANUFACTURERS

- A. Products made by the following manufacturers will be among those considered acceptable; however, the Construction Subcontractor is responsible for providing only products compatible with adjacent materials in the assembly.
 - 1. ATLAS Aluminum Corporation.
 - 2. Fry Reglet Corporation.
 - 3. Keystone Flashing Company.
 - 4. MM Systems Corporation.
 - 5. Petersen Aluminum Corporation.
 - 6. Vincent Metals.

2.3 MATERIALS

- A. General: Unless otherwise indicated in Subcontract documents, provide Aluminum-Zinc Alloy-Coated Steel Sheet, as standard material with a fluoropolymer "Kynar 500" or "Hylar 5000" factory finish.
- B. Prepainted Coil-Coated Galvanized Steel Sheet: Zinc-coated, commercial quality steel sheet conforming to ASTM A755, G90 coating designation, coil-coated with high performance fluoropolymer coating.
 - 1. Finish: Coil-coated factory finish "Kynar 500" or "Hylar 5000."
 - 2. Color: Selected from manufacturer's standard color selection at time of submittals.
 - 3. Provide strippable plastic protective film on prepainted surfaces.

2.4 REGLETS

- A. General: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counter-flashing pieces and compatible with flashing indicated.
- B. Surface Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
- C. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
- D. Masonry Type: Provide with offset top flange for embedment in masonry mortar joints.
- E. Counter flashing Wind-Restraint Clips: Provide hold down clips with 1/2 inch kickout to be installed before counter-flashing to prevent wind uplift on the counter-flashing lower edge. Fabricate the clips of the following materials.
 - 1. Galvanized Steel: 22 gage; 0.0336 inch thick

2.5 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Solder: For use with steel, furnish lead-free solder complying with ASTM B32, Alloy Grade.
- B. Soldering Flux: FS O-F-506, Type I, Form A (acid type).
- C. Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened. All exposed fasteners to be #8 or larger with an integral washer and neoprene gasket or
- D. Sealants: Polyisobutylene; non-hardening, non-skinning, nondrying, non-migrating sealant.
- E. Sealant and Fasteners: For metal work, provide the type sealant and fasteners recommended by the producer of the metal sheets for fabrication and installation.
- F. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.
- G. Installation Accessories: Provide joint tape, adhesives, sealers, and fasteners as recommended by flashing manufacturer for indicated applications.
- H. Bituminous Coating: FS TT-C-494, MIL-C-18480, or SSPC Paint 12, cold-applied bituminous mastic, compounded for 15-mil dry film thickness coating.

2.6 FABRICATION, GENERAL

- A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendation of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal and other characteristics of the item indicated.
- B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather resistant performance once

installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

- C. Form exposed sheet metal work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.
- D. Seams: Fabricate nonmoving seams in sheet metal flat-lock seams.
- E. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
- F. Expansion Provisions: Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficient weatherproof and waterproof, form expansion joints of intermeshing hooked flange, not less than 1 inch deep filled with mastic sealant concealed within joints.
- G. Separate metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.
- H. Conceal fasteners and expansion provisions where possible. Exposed fasteners are only allowed on faces of sheet metal exposed to public view with direct approval of LANL Subcontract Technical Representative (STR) or as part of an exposed fastener roof system
- I. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by SMACNA or sheet metal manufacturer.
 - 1. Size as recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.
- J. Form a ½ inch hem on underside of exposed edges.

2.7 SHEET METAL FABRICATIONS

- A. As a minimum, fabricate flashings using materials in the thickness listed for each flashing application.
- B. Exposed Flashings-Low Slope Roofs or Waterproofing: Formed copings, gravel stops and scuppers:
 - 1. Galvanized Steel Sheet: 24 gage (0.0276 inch).
 - 2. Aluminum-Zinc Alloy-Coated Steel Sheet: 24 gage (0.0276 inch).
 - 3. Preprinted Coil-Coated Galvanized Steel Sheet: 24 gage (0.0276 inch).
- C. Semi-concealed Flashings-Low Slope Roofs or Waterproofing: Counter flashing, reglets, equipment support flashing, roof area joint and roof expansion joint covers and pipe/conduit penetration flashing:
 - 1. Galvanized Steel Sheet: 24 gage (0.0276 inch).
 - 2. Aluminum-Zinc Alloy-Coated Steel Sheet: 24 gage (0.0276 inch).
 - 3. Preprinted Coil-Coated Galvanized Steel Sheet: 24 gage (0.0276 inch).

D. Miscellaneous Flashings:

1. Galvanized Steel Sheet: 24 gage (0.0276 inch).
2. Aluminum-Zinc Alloy-Coated Steel Sheet: 24 gage (0.0276 inch).
3. Preprinted Coil-Coated Galvanized Steel Sheet: 24 gage (0.0276 inch).

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that work may properly commence. Verify that substrate is sound, dry, smooth, clean, sloped for drainage and securely anchored. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- B. Isolate dissimilar metals by means of a heavy bituminous coating, approved paint coating, adhered polyethylene sheet, or other means approved by the LANL STR.

3.3 INSTALLATION

- A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's *Architectural Sheet Metal Manual*. Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units. Conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.
- B. Install exposed sheet metal work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Prein edges of sheets to be soldered to a width of 1-1/2 inches except where pretinned surface would show in finished work. Do not solder prepainted, coil-coated, galvanized steel sheets.
- D. Interlocking joints/slip joints where flashing and trim must be 10 feet max pieces interlocked in a 6 inch lap and filled with mastic, with joints 2 feet from corners and intersections.
- E. Sealed Joints: Form non-expansion, but moveable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joints with sealant and form metal to completely conceal sealant.
1. Use joint adhesive for nonmoving joints specified not to be soldered.
 2. Moving Joints: When ambient temperature is moderate (40 - 70 degrees F) at time of installation, set joined members for 50 percent movement

either way. Adjust setting position of joined members proportionally for temperatures above 70 degrees F.

3. Do not install sealant type joints at temperatures below 40 degrees F. Follow Section 07 9200, "Joint Sealants," for handling and installation requirements for joint sealers.

NOTE: Sheet metal expands at a rate of 1 inch plus per 100 lineal feet.

- F. Counter flashings: Coordinate installation of counter-flashings with installation of assemblies to be protected by counter-flashing. Install counter-flashings in reglets or receivers. Secure in a waterproof manner by means of snap-in installation and sealant, lead wedges and sealant, interlocking folded seam, or blind rivets and sealant. Lap counter-flashing joints a minimum of 2 inches and bed with sealant.
- G. Roof Edge Flashings: Secure metal flashings at roof edges to comply with FMG Loss Prevention Data Sheet 1-49 for Zone 2 wind exposure.
- H. Surface-Mounted Reglets: Attach reglets securely to substrate, at locations indicated. Install elastomeric sealant at top edge.

3.4 CLEANING AND PROTECTION

- A. Remove protective film from prefinished sheet metal immediately after installation.
- B. Repair or replace work that is damaged or defective, as directed by LANL STR. Refinish marred and abraded areas of prefinished sheet using manufacturer's recommended methods. Replace units that cannot satisfactorily be refinished in place.
- C. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.
- D. Provide final protection and maintain conditions that ensure sheet metal flashing and trim work during construction is without damage or deterioration other than by natural weathering.

3.5 ADJUSTING AND CLEANING

- A. Review completed work for accuracy of installation and neatness of installation. Adjust the work as required to present smooth and straight surfaces and lines.
- B. Clean exposed surfaces of dirt, acid flux, excess solder, or foreign material

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 07 6200, Rev. 3, dated January 19, 2010.

SECTION 07 8400

FIRESTOPPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Firestopping materials, accessories, and installation for sealing penetrations through fire rated barriers, firestopping tops of fire rated walls, and sealing penetrations/joints through barriers where smoke sealing is required. This section does not include fire/smoke dampers or fire doors.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4000, "Quality Requirements."
- C. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. See Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Product Data: Submit data on product characteristics, performance and limitation criteria.
- B. Engineering Judgments: For conditions not covered by UL or FM or WH listed designs, submit proposed system design, evaluation and judgment by the product manufacturer's engineering department or a licensed professional engineer suitable for presentation to authority having jurisdiction (LANL Fire Marshal) for acceptance as meeting code fire protection requirements.
- C. Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.
- D. Manufacturer's Installation Instructions: Submit standard detail for each different typical type of firestopping application. Submit preparation and installation instructions.
- E. Performance Requirement Certifications.
- F. Inspection Report.

1.5 LANL PERFORMANCE REQUIREMENTS

- A. Through-penetration fire stop systems shall have been tested in accordance with ASTM E814 or ANSI/UL 1479 to achieve fire ratings of adjacent construction shown on the Drawings.
- B. Through-penetration fire stop systems shall be Listed by Underwriters Laboratories or Warnock-Hersey, or Approved by Factory Mutual.

- C. Through-penetration fire stop systems shall conform to applicable requirements for flame spread and smoke developed ratings.
- D. The following UL listed penetration seal designs are suggested but not intended to be all inclusive. (Note: Submittal requirements per Paragraph 1.5 apply regardless of which seal designs are used.)

UL Drawing	Subject
C-AJ-1291	Steel, cast iron, copper, conduit or EMT
C-AJ-2220	Max. 2" PVC, CPVC, FRPP or ABS (closed or open)
C-AJ-4017	Cable trays (steel or aluminum)
C-AJ-5091	Steel or copper w/glass fiber insulation (sleeved or unsleeved)
C-AJ-7051	Metal duct without damper
C-AJ-8041	Multiple insulated and non-insulated steel, copper, conduit or EMT
C-AJ-8056	Multiple insulated and non-insulated steel, copper, EMT, cables and cable trays
W-J-2071	Max. 2" PVC or CPVC (closed system only)
W-J-3036	Single or multiple cables (sleeved or unsleeved)
W-J-3060	Cable bundle (various cables)(sleeved).
W-J-5057	Max. 10" steel pipe with max. 3" thick glass-fiber insulation
W-L-2098	Max. 2" PVC or CPVC (closed system only)
W-L-7040	Metal duct without damper
W-L-8004	Multiple cables, EMT, and PVC (closed)

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. For new buildings and major additions including this Subcontract, firestopping shall be installed by a single subcontractor specializing in firestopping regardless of craft responsible for penetration. Installer shall be a company that has been appropriately trained by the manufacturer to install products specified in this section having 3 years experience (both Company and technicians) installing similar products in similar locations.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Where multi-component foams are used, do not apply materials when temperature of substrate material and ambient air is below 60 degrees F (15 degrees C), or as specified by the manufacturer. Maintain this minimum temperature before, during, and for minimum 3 days after installation of materials, or as specified by the manufacturer.
- B. Provide appropriate ventilation in areas to receive solvent cured materials.

1.8 QUALITY ASSURANCE

- A. Work identified in this section shall be done under a Quality Assurance Program (QAP) in accordance with Section 01 4000, "Quality Requirements."

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Comply with Section 01 2500, "Substitution Procedures."

2.2 FIRESTOPPING

- A. Manufacturers: Any manufacturers of firestopping products are acceptable, as long as the proposed through-penetration fire stop system provided by the manufacturer is Listed by Underwriters Laboratories or Warnock-Hersey, or Approved by Factory Mutual. The following manufacturers are among those with approved through-penetration fire stop systems. This list is not all-inclusive.
 - 1. Dow Corning Corp.
 - 2. Hilti Corp.
 - 3. 3M Fire Protection Products
 - 4. Specified Technologies, Inc.
 - 5. Others per Section 01 2500, "Substitution Procedures."
- B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
- C. Color: As selected from manufacturer's full range of colors.

2.3 ACCESSORIES

- A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.
- B. Dam Material: Where a dam material will be a permanent part of the installation, use dam material as required by the manufacturer. Where there manufacturer does not specify a dam material, use one of the following as appropriate:
 - 1. Mineral fiberboard.
 - 2. Mineral fiber matting.
 - 3. Sheet metal.
 - 4. Alumina silicate fire board.
- C. Installation Accessories: Provide clips, straps, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.
- D. Labels: Red and white self-adhesive label, or plastic or metal plate. As a minimum stating the installation is a "fire rated assembly" or "through-penetration fire stop system," and installation data (UL-Listed or FM-Approved configuration number, date installed, installer and organization). Also state "Modify/remove only with LANL Fire Group approval" if space permits. Examples of acceptable products:
 - 1. Hilti sticker P/N 00339611
 - 2. Hilti plate P/N 00306219

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify openings are ready to receive firestopping (items penetrating the opening have been installed, opening is appropriately sized to allow use of the proposed firestopping system, etc.).
- B. After firestopping installation and at least 5 days before covering up the installation (with gypsum board etc), notify LANL Subcontract Technical Representative (STR) so that inspection can occur.

3.2 PREPARATION

- A. Protect adjacent surfaces from damage.
- B. Clean substrate surfaces of dirt, dust, grease, oil, loose material.
- C. Remove incompatible materials that could affect the bond between the seal material and the opening.
- D. Install damming materials per manufacturer's instructions.

3.3 APPLICATION

- A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, raceway, conduit and other items requiring firestopping.
- B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.
- C. Apply firestopping material in accordance with manufacturer's instructions to achieve required fire rating.
- D. Place foamed material gradually and per manufacturer's instructions to ensure homogenous density, filling cavities and spaces. Place sealant to completely seal junctions with adjacent dissimilar materials.
- E. If firestopping material requires installation of a dam as part of installation of the firestopping material, remove the dam material following installation only if permitted by manufacturer's instructions.
- F. Where air ducts pass through walls, floors, or partitions that are required to have a fire resistance rating and where fire dampers are not required, the opening in the construction around the air duct shall be as follows:
 - 1. Not exceeding a 1-in. (2.54-cm) average clearance on all sides
 - 2. Filled solid with an approved through-penetration fire stop assembly material capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste when subjected to the time-temperature fire conditions required for fire barrier penetration as specified in, NFPA 251, Standard Methods of Tests of Fire Endurance of Building Construction and Materials

3.4 FIELD QUALITY CONTROL

- A. Inspect installed firestopping for compliance with specifications, submitted schedule, and manufacturer's instructions for the installed seal configuration.

3.5 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.6 LABELING

- A. Label fire barriers (wall/floor) to indicate fire barriers (ex., "Two-hour fire-rated wall"). Labels shall be frequent and visible enough that future activities requiring penetration of the fire barrier will recognize the need for firestopping.
- B. Label fire barrier penetration seals on both sides of the penetrated fire barrier. Provide labels per Part 2.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 07 8400, Rev. 1, dated May 5, 2008.

SECTION 07 9200
JOINT SEALANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Clean and prepare joint surfaces.
- B. Sealant and backing materials.

1.2 RELATED SECTIONS

- A. Section 01 4000, "Quality Requirements."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- C. Section 01 6000, "Product Requirements."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Catalog Data: Manufacturer's data sheets on each product to be used, including,
 - 1. Storage and handling requirements and recommendations
 - 2. Shelf life and temperature range of storage and use.
 - 3. Notation of intended location of use (interior, exterior, vertical or horizontal) and proposed materials to be sealed for each type of sealant.
 - 4. MSDS.
- B. Installation Instructions: Manufacturer's information including preparation instructions and recommendations as well as installation methods.
- C. Samples: Sealant colors for each type of sealant used.
- D. Warranty: As specified herein.

1.5 QUALITY ASSURANCE

- A. Work identified in this section shall be done under a Quality Assurance Program (QAP) in accordance with Section 01 4000, "Quality Requirements."
- B. Installer qualifications: Trained, experienced, and approved or licensed by manufacturer for installation of sealant to be applied.
- C. Source limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with Section 01 6000, "Product Requirements."
- B. Store products in manufacturer's unopened packaging, with labels intact, until ready for installation.

- C. Store products off ground; if stored on roof, do not exceed structural capacity of deck.
- D. Store materials at minimum of 68 degrees F for at least 24 hours prior to installation, regardless of temperature at location.
- E. Do not allow materials to freeze prior to application.

1.7 WARRANTY

- A. Duration: Provide one-year warranty.
- B. Coverage: Replace sealants that fail because of loss of cohesion or adhesion onto surfaces applied or that does not cure. If the sealant can be detached from a surface by rubbing the surface contact point with a finger, than the surface adhesion is inadequate.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Comply with Section 01 2500, "Substitution Procedures."

2.2 SEALANT MATERIALS

- A. General: VOC Content of Interior Sealants – Provide interior sealants and sealant primers that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Sealants: 250 g/L
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L
 - 3. Sealant Primers for Porous Substrates: 775 g/L
- B. Sealant: Silicone base, single component, solvent curing; capable of withstanding movement of up to 25 percent of joint width and being satisfactorily applied throughout a temperature range of 40 - 80 degrees F; shore A hardness of 50 maximum; nonstaining; color to be selected by the architect via the STR.
- C. Sealant: Acrylic base, single component, solvent curing; capable of being continuously immersed in water, withstanding movement of up to 7.5 percent of joint width and being satisfactorily applied throughout a temperature range of 40 - 80 degrees F; shore A hardness of 55 maximum; nonstaining; nonbleeding; nonsagging; color to be selected by the architect via the STR.

2.3 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Noncorrosive and non-staining type, recommended by sealant manufacturer; compatible with joint-forming materials.
- C. Joint Filler: ASTM C 1330; round, type as recommended by sealant manufacturer; oversized 30 to 50 percent
- D. Bond Breaker: Pressure-sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to installation, notify LANL Subcontract Technical Representative (STR) that joint dimensions and physical and environmental conditions are suitable for application of joint sealers.
- B. By beginning the Work of this section, Subcontractor warrants it has examined and verified that existing conditions are in accordance with provisions of Paragraph 3.1A.

3.2 PREPARATION

- A. Clean, prepare, and size joints in accordance with manufacturer's instructions. Remove any loose materials and other foreign matter that might impair adhesion of sealant.
- B. Verify that joint-shaping materials and release tapes are compatible with sealant.
- C. Examine joint dimensions and size materials to achieve required width/depth ratios.
- D. To allow sealants to perform properly, use joint filler to achieve required joint depths.
- E. Use bond breaker where required.

3.3 INSTALLATION

- A. Perform Work per ASTM C 1194 for solvent-release and ASTM C 1193 for latex-base sealants.
- B. Install sealant per manufacturer's instructions.
- C. Apply sealant within recommended temperature ranges. Consult manufacturer when sealant cannot be applied within recommended temperature ranges.
- D. Tool Joints: Channel shaped.
- E. Joints: Free of air pockets, foreign embedded matter, ridges, and sags.
- F. Follow manufacturer's recommended cure time before painting or overcoating.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 07 9200, Rev. 2, dated May 5, 2008.

SECTION 08 1100
METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Steel doors and frames.
- B. Fixed window frames.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4000, "Quality Requirements."
- C. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- D. Section 08 8000, "Glazing."

1.1 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- E. See Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Catalog data substantiating that product comply with specified requirements.
- B. Certifications for door assemblies required to be fire-rated that exceed sizes of tested assemblies, and for each door and frame assembly that has been constructed to conform to design, materials, and construction equivalent to the requirements for labeled construction.
- C. Shop drawings for fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections.
 - 1. Show anchorage and accessory items.
 - 2. Provide schedule of doors and frames using same reference numbers for details and openings as those on the Drawings.
 - 3. Indicate coordination of glazing frames and stops with glass and glazing requirements.

1.4 QUALITY ASSURANCE

- A. Work identified in this section shall be done under a Quality Assurance Program (QAP) in accordance with Section 01 4000, "Quality Requirements."
- B. Provide doors and frames complying with Steel Door Institute "Recommended Specifications: Standard Steel Doors and Frames" (SDI-100) and as herein specified.
- C. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated or required, provide fire-rated door and frame assemblies that comply with NFPA 80

"Standard for Fire Doors and Windows", and have been tested, listed, and labeled in accordance with ASTM E 152 "Standard Methods of Fire Tests of Door Assemblies" by a nationally recognized independent testing and inspection agency acceptable to LANL.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver hollow metal work cartoned or crated to provide protection from damage during transit and job storage. In addition, provide sealed doors in plastic wrapping.
- B. Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided finish items are equal in all respects to new work and acceptable to the LANL Subcontract Technical Representative (STR); otherwise, remove and replace.
- C. Store doors and frames at building site under cover. Store vertically, place units on minimum 4in. high wood blocking. Do not use non-vented plastic or canvas shelters which could create a humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4 inch space between stacked doors to promote air circulation.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."

2.2 MATERIALS

- A. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A 568 and ASTM A 1011.
- B. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A 568 and ASTM A 1008.
- C. Hot dipped zinc coated steel: ASTM A 924 and A 653, Class A40 for alloyed coatings.
- D. Supports and Anchors: Fabricate of not less than 18 gage galvanized sheet steel.
- E. Inserts, Bolts and Fasteners: Use manufacturer's standard units, except hot-dip galvanize items that are to be built into exterior walls, complying with ASTM A 153, Class C or D as applicable.
- F. Shop-Applied Paint Primer: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints.
- G. Locks and Latches: Per NFPA 80 Section 6.4.4.

2.3 FABRICATION, GENERAL

- A. Comply with ANSI A250.8.
- B. Fire-rated openings: Comply with NFPA 80.
 - 1. Fire doors: provided with permanent labels attesting to fire resistance.

2. At stairway enclosures, provide units listed for 450 degree F maximum temperature rise rating for 30 minutes of exposure.
 3. Provide manufacturer's certificate that oversized openings have been constructed in accordance with all other applicable requirements for labeled door construction.
- C. Fabricate steel door and frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at project site. Comply with requirements as follows:
1. Exterior Doors: SDI-100, Grade III, extra heavy-duty, Model 2, minimum 16-gage faces, insulated.
 2. Interior Door: SDI-100, Grade II, heavy-duty, Model 2, minimum 18 gauge faces, fire rated.
- D. Fabricate exposed faces of doors and panels from cold-rolled steel only.
- E. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel (at fabricator's option).
- F. Fabricate exterior doors, panels and frames from galvanized sheet steel. Close top and bottom edges of exterior doors as integral part of door construction or by addition of minimum 16 gage inverted steel channels.
- G. Unless otherwise indicated, provide countersunk flat Phillips heads for exposed screws and bolts.
- H. Prepare doors and frames to receive mortised and concealed finish hardware in accordance with the approved Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 series specifications for door and frame preparation for hardware.
- I. Reinforce hollow metal doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.
- J. Locate finish hardware as shown on final shop drawings or , if not indicated, in accordance with "Recommended Locations for Builder's Hardware", published by Door and Hardware Institute.
- K. Install stationary louvers for exterior doors as indicated.
- L. Provide metal frames with concealed fastenings, unless otherwise indicated. Fabricate frames of minimum 16 gage cold-rolled furniture steel. Fabricate frames with mitered and welded corners.
- M. Door Silencers: Except on weather-stripped frames, drill stops to receive 3 silencers on strike jambs of single door frames and 2 silencers on heads of frames with pairs of doors.
- N. Provide face welded type frames unless otherwise indicated.
- O. See Section 08 8000, "Glazing" for Door Lites.

2.4 FINISHES

- A. Prime: Thoroughly clean doors and frames and chemically treat to ensure maximum paint adhesion, Factory apply coat of rust inhibiting primer, either air-dried or baked-on, to door and frame surfaces exposed to view.
- B. Finish: Meet acceptance requirements stated in ANSI A 250.10.

2.5 DESIGN CLEARANCES

- A. Unless noted otherwise, clearances are subject to tolerance of plus or minus 1/32 inch.
- B. Clearance between Door and Frame Head and Jambs: 1/8 inch.
- C. Clearance between Meeting Edges of Pairs of Fire-Rated Doors: 1/8 inch plus or minus 1/16 inch.
- D. Clearance between Meeting Edges of Non-Rated Pairs of Doors: 1/8 inch to 1/4 inch.
- E. Clearance at Bottom: 5/8 inch.
- F. Clearance between Door Face and Door Stop: 1/16 inch to 1/8 inch.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that project conditions are suitable before beginning installation of frames.
 - 1. Verify that completed openings are of correct size and thickness.
- B. Correct unsatisfactory condition before proceeding with installation.

3.2 INSTALLATION

- A. Install frames plumb, level, rigid, and in true alignment as recommended in ANSI A250.11 and DHI A115.1G.
- B. General: Install standard steel doors, frames, and accessories in accordance with final shop drawings and manufacturer's data, and as herein specified.
- C. Placing Frames: Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
 - 1. Install fire-rated frames in accordance with NFPA Std. No. 80.
 - 2. Steel Stud Partitions: Install at least three wall anchors per jamb at hinge and strike levels. In open steel stud partitions, place studs in wall anchor notches and wire tie. In closed steel stud partitions, attach wall anchors to studs with tapping screws. Solidly pack mineral-fiber insulation behind frame.
 - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
 - 4. Concrete Walls: Solidly fill space between frames and concrete with grout. Install grout in lifts and take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.

5. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 6. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with post-installed expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.
 7. Installation Tolerances: Adjust Standard Steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measure at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at top and bottom of frame.
- D. Door Installation:
1. Fit hollow metal doors accurately in frames, within clearances specified in SDI-100.
 2. Place fire-rated doors with clearances as specified in NFPA 80.

3.3 ADJUST AND CLEAN

- A. Prime Coat Touch-up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
- B. Final Adjustments: Adjust doors for proper operation, free from binding or other defects.
- C. Clean and restore soiled surfaces. Remove scraps and debris, and leave site in clean conditions.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 08 1100, Rev 1, dated May 12, 2008.

SECTION 08 3100
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Ceiling and wall mounted, non-rated access door and frame units.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Catalog data which includes sizes, types, finishes, and details of adjoining work.
- B. Manufacturer's Installation Instructions and rough-in dimensions.
- C. Schedule: Types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. CESCO Products.
- B. J. L. Industries.
- C. Milcor.

2.2 FABRICATION

- A. Fabricate frames and flanges of 16 gauge steel.
- B. Fabricate door panels of 14 gauge steel (non-insulated).
- C. Weld, fill, and grind joints to assure flush and square unit.
- D. Hardware:
 - 1. Hinge: 175 degree steel hinges with removable pins.
 - 2. Lock: Screw driver slot for quarter turn cam lock.

2.3 FINISHES

- A. Base Metal Protection: Prime coat units with baked on primer.
- B. Finish: Two coats acrylic enamel, white color or match adjoining color where exposed.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that rough openings are correctly sized and located.

3.2 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings. Secure rigidly in place.
- C. Position unit to provide convenient access to concealed work requiring access.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 08 3100, Rev. 2, dated May 12, 2008.

SECTION 08 3323
OVERHEAD COILING DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Exterior overhead coiling doors and electric motor operating devices with manual override.
- B. Exterior door assembly to withstand wind/suction load of 30 psf without undue deflection or damage to door or assembly components.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 08 7100, "Door Hardware."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Catalog data indicating general construction, component connections and details, and electrical equipment requirements.
- B. Shop drawings, for each type and size indicate pertinent dimensions, anchorage methods, hardware locations and installation details.
- C. Manufacturer's installation instructions indicating installation sequence and procedures, and adjustment and alignment procedures.
- D. Operation and maintenance data indicating lubrication requirements, periodic adjustments required, and operation of controls.
- E. Provide manufacturer's standard labor and material warranty.

1.5 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Windsor Republic Door, Model SFWI.
- B. Cookson Company, Model FMWI.
- C. Wayne-Dalton, Model Titan.

2.2 MATERIALS

- A. Curtain Slats: Interlocking, minimum 20 gage exterior face, 22 gage interior face, of ANSI/ASTM A525 steel, galvanized to minimum 1.25 oz/sq ft coating conforming to ASTM G90; sandwich slat construction with foam insulated core, minimum R value = 4.
- B. Guides: Continuous, vertical mounted, formed steel angles, mounted with galvanized steel brackets.
- C. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to assure smooth operation of curtain from any position, with adjustable spring tension.
- D. Hood Enclosure and Fascia: Galvanized steel, internally reinforced to maintain rigidity and shape.
- E. Hardware:
 - 1. Lock Cylinder: As specified in Section 08 7100, "Door Hardware."
 - 2. Handle: Inside center mounted, adjustable keeper, spring activated latch bar with feature to keep it in locked or retracted position, interior and exterior handles.
 - 3. Weatherstripping: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure.

2.3 ELECTRIC OPERATOR

- A. Operator:
 - 1. Description: ANSI/UL 325, side mounted.
 - 2. Motor Enclosure: NEMA MG1, Type 1, open drip proof TEFC.
 - 3. Motor Rating: 1/2 hp, continuous duty.
 - 4. Motor Voltage: 120 V, 1 phase, 60 Hz.
 - 5. Controller Enclosure: NEMA 250, Type 1.
 - 6. Door Speed: 12 inches per second.
 - 7. Brake: Adjustable friction clutch type, activated by the motor controller.
- B. Controller: Standard three button (OPEN-STOP-CLOSE) constant pressure control for each operator; 24 volt circuit, surface mounted.
- C. Safety Edge: Located at curtain bottom, electro-mechanical sensitized type, wired to stop curtain upon striking an object, hollow neoprene weather seal.

2.4 FINISHES

- A. Curtain Slats: steel, galvanized and primed.
- B. Steel Guides and Hood Enclosure: steel, primed.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that opening size, tolerances and conditions are acceptable.

3.2 INSTALLATION

- A. Install door assembly in accordance with shop drawings and manufacturer's instructions.
- B. Securely fasten guide assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure.
- D. Fit and assembly, including hardware, to provide smooth operation.
- E. Coordinate installation of electrical service.
- F. Install perimeter trim and weatherstrip.

3.3 ERECTION TOLERANCES

- A. Maximum variation from plumb is 1/8 inch.
- B. Maximum variation from level is 1/8 inch.
- C. Maximum longitudinal or diagonal warp is plus or minus 1/8 inch per 10 feet straight edge.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 08 3323, Rev. 2, dated May 12, 2008.

SECTION 08 4113
ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Aluminum doors and frames.
- B. Vision glass.
- C. Door hardware.
- D. Perimeter sealant.

1.2 SYSTEM DESCRIPTION

- A. Aluminum entrances and storefront system includes tubular aluminum sections shop fabricated, factory finished; vision glass; related flashings, anchorage and attachment devices, and sealant.

1.3 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 07 9200, "Joint Sealants."
- C. Section 08 7100, "Door Hardware."
- D. Section 08 8000, "Glazing."

1.4 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.5 PERFORMANCE REQUIREMENTS

- A. Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall, to a design pressure of 22 psf measured in accordance with ASTM E 330.
- B. Limit mullion deflection to flexure limit of specified glass, with full recovery of glazing materials.
- C. Accommodate, without damage to components or deterioration of seals, movement between system and peripheral construction, dynamic loading and release of loads, and deflection of structural support framing.
- D. Limit air infiltration through assembly to 0.10 cfm, measured at a reference differential pressure across assembly of 6.24 psf as measured in accordance with ASTM E 283.
- E. Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.
- F. Eliminate water leakage when tested in accordance with ASTM E 331 with a test pressure of up to 12 psf.

- G. Provide for expansion and contraction within system components caused by cycling temperature range of 70 °F over a 12-hour period without causing detrimental effect to system components and anchorage.
- H. Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to the exterior by a weep drainage network.

1.6 SUBMITTALS

- A. Submit the following in accordance with requirements of Exhibit I:
 - 1. Catalog data, for each type of product specified, indicating component dimensions, describing components within assembly, anchorage and fasteners, glass, door hardware, and internal drainage details.
 - 2. Calculations or load tables indicating framing member structural and physical characteristics and dimensional limitations.
 - 3. Shop drawings indicating system dimensions, framed opening requirements and tolerances, affected related work, and expansion and contraction joint locations and details.
 - 4. Two samples of at least 6 square inches of aluminum material finish.
 - 5. Manufacturer's standard warranty and ensure forms have been completed in Owner's name and registered with the manufacturer.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with AAMA SFM-1 and *AAMA Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual*.
- B. Conform to requirements of ANSI A117.1.
- C. Use products of a single source specializing in manufacturing aluminum glazing systems with minimum of 10 successfully completed projects of similar size and scope as this project.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not install sealants when the temperature is less than the manufacturer's recommended minimum temperature for installation and curing.

1.9 WARRANTY

- A. Provide manufacturer's standard warranty that provides correction of defective Work and materials.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Kawneer.
- B. United States Aluminum.
- C. Vistawall Architectural Products.

2.2 MATERIALS

- A. Use extruded aluminum conforming to ASTM B 221.

- B. Use sheet aluminum conforming to ASTM B 209.
- C. Use steel sections conforming to ASTM A 36/A 36M, shaped to suit mullion sections.
- D. Use stainless-steel or galvanized-steel fasteners.
- E. Use sealants specified in Section 07 9200, "Joint Sealants."

2.3 COMPONENTS

- A. For exterior applications use frame material with 2 by 4-1/2-in. nominal dimensions; thermally broken, with interior tubular section insulated from exterior; flush-glazing stops; drainage holes; internal weep drainage system.
- B. For interior applications use frame material 1-3/4 by 4-in. nominal dimension; not thermally broken; flush-glazing stops.
- C. Use doors 1-7/8 in. thick; 3-3/16-in. top rail; 3-1/2-in. vertical stiles; 7-1.2 in. bottom rail; square-glazing stops.
- D. Use flashings of aluminum with finish to match mullion sections.

2.4 HARDWARE

- A. Use manufacturer's standard tubular shape pull that coordinates with exit device specified in Section 08 7100, "Door Hardware."
- B. All other hardware is specified in Section 08 7100.

2.5 FABRICATION

- A. Fabricate components with minimum clearance and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline and weatherproof.
- C. Prepare components to receive anchor devices. Fabricate anchors.
- D. Install fasteners and attachments to be concealed from view.
- E. Prepare components with internal reinforcement for door hardware.
- F. Reinforce framing members for imposed loads.

2.6 FINISHES

- A. For exterior exposed aluminum surfaces use dark bronze anodize finish conforming to AA-M12-C22-A44, architectural Class I.
- B. Use concealed steel items galvanized in accordance with ASTM A 123/A 123M to 2.0 oz/ft².
- C. Extent of finish
 - 1. Apply factory finish to all surfaces exposed at completed assemblies.
 - 2. Apply matching finishes to surfaces cut during fabrication, so that no natural aluminum is visible in completed assemblies, including joint edges.

3. Apply touchup materials recommended by finish manufacturer for field application to cut ends and minor damage to factory applied finish.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify dimensions, tolerances, and methods of attachment with other Work.
- B. Verify wall openings and adjoining air and vapor seal materials are ready to receive Work of this section.
- C. Apply bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar surfaces.

3.2 INSTALLATION

- A. Install wall system in accordance with manufacturer's installation instructions and *AAMA - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual*.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges, seal to adjacent Work to form water tight dam.
- G. Coordinate attachment and seal of perimeter air and vapor barrier materials.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in bed of mastic and secure.
- J. Install hardware using templates provided.
- K. Install glass in accordance with Section 08 8000, "Glazing," using glazing method required to achieve performance criteria.
- L. Install perimeter sealant in accordance with Section 07 9200, "Joint Sealants."

3.3 INSTALLATION TOLERANCES

- A. Maximum variation from plumb is 1/16 in. per 10 ft.
- B. Maximum misalignment of two adjoining members abutting in a plane is 1/32 in.

3.4 ADJUSTING

- A. Adjust operating hardware for smooth operation.

3.5 CLEANING

- A. Remove protective material from frame members.

- B. Wash surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean and dry.

3.6 PROTECTION OF FINISHED WORK

- A. Protect finished work from damage.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 08 4113, Rev. 2, dated May 12, 2008.

SECTION 08 7100
DOOR HARDWARE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Hardware for hollow steel doors.
- B. Thresholds
- C. Gaskets and Edge Seals

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 08 1100, "Metal Doors and Frames."
- C. Section 08 3100, "Access Doors and Frames."
- D. Section 08 4113, "Aluminum Entrances and Storefronts."
- E. Section 28 1321, "Administrative Access Control System Rough-in."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
 - 1. National Fire Protection Association (NFPA):
 - a. NFPA 80, *Standard for Fire Doors and Windows*.
 - b. NFPA 101, *Life Safety Code* (Chapter 5).
 - 2. American National Standards Institute/Council of American Building Officials (ANSI/CABO):
 - a. ANSI/CABO A 117.7, *Standard for Accessible and Usable Buildings and Facilities*.
 - 3. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):
 - a. ANSI A115 Series, *Preparation of Door Hardware for Installation*.
 - b. ANSI/BHMA A156.1, *Butts and Hinges*.
 - c. ANSI/BHMA A156.2, *Bored and Preassembled Locks and Hatches*.
 - d. ANSI/BHMA A156.3, *Exit Devices*.
 - e. ANSI/BHMA A156.4, *Door Controls – Closers*.
 - f. ANSI/BHMA A156.5, *Auxiliary Locks and Associated Products*.
 - g. ANSI/BHMA A156.6, *Architectural Door Trim*.
 - h. ANSI/BHMA A156.7, *Template Hinge Dimensions*.
 - i. ANSI/BHMA A156.8, *Door Controls – Overhead stops and Holders*.

- j. ANSI/BHMA A156.12, *Interconnected Locks and Latches*.
- k. ANSI/BHMA A156.13, *Mortise Locks and Latches*.
- l. ANSI/BHMA A156.15, *Release Devices – Closer Holder*.
- m. ANSI/BHMA A156.16, *Auxiliary Hardware*.
- n. ANSI/BHMA A156.18, *Materials and Finishes*.
- o. ANSI/BHMA A156.19, *Power Assist and Low Energy Power Operated Doors*.
- p. ANSI/BHMA A156.21, *Thresholds*.
- q. ANSI/BHMA A156.22, *Door Gasketing and Edge Seal Systems*.
- r. ANSI/BHMA A156.31, *Electric Strikes and Frame Mounted Actuators*.

4. Door and Hardware Institute (DHI):

- a. *DHI Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames*.

5. Underwriters Laboratories (UL)

1.4 LANL-FURNISHED AND INSTALLED EQUIPMENT

- A. The subcontractor shall provide construction lock cores and keys. Permanent lock cylinder cores and keys will be furnished by LANL.

1.5 SUBMITTALS

Submit the following in accordance with requirements of Exhibit I:

- A. Catalog data for each item of hardware. Include whatever information may be necessary to show compliance with the specified requirements, and include instructions for installation and for maintenance of operating parts and finish.
- B. Materials list in the form of a final hardware schedule in manner indicated below. Coordinate hardware with doors, frames and related work to ensure proper size, thickness, hand, function and finish of hardware.
- C. Final Hardware Schedule: Based on finish hardware indicated, organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
 - 1. Type, style, function, size and finish of each hardware item.
 - 2. Name and manufacturer of each item.
 - 3. Fastenings and other pertinent information.
 - 4. Location of hardware set cross-referenced to indications on Drawings.
 - 5. Explanation of all abbreviations, symbols, codes, etc. contained in schedule.
 - 6. Mounting locations for hardware.
 - 7. Keying information.
- D. Submittal Sequence: Submit hardware schedule at earliest possible date, particularly where acceptance of hardware schedule must precede fabrication of other work (e.g., hollow metal frames). Include with hardware schedule, the project data, samples, shop drawings of other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule. If door has access control, S-3 and CTN-4 must review for approval.

- E. Provide 5-year warranty on materials and installation workmanship on specified door hardware under this section. Repair or replace all failed items.
- F. Provide manufacturer's standard materials and workmanship 2-year warranty for electromechanical door operators.
- G. Furnish a complete set of specialized tools and maintenance instructions as needed for LANL's continued adjustment, maintenance, removal and replacement of finish hardware.

1.6 COORDINATION

- A. Supply templates to manufacturers for door and frame preparation.
- B. The Contractor shall coordinate with the access control system installer to ensure compatibility of all system components.

1.7 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with provisions contained in the above referenced nationally-accepted Codes and Standards, unless otherwise specified herein.
- B. Single Source Responsibility: Obtain each type of hardware (locksets, hinges, closers, etc.) from a single manufacturer specializing in the manufacture of that hardware type
- C. Supplier Qualifications: Obtain hardware from a recognized architectural hardware supplier that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this project.
- D. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA 80, NFPA 101 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by UL, Warnock Hersey, or FM, for use on types and sizes of doors indicated in compliance with requirements of fire-rated door and frame labels.

1.8 PRODUCT HANDLING

- A. Tag or package each item separately, with identification related to final hardware schedule, and include basic installation instructions with each item or package.
- B. Provide secure lock-up for hardware delivered to the project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable, so that completion of the Work will not be delayed by hardware losses, both before and after installation.

PART 2 PRODUCTS

2.1 GENERAL

- A. Requirements for design, grade, function, finish, size and other distinctive qualities of each type of finish hardware are indicated in the Finish Hardware Paragraph 3.4 of this section. Products are identified by ANSI/BHMA 156 Series hardware designation numbers.

2.2 MATERIALS AND FABRICATION

A. General:

1. Drawings show direction of swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.
2. Do not use manufacturer's products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required UL labels and approved by LANL.
3. Produce hardware units of basic metal and forming method indicated, using the manufacturer's standard metal alloy, composition, temper and hardness. Construction of hardware units must conform to applicable ANSI A156 series standards for each type hardware item and finish designation indicated. Do not furnish "optional" materials or forming methods for those indicated, unless specified otherwise.
4. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws.
5. Furnish screws for installation, with each hardware item. Provide Phillips flat-head screws unless otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish, or if exposed in surfaces of other work, to match finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.
6. Provide concealed fasteners for hardware units that are exposed when door is closed, unless no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed, except where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each thru-bolt or use sex bolt fasteners.

2.3 HINGES AND BUTTS

- A. Provide butts of five knuckle; ball bearing type.
- B. Screws: Use Phillips flat-head or machine screws for installation of units, except use Phillips flat-head or wood screws for installation of units into wood. Finish of screw heads shall match surface of hinges or pivots.
- C. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
1. Steel Hinges: Steel pins.
 2. Non-ferrous Hinges: Stainless steel pins.
 3. Exterior Doors: Non-removable pins.
 4. Out-swing Corridor Doors: Non-removable pins.
 5. Interior Doors: Non-rising pins.
 6. Tips: Flat button and matching plug, finished to match leaves.
 7. Number of Hinges: Provide number of hinges indicated but not less than 3 hinges per door leaf for doors 90 inches or less in height and one additional hinge for each 30 inches of additional height or fraction thereof.

2.4 LOCK CORES AND KEYING

- A. Manufacturer: Cyberlock® System Keying 4 cores. Alternate Manufacturers or products will not be accepted. Keys and cores are interchangeable owner provided and installed by the Contractor.
- B. Cores: Each type of lockset/exit device included under Paragraph 3.4, "Hardware Schedule," shall accept Cyberlock CL-SF03 cylinders.
- C. Keying: Electronic keys will be provided by LANL.

2.5 LOCKS, LATCHES AND BOLTS

- A. Mechanical Strikes: Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set.
 - 1. Provide dust-proof strikes for foot bolts, except where special threshold construction provides non-recessed strike for bolt.
 - 2. Provide roller type strikes where recommended by manufacturer of the latch and lock units.
- B. Electric Strikes:
 - 1. Strikes are provided and installed by the LANL Lock Shop. Coordinate connection with LANL STR. Provide electrified hinge for power transfer device.
- C. Lock Throw: Provide 5/8-inch minimum throw of latch and deadbolt used on pairs of doors. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.
- D. Flush Bolt: Provide minimum 1/2 inch diameter rods of brass, bronze or stainless steel, with minimum 12 inch long rod for doors up to 7 feet in height. Provide longer rods as necessary for doors exceeding 7 feet in height.
- E. Mortise Type Locks and Latches:
 - 1. Conform to ANSI A156.13, Series 1000, Operational Grade 1, Security Grade 2, and be UL-listed for use on 3-Hour A label doors.
 - 2. Manufacturer: Best Access Systems, subsidiary of Stanley. Alternate Manufacturers or products will not be accepted.
 - 3. Provide 45H Series, heavy-duty mortise locksets with levers and trim items as specified. Function to be per Paragraph 3.4 of this section. Provide lockset with type 1E74 cylinder housing that accepts interchangeable 7-pin core as specified in Paragraph 2.4.
 - 4. Levers: Provide Style 3, solid tube with return levers, complying with Accessibility requirements. Provide levers at entrances into hazardous areas (i.e. electrical rooms) with a tactile (TL style) or knurled (KNL style) finish.
 - 5. Trim: Provide Style H, 2-9/16" diameter flat rose to match mortise lockset configuration.
 - 6. Finish: Hardware finish code number 625 (US 26), bright chromium plated, per ANSI A156.18.
 - 7. Provide mortise locksets that fit ANSI A115.1 door preparation.

2.6 EXIT DEVICES

- A. Conform to ANSI A156.3, Grade I. Provide exit devices at fire-rated openings complying with requirements of NFPA 80 and NFPA 101.
- B. Acceptable Manufacturer: Von Duprin.
- C. Flush and Wide Stile Doors
 - 1. Provide Series 98 touchbar type panic rated or fire rated, rim or concealed vertical rod exit devices as identified in Paragraph 3.4 of this section. Do not use EL33, EL35, EL98, or EL99 crash bars. Use E996C trim for series 98/99. Use E360L-BE trim on series 33/35.
- D. Where closers are installed on doors equipped with exit devices, provide exit devices with keyed dogging to hold push bar down and latch bolt in the retracted position. Provide devices with field convertible hex key dogging to high security cylinder dog operation.
- E. Provide non-handed exit devices and capable of direct field conversion for all available trim functions.
- F. Provide exit devices with hydraulic sound dampers.
- G. All working parts to be made of stamped steel.
- H. Latch bolts to be self-lubricating to reduce friction and wear.
- I. All rim and vertical rod exit devices to be capable of electric trim activation. Provide Manufacturer's available accessory products, including power supplies, monitoring switches and controls to complete the system. All components to be UL-listed.
- J. Trim: Provide exit device trim as indicated in Paragraph 3.4 of this section. Trim to accept 7 pin interchangeable cores as specified in Paragraph 2.4.
- K. Finish: Hardware finish code number 626 (US26D), satin chromium plated, per ANSI A156.18.

2.7 OPERATORS, CLOSERS AND DOOR CONTROL DEVICES

- A. Powered Door Operators
 - 1. Comply with requirements of ANSI A156.19 and the ADA. Provide UL-listed operators per UL 325 for self-closing doors.
 - 2. Acceptable Manufacturers:
 - a. LCN Closers, an Ingersoll-Rand Business.
 - b. Dorma Architectural Hardware.
 - 3. Operators to be surface-mount, double-egress, low-energy electromechanical units complete with controls and actuators.
 - 4. Operator opening force, time delay, and the opening, closing, and back check speeds to be individually adjustable.
 - 5. Operators to include a vestibule function for sequencing operation of two units.
 - 6. Operators to have on/off strike switch to delay operation while locking device releases.

7. Provide Operators with Push and Go feature to activate low energy or power assistance with the door.
8. Provide operator with a safety feature that reverses the direction of door travel if it contacts an object during either opening or closing.
9. Provide Operators with a power boost feature to increase latching force to ensure secure latching in severe wind or stack conditions.
10. Operator power supply to provide 12VDC to power card readers, electric locking devices, and other peripherals.
11. Actuators to be hardwired 12VDC round 4-1/2 inch diameter stainless-steel touch plates with engraved blue-filled handicapped symbol. Actuators to be installed in manufacturer's standard flush or surface-mounting boxes to be located on a vertical surface near controlled door.
12. Finish: Manufacturer's standard sprayed or anodized aluminum (BHMA No., 689) or dark bronze (BHMA No. 695).

B. Door Closers

1. Conform to ANSI 156.4, Type C02011, hinge-side mounting, for interior and exterior in-swinging doors; Type CO2021, parallel arm mounting, for exterior and corridor out-swinging doors. Closers to be surface type with modern slim line covers.
2. Size of Units: Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit depending upon size of door, exposure to weather and anticipated frequency of use. Where parallel arms are indicated for closers, provide closer unit one size larger than recommended for use with standard arms.
3. Access-free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ANSI A117.1 provisions for door opening force and delayed action closing.
4. Closer Finish: Select manufacturers' standard powder-coated or painted finish to match other hardware installed at opening.

C. Door Stops

1. Conform to ANSI A156.16. Stops shall be BHMA L42101, L42251, L12141 or L12161, as applicable. Provide gray resilient parts for exposed bumpers.

2.8 DOOR TRIM UNITS

- A. Fasteners: Provide manufacturer's standard exposed fasteners, either machine screws or self-tapping screws, for door trim units (kick plates, edge trim, viewers, knockers, mail drops and similar units).
- B. Fabricate edge trim items of anodized aluminum in length of not more than 1/2 inch nor less than 1/16 inch smaller than door dimension.
- C. Fabricate kickplates not more than 1-1/2 inches less than door width and 12 inches high. Kickplates shall conform to ANSI 156.5, Type J102. Plates shall be a minimum of 0.050 inch thick stainless steel with finish to be US 32.

2.9 DOOR SEALS AND GASKETS

- A. Manufacturer: National Guard Products, Inc.
- B. Provide self-adhesive silicone products complying with ANSI A156.22. Provide gaskets for 20, 45, or 60 minute rated single swing or standard pair doors.
- C. Fire Gasketing
 - 1. Hollow Metal fire doors rated up to 3 hours.
 - a. UL 10B Classified, complying with NFPA 252.
 - 2. IBC Positive Pressure Hollow Metal fire doors rated up to 3 Hours.
 - a. UL 10C Classified, complying with IBC Positive Pressure requirements.
 - b. Category "J" listed.
- D. Smoke Gasketing
 - 1. Edge Sealing System
 - a. Category "G" listed.
 - 2. Smoke and Draft Control Gasketing
 - a. For use on all "S" labeled IBC Positive Pressure doors.
 - b. Category "H" listed.
 - c. Comply with UL 1784, NFPA 105 and IBC Positive Pressure requirements.
 - 3. Combination Edge Sealing System and Smoke Draft Control Gasketing
 - a. Category "G" and "H" Listed.
 - b. Acoustical Gasketing.
 - c. Can be used on Positive Pressure assemblies.
 - d. Category "J" listed.
 - e. Tested to ASTM E90 and ASTM E413.
 - f. Automatic Door Bottoms and Thresholds.
 - 4. Smoke Assembly: Any UL 10C classified threshold, automatic door bottom, door sweep or door shoe may be installed (although not required) on an "S" label door without affecting the label.
 - 5. Acoustical Assembly: Provide automatic door bottoms and compatible thresholds as tested to ASTM E90 and ASTM E413.

2.10 WEATHERSTRIPPING

- A. General: Except as otherwise indicated, provide continuous weatherstripping at each edge of every exterior door leaf. Provide non-corrosive fasteners as recommended by manufacturer for application indicated. Provide weatherstripping with manufacturer's standard clear or bronze anodized finish.
- B. Replaceable Seal Strips: Provide only units for which resilient seal is easily replaceable and readily available from stocks maintained by manufacturer.

2.11 THRESHOLDS

- A. General: Except as otherwise indicated, provide standard metal threshold unit of type, size and profile as scheduled. Finish: manufacturer's standard mill finish aluminum.

2.12 HARDWARE FINISHES

- A. Provide matching finishes for hardware units at each door or opening, except as otherwise specified. Reduce differences in color and textures as much as commercially possible where base metal or metal forming process is different for individual units of hardware at the same opening.
- B. Provide finishes which match those established by BHMA.
- C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness and other qualities complying with manufacturer's standards, but in no case less than specified for the applicable units of hardware by referenced standards.
- D. Designations used in schedules and elsewhere to indicate hardware finishes are as listed in ANSI A156.18 "Materials & Finishes Standard", including coordination with traditional U.S. finishes shown by certain manufacturers for their products.
- E. Unless otherwise specified, acceptable hardware finishes include BHMA No. 625 (US26D), satin chromium plated; No. 625 (US26), bright chromium plated; and No. 629 (US32), bright stainless steel.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that doors and frames are ready to receive hardware and that dimensions are as indicated on shop drawings.
- B. Verify that power supply is available to power operated devices.

3.2 DOOR PREPARATION

- A. Prep door to accept all door hardware devices including electric strikes, power transfer devices, and conductor raceways.

3.3 MANUFACTURER LEGEND

B	Best
BC	Barry Craft
BO	Bomer
F	Folger-Adams
I	Ives
L	LCN
P	Pemco
S	Sargent
T	Trimco
VD	Von Duprin
W	Wooster

3.4 HARDWARE SCHEDULE

HARDWARE – PROCESS BUILDING # 50-230

HW Set 1 Entry Aluminum/Glass Door PR 3' x 7'-2" x 1-7/8"
Door 1000

The door manufacturer shall supply and install the following:

Hinges
Threshold
Weather seals
Door sweep
Frames – Dark Bronze
Glazing – 3/4" Low E insulated clear tempered glass
Power transfer – EP-10 Von Durpin, finish to match door frames
Door operation/Closer – 4822 LCN, US26D
Strikes – By Security Contractor

1 ea.	Exit Device	E9875 FSE (RHRB)	US26D	VD
1 ea.	Exit Device	EL9867EO (LHRV)	US26D	VD
1 ea.	Night Latch	9875NL (RHRB)	US26D	VD
1 ea.	Cylinder	1E72	26	B
1 ea.	Power Supply	PSB75BK w/Battery Backup	Primer	VD
2 ea.	Keypad & Control box – see security drawings		---	---
1 ea.	Compressor control Box	ES7982	Primer	L
2 ea.	Door Stop	2011	PI	T

HW Set 2 NE Exit Aluminum/Glass Door PR 3' x 7'-2" x 1-7/8"
Door 1000A

The door manufacturer shall supply and install the following:

Hinges
Threshold
Weather seals
Door sweep
Frames – Dark Bronze
Glazing – 3/4" Low E insulated clear tempered glass
Closer, stop, hold – US26D
Strikes – By LANL Lock Shop

1 ea.	Exit Device	9875	US26D	VD
1 ea.	Night Latch	9875NL	US26D	VD
1 ea.	Cylinder	1E72	26	B
1 ea.	Door Stop	2011	PI	T
2 ea/	Keypad & Control Box – See Security Drawings			

HARDWARE –
PROCESS BUILDING # 50-230

HW Set 3 Electrical, Fire Riser, Vacuum Pump Rooms H.M. (PR) 3' x 7' x 1-3/4"
Door 1014, 1016, 1018

6 ea.	Butts	BB5004-450	26	BO
1 ea.	Lockset	35H7EW 3J (RHRB)TL	626	B
1 ea.	Latchset	35H0Y 3J (LHRB)	626	B
2 ea.	Closer	4111-3049SCNS	626	L
1 ea.	Fire/Weather Seal	316-DS(PG)	AL	P
1 ea.	Threshold	200A	AL	P
1 ea.	Door Sweep	307AV	AL	P

HW Set 4 Building Exit H.M. 3' x 7' x 1-3/4"
Door 1009, 1011A, 1011B

3 ea.	Butts	BB5004-450	26	BO
1 ea.	Lockset	35H7EW 3J (LHRB)TL	626	B
2 ea.	Closer	4111-3049SCNS	626	L
1 ea.	Fire/Weather Seal	316-DS(PG)	AL	P
1 ea.	Threshold	200A	AL	P
1 ea.	Door Sweep	307AV	AL	P

HW Set 5 Operations Center, Corridor H.M. 3' x 7' x 1-3/4"
Doors 1001, 1000B, 1000C

3 ea.	Butts	BB5004-450	26	BO
1 ea.	Lockset	93K7R14C S3	626	B
1 ea.	Closer	4111-3049SCNS	626	L
2 ea.	Silencer	SR64	GRY	I
1 ea.	Kickplate	K0050 - 12" x 1-1/2" LDW	32	T

HW Set 6 COMM Room, Wet Lab H.M. (PR) 3' x 7' x 1-3/4"
Doors 1002, 1012

6 ea.	Butts	BB5004-450	26	BO
1 ea.	Lockset	93K7D14C S3 (RHRB)	626	B
1 ea.	Latchset	35HOY 3J (LHRB)	626	B
2 ea.	Closer	4111-3049SCNS	626	L
2 ea.	Threshold	200A	AI	P
2 ea.	Door Sweep	307AV	AL	P
2 ea.	Kickplate	K0050 - 12" x 1-1/2" LDW	32	T

HARDWARE –
PROCESS BUILDING # 50-230

HW Set 7	Janitor		H.M. 3' x 7' x 1-3/4"
Doors	1003		
3 ea.	Butts	BB5004-450	26 BO
1 ea.	Lockset	93K7D14C S3	626 B
1 ea.	Closer	4111-3049SCNS	626 L
2 ea.	Silencer	SR64	GRY I
1 ea.	Kickplate	K0050 - 12" x 1-1/2" LDW	US32 T

HW Set 8	Men & Women Restrooms		H.M. 3' x 7' x 1-3/4"
Doors	1005, 1006		
3 ea.	Butts	BB5004-450	26 BO
1 ea.	Lockset	93K7D14C S3	626 B
1 ea.	Closer	4111-3049SCNS	626 L
2 ea.	Silencer	SR64	GRY I
1 ea.	Kickplate	K0050 - 12" x 1-1/2" LDW	US32 T
LDW = Less than Door Width			

HW Set 9	LLW Process Area		H.M. (PR) 3' x 7' x 1-3/4"
Door	1011	45-min Fire Rated	
6 ea.	Butts	BB5004-450	26 BO
1 ea.	Lockset	93K7D14C53 (RHRB)	626 B
1 ea.	Latchset	35H0Y 3J (LHRB)	626 B
2 ea.	Threshold	200A	AL P
2 ea.	Door Sweep	307AV	AL P
2 ea.	Kickplate	K0050 - 12" x 1-1/2" LDW	32 T
2 ea.	Fire/Weather Seal	316_DS(PG)	AL P
LDW = Less than Door Width			

HARDWARE –
SAMPLE BUILDING # 50-261

HW Set 2A Door	Entry 4000		H.M. (PR) 3' x 7'-2" x 7/8"	
6 ea.	Butts	BB5004-450	26	BO
1 ea.	Lockset	93K7D14 S3 3/4 (RHRB)	626	B
2 ea.	Flush bolt	FB458 (LHRB)	US260 D	I
1 ea.	Dust proof strike	DP1, DP2	US26D	I
1 ea.	Door Closer	4111-3077SCNS	Metal	L
1 ea.	Threshold	112, 6"	Ferrogrit	W

HARDWARE –
UTILITY BUILDING # 50-251

HW Set 1A Doors	Entry 2000		H.M. (PR) 3' X 7'-2" x 7/8"	
3 ea.	Butts	BB5004-450	26	BO
1 ea.	Lockset	35H7EW3J (LHRB)	626	B
1 ea.	Door Closer	4111-3077SCNS	Metal	L
			US26	
1 ea.	Fire/Weather seal	316-ADS (PG)	AL	P
1 ea.	Threshold	112, 6"	Ferrogrit	W
1 ea.	Door Sweep	307AV	AL	P

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 08 7100, Rev. 2, dated May 12, 2008.

SECTION 08 8000

GLAZING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Glass and glazing for non-rated hollow metal doors.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 08 1100, "Metal Doors and Frames."
- C. Section 08 8117, "Fire-Rated Glass."

1.1 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Catalog data on glass types indicating structural, physical and environmental characteristics, size limitations, special handling, or installation requirements.
- B. Catalog data on glazing compounds indicating chemical, functional and environmental characteristics, limitations, special handling, or installation requirements.
- C. Manufacturer's certifications that glazing meets or exceeds specified requirements.
- D. Glazing compound manufacturer's installation instructions.
- E. Three-inch-long beads of glazing sealant for color selection.
- F. Manufacturer's standard labor and material replacement warranty against sealed insulating glass units having seal failure and/or interpane dusting or misting.

1.4 LANL PERFORMANCE REQUIREMENTS

- A. Provide glass and glazing materials for continuity of building enclosure, vapor retarder and air barrier:
 - 1. In conjunction with materials described in Section 08 1100, "Metal Doors and Frames."
 - 2. Maintaining a continuous vapor retarder and air barrier throughout the glazed assembly from glass pane to heel bead of glazing sealant.
- B. Size glass to withstand dead loads and positive and negative live loads acting normal to plane of glass in accordance with ASCE 7.
- C. Limit glass deflection to $l/200$ or flexure limit of glass with full recovery of glazing materials, whichever is less.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with FGMA Glazing Manual and FGMA Sealant Manual.
- B. Use an installer that has completed at least 20 projects of similar size and scope as this project.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not install glazing when ambient temperature is lower than the minimum recommended in the glazing compound manufacturer's installation instructions.

PART 2 PRODUCTS

2.1 FLAT GLASS MATERIALS

- A. Manufacturers
 - 1. Guardian Industries Corporation.
 - 2. Interpane Glass Company.
 - 3. Libbey-Owens-Ford Company.
 - 4. PPG Industries, Inc.
- B. Tempered safety glass
 - 1. Use Type FG-B, clear, fully tempered to comply with ANSI Z-97.1, 1/4 inch thick.
- C. Wired glass
 - 1. Not Used, see Section 08 8117, "Fire-Rated Glass."

2.2 GLAZING COMPOUNDS

- A. Manufacturers
 - 1. Pecora Corporation, No. 896.
 - 2. Tremco Construction Products, Proglaze.
- B. Use silicone sealant, Type GC-F, ASTM C920, Type S, Grade NS, Class 25, single component, non-bleeding, non-staining, cured Shore A hardness of 15 to 25, color as selected from manufacturer's standard colors. VOC content not to exceed 250 g/L when calculated according to 40 CFR 59, Subpart D.

2.3 GLAZING ACCESSORIES

- A. Manufacturers
 - 1. Tremco Construction Products.
- B. Use setting blocks; ASTM C864 Option II, silicone, Shore A hardness of 80, length of 0.1 inch for each square foot area of glazing.
- C. Use spacer shims; ASTM C864 Option II, silicone, Shore A hardness of 50, minimum 3 inch long by one half the height of the glazing stop by thickness to suit application.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that openings for glazing are correctly sized and within tolerance.
- B. Verify that surfaces of glazing channels or recesses are clean and free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.2 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.
- D. Install sealant in accordance with manufacturer's installation instructions.

3.3 INSTALLATION - EXTERIOR WET METHOD

- A. Place setting blocks at 1/4 points and install glazing pane or unit.
- B. Insert removable stops with glazing centered in space by inserting spacer shims both sides at 24 inch intervals, 1/4 inch below sight line.
- C. Fill gaps between glazing and stops with sealant to depth of bite on glazing, but not more than 3/8 inch below sight line to ensure full contact with glazing and continue the air and vapor seal.
- D. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.4 CLEANING

- A. Remove glazing materials from finish surfaces.
- B. Remove labels after Work is complete.
- C. Clean glass and adjacent surfaces.

3.5 PROTECTION OF FINISHED WORK

- A. After installation, mark panes with an "X", using removable plastic tape or paste. Do not mark coated glazing that may be damaged by the marking material.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 08 8000, Rev. 2, dated May 12, 2008.

SECTION 08 8117
FIRE-RATED GLASS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fire-rated glazing materials installed as vision lights in fire-rated doors.
- B. Fire-rated glazing materials installed in fire-rated frames and wall applications.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 01 6000, "Product Requirements."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. American National Standards Institute (ANSI):
 - 1. ANSI Z97.1, *Standard for Safety Glazing Materials Used in Buildings*.
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM E 119, *Fire Tests of Building Construction and Materials*.
 - 2. ASTM E 2010-01, *Standard Test Method for Positive Pressure Fire Tests of Window Assemblies*.
- D. Consumer Product Safety Commission (CPSC):
 - 1. CPSC 16 CFR 1201: *Safety Standard for Architectural Glazing Materials*
- E. Glass Association of North America (GANA):
 - 1. GANA, *Glazing Manual*.
 - 2. FGMA, *Sealant Manual*.
- F. International Building Code (IBC):
 - 1. *2009 International Building Code*.
- G. National Fire Protection Association (NFPA):
 - 1. NFPA 80, *Fire Doors and Windows*.
 - 2. NFPA-101, *Life Safety Code*.
- H. Underwriters Laboratories, Inc. (UL):
 - 1. UL 263, *Standard for Fire Tests of Building Construction and Materials*.

1.4 LANL PERFORMANCE REQUIREMENTS

- A. Fire-rated, clear and wireless glazing material for use in locations such as doors, side lites, transoms, borrowed lites, and wall applications with fire rating requirements ranging from 45 minutes to 2 hours with required hose stream test; for use in interior and exterior applications.

- B. Provides protection by reducing the radiant and conductive heat transfer
- C. Is bi-directional, providing equal fire protection from both sides?

1.5 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Product Data: Submit manufacturer's technical data for each glazing material required, including installation and maintenance instructions.
- B. Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements and that glazing materials will bear manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.
- C. Product Test Listings: From UL and indicating fire-rated glass complies with requirements, based on comprehensive testing of current product.
- D. Samples: Submit, for verification purposes, approx. 8-inch by 10-inch sample for each type of glass indicated.

1.6 QUALITY ASSURANCE

- A. Glazing Standards: FGMA Glazing Manual and Sealant Manual.
- B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
- E. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.
- F. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F (250 deg C), and the fire-resistance rating in minutes.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials under provisions of Section 01 6000, "Product Requirements."
- B. Deliver materials to specified destination in manufacturer or distributor's packaging, undamaged, complete with installation instructions.
- C. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.
- D. Do not expose glazing materials to UV light, temperatures greater than 120 degrees or less than minimum 40 degrees F during storage and transportation.

- E. Store off ground, under cover, protected from weather and construction activities.
- F. Store sheets of glass vertically. Do not lean.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to replace units that deteriorate within specified warranty period for defects present at delivery or developed from normal use that are not attributed to glass breakage or to maintaining and cleaning contrary to manufacturer's written instructions.
- B. Warranty period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 FIRE-PROTECTION-RATED GLAZING

- A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 for window assemblies.
- B. Products: Subject to compliance with requirements, provide one of the following rated glazing types that may be incorporated into the Work
 - 1. Laminated Glass with Intumescent Interlayers: Laminated glass made from multiple plies of uncoated, clear float glass; with intumescent interlayers; complying with testing requirements in 16 CFR 1201 for Category II materials.
 - a. Provide one of the following available products including, but are not limited to, the following:
 - 1) Pilkington Group Limited (distributed by Technical Glass Products); PyroStop.
 - 2) InterEdge, Inc., a subsidiary of AFG Industries, Inc.; Pyrobel.
 - 3) Vetrotech Saint-Gobain; SGG Contraflam N2 or SGG Swissflam N2.
 - 2. Gel-Filled, Double Glazing Units: Double glazing units made from two lites of uncoated, clear, fully tempered float glass; with a perimeter metal spacer separating lites and dual-edge seal enclosing a cavity filled with clear, fully transparent, heat-absorbing gel; complying with testing requirements in 16 CFR 1201 for Category II materials.
 - a. Provide one of the following available products including, but are not limited to, the following:
 - 1) Safti First; SuperLite II.
- C. Properties:
 - 1. Thickness: For Interior Use: As required for fire rating listed.
 - 2. Weight: Varies with thickness (approximate range 9 to 22 lb/ft²).
 - 3. Approximate Visible Transmission: Varies with thickness (approximate range 88 to 75 percent).

4. Fire-rating: Up to 2 hours. Bi-directional, providing equal fire protection from both sides.
 5. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).
 6. STC Rating: Up to 46 dB.
- D. Permanently label each piece of glazing with marking required under Quality Assurance above.
- E. Fire Rating – 60 Minutes and Greater: Fire rating listed and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with ASTM E 119 and UL 263.

2.2 GLAZING COMPOUND FOR FIRE-RATED GLAZING MATERIALS

- A. General:
1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
 4. Colors of Exposed Glazing Sealants: As indicated by manufacturer's designations.
- B. Glazing Tape: Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent, designed for compression of 25 percent to effect an air and vapor seal.
- C. Glazing Sealants for Fire-Rated Glazing Products: Manufacturer's standard sealants that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.
- D. Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable. Available Products:
1. Dow Corning 795 - Dow Corning Corp.
 2. Silglaze-II 2800 - General Electric Co.
 3. Spectrem 2 - Tremco Inc.
- E. Setting Blocks: calcium silicate; glass width by 4 inches by 3/16 inch thick.
- F. Spacers: Neoprene or other resilient blocks of 40 to 50 Shore A durometer hardness, adhesive-backed on one face only, tested for compatibility with specified glazing compound.

- G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.
- H. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

2.3 FABRICATION

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine glass framing, with glazier present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
 - 2. Minimum required face or edge clearances.
 - 3. Observable edge damage or face imperfections.
- B. Do not proceed with glazing until unsatisfactory conditions have been corrected.
- C. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 INSTALLATION (GLAZING)

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- C. Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.

- D. Place setting blocks located at quarter points of glass with edge block no more than 6-inches from corners.
- E. Glaze vertically into labeled fire-rated metal frames or partition walls with the same fire rating as glass and push against tape for full contact at perimeter of pane or unit.
- F. Place glazing tape on free perimeter of glazing in same manner described above.
- G. Do not remove protective edge tape.
- H. Install removable stop and secure without displacement of tape.
- I. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- J. Knife trim protruding tape.
- K. Apply cap bead of silicone sealant along void between the stop and the glazing, to uniform line, with bevel to form watershed away from glass. Tool or wipe sealant surface smooth.
- L. Provide minimum 3/16 inch edge clearance.
- M. Install so that appropriate Fire-Protection-Rated Glazing Labeling and manufacture's markings remain permanently visible.

3.4 PROTECTION AND CLEANING

- A. Protect glass from contact with contaminating substances resulting from construction operations. Remove any such substances by method approved by glass manufacturer.
- B. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- C. Wash glass on both faces not more than four days prior to date scheduled for inspections intended to establish date of substantial completion. Wash glass by method recommended by glass manufacturer.

END OF SECTION

SECTION 08 9100

LOUVERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Exterior wall, drainable blade stationary louver assemblies with removable bird screens.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- C. Section 07 9200, "Joint Sealants."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Catalog data describing materials and finish, and product criteria.
- B. Manufacturer's installation instructions.
- C. Samples or color charts of standard colors for metal and screen.
- D. Shop drawings indicating component details, framed openings, bearing, and anchor location of fasteners and accessories.

1.5 QUALITY ASSURANCE

- A. Use products of a company specializing in the manufacture of AMCA certified louvers that bear the AMCA certified rating seal for air performance and water penetration.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."

2.2 MANUFACTURERS

- A. Dowco Corporation.
- B. Construction Specialties, Inc.
- C. Industrial Louvers, Inc.

2.3 MATERIALS

- A. Aluminum Extrusions: ASTM B221, Alloy 6063-T5.
- B. Aluminum Sheet: ASTM B209, alloy 3003 or 5005, with temper as required for forming.
- C. Fasteners: Use aluminum or 300 series stainless steel fasteners. Provide other accessories as required for complete and proper installations.
- D. Bird Screen: Standard expanded aluminum mesh, maximum 3/4 inch.

2.4 ACCESSORIES

- A. Use flashings of same material as louver frame.
- B. Use sealants as specified in Section 07 9200, "Joint Sealants."

2.5 FABRICATION

- A. Fabricate with nominal frame depth of 6 inches.
- B. Provide louvers of sizes indicated on the drawings.

2.6 FINISHES

- A. Use submittal-approved finish and colors for exterior and interior metal surfaces and screens.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that prepared openings and flashings are ready to receive work, and openings are as indicated on shop drawings.
- B. Beginning of installation indicates acceptance of existing conditions.

3.2 INSTALLATION

- A. Install louver in accordance with manufacturer's installation instructions.
- B. Install louvers level and plumb.
- C. Secure louvers in opening with fasteners that are removable for maintenance purposes.
- D. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to the exterior.
- E. Install bird screen to interior of louver, removable for access.
- F. Install perimeter sealant in accordance with Section 07 9200, "Joint Sealants."

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 08 9100, Rev. 2, dated May 12, 2008.

SECTION 09 2116
GYPSUM BOARD SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Light gauge metal framing.
- B. Metal channel ceiling framing.
- C. Gypsum board and joint treatment.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4000, "Quality Requirements."
- C. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- D. Section 05 4000, "Cold Form Metal Framing."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Catalog data on metal framing, gypsum board, joint tape, joint compound and texturing materials. Submit metal studs, tracks and accessories 18 gauge or heavier under Section 05 4000, "Cold Form Metal Framing."
- B. Gypsum manufacturer's documentation of recycled content for gypsum board.
- C. Gypsum manufacturer's documentation of buyback and/or recycling program.
- D. Submit manufacturer's written certification that all materials are free of asbestos.
- E. Manufacturer's installation instructions.
- F. Twelve inch square sample of gypsum board with texture finish.

1.5 QUALITY ASSURANCE

- A. Work identified in the section shall be done under a Quality Assurance Program (QAP) in accordance with Section 01 4000, "Quality Requirements."
- B. Perform work in accordance with ASTM C 840, GA-214, GA-216 and GA-600.

1.6 REGULATORY REQUIREMENTS

- A. Conform to IBC for fire rated assemblies as follows:
 - 1. Fire Rated Partitions: Listed assembly for 1 and 2 hour rating, ANSI/UL 263 U423.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Comply with Section 01 2500, "Substitution Procedures."

2.2 MANUFACTURERS

- A. Georgia Pacific Corp.
- B. National Gypsum Company.
- C. United States Gypsum Company.

2.3 FRAMING MATERIALS

- A. Light gauge furring, framing and accessories conforming to ASTM C 645 and GA-600.
- B. Fasteners conforming to ASTM C 514 and GA-216.
- C. Adhesive conforming to ASTM C 557 and GA-216.

2.4 GYPSUM BOARD MATERIALS

- A. Recycled Content: Gypsum recycled content to be the greatest amount available, up to 28 percent post-industrial content. Subject to compliance with requirements, use synthetic (flue-gas) gypsum when available. Paper facing to be 100 percent post consumer recycled content. Fiber gypsum board shall consist of recycled newspaper and gypsum over recycled newspaper, gypsum and perlite core.
- B. Provide gypsum board conforming to ASTM C 36 and ASTM E 119, fire resistive, Type X, 5/8 in. thick, maximum practical length, with square cut ends and tapered edges.
- C. Moisture resistant gypsum board conforming to ASTM C 630, Type X, 5/8 in. thick, maximum practical length, with square cut ends and tapered edges.

2.5 ACCESSORIES

- A. Self-drilling, self-tapping screws, bolts, nuts and washers with hot dip galvanized finish.
- B. Corner beads of metal and paper construction.
- C. Edge bead conforming to ASTM C 1047 and GA-216.
- D. Joint materials conforming to ASTM C 475 and GA-216; reinforcing tape, joint compound, adhesive (all 100 percent asbestos free) and water.
- E. Latex based texture finish materials.

PART 3 EXECUTION

3.1 METAL STUD INSTALLATION

- A. Install studs as indicated on the drawings and in accordance with manufacturer's instructions and ASTM C 754.

- B. Refer to drawings for locations of studding to be installed under this section and heavy gauge studding to be installed under Section 05 4000, "Cold Form Metal Framing."
- C. Refer to drawings for locations of studding extending to the ceiling, through the ceiling, and to structure above.

3.2 CEILING GRILLAGE INSTALLATION

- A. Install metal joist per structural drawings and Section 05 4000, "Cold Form Metal Framing."
- B. Install furring channels at right angle to channels at 16 in. on center.

3.3 GYPSUM BOARD INSTALLATION

- A. Install gypsum board in accordance with manufacturer's instructions.
- B. In non-fire rated partitions, erect single layers of gypsum board in most economical direction, with edges and ends occurring over firm bearing.
- C. In fire rated partitions erect single layer of gypsum board vertically, with edges and ends occurring over firm bearing.
- D. Install screws in accordance with manufacturer's instructions.
- E. In double layer installations, erect second layer perpendicular to first layer, secured to first layer with adhesive. Offset joints of second layer from joints of first layer.
- F. Treat cut edges and holes in moisture resistant gypsum board with sealant.
- G. Install corner beads at exterior corners. Install edge trim where gypsum board abuts dissimilar materials.

3.4 JOINT TREATMENT

- A. Tape, fill and sand exposed joints, edges and corners to produce smooth surface, ready for finish.
- B. Feather coats onto adjoining surfaces so that camber is maximum 1/32 in.

3.5 TEXTURE FINISH

- A. Apply finish texture coating to attain a light sand finish.

3.6 TOLERANCES

- A. Maximum variation of finished gypsum board surface from true flatness is 1/8 in. in 10 ft in any direction.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 09 2116, Rev. 2.1, dated April 4, 2012.

SECTION 09 3013

CERAMIC TILING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Ceramic tile floor and base finish installed using the thinset method.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 01 7700, "Closeout Procedures."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

Submit the following according to the requirements of Exhibit I:

- A. Samples of proposed tile for approval and selection of colors and textures.
- B. Samples of grout material for approval and selection of colors and textures.
- C. Manufacturer's installation instructions for using adhesives and grout.

1.5 QUALITY ASSURANCE

- A. Use materials conforming to ANSI standards specified in this section.
- B. Install conforming to ANSI A108.6.
- C. Use products of a company specializing in the manufacture of the products specified in this section.
- D. Use an installer who has successfully completed at least 25 projects of similar type and scope as this project.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Maintain minimum 50 degrees F during installation of mortar and grout materials.

PART 2 PRODUCTS

2.1 CERAMIC TILE MATERIALS

- A. Use unglazed ceramic mosaic tile conforming to ANSI A137.1 and the following:
 - 1. Moisture Absorption: 0 to 0.5
 - 2. Size: 2 by 2 by 1/4 inches
 - 3. Shape: Square
 - 4. Edge: Cushioned
 - 5. Color: As selected from the manufacturer's standard colors.

2.2 BASE MATERIALS

- A. Match wall tile for type, moisture absorption, size and color.
 - 1. Top edge: Bullnose
 - 2. Internal corner: Coved
 - 3. External corner: Bullnose

2.3 ADHESIVE MATERIALS

- A. Use organic adhesive conforming to ANSI A136.1, of Types I and II thinset bond type.

2.4 GROUT MATERIALS

- A. Use grout conforming to ANSI A118.6 of color selected.

2.5 GROUT MIX

- A. Mix and proportion grout materials in accordance with manufacturer's instructions.

2.6 SEALANT MATERIALS

- A. Use sealant compatible with grout, and of same color and texture as grout material.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that surfaces are ready to receive work.
- B. Do not begin installation and notify the Subcontract Technical Representative (STR) if substrate conditions will adversely affect acceptable results.

3.2 PREPARATION

- A. Vacuum clean surfaces.
- B. Protect surrounding work from damage or disfiguration.

3.3 INSTALLATION - THINSET METHOD

- A. Install adhesive, tile and grout in accordance with TCA Handbook.
- B. Lay tile to square pattern. Do not interrupt tile pattern through openings.
- C. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Align floor, base and wall joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
- E. Sound tile after setting. Replace hollow sounding units.
- F. Allow tile to set for a minimum of 48 hours prior to grouting.
- G. Grout tile joints.
- H. Apply sealant in joints at junctions of dissimilar planes.

3.4 CLEANING

A. Clean work under provisions of Section 01 7700, "Closeout Procedures."

3.5 PROTECTION OF FINISHED WORK

A. Do not permit traffic over finished floor for 4 days after installation.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 09 3013, Rev. 1, dated May 14, 2008.

SECTION 09 5100
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Suspended metal grid ceiling system and perimeter trim.
- B. Acoustic panels.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- C. Section 03 1534, "Post-Installed Concrete Anchors – Normal Confidence."
- D. Section 07 2100, "Thermal Insulation."
- E. Section 07 9200, "Joint Sealants."
- F. Section 08 3100, "Access Doors and Panels."
- G. Section 09 2116, "Gypsum Board Systems."
- H. Section 21 1313, "Wet-Pipe Sprinkler Systems."
- I. Section 26 5100, "Interior Lighting."
- J. Section 27 3000, "Voice Communications."
- K. Section 28 3100, "Fire Detection and Alarm."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. ASTM International:
 - 1. ASTM C 635/C 635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
 - 2. ASTM C 636/C 636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
 - 3. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 4. ASTM E 119 – Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 5. ASTM E 580/E 580M - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint.
 - 6. ASTM E 1264 - Standard Classification for Acoustical Ceiling Products.

- C. American Society of Civil Engineers:
 - 1. ASCE 7-05 - Minimum Design Loads for Buildings and Other Structures.
- D. Ceilings and Interior Systems Construction Association:
 - 1. Cisca - Acoustical Ceilings: Use and Practice.
- E. UL – Underwriters Laboratory Directory of Construction Materials.

1.4 ACTION / INFORMATIONAL SUBMITTALS

- A. Submit the following in accordance with the requirements of Exhibit I.
- B. Product Data: Unless providing exactly as specified, submit data for grid system, panels, and accessories; electrical resistance characteristics and ground connection requirements.
- C. Calculations: Submit suspended ceiling seismic design calculations performed in accordance with ASCE 7-05, Section 13.5.6.
- D. Shop Drawings: Indicate ceiling layout, interruptions to grid, panels requiring drilling or cut-out for services, appurtenances or interruptions, edge details.
- E. Samples: Submit two 6x6 inch in size of ceiling grid and panel, illustrating finishes and color.
- F. Manufacturer's Installation Instructions: Submit special procedures, perimeter conditions requiring special attention.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data
- B. Warranty Documentation
- C. Project Records Documentation

1.6 EXTRA STOCK MATERIALS SUBMITTALS

- A. Furnish two cartons of each type of extra panels to the LANL Subcontract Technical Representative (STR).

1.7 QUALITY ASSURANCE

- A. Qualifications
 - 1. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.
 - 2. Installer: Company specializing in performing Work of this section approved by sub-contractor.
- B. Source Limitations: Obtain ceiling system through one source from a single manufacturer.
- C. Seismic Standard: Provide acoustical panel ceilings designed including typical 2 foot by 4 foot electrical ceiling light (maximum design weight 35 lbs.) and installed to withstand the effects of earthquakes according to the following:

1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM C 635/C 635M, ASTM C 636/C 636M, and ASTM E 580.
2. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies – Seismic Zones 3 & 4."
3. ASCE 7-05, *Minimum Design Loads for Buildings and Other Structures*, Section 9, "Earthquake Loads" and Section 13.5.6, "Suspended Ceilings."
4. Seismic-Restraint Loading:
 - a. Occupancy Category as Defined in IBC: II
 - b. Site Class as Defined in IBC: D
 - c. Seismic Design Category as Defined in the IBC: D
 - d. Component Importance Factor: 1.0
 - e. Component Response Modification Factor 2.5
 - f. Component Amplification Factor: 1.0.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.9 SITE CONDITIONS

- A. Install ceiling panels only after building is enclosed, sufficient heat is provided, dust generating activities have been finished, overhead work is completed, tested, and approved, and interior wet work is dry.
- B. Maintain uniform temperature of minimum 60 degrees F and a maximum humidity of 40 percent prior to, during, and after ceiling panel installation.

1.10 WARRANTY

- A. Provide manufacturer's standard, all inclusive warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS:

- A. Alternate products may be accepted per Section 01 2500, "Substitution Procedures," Paragraph 1.2.

2.2 PERFORMANCE / DESIGN CRITERIA

- A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE 7-05.

- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- C. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.3 ACOUSTICAL PANELS, GENERAL

- A. Low-Emitting Materials: Acoustical panel ceilings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Recycled Content:
 - 1. Acoustical Panels: Minimum 20% recycled content.
- C. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.
- D. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance unless otherwise indicated.
 - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E 795.
- E. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
 - 1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturer's proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.4 ACOUSTICAL TILES

- A. Acoustic Panels: ASTM E 1264, conforming to the following:
 - 1. Size: 24 x 48 inches.
 - 2. Thickness: 5/8 inch.
 - 3. Composition: Mineral.
 - 4. Density: .60 lb/cu.ft.

2.5 METAL SUSPENSION SYSTEMS, GENERAL

- A. Recycled Content:
 - 1. Aluminum: Minimum 50% recycled content.

- B. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.
 - 1. High-Humidity Finish: Comply with ASTM C 635/C 635M requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
- C. Attachment Devices
 - 1. Comply with seismic design Category D. Shall be designed and installed in accordance with ASTM C 635/C 635M and the CISC for Seismic Zones 3 and 4.
 - 2. Comply with Section 03 1512, "Post-Installed Concrete Anchors Purchase- High Confidence;" Section 03 1534, "Post Installed Concrete Anchors Purchase – Normal Confidence," and Section 03 1550, "Post Installed Concrete Anchors; Installation and Testing."
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Size: Select wire diameter so its stress at three times hanger design load ASTM C 635/C 635M, Table 1, "Direct Hung" will be less than yield stress of wire, but provide not less than 0.135-inch diameter wire.
- E. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- F. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch thick, galvanized-steel sheet complying with ASTM A 653/A 653A, G90 (Z275) coating designation; with bolted connections and 5/16-inch diameter bolts.
- G. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces as shown on drawings.
- H. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces as shown on drawings.
- I. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in place.
- J. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 25 inches o.c. on all cross tees.
- K. Impact Clips: Where indicated, provide manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.

2.6 METAL SUSPENSION SYSTEM

- A. Non-fire Rated Grid: ASTM C 635/C 635M, light; exposed T; components die cut and interlocking.
- B. Grid Materials: Extruded aluminum.
- C. Exposed Grid Surface Width: 15/16 inch.
- D. Grid Finish: White.
- E. Accessories: Stabilizer bars, clips, splices, perimeter moldings, and hold down clips are required for suspended grid system.

- F. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Verify layout of hangers will not interfere with other work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Lay-In Grid Suspension System:
 - 1. Install suspension system in accordance with ASTM C 635/C 635M, ASTM C 636/C 636M and as supplemented in this section.
- C. Erection Tolerances
 - 1. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
 - 2. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: LANL will engage a qualified special inspector to perform the following special inspections:
 - 1. Compliance of seismic design.
- B. Testing Agency: LANL will engage a qualified testing agency to perform tests and inspections and prepare test reports.
- C. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages. Do not proceed with installations of acoustical panel ceiling hangers for

the next area until test results for previously completed installations show compliance with requirements.

1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.
 - a. Within each test area, testing agency will select one of every 10 power-actuated fasteners and post-installed anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every two post-installed anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
 - b. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- D. Acoustical panel ceiling hangers and anchors and fasteners will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.5 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09 6500
RESILIENT FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Furnishing and installation of sheet vinyl and static dissipative tile flooring

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM D 2047, *Static Coefficient of Friction*.
 - 2. ASTM E 84, *Test Method for Surface Burning Characteristics of Building Materials*.
 - 3. ASTM E 648, *Standard Method of Test for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source*.
 - 4. ASTM E 662, *Smoke Chamber Specific Optical Smoke Density*.
 - 5. ASTM F 1066, *Standard Specification for Vinyl Composition Floor Tile*.
- C. U.S. Environmental Protection Agency (EPA):
 - 1. EPA CPG, *Comprehensive Procurement Guideline*, <http://www.epa.gov/cpg>.

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Product data for approval of the resilient sheet flooring. Provide samples of the pattern style and color range specified or offered by the manufacturer.
- B. Samples/colors Provide samples of the pattern style and color range specified or offered by the manufacturer.
- C. Manufacturer's installation instructions.
- D. Cleaning and maintenance information.
- E. Certification that percentage of recovered materials will be at least equal to amount specified in Part 2 for applicable material.
- F. Manufacturer's certification of asbestos-free products for all products including adhesives and mastics.

1.5 REGULATORY REQUIREMENTS

- A. Materials and accessories: Flame spread rating of 25/50 or less and smoke developed of 450 or less in accordance with ASTM E84.

1.6 DELIVER, STORAGE AND HANDLING

- A. Store materials for three (3) days prior to installation in area of installation to achieve temperature stability. Allow seven (7) days for storage in winter months. Store materials in manufacturer's shipping packages.
- B. Maintain ambient temperature required by adhesive manufacturer 3 days prior to, during, and 24 hours after installation of materials.
- C. Store highly flammable materials (adhesives, fillers, solvents) segregated from other materials and arranged to facilitate fire fighting.

1.7 EXTRA MATERIALS

- A. Provide at least 5 percent of calculated area of flooring materials of each type specified.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Comply with Section 01 2500, "Substitution Procedures."

2.2 RESILIENT FLOORING AND ACCESSORIES

- A. Sheet Vinyl with Backing: ASTM F-1303, Type II, vinyl wear thickness of 0.050 inch, total thickness of 0.080 inch; sheet width of 6 feet.
- B. Static Dissipative Tile:
 - 1. ASTM E-84, 1/8 inch thick x 12 inches x 12 inches,
 - 2. Electrical Resistance:
 - a. ESD-S7.1 and ASTM F-150: point to point and point to ground: 10^6 to 10^9 ohms
 - 3. Static Generation
 - a. ESD STM 97.2 (flooring in combination with footwear and a person)
 - 1) at 40% R.H. with ESD shoes: < 10 volts
 - 2) at 12% R.H. with ESD shoes: < 100 volts
 - 4. Static Decay:
 - a. Flooring in combination with footwear (ESD shoes and a person (5000 volts to zero): 0.5 seconds avg.
 - b. Fed. Test 101C, Method 4045 (5000 volts to zero): <0.5 seconds
- C. Flame spread of not more than 75 and a critical radiant flux of not less than 0.45 w/cm² according to ASTM E-648.
- D. Smoke Density of 450 or less in accordance with ASTM E-662
- E. Fillers and Leveling Compounds: As recommended by the flooring material manufacturer for filling small cracks, holes, and depressions in the substrate.
- F. Primers and Adhesives: Use non-staining and waterproof types as recommended by the flooring material manufacturer. Asphalt emulsions and other non-waterproof types will not be acceptable.

- G. Edge Strips: Use flooring material.
- H. Sealer and Wax: Use products recommended by flooring material manufacturer.

2.3 MANUFACTURERS

- A. Sheet Vinyl with Backing
 - 1. Armstrong World Industries, Inc., "Safeguard Design" pattern.
 - 2. Congoleum Corp., "Specifications" pattern.
 - 3. Mannington, "Lifelines" pattern.
- B. Static Dissipative Tile
 - 1. Armstrong World Industries, Inc., "SDT (Static Dissipative Tile)"

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that surfaces are smooth and flat with maximum variation of 1/8 inch in 10 feet, and are ready to receive work.
- B. Verify that concrete floors are dry to a maximum moisture content of 3 percent, and exhibit negative alkalinity, carbonization or dusting.
- C. Verify that floor surfaces are free of substances that may impair adhesion of adhesive and finish materials.
- D. Do not begin installation, and notify LANL Subcontractor Technical Representative (STR), if existing conditions will adversely affect acceptable results.

3.2 PREPARATION

- A. Thoroughly clean all surfaces to receive covering. The floor surface temperature shall be 60 degrees F or higher.
- B. Concrete surfaces should be at least 30 days old and cleaned of all traces of curing compound. Smooth all roughness and uneven joints by fillers and/or grinding.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions, with a minimum number of seams in sheet vinyl.
- B. Spread only enough adhesive to permit installation of materials before initial set.
- C. Set flooring in place and press with heavy roller to attain full adhesion.
- D. Terminate flooring at centerline of door where adjacent floor finish is dissimilar.
- E. Install tile with pattern running in same direction - no checker boarding.
- F. Scribe flooring to walls, columns, cabinets, floor outlets and other appurtenances to provide tight joints.

3.4 CLEANING

- A. Keep surfaces of resilient flooring free of adhesive while installing. Remove excess adhesive from surface within recommended working time.

- B. Remove soil, stain, and extraneous material caused by installation of resilient material from adjacent surfaces.
- C. Clean and finish resilient flooring surfaces as recommended by the manufacturer. Remove and replace defective, off color, or improperly installed materials that cannot be made to satisfactorily match adjacent surfaces.

3.5 PROTECTION

- A. Protect the installed resilient material from damage. Do not permit traffic or work over the installed material until the material is adequately protected.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 09 6500, Rev. 3 dated December 9, 2009.

SECTION 09 6513
RESILIENT BASE AND ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Resilient base at resilient flooring finishes.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 REGULATORY REQUIREMENTS

- A. Conform to applicable code for flame/fuel/smoke rating requirements of ASTM E 84.
- B. 40 CFR 247 Comprehensive Procurement Guidelines for Products Containing Recovered Materials.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Store materials in area of installation for three days prior to installation to achieve temperature stability.
- B. Maintain ambient temperature required by adhesive manufacturer three days prior to, during, and 24 hours after installation of materials.

1.6 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Product data for approval of the resilient base.
- B. Manufacturer's installation instructions.
- C. Provide samples of color range specified or offered by the manufacturer.
- D. Cleaning and maintenance information.
- E. Certification that recovered (recycled) materials is 90 to 100 percent per 40 CFR 247 requirements.
- F. Manufacturer's certification of asbestos-free products for all products including adhesives and mastics.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Comply with Section 01 2500, "Substitution Procedures."

2.2 ACCEPTABLE MANUFACTURERS - BASE MATERIALS

- A. Burke Flooring Products.
- B. Flexco Company.
- C. Roppe.

2.3 BASE MATERIALS

- A. Provide base conforming to FS SS-W-40: Type I rubber; provide roll stock for distances 8 feet or greater, 4 inches high; 1/8 inch thick; top set coved; color will be selected by LANL from the manufacturer's standard samples.

2.4 ACCESSORIES

- A. Provide primers and adhesives that are waterproof, and of type recommended by manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. If substrate conditions will adversely affect acceptable results, do not begin installation and notify the LANL Subcontract Technical Representative (STR).

3.2 INSTALLATION - BASE MATERIAL

- A. Fit joints tight and vertical. Maintain minimum measurement of 18 inches between joints.
- B. Miter internal corners. At external corners, "V" cut back of base strip to 2/3 of its thickness and fold.
- C. Install base on solid backing. Bond tight to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

3.3 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage to those surfaces.

END OF SECTION

SECTION 09 9100

PAINTING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Surface preparation, painting, and finishing of exposed interior and exterior items and surfaces, including touch-up painting on prefinished items. Surface preparation, priming, and finish coats specified in this section are in addition to shop-priming and surface treatment specified under other sections.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory finish applied.

B. Surfaces To Be Painted

1. Paint all exposed surfaces whether or not colors are designated in Sections 3.6 and 3.7, except where surface or material is specifically indicated not to be painted or to remain natural.
2. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces.
3. If color or finish is not designated, the Subcontract Technical Representative (STR) will select from standard colors or finishes available.
4. Surfaces listed in Sections 3.6, 3.7, and 3.8, other than those listed in Paragraphs 1.1C and 1.1D, will receive the surface preparation, paints, and number of coats prescribed in the schedule.

C. Surfaces Not Requiring Painting

1. Prefinished items including the following factory-finished components:
 - a. Metal toilet enclosures, unless otherwise specified
 - b. Acoustic materials
 - c. Architectural woodwork and casework
 - d. Finished mechanical and electrical equipment
 - e. Switchgear
 - f. Distribution cabinets
 - g. Metal roofing
 - h. Galvanized components of prefabricated metal buildings
 - i. Factory painted mechanical equipment with approved finishes.
2. Concealed surfaces including wall or ceiling surfaces in unfinished spaces.
 - a. Foundation spaces
 - b. Duct shafts
 - c. Elevator shafts

3. Factory finished surfaces such as:
 - a. Anodized aluminum
 - b. Stainless steel
 - c. Chromium plate
 - d. Glass
 - e. Bronze and brass
 4. Operating parts including moving parts of operating equipment such as the following:
 - a. Valve and damper operators
 - b. Linkages
 - c. Sensing devices
 - d. Motor and fan shafts
 - e. Regulators, controls, instruments.
 5. Electrical conduit, boxes, panels and other associated electrical equipment located in Mechanical or Electrical equipment rooms, above ceilings, in chases, in basements or in other locations where they are not normally visible to the building occupants, unless otherwise specified.
- D. Surfaces For Which Painting Is Prohibited:
1. Sprinkler heads.
 2. Heat and smoke detectors.
 3. Pre-painted Electrical equipment in equipment rooms including Lighting Inverters, VFCs, MCCs, Switchboards, Fire Alarm and Facility Control System (FCS) panels. (Exception – to touch up existing paint damaged during installation or other construction).
 4. Conduit color banding or other identification.
 5. Equipment in hazardous (classified) locations.
 6. Labels: Do not paint over Underwriter's Laboratories, Factory Mutual, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
 7. Concealed auto-releasing sprinkler head covers (i.e.; escutcheon plates).
 8. Glass, brass, or chrome plated portions of fire protection system control valves (i.e., PIVs, gate valves) hydrants and fire department connections. (Reference NFPA 13 and Section 21 1313 Wet-Pipe Sprinkler Systems).

1.2 REFERENCES

- A. Abbreviations and Acronyms
1. GS – Green Seal
 2. LEED – Leadership in Energy and Environmental Design
- B. Definition: The term “paint” as used herein includes emulsions, primers, enamels, stains, varnishes, sealers, cement-emulsion filler, and other coatings, whether used as prime, intermediate, or finish coat. Standard coating terms defined in ASTM D 16 apply to this section.

C. Reference Standards

1. ASTM
 - a. D 16 Standard Terminology for Paint, Related Coatings, Materials, and Applications.
2. National Fire Protection Association (NFPA)
 - a. NFPA 13, Standard for the Installation of Sprinkler Systems
3. Code of Federal Regulations (CFR)
 - a. Title 29 Part 1910, Labor - Occupational Safety and Health Standards
 - b. Title 29 Part 1926, Safety and Health Regulations for Construction
4. Green Seal (GS)
 - a. GS-11, Paints
 - b. GS-47, Stains and Finishes

1.3 SUBMITTALS

- A. Submit the following in accordance with the requirements of Exhibit I.
- B. Action/Informational Submittals:
 1. Product Data: Manufacturer's catalog data, label analysis, volatile organic compound (VOC) content, and application instructions for each material proposed for use.
 - a. List each material and cross-reference the specific coating and finish system and application. Identify each material by the manufacturer's catalog number and general classification.
 - b. Samples for initial color selection shall be in the form of manufacturer's color charts.
 2. Qualification Data: For applicator per Paragraph 1.4.D.
 3. Samples: For each color specified, apply a complete liquid glaze coating system to representative samples of the actual substrate to be used in the work and submit for approval. The approved sample panels will be used for quality control in applying the glaze coating system.
 - a. Provide a list of material and application for each coat of each sample. Label each sample as to location and application.
- C. Maintenance Material Submittals
 1. Extra Stock Materials
 - a. Provide 1 extra gallon of each type, color, and surface texture to LANL.
 - b. Label each container with color, texture, room locations, in addition to the manufacturer's label.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer of the finish coats.
- B. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total coating systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify the STR of problems anticipated using the materials specified.
- C. Material Quality: Provide the manufacturer's best quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification are not acceptable.
 - 1. Proprietary names used to designate colors or materials are not intended to imply that products named are required, or to exclude equal products of other manufacturers.
- D. Applicator Qualification: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this project, whose work has resulted in applications with a record of successful in-service performance on a minimum of five projects.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name, label, and the following information:
 - 1. Product name or title of material
 - 2. Product description (generic classification or binder type)
 - 3. Manufacturer's stock number and date of manufacture
 - 4. Contents by volume, for pigment and vehicle constituents
 - 5. Thinning instructions
 - 6. Application instructions
 - 7. Color name and number
 - 8. VOC content
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 Degrees F . Store all flammable materials not in use in Underwriter's Laboratories, Inc., NFPA or other approved flammable storage cabinet. Reference OSHA 29 CFR 1926 if storage of combustible or flammable liquids exceeds 25 gallons . Maintain containers and cabinets used for storage in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.6 PROJECT CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 Degrees F and 90 Degrees F.
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F and 95 degrees F.
- C. Do not apply paint in snow, rain, fog, or mist, when the relative humidity exceeds 85 percent, at temperatures less than 5 degrees F above the dew point, or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature and humidity limits specified by the manufacturer during application and drying periods.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
 - 1. Dunn Edwards Company (DE)
 - 2. Benjamin Moore and Co. (BM)
 - 3. Sherwin-Williams Company (S-W)
 - 4. Visions Recycling, Inc. (VRI)
 - 5. Kwal Paint (KW)

2.2 DESCRIPTION

- A. Regulatory Requirements
 - 1. Materials: Minimum Class B per NFPA 101 (Flame Spread 26-75, Smoke Developed 0-450).
- B. Sustainability Characteristics
 - 1. Reprocessed Latex Paint.
 - a. White, off-white, pastel colors: 20% post consumer content.
 - b. Grey, Brown, Earth tones and other dark colors: 50-90% recovered material, including 50-99% post consumer content.
 - 2. Consolidated Latex Paint: 100% post consumer content.

2.3 MATERIALS

- A. The following compounds shall not be used in paints or primers on any projects:
 - 1. Prohibited organic compounds
 - a. Methylene chloride
 - b. 1,1,1-Trichloroethane
 - c. Benzene
 - d. Toluene (methylbenzene)
 - e. Ethylbenzene
 - f. Di-n-octyl phthalate
 - g. Diethyl phthalate
 - h. Dimethyl phthalate
 - i. Isophorone
 - j. Formaldehyde

- | | | | |
|----|-----------------------------|----|------------------------|
| f. | Vinyl chloride | q. | Methyl ethyl ketone |
| g. | Naphthalene | r. | Methyl isobutyl ketone |
| h. | 1,2-Dichlorobenzene | s. | Acrolein |
| i. | Di (2-ethylhexyl) phthalate | t. | Acrylonitrile |
| j. | Butyl benzyl phthalate | u. | Alkylphenol Ethoxylate |
| k. | Di-n-butyl phthalate | | |

2. Prohibited metals (including their oxides)

- | | | | |
|----|---------------------|----|---------|
| a. | Antimony | d. | Lead |
| b. | Cadmium | e. | Mercury |
| c. | Hexavalent chromium | | |

B. Masonry Block Filler

1. High-Performance Latex Block Filler: Heavy-duty latex block fillers used for filling open, textured interior and exterior concrete masonry block before application of top coats.
2. Use block filler under high-performance polyamide epoxy coatings.

C. Primers/Sealers

1. Interior Latex Enamel: To be used as under-coat for smooth cementitious surfaces and bare wood. VOC content to comply with GS-11, or not exceed 150 grams per liter (g/L)
2. Interior Latex-Based White Primer: Latex-based primer coating to be used on interior gypsum drywall under a flat latex paint or a semi-gloss latex enamel.
3. Exterior Primer Coating: Exterior alkyd wood primer used for priming wood under alkyd enamels.
4. Rust-Inhibiting Primer: Quick-drying, rust-inhibiting primer used for priming ferrous metal on the exterior under high-gloss enamel and on the interior under enamel.
5. Galvanized Metal Primer: Primer used to prime interior and exterior zinc-coated (galvanized) metal surfaces.
6. Pigmented Sealer: Pigmented sealers over concrete used under high performance polyamide epoxy coatings.

D. Exterior Finish Paint Material

1. Exterior Acrylic: Quick-drying, flat, acrylic paint used on the exterior over concrete, stucco, and masonry (including concrete masonry block). VOC content to comply with GS-11, or not exceed 100 g/L.
2. Alkyd Enamel: Weather-resistant, air-drying, semi-gloss enamel used on the exterior over prime-coated wood, and over primed ferrous metal surfaces. VOC content to comply with GS-11, or not exceed 200 g/L.

E. Interior Finish Paint Material

1. Interior Semi-Gloss Latex Enamel: Semi-gloss, latex enamel used over a primer on concrete, masonry (including concrete masonry block), wood

and hardboard, ferrous and zinc-coated (galvanized) metal surfaces, and over a primer on gypsum drywall. VOC content to comply with GS-11, or not exceed 150 g/L.

2. Latex-Based, Interior Flat Paint: Ready-mixed, latex-based paint used as a "size" on cotton or canvas covering over insulation. VOC content shall comply with GS-11, or not exceed 50 g/L.
3. High-Performance Polyamide Epoxy Coating: High-gloss coating used over concrete and concrete masonry. VOC content shall comply with GS-11, or not exceed 200 g/L.

F. Miscellaneous Wood Finishing Materials

1. Solvent Thinned Interior Wood Stain: Slow-penetrating solvent thinned wood stain for general use on interior wood surfaces under clear finishes.
2. Sanding Sealer: Manufacturer's recommended sanding sealer, compatible with catalyzed polyurethane finish coat. Sand Paper: 220 grit.
3. VOC content for stains and sealers to comply with GS-47.
 - a. Stains: 250 g/L
 - b. Sealers: 200 g/L

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions under which painting will be performed for compliance with requirements for application of paint. Do not begin paint application until unsatisfactory conditions have been corrected. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.

3.2 PREPARATION

- A. General Procedures: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items in places that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items if necessary for complete painting of the items and adjacent surfaces. Clean surfaces before applying paint or surface treatments. Remove oil and grease prior to cleaning. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly-painted surfaces. Following completion of painting operations in each space or area, items shall be reinstalled in the same manner that they were removed.
- B. Surface Preparation: Clean and prepare surfaces to be painted in accordance with the manufacturer's instructions for each particular substrate condition and as specified. Provide barrier coats over incompatible primers or remove and reprime. Notify STR in writing when problems are anticipated in using the specified finish-coat material with substrates primed by others.
- C. Cementitious Materials: Prepare concrete, concrete masonry block, and stucco to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release

agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

1. Use abrasive blast-cleaning methods if recommended by the paint manufacturer.
 2. Determine alkalinity and moisture content of surfaces by performing appropriate tests. Pay special attention to concrete masonry unit mortar joints and patched concrete surfaces. If surfaces are sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application. Do not paint surfaces where moisture content of surface to be painted exceeds that permitted in manufacturer's printed directions.
 3. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, and rinse; allow to dry and vacuum before painting.
- D. Wood Materials: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper. Sand smooth surfaces exposed to view and dust off.
1. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer before application of primer.
 2. Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
 3. When transparent finish is required, back prime with spar varnish.
 4. Back prime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.
 5. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately upon delivery to jobsite.
- E. Ferrous Metals: Clean non-galvanized ferrous-metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council.
1. Treat bare and sand-blasted or pickled clean metal with a metal treatment wash coat before priming.
 2. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by the paint manufacturer, and touch up with the same primer as the shop coat.
- F. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

- G. Gypsum Board: Surfaces shall be dry and shall have all loose dirt and dust removed by brushing with a soft brush, rubbing with a dry cloth, or vacuum-cleaning prior to application of first-coat material. Repair blemishes, irregularities and damaged surfaces.
- H. Material Preparation: Carefully mix and prepare paint materials in accordance with the manufacturer's directions.
 - 1. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.
 - 2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
 - 3. Use only thinners approved by the paint manufacturer, and only within recommended limits. Use odorless thinner with alkyd enamel.

3.3 APPLICATION

A. General

- 1. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied. Spray applications will require prior approval from the STR.
- 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
- 3. Surface treatments and finishes shall be as indicated in Sections 3.6, 3.7, and 3.8 or as approved by STR.
- 4. Provide finish coats that are compatible with primers used.
- 5. The number of coats and film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce an even, smooth surface in accordance with the manufacturer's directions.
- 6. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
- 7. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas as required to maintain the system integrity and provide desired protection.
- 8. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
- 9. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.

10. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 11. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.
 12. Sand lightly between each succeeding enamel or varnish coat.
 13. Omit primer on metal surfaces that have been shop-primed and touch up painted.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration. Allow time between successive coats to permit proper drying per manufacturer's recommendations.
- C. Minimum Coating Thickness: Apply materials at not less than the manufacturer's recommended spreading rate. Provide a total dry film thickness of the entire system as recommended by the manufacturer or as specified, whichever is greater.
- D. Mixing and Thinning: Unless otherwise recommended by the manufacturer, paints may be thinned immediately prior to application with an approved manufacturer's thinner and used only within recommended limits when necessary to suit conditions of surface temperature, weather and application methods. The use of thinner shall not relieve the Construction Subcontractor from obtaining complete hiding, full film thickness, or required gloss. Paints of different manufacturers shall not be mixed.
- E. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled. Apply at a dry film thickness of not less than that recommended by the manufacturer.
- F. Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the manufacturer to material that is required to be painted or finished and has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
- G. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections are not acceptable.
- H. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections. Provide satin finish for final coats.
- I. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

3.4 CLEANING

- A. Cleanup: At the end of each work day, completely remove empty cans, rags, tools, rubbish, and other discarded paint materials from the project site.

- B. Do not clean tools, brushes, applicators, and equipment at the project site unless specifically authorized by the STR. Do not use sinks in restrooms, janitors' closets, or in locations where food is prepared.
- C. Upon completion of painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping, using care not to scratch or damage adjacent finished surfaces.

3.5 PROTECTION

- A. Protect work of other trades, whether to be painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to the STR.
- B. Provide "wet paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINT SCHEDULE

- A. Provide the following paint systems for the various substrates indicated. No primer or block filler is required on previously painted surfaces, unless specified in Contract documents or where alkaline, moisture or freeze-thaw cycles have caused blistering or peeling.
- B. Concrete, Stucco, and Masonry (other than concrete masonry units):
 - 1. Lusterless (Flat) Acrylic Finish: Two (2) coats with total dry film thickness per manufacturer's recommendations.
 - a. First Coat: Exterior Acrylic
 - b. Second Coat: Exterior Acrylic

3.7 INTERIOR PAINT SCHEDULE

- A. General: Provide the following paint systems for the various substrates, as indicated. No primer or block filler is required on previously painted surfaces.
- B. Concrete and Masonry (other than concrete masonry units):
 - 1. Semi-Gloss Enamel Finish: Three (3) coats with total dry film thickness per manufacturer's recommendations.
 - a. Primer: Interior Latex Enamel
 - b. Undercoat: Interior Semi-Gloss Latex Enamel
 - c. Finish Coat: Interior Semi-Gloss Latex Enamel
 - 2. Polyamide Epoxy Coating: Two (2) coats of polyamide epoxy coating over pigmented sealer.
 - a. Sealer Coat: Manufacturer's recommended pigmented sealer
 - b. Intermediate Coat: Polyamide Epoxy
 - c. Finish Coat: Polyamide Epoxy
- C. Gypsum Drywall Systems

1. Semi-Gloss Latex Enamel Finish: Three (3) coats (drywall decoration primer excluded) with total dry film thickness per manufacturer's recommendations.

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|----|--------------------|-----------------------------------|
| a. | Primer: | Interior Latex-Based White Primer |
| b. | Intermediate Coat: | Interior Semi-Gloss Latex Enamel |
| c. | Finish Coat: | Interior Semi-Gloss Latex Enamel |

D. Woodwork and Hardboard

1. Semi-Gloss Enamel Finish: Three (3) coats.

- | | | |
|----|--------------------|----------------------------------|
| a. | Primer: | Interior Latex Enamel |
| b. | Intermediate Coat: | Interior Semi-Gloss Latex Enamel |
| c. | Finish Coat: | Interior Semi-Gloss Latex Enamel |

3.8 FIRE PROTECTION PAINTING

- A. Paint those portions of fire protection systems as required by LANL as follows, except as required in Section 1.1.D:

B. Color Coding of Outdoor Water-Based Fire Protection System

1. Hydrants: All fire hydrants shall be painted "Traffic Yellow"
2. Post Indicator Valves: Sprinkler controlled post indicator valves shall be painted "Fire Protection Red." Water distribution system division post indicator valves shall be painted "Traffic Yellow."
3. Water Motor Alarms: All water motor alarms, gongs and sprinkler system drains through walls shall be painted "Fire Protection Red."
4. Sprinkler Piping: All sprinkler piping which is exposed to exterior surface corrosion shall be painted "Fire Protection Red." Reference OSHA 29 CFR 1910 159(C).6.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 09 9100, Rev. 3, dated December 9, 2009.

SECTION 09 9600
SPECIAL COATINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Surface preparation and application of Industrial Coatings (IC) as indicated on the drawings.

1.2 RELATED SECTIONS

- A. Section 01 4000, "Quality Requirements."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 DESIGN AND PERFORMANCE CRITERIA

- A. Provide nuclear decontaminable coating systems for low-level waste treatment and storage areas including application on wall, floor, and ceiling surfaces within the radiological laboratory areas as indicated as Industrial Coating (IC) on the drawing, Room Finish Schedule.
- B. Provide Industrial coating systems with physical characteristics to ensure volatile organic compound (VOC) limit compliance.

1.5 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Shop Drawings: Provide shop drawings illustrating location and extent of all Industrial coating systems.
- B. Schedule: Provide paint schedule identifying:
 - 1. Surface preparation requirements
 - 2. Number and thickness of coats (primer, 1st coat, 2nd coat, topcoat) for each coating type
 - 3. Exposure condition (floor, wall, or ceiling application).
 - 4. Appropriate application methods for each condition.
- C. Certifications: Submit testing agency certification that coating products meet nuclear decontaminability requirements.
- D. Catalog Data: Submit catalog data including VOC content and material safety data sheets (MSDS) on all finishing products, including name of proposed paint manufacturer for approval;
- E. Color samples for selection of colors by LANL.
- F. Installation Instructions: Submit manufacturer's instructions.

1.6 QUALITY ASSURANCE

- A. Work identified in this section shall be done under a Quality Assurance Program (QAP) in accordance with Section 01 4000, "Quality Requirements."
- B. Industrial coatings selected for application on laboratory wall, floor, and ceiling surfaces shall meet the following requirements:
 - 1. Minimum Class B per NFPA 101.
 - 2. DOE-STD-1066 flame spread limits for interior finishes
 - a. Exposed interior wall or ceilings (including ceilings formed by the underside of roofs), and any factory-installed facing material, shall have a UL-listed/FM-approved flame spread rating of 25 or less and a smoke developed rating of 50 or less, per ASTM E-84."
 - 3. Radiation resistant as determined by ASTM D 4082
 - 4. Decontaminable to at least 95 percent of total activity removed and certified for Nuclear Coating Service Level II

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the Site in sealed and labeled containers; inspect to verify acceptance.
- B. Container labeling shall include manufacturer's name, type of paint, brand name, brand code, VOC content, coverage, surface preparation, drying time, clean-up, color designation, and instructions for mixing and reducing.
- C. Store paint materials at minimum ambient temperature of 45 °F and a maximum of 90 °F, in a well ventilated area, unless required otherwise by manufacturer's instructions.
- D. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45 °F for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent, unless required otherwise by manufacturer's instructions.
- C. Do not apply latex paints when temperatures are below 45 °F for interiors and 50 °F for exterior, unless required otherwise by manufacturer's instructions.

1.9 EXTRA STOCK

- A. Provide one extra gallon of each type, color, and surface texture to LANL.
- B. Label each container with color, texture, room locations, in addition to the manufacturer's label.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Select coatings that are radiation resistant as determined by ASTM D 4082 and decontaminable to at least 95 percent of total activity removed and certified for Nuclear Coating Service Level II.
- B. Select coatings that do not contain mercury, lead, hexavalent chromium, and cadmium.
- C. The industrial coating system, including sealers, patch compound, primer, and finish shall be the product of one manufacturer and as recommended by the manufacturer for compatibility.
- D. Select coatings that are compatible with exposure to strong acids (HCl, HNO₃) and strong bases (NaOH) as well as salt solutions (FeCl₃, MgCl₂, NaCl, NaNO₃) ranging from pH 2 to as high as pH 11.

2.2 ACCEPTABLE MANUFACTURERS

- A. Tnemec, 6800 Corporate Drive, Kansas City, Missouri 64120-1372.
- B. PPG Protective and Marine Coatings: One PPG Place, Pittsburgh, Pennsylvania 15272.

2.3 COATINGS AND ASSOCIATED MATERIALS

- A. Wall Coatings:
 - 1. Tnemec Series 113 H.B. Tnemec-Tufcoat
- B. Floor Coatings
 - 1. PPG PSX 700
- C. Primers and Preparation
 - 1. Walls:
 - a. Tnemec Series 151-1051 Elasto-Grip FC
 - b. Tnemec Series 113 H.B. Tnemec-Tufcoat
 - 2. Floors:
 - a. PPG Amerloc 400
 - b. PPG Amerlock Sealer.
 - c. PPG Nu-Clad 114A
 - d. aluminum oxide grit.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions under which coating will be applied for suitability to receive Industrial coatings before proceeding with coating application.

3.2 GENERAL REQUIREMENTS

- A. Comply with manufacturer's recommendations and instructions pertaining to the mixing, storing, applying, and using of products.

- B. Precautions shall be employed when cleaning surfaces and applying coatings to protect adjacent surfaces from over-spray, drips, and blast particulate from hitting or entering other building material, components, and equipment. Coating which is applied, over-sprayed, dropped, or otherwise permitted to get on any object or surface other than to which it is being applied, shall be removed at once, and the surfaces on which it was present shall be cleaned, as necessary, to remove all traces of soiling. All cleaning residues shall be containerized in accordance with 40 CFR Part 262.11 and managed as waste in accordance with 20.4.1 NMAC et sec. or 20.9.1 NMAC et sec. as applicable.
- C. Safety precautions shall be observed at the time of coating application. Applications and mixing of paint materials made in open air, and where ventilation is not limited, shall have sufficient precautions to prohibit smoking, sparks, and open flames within a radius of 50 ft. During the application of coatings, necessary precautions shall include proper ventilation, special fire precautions, measurements for control of solvent vapor concentrations, in accordance with 29 CFR 1926.55 and 29 CFR 1910.1000. Applicators, if required to use respiratory protection equipment, shall be trained according to the provisions of 29 CFR 1926.103 and 29 CFR 1910.134.
- D. Fumes shall not be allowed to build up. Areas where coating works are to be completed shall be ventilated to remove fumes. Concentration of combustible fumes shall be maintained below 10 percent of the Lower Explosive Limit.

3.3 SURFACE PREPARATION

- A. Perform surface preparation in accordance with coating manufacturer's product data sheets for each surface condition. The wall and ceiling surfaces shall be generally smooth and ready to receive industrial coating system. The use of stippled surfaces is undesirable.
- B. Joints should be sealed or filled with silicone type materials to facilitate cleaning (or removal in the event that decontamination cannot be achieved). Service penetrations in walls and ceilings should be sealed and coved.

3.4 PAINT APPLICATION

- A. Perform coating application in strict accordance with the recommended application instructions of the coating manufacturer. Apply successive coats to wet film thickness recommended by the paint manufacturer to achieve the specified dry film thickness indicated on the manufacturer's published product data sheets.
- B. Wall Coatings:
 - 1. Primer: Tnemic Series 151-1051 Elasto-Grip FC at 0.7 to 1.5 dry mill thickness (D.M.T.)
 - 2. Intermediate coat: Tnemic Series 113 H.B. Tnemi-Tufcoat at 4.0 to 6.0 D.M.T.
 - 3. Top coat Tnemic Series 113 H.B. Tnemi-Tufcoat at 4.0 to 6.0 D.M.T.
 - 4. At base of wall (floor to 12" up wall) apply
 - a. Primer: PPG Amerloc 400 per below
 - b. PSX 700 per below.

C. Floor Coatings:

1. Prep-coat PPG Amerlock Sealer at 1.0 to 2.0 D.M.T.
2. Prep-coat PPG Nu-Clad 114A to holes and cracks up to ¼ inch and other surface discontinuities
3. Primer: PPG Amerloc 400 at 6.0 to 8.0 D.M.T.
4. Broadcast aluminum oxide grit into primer while wet per manufacturer's instructions.
5. Top coat: PSX 700 at 5.0 to 8.0 wet mil thickness to obtain final coating of 10 to 15 D.M.T.

3.5 FIELD QUALITY CONTROL

- A. Surfaces that are to receive coatings shall be inspected and tested in a manner to physically measure the wet or dry film thickness. Nondestructive methods of testing are preferred; however, if destructive methods are employed, the test site shall be touched up to repair the finished surface to its original finished condition after the destructive test is completed. Film thickness (either wet or dry) shall average no more or less than 20 percent of the specified thickness.
- B. Each coat of paint shall be inspected and tested by a qualified inspector/testing professional with periodic witnessing by the LANL Contract Administrator before application of succeeding coat. Maintain testing records at jobsite for inspection by LANL Contract Administrator.
- C. Test coating thickness with an approved type of low voltage dry mil gauge apparatus to measure the dry film thickness.

3.6 CLEANING

- A. During the progress of the Work, remove from the Site all discarded paint materials, rubbish, cans, and rags at the end of each work day and clean all coating equipment, brushes, sprayers, and related materials, as recommended by the manufacturer.
- B. Collect cotton waste, cloths, and materials that may constitute a fire hazard, place in closed metal containers, remove daily from the Site, and characterized in accordance with 40 CFR Part 262.11 and managed as waste in accordance with 20.4.1 NMAC et sec. or 20.9.1 NMAC et sec. as applicable.

END OF SECTION

SECTION 10 1405
EXTERIOR SIGNAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Exterior signs of the following types:
 - 1. On building identification – plaques.
 - 2. Regulatory – safety and security.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Product Data: Submit product data for specified products, Include material details for each sign specified. Include printed illustrative literature
- B. Shop Drawings: Showing layout, profiles, and product components, including dimensions, anchorage, and accessories.
- C. Samples: Submit color samples for verification purposes.
- D. Closeout Submittals: Submit operation and maintenance data for installed products, including precautions against harmful cleaning materials and methods and warranty documents.

1.5 QUALITY ASSURANCE

- A. Supplier: Obtain all products from a single supplier.
- B. Regulatory Requirements: Products shall meet requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAG).
- C. Installer: Installation shall be performed by installer specialized and experienced in work similar to that required for this project.
- D. Closeout Submittals: Submit operation and maintenance data for installed products, including precautions against harmful cleaning materials and methods and warranty documents.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ordering instructions and lead-time requirements to avoid construction delays.
- B. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Store products protected from weather, temperature, and other harmful conditions as recommended by supplier.

- D. Handle products in accordance with manufacturer's instructions.

1.7 WARRANTY

- A. Product Warranty: Provide manufacturer's standard material and workmanship warranty and installation workmanship warranty of minimum 1 year.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Letter style: Frutiger 75 Black.
- B. Graphics to be Vinyl Die Cut and Paint.
- C. Text to be:
 - 1. black premium 3M vinyl – reflective
- D. LANL Logo to be painted to match PMS 8240 metallic.

2.2 SIGN MATERIALS AND COMPONENTS

- A. Materials and Components:
 - 1. Aluminum Panels: Meeting ASTM B209, alloy EN 5052 H12, minimum 0.125" thick.
 - 2. Accessories: Provide end caps, couplings, coupling fittings, mounting fittings, interchangeable fittings, and other hardware and accessories for a complete installation.
- B. Finish: Standard two-phase, high temperature cured polyester color coating as follows:
 - 1. Primer: 2 mil thick layer for optimum surface coat adhesion and weather ability.
 - 2. Top Coat: two components, water-based, non-toxic, zero emissions, high temperature cured polyester coating, 2-3 mil thickness.
 - 3. Colors:
 - a. Matthews Acrylic Polyurethane (MAP) Satin Gloss to match PMS #3025U Blue.
 - b. MAP Satin Gloss 30136 Brushed Aluminum.
 - c. MAP Satin Gloss 30132 Black.
 - d. MAP Satin Gloss 23966 Red.
 - e. MAP Satin Gloss 10210 Yellow.

2.3 FABRICATION

- A. General: Comply with requirements indicated on the drawings for materials, thickness, finish, color, design, shapes, sizes, and details of construction.
- B. Design, fabricate, and install sign assemblies to prevent buckling, opening of joints and over-stressing of welds and fasteners.
- C. Mill joints to a tight, hairline fit. Form joints exposed to weather to exclude water penetration.

- D. Pre-assemble signs in the shop to the greatest extent possible to minimize field assembly. Disassemble signs only as necessary for shipping and installation.
- E. Conceal fasteners if possible; otherwise, locate fasteners to appear inconspicuous.
- F. Coordinate dimensions and attachment methods to produce message panels with closely fitting joints. Align edges and surfaces with one another in the relationship indicated.
- G. Increase material thickness or reinforce with concealed stiffeners of backing materials as required to produce surfaces without distortion, buckles, warp, or other surface deformations.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions for type of installation methodology and proper engineering.
- B. Coordinate and schedule installation with other site work activities.
- C. Verify that substrate and conditions are ready for product installation.

3.2 INSTALLATION

- A. Install product in accordance with fabricator's instructions, engineering specifications, and drawings.
- B. Install product in locations indicated on the drawings using mounting methods recommended by sign manufacturer, free from distortion, warp, or defect adversely affecting appearance, functionality or warranty.
- C. Install product level, plumb, and at height indicated.

3.3 CLEANING

- A. Repair scratches or other damage having occurred during installation.
- B. Replace components where repairs were made but are still visible to the unaided eye from a distance of 10 feet.
- C. Clean installed product using manufacturer recommended products and in accordance with Subcontract provisions.
- D. Remove temporary coverings and protection to adjacent work surfaces/areas.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification Section 10 1405, Rev. 2, dated January 13, 2010.

SECTION 10 1410
INTERIOR SIGNAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Interior signs for room identification, directional/way finding, stairwell, restroom, and other pictograph signs.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. International Code Council, Inc.:
 - 1. *International Building Code* (Section 3107).
- C. U.S. Architectural and Transportation Barriers Compliance Board (Access Board):
 - 1. *Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities* (ADAAG) (1998) (Section 4.30, "Signage").

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Submit shop drawings and sign schedule(s) listing sign type, location, size, and letterform and letter heights.
- B. Submit one sample sign of type and style, including method of attachment.
- C. Submit supplier's standard color samples for purposes of color selection of ADA appliqué. Color samples can be actual materials used in signage or color charts.
- D. Submit copy of manufacturer's product warranty.

1.5 CLOSEOUT DOCUMENTATION

- A. Provide copy of manufacturer's recommended maintenance methods.
- B. Provide manufacturer's warranty documentation.
- C. Provide template file to end-user as described in Paragraph 2.2A.2 below.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Vista System-MCFT as distributed by Century Sign Builders, 2117 Commercial NE, Albuquerque, New Mexico 87102 (1-800-279-2904).
- B. No substitutions accepted.

2.2 MATERIALS

- A. Provide Interior Signs constructed with changeable message inserts and curved aluminum frame with the following characteristics:
1. Insert.
 - a. Provide tactile lettering and symbols formed using rotary engraving method and bonded to sign plaque using 3M Scotch 467HP adhesive. Lettering and symbols to have 1/32 inch return cut to 22 degree angle. Letters, and symbols to be constructed with materials having embedded coloration that is the final approved color for the signs. Products with painted or otherwise applied coloration method are not acceptable.
 - b. Provide Text accompanied by Grade 2 Braille on signs requiring Braille.
 - c. Provide all letters, numbers and/or symbols with a 70% contrast to the plaque color of the sign as required by ADA regulations.
 - d. Provide sign plaques, lettering, and symbols with a matte finish.
 - e. Provide Insert Base constructed using 0.0625" single-ply non-glare acrylic multipolymer material.
 2. Changeable Insert
 - a. Fabricate changeable message insert from commonly available transparency media that is compatible with inkjet or laser printers.
 - b. Provide manufacturer's template file to end-user / client allowing for new inserts to be created. Template file to integrate with LANL's already existing software environment and must not require the implementation of new or proprietary software.
 3. Opaque Insert
 - a. Opaque graphic insert to be created using any approved printing process on silver paper with 80% screened LANL "atom" logo.
 4. Curved Aluminum Sign Frame
 - a. Provide curved aluminum sign frame with interchangeable faceplates constructed to remain flat under installed conditions and within tolerance of plus or minus .015" when measured diagonally.
 - b. Construct aluminum frame from curved aluminum extrusions and contoured frame edge profiles with two (2) interlocking screw mounted ABS plastic end caps.
 - c. Provide aluminum frame capable of containing both the opaque insert and changeable identification insert behind the outer clear ADA insert.
 - d. Provide suction cup tool for changing inserts in the aluminum frame.
 - e. Provide black ABS plastic end caps.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Mount signs using double vinyl foam tape (1/16" thickness) and silicon adhesive (when necessary) when mounting to wall. If conditions warrant, use anti-corrosive screws into substantial substrate.
- B. Mount ADA wall signs in accordance with the ADAAG.
- C. If condition in Paragraph 3.1B cannot be met, obtain approval from STR to install in alternate location.

3.2 CLEANING AND MAINTENANCE

- A. Repair scratches or other minor damage, which might have occurred during installation.
- B. Clean installed product using manufacturer recommended products.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification Section 10 1410, Rev. 2, dated January 13, 2010.

SECTION 10 2113.13
METAL TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Furnishing and installation of metal toilet compartments.
- B. Furnishing and installation of urinal screen(s).

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. ASTM International:
 - 1. ASTM A 167-99, *Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications*.
- C. Federal Supply Service:
 - 1. FS A-A-60003, *Partitions, Toilet, Complete*.
- D. U.S. Architectural and Transportation Barriers Compliance Board (Access Board):
 - 1. *Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities* (ADAAG) (1998).
- E. U.S. Environmental Protection Agency:
 - 1. *Comprehensive Procurement Guideline (CPG) Program* (<http://www.epa.gov/cpg>).

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Submit product data for approval for materials, fabrications and installation.
- B. Submit shop drawings for approval for fabrications and erection of partition assemblies not fully described by product data.
- C. Submit standard color charts for approval.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store material in the manufacturer's shipping packages.
- B. Protect material from damage.
- C. Handle material carefully to prevent damage. Unpack and install in a manner to protect the panel finish from damage.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Comply with Section 01 2500, "Substitution Procedures."

2.2 GENERAL

- A. Toilet compartments are to be overhead braced type and include dividing panels, doors, fronts, headrail, and hardware.
- B. Handicapped toilet compartments are to comply with ADA requirements.

2.3 MANUFACTURERS

- A. Manufacturers offering products that comply with the requirements for metal toilet compartments include:
 - 1. All American Metal Corporation.
 - 2. Global Steel Products Corporation, Embassy.
 - 3. General Partitions Mfg. Corporation.
 - 4. Sanymetal Products Company, Inc.

2.4 MATERIALS

- A. Use sheet steel conforming to ASTM A 526 with G90 zinc coating.
- B. Provide attachments, screws and bolts made from stainless steel, tamper proof type; heavy duty extruded aluminum brackets.
- C. Provide hardware with chrome plated non-ferrous cast pivot hinges, gravity type, adjustable for door close positioning; nylon bearings; thumb turn door latch; door strike and keeper with rubber bumper; cast alloy chrome plated coat hook and bumper.
- D. Minimum recovered (recycled) material content 25-30 percent steel from Basic Oxygen Furnace (BOF) process or 100 percent from Electric Arc Furnace (EAF) process in accordance with EPA's CPG Program.

2.5 FABRICATION

- A. Fabricate partitions in accordance with FS A-A-60003.
- B. Fabricate components of steel sheet as follows:
 - 1. Pilasters and Fronts, 20 gauge.
 - 2. Panels and Screens, 20 gauge.
 - 3. Doors, 22 gauge.
 - 4. Concealed Reinforcement for Anchorages, 12 gauge.
 - 5. Concealed Reinforcement for Tapping, 14 gauge.
- C. Core Material: Standard sound-deadening honeycomb impregnated kraft paper, in thickness to provide finished dimensions of 1 inch for doors, panels, and urinal screens, and 1 1/4 inch for pilasters and fronts.
- D. Provide pilaster shoes conforming to ASTM A 167 Type 304 stainless steel not less than 3 inches high, 20 gauge, finish to match the hardware.
- E. Stirrup Brackets: Standard design for attaching panels to walls and pilasters of anodized aluminum to match the hardware finish.
- F. Provide internal reinforcement in areas of attached hardware and fittings.

- G. Hardware and Accessories: Standard design, heavy-duty operating hardware and accessories of nonferrous cast alloy with chrome-plated finish for coat hook/bumper, hinges and locking hardware.
- H. Anchorages and Fasteners: Standard exposed fasteners of stainless steel or brass finished to match hardware. Use theft-resistant (one-way) type heads and nuts for exposed anchorages. Concealed anchors will be hot-dip galvanized cadmium plated or other rust-resistant material.
- I. Overhead Bracing: Continuous anodized aluminum tubing, anti-grip.

2.6 FACTORY FINISHING

- A. Clean, degrease and neutralize panels.
- B. Follow with a phosphatizing treatment prime coat and two finish coats of baked enamel of color selected.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that site conditions are ready to receive work of this section, and opening dimensions are as indicated on shop drawings.
- B. Verify correct spacing of toilet fixtures.
- C. Verify correct location of built-in framing, anchorages and bracing, where required.
- D. If existing conditions will adversely affect acceptable results, do not begin installation and notify the LANL Subcontract Technical Representative (STR).

3.2 INSTALLATION

- A. Install partitions secure, plumb and level, in accordance with approved shop drawings.
- B. Maintain 1 inch space between wall and panels, and 3/8 to 1/2 inch between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets with through sleeve theft-proof bolts and nuts.
- E. Anchor urinal screen panel to wall with two panel brackets and vertical upright consisting of 12 inch wide pilaster stock and socket anchored to floor.
- F. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster. Conceal floor fasteners with pilaster shoes.
- G. Equip doors with 2 hinges, 1 door latch, and 1 coat hook and bumper.
- H. Install door strike and keeper with door bumper on pilaster in alignment with door latch.
- I. Adjust hinges to locate door in full closed position when latched.

3.3 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

3.4 CLEANING

- A. Remove protective maskings, clean surfaces.
- B. Replace damaged or scratched materials with new materials.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 10 2113.13, Rev. 1, dated May 16, 2008.

SECTION 10 2800
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Toilet accessories and their associated fasteners and hardware.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.2 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 QUALITY ASSURANCE

- A. Furnish inserts and anchoring devices which must be set in concrete or built into masonry. Coordinate delivery with other Work to avoid delay.
- B. Coordinate accessory locations with other Work to avoid interference and to ensure proper operation and servicing of accessory units.
- C. Provide all accessories manufactured by the same company, except for soap dispenser, which must accommodate "Sani-Fresh" soap cartridges.

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Catalog data.
- B. Manufacturer's installation instructions.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."

2.2 MATERIALS, GENERAL

- A. Use stainless steel complying with ANSI Type 302/304, with polished No. 4 finish, 22 gauge (0.34 inch) minimum, unless otherwise indicated.
- B. Use leaded and unleaded brass, flat products, complying with FS QQ-B-613; rods, shapes, forgings and flat products with finished edges, FS QQ-B-62.
- C. Use commercial quality, cold rolled, sheet steel complying with ASTM A 366, 20 gauge (0.040 inch) minimum, unless otherwise indicated. Provide surface preparation and metal pretreatment as required for applied finish.
- D. Use galvanized steel sheet complying with ASTM A 527, G60.

- E. Use base metal with nickel and chromium electrodeposited in compliance with ASTM B 456, Type SC2.
- F. Use galvanized steel mounting devices complying with ASTM A 153, hot dip galvanized after fabrication.
- G. Use screws, bolts, and other devices of same materials as accessory unit or of galvanized steel where concealed.
- H. Use 1/4 inch thick, Type I, Class 1, Quality q2, mirror glass conforming to FS DD-G-451, with silvering, copper coating, and protective organic coating complying with FSS DD-M-411.

2.3 MANUFACTURERS

- A. Bradley Corporation.
- B. Bobrick Washroom Equipment Co.
- C. AJ Washroom Accessories.
- D. American Specialties Inc. (ASII).

2.4 COMBINATION TOWEL DISPENSER/WASTE RECEPTACLE UNIT

- A. Semi-recessed unit with extended waste receptacle. Provide stainless steel unit made for 4 inch over-all depth, with continuous 1 inch wall flange. Provide towel dispenser in top of unit, designed for standard core 8 inch or 9 inch wide, 800 feet long. Provide waste receptacle in bottom of unit. Bobrick Model B-3966, Bradley Model 227-10. Symbol G1.

2.5 SANITARY NAPKIN DISPENSER

- A. Provide surface mounted, stainless steel unit that dispenses both napkins and tampons, coin free. Provide dispensing identification of "Napkins" and "Tampons". Bobrick Model B-254, Bradley Model 426. Symbol G2.

2.6 SANITARY NAPKIN RECEPTACLE

- A. Provide surface mounted, stainless steel unit with self-closing door. Bobrick Model B-254, Bradley Model 4722-15. Symbol W4.

2.7 TOILET SEAT COVER DISPENSER

- A. Provide surface mounted, stainless steel unit with hinged access door for refilling. Bobrick Model B-221, Bradley Model 583. Symbol W5.

2.8 GRAB BARS

- A. Provide 1 1/4 inch OD, stainless steel grab bars with mounting flanges with concealed fasteners. Provide 1 1/2 inch clearance from bar to wall. Provide textured gripping surface. Bobrick Model B-550 Series, Bradley Model 893 Series. Symbol W2, W3, S2.

2.9 SOAP DISPENSER

- A. Provide stainless steel, lavatory mounted liquid soap dispenser unit. ASI Model 0332. Symbol L2.

2.10 TOILET PAPER DISPENSER

- A. Provide stainless steel, surface mounted dispenser for two rolls, with shelf. Bobrick Model B-2840, Bradley Model 5263. Symbol W1.

2.11 MIRROR

- A. Provide stainless steel framed mirror with 1/4 inch plate glass mirror. Bobrick Model B-290 Series, Bradley Model 700 Series. Symbol L1.

2.12 SHOWER ROD

- A. Provide stainless steel shower rod fabricated of 18 gage (18-8) 1" diameter tubing with 20 gage stainless steel flanges. Bradley Model 953, Bobrick 6107. Symbol S1.

2.13 SHOWER CURTAIN

- A. Provide 8 gage vinyl curtain with chrome plated nickel plated grommets at 6" O/C. 12" wider than opening x 72" long. Provide Bradley Model 9533, Bobrick 204-2. Symbol S1.

2.14 SHOWER CURTAIN HOOKS

- A. Provide shower curtain hooks fabricated of 304 stainless steel. Bradley Model 5936, Bobrick 204-1. Symbol S1.

2.15 MOP AND BROOM HOLDER

- A. Provide stainless steel, wall mounted combination mop and broom holder. Bobrick Model B-223x24, Bradley Model 9953. Symbol G3.

2.16 FABRICATION

- A. Only an unobtrusive stamped logo of the manufacturer is permitted on exposed faces of the units. In an unexposed location, place the manufacturer's name and product model number.
- B. Fabricate units with welded and ground joints and edges rolled. Hang doors with continuous stainless steel piano hinges. Provide for concealed anchorage wherever possible.
- C. Mirror fabrication:
 - 1. Fabricate frames to accommodate wood, felt, plastic, or other glass edge protection material.
 - 2. Provide galvanized steel backing sheet, no less than 22 gauge and full mirror size, with non-absorptive filler material. Corrugated cardboard is not an acceptable filler material.
 - 3. Provide hanger system for tamperproof installation, using galvanized steel wall brackets with concealed locking devices requiring a special tool to remove.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install accessories in accordance with approved manufacturer's installation instructions.

- B. Securely attach each accessory, level and plumb, at locations shown on the Drawings and at heights, spacing, and load resistance required by ADAAG (Americans with Disabilities Act Accessibility Guidelines).
- C. Use fasteners that are appropriate for surfaces where accessories are to be mounted.
- D. Use concealed fasteners wherever possible.
- E. Secure mirrors in a tamperproof manner.

3.2 CLEANING

- A. Clean stainless steel and mirror surfaces in compliance with manufacturer's instructions.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 10 2800, Rev. 1, dated May 16, 2008.

SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fire extinguishers, fire extinguisher cabinets, and brackets for wall mounting.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

- A. Submit the following in accordance with the requirements of Exhibit I:
 - 1. Catalog data indicating roughing-in dimensions and details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style and door construction, and panel style and materials.
 - 2. Shop Drawings indicating location and type of fire extinguisher.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Comply with Section 01 2500, "Substitution Procedures."

2.2 MANUFACTURERS (CABINETS)

- A. J. L. Industries.
- B. Larsen's Mfg. Co.
- C. Johnson-Lee, Division of W. F. Lee Corp.
- D. Muckle Manufacturing, Division of Technico, Inc.
- E. Watrous, Inc.

2.3 FIRE EXTINGUISHER CABINETS

- A. General: Provide fire extinguisher cabinets where indicated, of suitable size for housing fire extinguishers of types and capacities indicated.
- B. Construction: Manufacturer's standard enameled steel box, with trim, frame, door and hardware to suit cabinet type, trim style, and door style indicated. Weld all joints and grind smooth. Miter and weld perimeter door frames.

- C. Cabinet Type: Suitable for mounting conditions indicated, of the following types:
 - 1. Semi-Recessed: Cabinet box (tub) recessed in walls of sufficient depth to suit style of trim indicated. Minimum size of 12 in. by 27 in. by 8 in. inside to house one Subcontractor-furnished and installed extinguisher.
- D. Trim Style: Fabricate trim in one piece with corners metered, welded and ground smooth.
 - 1. Exposed Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
 - a. Rolled-Edged Trim: Rolled edges with backbend depth of 4-1/2 in.
 - b. Trim Metal: of same metal as door.
- E. Door Material and Construction: Manufacturer's standard door construction, of hollow steel construction, coordinated with cabinet types and trim styles selected.
- F. Door Style: Manufacturer's standard design with Full-Glass Panel with 1/4-in. tempered glass.
- G. Door Hardware: Provide manufacturer's standard door operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam action latch, or door pull, exposed or concealed, and friction latch. Provide concealed or continuous type hinge permitting door to open 180 degrees. Breakable glass front cabinets are not permitted.

2.4 FACTORY FINISHING OF FIRE EXTINGUISHER CABINETS

- A. General: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations except as otherwise indicated. Apply finishes in factory after products are assembled. Protect cabinets with plastic or paper covering, prior to shipment.
- B. Painted Finishes: Apply baked enamel finish to both concealed and exposed surfaces of cabinet components except where other than a painted finish is indicated.
 - 1. Color: Red.

2.5 FIRE EXTINGUISHER

- A. Provide portable fire extinguishers, UL-listed, in accordance with NFPA 10 for quantity and type, based on occupancy and hazards.

2.6 ACCESSORIES

- A. Provide screw anchored hooks for extinguishers in non-public spaces.
- B. Provide signage to be located above the recessed cabinets capable of view perpendicular and horizontal to the surface of the cabinet. Typical signs are white lettering or symbols on red background.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install cabinets in locations indicated on the Drawings and at the mounting height of 5 feet maximum from finished floor to top inside surface of cabinet.
 - 1. Prepare recesses in walls for fire extinguisher cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.
 - 2. Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.
- B. Install wall mount (non-cabinet) portable fire extinguishers in locations indicated on the drawings and at the mounting height of 5 ft maximum from top of extinguisher.
 - 1. Securely fasten mounting brackets and fire extinguisher to structure, square and plumb, to comply with manufacturer's instructions.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 10 4400, Rev. 1, dated May 16, 2008.

SECTION 10 5113
METAL LOCKERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Locker units with hinged doors.
- B. Metal bases, tops and filler panels.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Catalog data indicating locker types, sizes and accessories.
- B. Color chart indicating manufacturer's standard colors.
- C. Manufacturer's installation instructions.
- D. Shop drawing indicating locker plan layout.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. DeBourgh Manufacturing, Varsity Series.
- B. Interior/Medart, Fortress Series.
- C. Lyon Metal Products, Inc., Industrial Series.

2.2 MATERIALS

- A. Use mild, cold rolled and leveled unfinished sheet steel, with the following thicknesses:
 - 1. Body Sides and Bottoms: 16 gauge.
 - 2. Body Back: 18 gauge.
 - 3. Door: 14 gauge.
 - 4. Door Frame: 16 gauge.
 - 5. Sloping Top: 14 gauge.

2.3 ACCESSORIES

- A. Provide for each locker:
 - 1. Two double prong coat hooks.
 - 2. Hat shelf.
 - 3. Rubber bumpers.
 - 4. Combination lock.

2.4 FABRICATION

- A. Locker Units:
 - 1. Width: 12 inches.
 - 2. Depth: 12 inches.
 - 3. Height: 72 inches.
 - 4. Mounting: Surface mounted.
 - 5. Base: 4 inch high metal.
 - 6. Top: Sloping metal with closures.
 - 7. Ventilation Method: Louvers at top and bottom of doors.
- B. Locker Body: Formed and flanged, with steel stiffener ribs, electric spot welded.
- C. Frames: Formed channel or angle shapes, welded and ground flush, welded to body.
- D. Doors: Formed steel panel, channel reinforced frame, grind and finish edges.
- E. Hinges: Three butt hinges per door, welded to door and body.
- F. Latch: Recessed, with combination lock.

2.5 FINISHES

- A. Clean, degrease and neutralize metal, prime and apply two coats of baked enamel.
- B. Paint bodies and doors in contrasting colors.
- C. Door colors to be as selected from manufacturer's standard colors.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that project is ready to receive work of this section.
- B. Verify that bases are correctly sized and configured.

3.2 INSTALLATION

- A. Install according to manufacturer's installation instructions.
- B. Install lockers plumb and square.
- C. Secure lockers with fasteners appropriate for substrate.
- D. Bolt adjoining locker units together to provide a rigid installation.
- E. Install end panels, filler panels, and sloping tops.
- F. Install accessories.

3.3 CLEANING

- A. Clean locker interior and exterior surfaces.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 10 5113, Rev. 1, dated May 16, 2008.

SECTION 11 5311.08
ENCLOSURE DESIGN

PART 1 GENERAL

1.1 SCOPE

- A. This section addresses the following pieces of equipment: ENC-1701 and ENC-1702. These enclosures are not enclosures in the strict definition. However enclosure criteria are being applied to define expected standard of care.
- B. This section establishes the technical requirements for the design and quality assurance (QA) of enclosures, their
- C. Support stands, and components or appurtenances of enclosures.
- D. Additional technical requirements are provided in the subcontract drawings.
- E. The following is a summary of supplier responsibilities described in this section:
 - 1. Design enclosures in strict accordance with this section, the subcontract drawings, and the referenced documents.
 - 2. Furnish design data required by this section to document design of the enclosure.
 - 3. Provide a design schedule showing major design steps, submittal milestones, review periods, and as-built documentation. Provide a revised design schedule after any modification to the subcontract documentation, which revises the design requirements, required delivery date, or when other approved LANL changes otherwise change a scheduled design task.
 - 4. Provide LANL full access to the facility for performing random or scheduled inspections and/or surveillance of work performed.
 - 5. Provide LANL with a lower tier services plan including the name, address, telephone number, and point of contact for outside services that the supplier intends to use on this project. Identify the specific work requirements of this specification that will be performed by those outside service providers.

1.2 SECTION INCLUDES

- A. Enclosure Shells.
- B. Enclosure Support Stands.
- C. Iris Ports.
- D. Windows.
- E. Shell Penetrations.
- F. Other Enclosure Appurtenances.

1.3 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."

- B. Section 01 4000, "Quality Requirements."
- C. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- D. Section 05 1000, "Structural Metal Framing."
- E. Section 11 5311.10, "Enclosure Fabrication."
- F. Section 11 5311.12, "Enclosure Installation."
- G. Section 13 4800, "Sound, Vibration, and Seismic Control."

1.4 PROCESS DOCUMENTS

- A. Drawing C55864, Sheet D-6000, "Process Flow Diagram."
- B. Drawing C55864, Sheet D-6010, "Influent Filter System Roughing Filters P&ID."
- C. Drawing C55864, Sheet D-6029, "De-Watering System EVAP-1701, EVAP-1702 P&ID."
- D. 60239831-PCAL-001, *LLW Bounding Material Balance*.
- E. Drawing C55864, Sheet Q-5104, "Drum Loading Station Detail."
- F. Drawing C55864, Sheet Q-5105, "Drum Loading Station Weldment."
- G. Drawing C55864, Sheet Q-5106, "Drum Loading Station Details."

1.5 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.6 SUBMITTALS

- A. Provide reference to LANL Subcontract Number, Enclosure Number, Enclosure Title, and Drawing Number on correspondence.
- B. Provide the following submittals in accordance with the requirements of Exhibit I. Submittal list is provided in Attachment 5.
 - 1. Drawings, Calculations, and Supporting Data:
 - a. Submit design drawings, calculations, and supporting data before beginning fabrication of the Drum Loading Enclosures. LANL will review and comment on design calculations and drawings. The LANL review does not release the Supplier from responsibility to design and fabricate the Drum Loading Enclosures in accordance with applicable regulations and this specification. Include assumptions and input/output data with the calculations. If computer calculations are performed, include the name of the calculation program and the version number.
 - b. Allowable nozzle loads necessary for pipe stress analysis shall be supplied by the subcontractor to the contractor for review 30 days prior to scheduled installation date.
 - 2. Quality Assurance/Quality Control:
 - a. Work identified in this section shall be in accordance with Section 01 4000, "Quality Requirements."

- b. Notifications. Notify LANL at least seven days in advance for Acceptance Testing and Final Inspection.
 - c. Submit a Lower Tier Service Plan if outside Subcontractors will perform some of the Work. Provide LANL with the name, address, telephone number, and point of contact for outside services that the Supplier intends to use on this project. Identify the specific Work requirements of this specification that will be performed by those outside services.
 - d. Submit a Fabrication Schedule.
 - e. Material Control Procedure. Before fabrication, submit for LANL approval a material control procedure to be used in the execution of the Work. Describe the control methods and traceability documentation in the procedure used by the Supplier to handle and monitor the use of controlled materials, such as stainless steel and welding filler rod. Address in the procedure items such as procurement controls, segregation of materials, and traceability of materials from receipt at the shop through processing and final assembly.
 - f. Certifications. Submit a copy of:
 - 1) Certificate of Conformance for materials used.
 - g. Shipping Submittals. Submit a copy of:
 - 1) Supplier's Cleaning Procedure,
 - 2) Supplier's Packaging Procedure, and
 - 3) Bill of Lading with the unit shipments.
3. Design Changes:
- a. Submit a written request to LANL for any proposed technical changes, exceptions, and/or deviations to this specification or other Contract documents. Do not implement proposed changes, exceptions, or deviations until the LANL Subcontractor Technical Representative (STR) provides written approval.
 - b. Conflicts. Notify LANL STR, as soon as possible, in the event of conflicts among the specifications, drawings, and/or the manufacturer's recommended processes or instructions.
4. Warranty: Supplier is to guarantee the Drum Loading Enclosure and associated equipment at design conditions and warrant that materials and workmanship, plus apparatus supplied, if any, are in accordance with Subcontract document requirements.

1.7 SCHEDULE

- A. Provide a design schedule showing design steps, design submittal milestones, and review periods. Include milestones associated with the design phases, 60% and 100%.
- B. Indicate design phases and review periods. Plan on a 10 working day period for each LANL review cycle.

- C. Provide a revised design schedule for LANL approval within 7 working days of a modification to the subcontract document, which revises the required delivery date, or when other approved LANL changes otherwise change a schedule assembly step hold point, test, or inspection.

1.8 EXCEPTIONS, DEVIATIONS, AND CONFLICTS

- A. Submit a written request to LANL for any proposed technical changes, exceptions, and/or deviations to this specification or the subcontract drawings. Submit proposed changes that affect cost or schedule in accordance with the provisions of the subcontract document.
- B. Conflicts: Notify LANL in the event of conflicts amongst the specifications, drawings, and/or the manufacturer's recommended processes or instructions. Provide notification of a conflict immediately following its discovery. Provide notification in written form, or via phone call followed by facsimile.

1.9 SITE CONDITIONS

- A. Design enclosures and associated components for a design altitude of 7,500 feet above sea level.
- B. Design enclosures and associated components for a design ambient temperature of 70° F.

PART 2 PRODUCTS

2.1 PRODUCTS AND SUBSTITUTIONS

- A. Comply with Section 01 2500, "Substitution Procedures."

2.2 SUPPLIERS

- A. Companies specializing in enclosure design or structures similar to enclosures.

2.3 GENERAL

- A. All products and manufacturers may be substituted with approved equal products of manufacturers in accordance with Section 01 2500, "Substitution Procedures."
 - 1. All substituted products or manufacturers must be submitted to the Subcontract Technical Representative (STR) for review and approval.
 - 2. Submit product data and catalog cut sheets for substituted products or manufacturers.
- B. Material of Construction Compatibility: Selection of fasteners and interfacing components (bolts, nuts, washers, unions, gaskets, etc) shall be based on required performance (e.g., strength, fluid compatibility) and avoidance of potential for galvanic corrosion (e.g., connection/contact of dissimilar metals).
- C. Sketches illustrating the general arrangement of the Drum Loading Enclosures are shown in Drawing C55864, Sheets Q-5104, Q-5105, and Q-5106.
- D. A single point termination for incoming power shall be provided on each individual drum loading enclosure.

2.4 DATASHEET

- A. See datasheet in Attachment 1 for specification details for the Drum Loading Enclosures.

2.5 MATERIALS

- A. Radiation exposure is minimal; however, enclosures are to be constructed utilizing radiation-compliant materials. Refer to Attachment 3 for list of compliant materials. Refer to PART 3 of this section for design deliverable requirements.

2.6 DRUM LOADING ENCLOSURES

- A. The Drum Loading Enclosures shall contain fill station components, including: weighing scale, flexible fill hose (by others) and hose drip container. Waste transfer valve (by others) will be located outside of enclosure. The rectangular containment enclosure shall be designed with viewing windows on two opposing sides. Each window side of the enclosure shall have one set of standard 7-5/8" ID enclosure bare hand entries (Iris Ports). The design of the openings shall meet enclosure ergonomic standards for reach into the containment enclosure. One side of the enclosure shall have an access door large enough for the safe insertion and removal of a standard 55-gal drum. The access door of the containment enclosure shall provide a means of sealing the door to the enclosure. The seal design shall be approved by the STR before implementation. The containment enclosure shall have the capacity to capture 25 gallons of liquid waste below access door threshold. The enclosure shall have a platform or false bottom that will keep the scale device out of the 25 gallon spillage containment area. Scale platform shall be designed to carry the load of a full waste drum. Platform shall be designed for easy removal for housekeeping purposes. Platform shall be designed such that the scale device or the platform itself will not move during drum loading and unloading operations. The enclosure shall have a means to drain captured liquids from the 25 gallon containment area

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Some enclosure drawings have been previously produced for repeated use in LANL enclosure design. A drawing list is provided in Attachment 2 of this section. Use existing, proven designs as represented in Attachment 2, where available. Provide any new designs in compliance with the requirements of this specification.
- B. Provide enclosure design compatible with the process to be housed within the enclosure and allow for equipment to be installed and removed.

3.2 DOCUMENT AND DRAWING REQUIREMENTS

- A. General:
 - 1. Maintain required records in accordance with the supplier's quality assurance program plan.
- B. Engineering Documents:
 - 1. Develop documents in a legible fashion and in the English language. Develop engineering documents using Microsoft Word. Provide calculations in a typewritten fashion or handwritten in pencil or black ink. The use of software packages like Mathcad and Microsoft Excel for

development of calculations is acceptable. Request approval from LANL for use of any other software package not defined herein.

2. Validate and benchmark software used for calculations including engineering calculations, cost estimates, etc. in accordance with the supplier's quality assurance procedure requirements.
3. Document calculations with sufficient information on the purpose of the calculation, the design basis, assumptions, reference data, methods, results and conclusions to permit a technically qualified reviewer, including LANL, to determine their suitability for the intended purpose without recourse to the originator.

C. Drawings:

1. Develop drawings in accordance with the *LANL Drafting Standards Manual* and standard industrial machine design practices. Where the following requirements conflict with the *LANL Drafting Standards Manual*, the Drafting Manual takes precedence. Include the following in enclosure drawing packages: assembly drawings, shell drawings (weldment) showing window openings, irisport locations, and other openings with welded appurtenances; miscellaneous details; dimensioning; tolerancing; parts list; and weld maps.
 - a. Develop and produce drawings in accordance with ASME Y14-series documents.
 - b. Provide dimensional tolerances in accordance with ASME Y14.5M.
 - c. Provide surface texture symbols in accordance with ASME B46.1.
 - d. Provide welding symbols in accordance with AWS A2.4.
 - e. Use symbols for piping and instrumentation in P&IDs in accordance with LANL Engineering Standards Manual OST220-03-01-EM, Mechanical Chapter, P&ID Section.
 - f. Produce drawings using a commercial Computer Aided Design/Drafting (CADD) application. Provide electronic files of design drawings in drawing exchange format (.dxf) or AutoCAD format (.dwg).
 - g. Provide a drawing list of drawings generated with the enclosure drawing package. Update list as design progresses. Transmit list as title sheet of drawing package each time drawings are transmitted to LANL.
 - h. Provide sufficient detail on drawings to show materials for components, weld details, dimensions, and tolerances. Do not show welds that join sheet material of the enclosure shell on the shell weldment drawings.
 - i. Include manufacturer's name and applicable manufacturer's part or model numbers for vendor references, when included in bill of materials on drawings or included on data sheets.

D. Dimensioning:

1. Dimension square and rectangular openings on enclosure shells to the edge of the opening, not to the center of the opening.
2. Use baseline dimensioning in preference to string dimensioning, to avoid tolerance build-up.

E. Tolerances:

1. Specify tolerances for enclosures and sheet metal fabrication on drawings in accordance with LANL Drawing 26Y-202001, "Standard Enclosure Fabrication Requirements," ASME Y14.5M, and Section 6.1.10 of the *Guideline for Enclosures* (AGS-G001). Modify tolerances for enclosure shell fabrication accordingly when designing especially large enclosures up to 100-feet in length.
2. Use the following tolerance block for drawings of machined parts.

GENERAL NOTES	
1)	DIMENSIONS AND SYMBOLOGY ARE AMERICAN NATIONAL STANDARD UNLESS OTHERWISE SPECIFIED.
2)	DIMENSIONS AND TOLERANCES ARE IN INCHES.
3)	BREAK ALL SHARP EDGES.
4)	MACHINED SURFACE ROUGHNESS 125 rms OR BETTER.
5)	TOLERANCES:
DECIMALS:	.X = $\pm .030$
	.XX = $\pm .010$
	.XXX = $\pm .005$
FRACTIONS:	$\pm 1/16$
ANGULAR:	$\pm 1^\circ$

3.3 GENERAL PRINCIPLES AND PERFORMANCE REQUIREMENTS

- A. Design enclosure to provide a complete and permanent confinement of the equipment and processes within it under normal operating and incident conditions.
- B. Provide design of enclosures that accounts for methods of manufacture and inspection and testing.
- C. Design the enclosure structure to be rigid enough to resist deflections caused by ventilation pressure differentials, temperature fluctuations or seismic loading, which may give rise to leaks. Also, design the enclosure structure for sufficient flexibility to allow joints to conform to one another during assembly, and to allow seals to function as the stresses built into the structure during fabrication relieve over the first few years of the enclosure's lifetime. Adequately support heavy equipment and shielding to eliminate adverse effects on gaskets and seals.
- D. Design for enclosure flatness tolerances specified in 26Y-202001, "General Notes for Enclosures, Dropboxes & Introductory Boxes" for fabrication. Provide strength of materials calculations that evaluate in-process structural response from proposed live and dead loads; use a safety factor of 1.5 against yield strength. Evaluate and show acceptability of allowable load stresses and resultant load deflection against the following criteria:

1. "Exterior surfaces flat to (+/-) 1/8-inch in any 2 feet length, and not to exceed (+/-) 1/4-inch over the entire length of the box."

NOTE: The method of analysis, qualified approximation, and judgments based on practical experience may be proposed by the design agency. Provide calculation and other materials supporting conclusions to LANL for review/approval; obtain LANL requestor and Mechanical POC approval of any exception to the deflection guideline via Request for Information. The design bases for the proposed configuration shall be examined and demonstrated by a comparable load test to ensure structural rigidity and leak integrity. Include appropriate load test procedural requirements as part of Section 11 5311.10, "Enclosure Fabrication."

- E. Design the enclosure so that structural integrity of the enclosure shell, including panels and windows, withstands negative 0.5-inches w.g. for vacuum and 0.5-inches w.g. for pressure. Structural integrity is defined as not exceeding the yield strength of enclosure shell materials. Ensure that Section 11 5311.10 includes testing and inspection requirements sufficient to verify structural integrity of the shell and windows when dead and live loads are applied. Provide strengths of materials calculations to demonstrate the enclosure shell structural integrity. Perform strength calculations utilizing a safety factor of 1.5 against yield strength. Evaluate allowable load stresses and resultant load deflection based on the criteria in Paragraph 3.3D.
- F. Enclosure atmosphere will be air. Enclosure does not require an inert atmosphere. Enclosure atmospheric temperature will be at ambient.
- G. The irisports shall be located to provide easy access to the top of the 55-gallon waste drum. Operator must be able to reach the drum fill hose from its storage location and insert it into the drum fill bung. After filling operations, the operator shall be able to place the fill hose back to its storage location. The operator must be able to install bung caps through the irisport access.
- H. Design the enclosure to minimize the potential for buildup of residual contaminants in enclosures that could result in chronic personnel radiation exposure by providing smooth finishes and easily decontaminated surfaces. Reduce the potential for accumulation of contaminants in enclosures by using a smooth finish throughout the enclosure; by rounding corners and floor-to-wall intersections; by having internal brackets attached to walls of the enclosure instead of the enclosure floor; and by eliminating crevices and abrupt intersections that may be created by intermittent welding on the interior of the enclosure. Design enclosures to allow for easy cleaning and decontamination. Consider ergonomic impact from surface finish. Reflectivity from too highly polished surfaces can make working at enclosures for long periods of time uncomfortable.

3.4 SHIELDING AND CRITICALITY

- A. Design of enclosure is for airborne contaminants, radiation shielding does not apply.

3.5 SEISMIC DESIGN

- A. Depending upon the quantity and characteristics of the materials being contained, design enclosures to withstand a design basis earthquake (DBE).

Design spectral response acceleration parameters: five-percent damped design spectral response acceleration at short periods, $S_{DS} = 0.75g$, and at 1-second period, $S_{D1} = 0.64g$. Refer to LANL *Engineering Standards Manual* (ESM) (STD-342-100) for additional requirements.

- B. Refer to Section 13 4800, "Sound, Vibration, and Seismic Control," for additional seismic protection requirements.
- C. The performance category of the enclosure is PC-1.
- D. Perform seismic analysis of the enclosure in accordance with the applicable performance category requirements and as stated in DOE-STD-1020 and DOE-STD-1021 and LANL ESM (STD-342-100, Chapter 5, "Structural").
- E. In the seismic analysis, determine demand to capacity (D/C) ratios for the enclosure shell and support stand members.
- F. If the mass and center of mass of the equipment inside of the enclosure is unknown, increase the total calculated mass of the enclosure shell assembly by 25% to account for equipment and future additions to the enclosure internals.
- G. Account for an accidental offsetting of the center-of-mass by 5% of the plan dimensions from the calculated location.

3.6 ANTHROPOMETRICS

- A. Ensure that any part of the equipment or process within the enclosure requiring manual access is within effective glove reach.
- B. Design enclosures such that the majority of enclosure tasks are performed within a normal work envelope, 11 to 13 inches, with a maximum of 18 to 20 inches.
- C. Provide enclosure designs with dimensions for the front face of enclosure to the rear interior of enclosure, optimal dimensions for maximum accessibility as follows:
 - 1. Single-sided access: Nominal 24 inches, maximum 26-inches (range from 18 to 26 inches), (5th female percentile).
 - 2. Double-sided access: Nominal 48 inches, maximum 52 inches (range from 36 to 52 inches), (5th percentile female).
- D. Follow OSHA requirements set forth in 10 CFR 1910.120 and IEEE Std 1023, *IEEE Guide for the Application of Human Factors Engineering to Systems, Equipment, and Facilities of Nuclear Power Generating Stations*.

3.7 ENCLOSURE SHELL

- A. The inner wall/shell of each enclosure requires regular routine cleaning to remove operational deposit. Make inner faces accessible within irisport range and, as much as possible, unobstructed. Upper surfaces may be accessed using cleaning tools at the discretion of LANL.
- B. If enclosure stiffening is required, weld stiffeners externally to the enclosure, where practical. Provide stiffeners as plate, strip or sheet welded normal to the surface of the enclosure. Mechanical tubing stiffeners may also be used in lieu of plate strip or strip, where additional stiffness is required. Do not use mechanical tubing inside the enclosure without prior permission from LANL. Provide stiffeners of the same grade of stainless steel as the shell material.

Requirements for stiffening materials including ASTM specifications are provided in Section 11 5311.10, "Enclosure Fabrication."

C. Corners:

1. Provide corners of enclosures with a minimum inside radius of 5/8-inch. For larger enclosures and lined enclosures, the radius may be larger. Provide corners of lined enclosures with 2-inch radius to assure proper application of the lining.

D. Material:

1. Design enclosure shells using 300-series stainless steel of type 304, 304L, 316, or 316L. Provide designs with stainless steel sheet material of 7 gauge, cold rolled, annealed, and pickled per ASTM A 240/A 240M and ASTM A 480/A 480M, with a 2B mill finish.
2. Use plate stock of the same grade of stainless steel, when thicker material is required, such as for floors supporting heavy objects. Provide a continuous and contiguous transition between plate stock and sheet on the inner surfaces of the shell so that crevices within the enclosure interior are avoided.

3.8 SUPPORT STANDS

- A. Support enclosures by a fabricated support stand, bolted to the enclosure base. Design the support stand for anchoring the enclosure to the facility floor. Fabricate the support stand from stainless steel structural shapes.
- B. Refer to Section 05 1000, "Structural Metal Framing" and Section 11 5311.10, "Enclosure Fabrication," for requirements of structural steel.
- C. Design enclosure support stands in accordance with LANL Engineering Standards Manual, Chapter 5, Structural, and to meet appropriate performance category (PC) requirements in accordance with DOE-STD-1020 and DOE-STD-1021.
- D. Where a support stand is not required, design the enclosure for anchoring directly to the facility floor.
- E. Where determined by the seismic analysis to be necessary, provide corner gussets or diagonal braces with the support stand. Design diagonal braces for bolted attachment to the support stand upright members.
- F. When feasible, include a horizontal bar in the stand that can be used as a foot rest.

3.9 IRISPORTS AND IRISPORT PLACEMENT

- A. Design enclosures for the use of push-through irisports from Central Research Laboratories (CRL) of the round or oval shape for enclosures. Provide irisports welded into the enclosure shell or clamped into windows. Note that o-ring seal material for the rings and bungs will require selection based on the enclosure environment.
- B. Use oval-shaped or large-diameter irisports when increased functional reach capability is required.
- C. Place centerline height of primary, working irisports between 48-inches and 52-inches in height from finished floor to centerline of irisport.

- D. Provide spacing between horizontal centerlines of a working pair of irisports at nominally 16.5-inches (range between 15 and 18-inches).
- E. Provide spacing between vertical centerlines of a working pair of irisports at nominally 18-inches (range between 16 and 19-inches).
- F. For reach capability, maintain horizontal centerline of nearest row of irisports to enclosure top/bottom at 18-inches.

3.10 WINDOWS

- A. Provide windows of either the zipper window style or the clamp-strip style. Window details for both styles are provided in the Attachment 2.
- B. Select materials based on transparency, and resistance to fire, abrasion, corrosion, puncturing, tritium exchange, and water vapor permeation as necessary.
- C. Maximize size to optimize visibility, with the goal of minimizing blind spots.
- D. Provide horizontal centerline placement at eye level: 61 to 63 inches above finish floor for standing operations, centered above pair of irisports. The 5th percentile female eye height is 55.5-inches, and the 95th percentile male eye height is 68.2 inches.
- E. Use a sloping enclosure face, 10° to 15° maximum, where feasible, to reduce glare and potential blind spots and to enhance vision and working posture.

3.11 POWER, LIGHTING AND RECEPTACLE

- A. Provide junction box located on top exterior of enclosure for connection to 120VAC 20A branch circuit. Junction box to provide power to exterior lights. Enclosure shall be provided with interior wiring and raceways for powering receptacle from the incoming branch circuit.
- B. Provide one duplex GFCI NEMA 5-15R receptacle located inside the enclosure for power to internal instruments (i.e., scale).
- C. When using non-fluorescent lighting, provide methods to adjust lighting levels both inside and outside the enclosure to minimize glare. Design with approximately 30 footcandles (fc) at the work surface.
- D. Provide luminaries with baffles to diffuse light, and ensure light tube is not directly visible to a user's eye.
- E. Lights and lighting housing shall be accessible from the exterior of the enclosure.

3.12 ELECTRONIC DRUM SCALE

- A. Enclosures shall be provided with an electronic drum scale with weight indicator. Suggested Drum Scale manufacturer: Force Flow.
- B. Weight Indicator shall have the capacity for remote monitoring.

3.13 LIFTING POINTS – ENCLOSURE STRUCTURE

- A. Incorporate lifting features, (i.e. bolts or lugs) into the enclosure design as required. Design and position lifting features to prevent distortion of the enclosure. Design lifting features to accept lifting by forklift and mark features appropriately.

- B. Design enclosures so that they can be lifted from below the support frame.

3.14 WELD STUDS AND FASTENERS

- A. Provide sufficient clearance for box end wrenches or socket wrenches where hexagon headed bolts and acorn nuts are used, per ASME B18.2.1. Minimize the range of bolt sizes in the design of the enclosure (1/4-inch to 3/4-inch) in order to limit the number of tools required. Other cap screw and bolt sizes may be used as approved by LANL.
- B. Position fasteners inside of enclosures for ease of access via irisports and visibility through enclosure windows. Provide sufficient space manipulate tools for the loosening/tightening of fasteners.
- C. Do not penetrate the enclosure shell with fasteners since leakage can occur past the screw threads. Where items must be attached to the enclosure shell such as access panels, services panels, windows, etc., provide pattern of weld studs of appropriate size and spacing around a shell opening to allow attachment and appropriate sealing of the component. Blind tapped holes on the outside of the enclosure shell are also allowed when there is sufficient shell thickness to allow for proper screw thread engagement.
- D. Do not use screws or any other fastener inside a enclosure that would require use of a tool such as a screwdriver or Allen wrench that could puncture a glove.
- E. Where feasible, provide designed fastened joints such that screw thread engagement length is at least 1-1/2 times the diameter of the screw.
- F. Avoid the use of grub screws, knurled or slotted head fasteners, spiral pins, circlips, split pins, and locking wire unless specifically approved by LANL.
- G. Do not use high tensile steel fasteners in the construction of lifting equipment.
- H. Select materials for stainless steel threaded components carefully to minimize the possibility of galling and seizure. For this reason, do not use non-approved threaded components in place of specified requirements. When selecting dissimilar materials to prevent such occurrence, in general, provide the nut or one material of type 304L stainless steel and the mating material of ferritic stainless steel.
- I. Apply anti-seize compound to mating stainless steel threads prior to assembly.

3.15 SHELL PENETRATIONS AND UTILITIES

- A. Where practical, locate service penetrations for utilities on service panels that allow for easier modifications to the enclosure penetrations in the future.
- B. At a minimum, provide shell penetrations for the following utility: scale load cell connection. The enclosure penetrations shall be leak-tight.
- C. Provide a nominal amount of spare connections in service panels for future use.
- D. Do not provide connections/fastenings of the hose clamp type. Where feasible, use quick release type, self-sealing couplings with flexible connections inside of enclosures. Ensure that the enclosure design provides sufficient access to make/break these types of connections and that it does not pose a hazard to operators.
- E. Refer to Section 40 0511, "Compression Fittings on Copper and Stainless-Steel Tubing," for requirements of compression fittings for copper and stainless steel

tubing. Use face-seal fittings (o-ring or metal gasket) for tubing in critical leak tight applications.

- F. Run services around the perimeter of the enclosure so that they do not interfere with the requirements for routine access to the enclosure.
- G. Use small-bore pipe supports integral with the enclosure shell, with prior approval from LANL. Do not use self-adhesive clips.
- H. Fit services run inside enclosures with durable and easily readable fixed labels which do not have sharp corners, remain fixed in the original positions and do not become unreadable as a result of time or radiation. Provide mechanical identification of penetrations in accordance with Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."
- I. Unless otherwise specified, do not route service pipes through the enclosure base, as this inhibits cleaning and decontamination of the base.
- J. Provide flow-limiting orifices for any compressed gas services greater than 20 psig, to prevent over-pressurization of the enclosure in the event of a line rupture or accidental un-restricted flow into the enclosure.
- K. Provide two penetrations for the 1" fill line and breather filter lines. Reinforce pipe penetrations as necessary to prevent excessive bending of enclosure shell when connected to exterior piping or filter. Penetration to be provided shall be a 1" FNPT threaded coupling. Hose and breather filter and associated connecting pipe nipples to be provided by others. The two penetrations shall be spaced a minimum of 8" apart to allow clearance for connecting equipment.
- L. Enclosure shall be equipped with drain connection positioned in the enclosure floor pan. Drain will be equipped with a leak-tight shut-off ball valve.

3.16 ACCESS AND SERVICE PANELS

- A. Not applicable.

LANL Project I.D. 100761
60239831-SPEC-001, Rev. 0

RESULTS

Enclosure Drawing List	
Drawing #	Drawing Title
26Y-202001	General Notes
26Y-202002	Lead Shielding & Cladding for Zippered and Bolted Enclosures
26Y-202005	Lead Glass Shields for Zippered and Bolted Windows
26Y-202006	Zippered Window Assembly
26Y-202008	Bolted Window Assembly
26Y-202010	Shell Penetrations
26Y-202013	Typical Gloveport Ring
26Y-202014	Bolted Service Panel Assemblies
26Y-202015	Top Access Panel Assembly
26Y-202018	Bag Ring Assemblies
26Y-202019	Removable Shelf Assembly
26Y-202021	Cooling Well Assembly
26Y-202022	Resistance Furnace Well
26Y-202023	14" Dia. Airlock Assembly
26Y-202024	Standard Airlock Slide Tray Assembly
26Y-202026	Connector Ring Closure Cap Assy & Connector Assy
26Y-202031	14" Dia. Welded Connecting Ring Assembly
26Y-202032	Sample Taking Port Assembly
26Y-202034	Reagent Transfer Device Assembly
26Y-202035	Introductory Tube Assembly
26Y-202039	16" Square Connector Assembly
26Y-202046	Air Cylinder Mounting Assembly
26Y-202047	Air Operated Vertical Sliding Door Assembly
26Y-202048	14" Dia. Opening Counterbalanced Door Assembly 151 R/L
26Y-202049	16" Square Airlock Sliding Door--Hydraulic
26Y-202050	14" Dia. Opening Air Operated Vertical Sliding Door Assy
26Y-202052	Introductory Boxes and Hoods Exhaust Transition Piece
26Y-202053	Introductory Boxes and Hoods Upper & Lower Door Assy's
26Y-202057	8" Dia. Exhaust (HEPA) Filter Assembly
26Y-202059	8" Filter Housing Assembly
26Y-202060	Pressure Relief Device 161 Assembly
26Y-202066	Std. Hi-Vac System Diffusion Pump Mounting Flange Assy
26Y-202067	Dutchman Assembly
26Y-202075	Tunnel Dropbox Transition with Firedoor Assy (2 dr)
26Y-202076	Typical Dropbox Detail Bolt Pattern for Transition
26Y-202077	Tunnel Dropbox Transition with Firedoor Assy 167 (1 dr)
26Y-202121	2 x 3 Enclosure Support Stand Assy

Enclosure Drawing List	
Drawing #	Drawing Title
26Y-202122	2 x 2 Enclosure Support Stand Assy
26Y-202123	1 x 3 Enclosure Support Stand Assy
26Y-202124	1 x 2 Enclosure Support Stand Assy
26Y-202125	1 x 1 Enclosure Support Stand Assy
26Y-202130	12" Dia. Exhaust (HEPA) Filter Assembly
26Y-202131	Neutron Shielded Enclosure Details
26Y-202150	O-Ring Gasket Seal Tubing to Valve Joint
26Y-202151	3" and 2 1/4" I.D. Damper Assembly
26Y-202152	4" In-Line Filter Holding Bracket
26Y-202153	Open-Front Enclosure 7 1/2" Sash Assembly

Materials Subject to Radiation			
Material	Stability		
	Good (10 ⁵ Gy)	Satisfactory (10 ⁴ Gy - 10 ⁵ Gy)	Poor (Do not use) (10 ⁴ Gy)
Rubber (ASTM D 2000 and ASTM D 1056)	<ul style="list-style-type: none"> • Polyurethane ⁽¹⁾ • SBR Butadiene Styrene • Ethylene Propylene Copolymer ⁽²⁾ EPDM • Polychloroprene ⁽³⁾ 	<ul style="list-style-type: none"> • Natural Rubber • Butadiene-acrylonitrile copolymer NITRILE • Polysulphide • Polybutadiene 	<ul style="list-style-type: none"> • Fluorocarbon ⁽⁴⁾ VITON • Butyl • Silicon ⁽⁵⁾ • Neoprene
Thermoplastics	<ul style="list-style-type: none"> • Polystyrene • Polyethylen • Chlorosulphonated • Polyformaldehyde • Hypalon • ABS • PVA • Polyamide ⁽⁶⁾ • Nylon • Polycarbonate • Polyester ⁽⁷⁾ • Mylar or Melinex 	<ul style="list-style-type: none"> • Polymethylmethacrylate • PERSPEX • Chlorofluorocarbon ⁽⁸⁾ KEL-F 	<ul style="list-style-type: none"> • Fluorocarbon ⁽⁹⁾ • PTFE, Teflon, Fluon • Polypropylene
Thermosets	<ul style="list-style-type: none"> • Epoxy Resin ARALDITE • Styrene modified polyesters ⁽¹⁰⁾ (Mineral or unfilled) • Polyurethane ⁽¹⁾ • Polyetheretherketone EEK • Silicone ⁽¹¹⁾ 	--	<ul style="list-style-type: none"> • Styrene modified polyesters ⁽¹⁰⁾ (unfilled) • Amino-Formaldehyde • Phenol formaldehyde BAKELITE
Adhesives	<ul style="list-style-type: none"> • Epoxy Resin ARALDITE • Phenolics ⁽¹²⁾ 	--	<ul style="list-style-type: none"> • Pressure sensitive type ⁽¹³⁾
Lubricants	<ul style="list-style-type: none"> • Mineral Oils ⁽¹⁴⁾ (radiation resistant grades) 	<ul style="list-style-type: none"> • Synthetic Lubricants ^(14,15) 	<ul style="list-style-type: none"> • Natural Oils (Vegetable, etc.)
Others	<ul style="list-style-type: none"> • Metals Concrete Glass ⁽¹⁶⁾ 	<ul style="list-style-type: none"> • Cork & Wood ⁽¹⁷⁾ 	--

Notes:

- ⁽¹⁾ Polyurethane can be either polyether or polyester based. Polyether based polyurethanes are some of the most radiation resistant rubbers. However polyesters are susceptible to hydrolysis and should not be employed in humid radioactive environments.
- ⁽²⁾ Ethylene propylene copolymers are the most radiation stable rubbers.
- ⁽³⁾ Polychloroprenes degrade under irradiation releasing corrosive chlorine/hydrogen chloride.
- ⁽⁴⁾ Fluorocarbons release highly corrosive fluorine/hydrogen fluoride on irradiation.
- ⁽⁵⁾ Silicone rubbers are composed of an inorganic backbone of silicon and oxygen with organic side groups. The side groups may break off during irradiation thus affecting the characteristic properties of the material. There is also the possibility of the side groups containing corrosive halogens.
- ⁽⁶⁾ Polyamides include the nylons in which damage is caused by the combined effects of ionizing radiation and oxygen. Therefore the size of the component (surface to volume ratio) will affect the radiation stability, larger components will survive longer.
- ⁽⁷⁾ Polyesters are susceptible to hydrolysis. Therefore their stability is greatly reduced in moist conditions.
- ⁽⁸⁾ Chlorofluorocarbons will release corrosive halogens during irradiation.
- ⁽⁹⁾ Fluorocarbons degrade rapidly in radioactive environments and are also affected by oxygen (See Note 6 above). Fluorine is liberated which is highly corrosive.
- ⁽¹⁰⁾ Styrene modified polyesters exhibit a range of radiation stability dependent upon whether or not they are filled. The presence of inorganic fillers reduces radiation damage of the polyester. This is due to the radiation being absorbed throughout the component and inorganic materials are little affected by radiation.

Materials Subject to Radiation	
(11)	Silicone based Thermosets are more resistant to radiation than their rubber counterparts due to the presence of stable styrene side groups and fillers. (See Note 10 above).
(12)	Formaldehyde Phenolics have very poor radiation stability.
(13)	Some adhesives release vapors during curing so that pressure should be applied evenly to bond areas to avoid porous joints.
(14)	Aromatic lubricants (containing closed ring molecules/benzene rings) are more resistant to radiation than aliphatics (straight chain modules).
(15)	Almost all synthetic lubricants do not offer any advantage over mineral oils in terms of radiation stability. However, they may be used when their increased fire resistant, chemical and thermal stability are required.
(16)	Radiation stabilized glass should be used if discoloration transmission loss cannot be tolerated.
(17)	Cellulose based materials degrade in radiation and release fumes. The material eventually becomes tacky.

Enclosure Design Checklist

4.1 Form

- A. Are the enclosure internal/external surfaces decontaminable? - Is the proposed surface finish, suitable for the requirement?
- B. Does the enclosure have clean lines? Is it self-draining/self-cleaning with no powder traps?
- C. Does the enclosure have a simple shape with the minimum of fabrication and machining?
- D. Is enclosure sized appropriately to allow for installation into the facility? Has the design of the enclosure considered the path of transport the enclosure must take to be installed?

4.2 Manufacture

A. Materials

- 1. Is stainless steel required?
- 2. Are materials compatible to each other and to the process?
- 3. Do the materials of manufacture give suitable shielding protection?
- 4. Are Jigs/Fixtures/Tooling required or necessary to aid in manufacturing?
- 5. Are flammable or combustible liquids used?
- 6. Are Class A combustibles used? Has prior approval been obtained?
- 7. Are materials covered by the Resource Conservation Recovery Act (RCRA) used that may cause a mixed waste disposal problem?

B. Fasteners

- 1. Is the fastener material compatible with the parent material?
- 2. Are the sizes of fasteners standardized throughout the enclosure?
- 3. Are acorn nuts used? – Have sharp corners on exposed nuts been removed?
- 4. Are captive fasteners required to aid maintenance?
- 5. Are fasteners accessible by boxed end wrenches or sockets?

C. Lubricants

- 1. Are lubricants necessary within the enclosure?
- 2. Can the lubricated item be placed outside the enclosure - through wall drive system?
- 3. Are lubricants required to be radiation tolerant?
- 4. Does the lubricated item require re-lubricating on a regular basis?
- 5. Are there reservoirs for lubricants?
- 6. Are the flashpoints of the lubricants below 400° F?

4.3 Viewing and Access

- A. Are the viewing lines through windows believed to be acceptable for normal operation?
- B. Are the viewing lines through windows believed to be acceptable for maintenance operations?
- C. Is the access into the enclosure believed to be acceptable for normal operation?
- Are there any restrictions i.e. other equipment features or fittings?
- D. Is the access into the enclosure believed to be acceptable for maintenance operation? - Are there any restrictions i.e. other equipment, features or fittings?
- E. Do the viewing materials give suitable shielding protection?
- F. Are there any special viewing requirements? - Inspection purposes, etc.

4.4 Maintenance

- A. Do removable items fit into the bagport/material transfer port envelope?
- B. Are suitable set down areas provided within the enclosure confinement?
- C. Are there any special recovery requirements?
- D. Can modular items inside enclosure be manually handled (less than 13 lb.), or is material handling equipment required?
- E. Is calibration equipment provided for material handling equipment (e.g. test weights)?

4.5 Calculations and Data Sheets

- A. Are sizing and other calculations available?
- B. Are manufacturers specifications available?
- C. Is shielding adequate?
- D. Is structural integrity appropriate to meet performance requirements? Can enclosure structure and shell resist design loads including seismic loads and differential pressure loading?
- E. Check mass and facility floor loading.

4.6 Ventilation

- A. Has the ventilation of the enclosure been considered?
- B. Does the enclosure contain powder or solid material?
- C. Does the enclosure maintain capture velocity at opening when and opening is breached?
- D. What is the atmosphere within the enclosure? If an inert gas, will instrumentation continue to function?
- E. Is there potential for static atmosphere within the enclosure?

4.7 Operation

- A. Does the enclosure perform its required operation?
- B. Could the operation be simplified?
- C. Could the time at the enclosure face be reduced to lower operator dose?
- D. Have suitable number of penetrations for utilities and electrical services been provided to allow for installation, operations, and maintenance?
- E. Are spare penetrations provided for expansion and addition of utilities/electrical service connections?

List of Required Submittal										
Section No: 11 5311.08			Type of Submittal			Submittal Schedule				
Section Title: Enclosure Design						Number of Copies				
Description of Submittal Required		Specification Location	For information	For Engineering Review, Comment, and Approval	For Inspection and Acceptance	At Prefabrication Conference	Prior to Fabrication	With Shipment	7 Working Days Advance Notice	As Required
1.	60% Design Documents			X						
2.	Design Drawings			X			1			
3.	Seismic Analyses			X			1			
4.	100% Design Documents									
5.	Final Design Drawings (stamped and signed)			X				1		
6.	Final Seismic Analysis (stamped and signed)			X				1		
7.	Lower Tier Services Plan		X			1				
8.	Quality Assurance Manual (Design)									

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 11 5311.08, Rev. 1 dated May 19, 2008.

SECTION 11 5311.10
ENCLOSURE FABRICATION

PART 1 GENERAL

1.1 SCOPE

- A. This section applies to enclosure designated as project equipment ENC-1701 and ENC-1702. These enclosures are not enclosures in the strict definition. However enclosure criteria are being applied to define expected standard of care.
- B. This section establishes the technical requirements for the materials of construction, fabrication, testing, shipment, and quality assurance (QA) of enclosures, their support stands, and components or appurtenances of enclosures.
- C. Additional technical requirements are provided in the subcontract drawings.
- D. The following is a summary of supplier responsibilities described in this section:
 - 1. Fabricate enclosures in accordance with this section and the subcontract drawings.
 - 2. Procure equipment, materials, or supplies to complete the work, unless otherwise stated.
 - 3. Test and inspect as required by this section.
 - 4. Furnish the data required by this section to document that required tests and inspections have been performed.
 - 5. Package, ship, and deliver enclosures.
 - 6. Provide LANL full access to the facility for performing random or scheduled inspections and/or surveillance of work performed.
 - 7. Provide LANL with a lower tier services plan including the name, address, telephone number, and point of contact for outside services that the supplier intends to use on this project. Identify the specific work requirements of this section that will be performed by those outside services.
 - 8. Provide a fabrication schedule showing fabrication steps, hold points, tests, and inspections. Provide a revised fabrication schedule after any modification to the subcontract document, which revises the required delivery date, or when other approved LANL changes otherwise change a scheduled assembly step hold point, test, or inspections.
 - 9. Provide seven (7) working days advance notice of a hold point activity requiring LANL witness or inspection.
- E. Reference Subcontract Drawings
 - 1. Attachment 1 of this section provides a list of LANL Enclosure Drawings often referenced by subcontract drawings provided to the supplier for fabrication of enclosures.

1.2 SECTION INCLUDES

- A. Enclosure Shells.
- B. Enclosure Support Stands.
- C. Iris Ports.
- D. Windows.
- E. Shell Penetrations.
- F. Other Enclosure Appurtenances.

1.3 RELATED SECTIONS

- A. Section 01 1116, "Work by Owner."
- B. Section 01 2500, "Substitution Procedures."
- C. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.5 LANL-FURNISHED AND INSTALLED EQUIPMENT

- A. Refer to Section 01 1116, "Work by Owner."

1.6 SUBMITTALS

- A. Provide reference to LANL Subcontract Number, Enclosure Number, Enclosure Title, and Drawing Number on correspondence.
- B. Provide submittals listed in Attachment 3 in accordance with the requirements of Exhibit I.

1.7 SCHEDULE

- A. Provide a fabrication schedule showing fabrication steps, hold points, tests, and inspections.
- B. Provide a revised fabrication schedule for LANL approval within seven (7) working days of a modification to the subcontract document, which revises the required delivery date, or when other approved LANL changes otherwise change a schedule assembly step hold point, test, or inspection.
- C. Provide seven (7) working days advance notice of a hold point activity requiring LANL witness or inspection.

1.8 SHOP TRAVELER

- A. Use a shop traveler system and the subcontract drawings to transform the technical requirements of this section into specific work instructions, which indicate the fabrication and inspection sequence and identify hold points.
- B. Provide a shop traveler procedure. Include in the procedure a description of the preparation, use, and monitoring of the shop traveler. Also include in-process tracking of items, processes, hold points, and inspections. Submit for approval, the shop traveler procedure prior to fabrication. Provide the shop traveler form as an attachment to the shop traveler procedure.

- C. After work is finished, submit the completed shop traveler form as part of the QA Document Package in accordance with Exhibit I.

1.9 FABRICATION HOLD POINTS

- A. Hold points are required during the fabrication process to allow inspection, verification, or approval by LANL before the supplier does further work. Identify hold points on the shop traveler and make provision for LANL signoff. The hold points are:
 - 1. In-process Inspection,
 - 2. Root Weld Inspection,
 - 3. Filler Inspection,
 - 4. Weld Fit-up Inspection,
 - 5. Weld Final Inspection, and
 - 6. Shop Acceptance Testing and Inspection.
- B. For hold points requiring witness or inspection at the supplier's facility, provide seven (7) working days advance written notification to LANL so that a LANL representative may be present at the supplier's shop to witness the activity. At LANL's discretion, photographic records of the fit-ups may be substituted for physical inspections.
- C. Inspection Data Sheet-Enclosure: The LANL representative is required to log an inspection report for each activity. The Inspection Data Sheet is provided as Attachment 5. The LANL representative will document inspection conformance and/or exceptions and provide approval to proceed with fabrication. Submit the completed Inspection Data Sheet form as part of the QA Document Package in accordance with Exhibit I.

1.10 QUALITY ASSURANCE/QUALITY CONTROL

- A. As used in this document, QA is intended to control a combination of materials, preparation, fabrication, inspection, testing, cleaning, packaging, and shipping to be done to ensure the protection of an acceptable finished product.
- B. It is acceptable to reference the procedures in the following paragraphs as a part of the Quality Assurance Program.
- C. Fabrication and Quality Control (QC) Procedures: The list of procedures to be followed and their submittal schedule is contained in Exhibit I. LANL in cases may waive submittal, where procedures have previously been evaluated. Maintain a list of quality procedures, including the revision number or date of approval.
- D. Personnel Certifications: Ensure that supplier personnel assigned to enclosure fabrication including welding, assembly, testing, and inspections are fully qualified to perform their respective job functions. Exhibit I contains the list of required personnel certifications, and their schedule for submittal.
- E. Test Reports: Ensure that tests performed in support of the enclosure fabrication, welding, assembly, testing, and inspection are fully documented. Exhibit I contains the list of test reports, and their schedule for submittal.
- F. Material Certifications: Provide material certifications including legible copies of mill test reports indicating chemical analysis, physical test data, and heat number. Exhibit I contains the list of material certifications, and their schedule for submittal.

- G. As-Built Drawings: Submit as-built drawings as described in Paragraph 2.4 of this section, to reflect modifications or deviations to the subcontract drawings. In addition, use these drawings to indicate weld locations and material identification and to document the dimensional verification performed by the supplier.
- H. QA Document Package: Submit documents identified in this section as a part of the QA Document Package. Complete three bound or stapled document packages containing these documents required "with shipment" in accordance with Exhibit I. Mail one package to LANL and provide the other two packages with the enclosure shipping crate.

1.11 MATERIAL CONTROL

- A. Material Control Procedure:
 - 1. Submit to LANL, for approval, a material control procedure to be used in the execution of the work. Describe the control methods and traceability documentation in the procedure used by the supplier to handle and monitor the use of controlled materials, such as stainless steel and welding filler rod.
 - 2. Address procurement controls, segregation of materials, and traceability of materials from receipt at the shop through processing and final assembly in the procedure. Submit this procedure to LANL for engineering review, comment, and approval, prior to fabrication.
- B. Heat Numbers: Note heat numbers on weld maps using low-chloride content marking pens on each piece part and the material identifications transferred to the as-built drawings as described in Paragraph 2.3.

1.12 EXCEPTIONS, DEVIATIONS, AND CONFLICTS

- A. Submit a written request to LANL for any proposed technical changes, exceptions, and/or deviations to this section or the subcontract drawings. Submit proposed changes that affect cost or schedule in accordance with the provisions of the subcontract document.
- B. Supplier Deviation Disposition Request (SDDR): Provide proposed change information using the SDDR form provided as Attachment 2. Consecutively number SDDR's and submit by facsimile for expediency with a record copy to follow by mail. Submit one (1) copy the LANL Contract Administrator and a second to the LANL Subcontract Technical Representative (STR). Do not implement proposed changes, exceptions, or deviations until the LANL STR provides written approval by means of the SDDR form.
- C. Conflicts: Notify LANL in the event of conflicts amongst this specification, drawings, and/or the manufacturer's recommended processes or instructions. Provide notification of a conflict immediately following its discovery. Provide notification in written form, or via phone call followed by facsimile.
- D. Substitutions:
 - 1. Request approval for substitutions by submitting an SDDR form, where this section or the subcontract drawings contain a "brand name or equal" description. Submit one (1) copy to the LANL STR.
 - 2. If the supplier proposes to provide an equal to the listed brand names, the evaluation and the determination as to the quality of the proposed product

will be the decision of LANL and will be based on information furnished by the supplier.

3. There will be no responsibility by LANL for locating or securing any information to evaluate and determine the equality of any proposed product. Therefore, ensure that sufficient information and descriptive material are provided such as cuts, illustrations, drawings, or other information to establish clearly and precisely what product the supplier is proposing and demonstrate that the product offered meets the requirements of this section.

1.13 PACKAGING PREPARATION

- A. Do not perform packaging and shipping of enclosures until shop acceptance testing and inspection have been performed and the results approved by LANL. Prepare and package enclosures and associated components to prevent damage during shipping and handling. Use particular care to ensure that the surface finishes, cleanliness, dimensional stability, and overall integrity of the enclosures achieved during fabrication are not affected during shipment.
- B. Install windows loosely on the enclosure or ship separately. Electrical connector installation is optional, depending upon vulnerability. Seal enclosure openings with temporary covers or other protection to exclude dirt and prevent damage to openings of fittings or sealing surfaces of gasketed openings. Protect mating surfaces with clean plywood or cardboard covers. Use tape consisting of low chloride (250 ppm) content.
- C. If enclosure is fabricated at an elevation different from the elevation indicated in Paragraph 1.19 of this section, provide for a means of pressure relief in the enclosure during shipping. An open service penetration on the enclosure will provide adequate means of pressure relief. Do not seal enclosure during shipping.

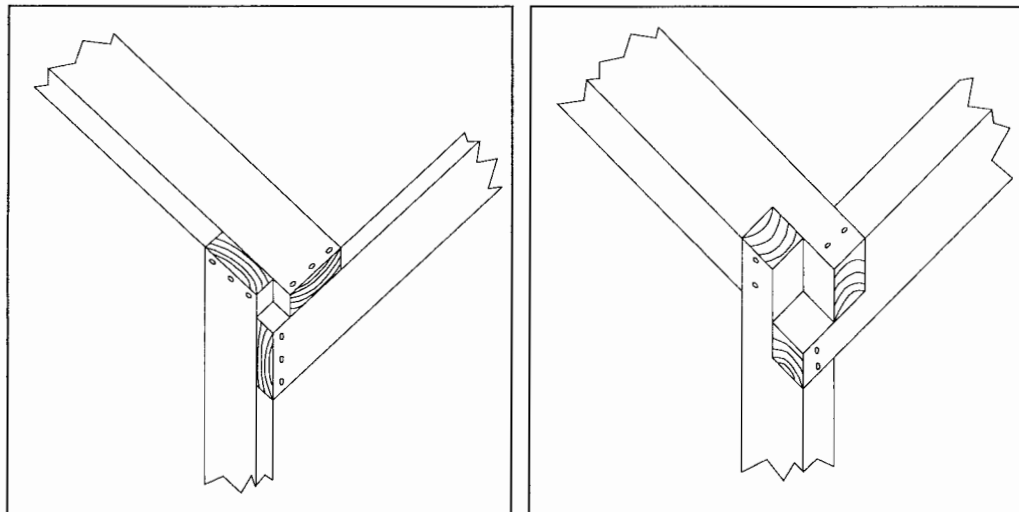
1.14 PACKAGING

- A. Packaging Procedure: Submit a packaging procedure. This procedure describes the methods, material control, and inspections to be used by the supplier to perform enclosure packaging for shipment. The procedure addresses the covering of enclosure openings, pallet and crate construction, protection of the enclosure sealing surfaces, and marking of the crate. Submit this packaging procedure for approval prior to performing this work.
- B. Pack enclosures individually in totally enclosed wooden crates with pallets or provisions for handling by a forklift. Ship enclosures as complete assembled units except for support stand legs. Fully welded support stands to be shipped separately from the enclosure shell. If shipping limitations restrict complete assembly shipments, propose a recommended alternative for approval by LANL. Separately pack components or items that may work loose or be lost in transit.
- C. Bag or crate any separate components that are part of the order and mark accordingly to describe or identify the enclosure with which the components are associated. Furnish packing material, weather protection, dunnage, and crating.
- D. Provide desiccant bags inside enclosures to prevent condensation build-up during shipping.

1.15 CRATING

- A. Provide lumber seasoned, reasonably sound, and free from cross grain and knots that would interfere with nailing or stapling, or knots that are greater than $\frac{1}{3}$ the width of the lumber.
- B. Construct crates with outer framework consisting of upright and horizontal members and with additional diagonal upright and horizontal members where necessary to provide proper strength and rigidity.
- C. Construct crates with three-way lock corners, where members will be joined with nails or staples driven into side grain of joining members (see Figure 1).
- D. Use double nailing or stapling to fasten joining crate members.
- E. Design and construct crates with transverse cross-members at the base sufficient in strength to protect the underside from damage by mechanical handling equipment.

Figure 1. Examples of Three-Way Lock Corners.



- F. **Crate Marking:** Properly and clearly mark crates on the top and four sides using a stencil. As a minimum, provide information including LANL subcontract number, enclosure number, and the actual weight of the crate and its contents. Identify each crate or package as a part of the total order, for example "Crate #1 of 5."

1.16 SHIPPING

- A. Provide LANL with a copy of the bill of lading concurrent with the shipment. Properly and clearly describe the shipment on the bills of lading.

1.17 RECEIVING

- A. **Final Inspection and Acceptance:** LANL will inspect the shipment as necessary to ensure that received items have not been damaged during shipment and that required items and supporting documentation have been received. The receipt inspection by LANL at Los Alamos constitutes final acceptance.

1.18 WARRANTY

- A. Guarantee the enclosures and enclosure equipment at design conditions and warrant that materials and workmanship or apparatus supplied, are in accordance with subcontract document requirements.

1.19 SITE CONDITIONS

- A. Enclosures will be installed at an altitude of 7,500 feet above sea level at Los Alamos National Laboratory, located in Los Alamos County, NM.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Comply with Section 01 2500, "Substitution Procedures."

2.2 SUPPLIERS

- A. Companies specializing in manufacturing products specified in this section with suitable documented experience of performing similar work.
 - 1. Absolute Control Systems
5168 Parfet St., Unit G
West Ridge, Colorado 80033
(303) 420-8922
 - 2. JONA Machining Company
2685 Industrial Lane
Broomfield, Colorado 80020
(303) 438-1570
 - 3. Premier Technology, Inc.
170 East Siphon Rd.
Pocatello, Idaho 83202
(208) 238-3036

2.3 MATERIALS

- A. Provide new materials complying with this section and relevant standards.
- B. For enclosure shell materials use stainless steel type 304L.
- C. Stainless Steel Sheet:
 - 1. Fabricate enclosures from 300-series stainless steel, as specified on the subcontract drawings. Use 7-gauge sheet stock with a No. 2B mill finish on both sides conforming to ASTM A 240/A 240M and ASTM A 480/A 480M for shell material.
 - 2. Fabricate 16-gauge sheet used to cover the lead sheet on shielded enclosures from 300-series stainless steel as specified on the subcontract drawings. Provide sheet with a No. 2B mill finish on both sides.
 - 3. It is recommended that the supplier purchase stainless steel sheet with a protective coating on both sides to protect the mill finish.
 - 4. Provide to LANL a Certified Material Test Report, as part of the QA Document Package in accordance with Exhibit I.

D. Stainless Steel Plate:

1. Do not use plate stock except where so specified in the subcontract drawings. When plate stock is required for use as a reinforced floor or as mounting pads for equipment, use the same grade of stainless steel as the shell material per ASTM A 240/A 240M. Polish the plate stock to the surface finish required by Paragraph 3.3.

E. Stainless Steel Bars and Shapes:

1. Provide structural bars and shapes used in enclosure fabrication in the same grade of stainless steel as the enclosure shell material, meeting the requirements of ASTM A 276.
2. Where approved by LANL, equivalent shapes may be fabricated by bending the appropriate sheet or plate stock.

F. Stainless Steel Forgings:

1. Provide forged couplings and other forged pieces used in enclosure fabrication as the same grade of stainless steel as the enclosure shell material. Ensure forgings meet the requirements of ASTM A 182/A 182M or ASTM A 479/A 479M. Castings are not permitted unless specified in the subcontract drawings. Castings are permitted for 150# rated pipe elbows. Couplings rated for 3000# may be used in lieu of couplings rated for 150# when the couplings are unavailable in the same material as the enclosure shell.

G. Stainless Steel Structural Shapes:

1. Provide stainless steel structural shapes including channel, I-beam, and L-angle per the chemical and physical requirements of ASTM A 276. Provide CMTR's with structural shapes.

H. Stainless Steel Structural Tubing:

1. Ensure square and rectangular tubing used for the support stand meet the chemical and physical requirements of ASTM A 554.

I. Carbon Steel:

1. Ensure carbon steel for the enclosure support stand conforms to the chemical and physical requirements of ASTM A 36/A 36M, ASTM A 572/A 572M, or A588 standards as specified on the subcontract drawings.

J. Welding Materials:

1. Use filler materials that conform to ASME B&PV Code, Section II, Part C and as follows:

Base Material	Filler Material
Type 304L SS	ER 308 L, or ER 347

2. Provide CMTRs or CoCs for welding filler materials used in the fabrication process as part of the QA Document Package in accordance with Exhibit I.

K. Iris Ports:

1. Use bare-hand entry ports of the round or oval shape for enclosures. Provide weld-in or clamp-in Iris Ports. Fit Iris Ports with blank plugs for when not in use.

L. Windows:

1. Provide viewing pane material of polycarbonate resin (Lexan).
2. Provide window materials with Certified Material Test Reports (CMTR). Certificates of Conformance (CoC) may be provided in lieu of CMTR's with prior approval from LANL.
 - a. Polycarbonate Resin: Provide fire retardant grade Lexan with silicate coating (MARGuard).
3. Provide window gasket elastomers of black neoprene, with durometer between 40 and 60, shore A.

M. Fasteners:

1. Provide fasteners with Certified Material Test Reports (CMTR). Certificates of Conformance (CoC) may be provided in lieu of CMTR's, when CMTR's are not available from the mill or subtier supplier. Where approved by LANL prior to submittal, CoCs may be submitted in lieu of CMTRs.
2. Use UNC-series threads with screws, fasteners and components with mating threads.
3. Provide bolts and cap screws with grade marks.
4. Implement provisions to ensure that materials used or supplied are not counterfeit or of other suspect origin. Pay particular attention to high strength bolting materials (grade 5 and 8 strength) and pipe fittings. Reference Attachment 4 for further guidance on suspect fasteners.
5. Stainless Steel
 - a. Unless otherwise specified on the subcontract drawings, use stainless steel for nuts and washers used in the enclosure fabrication.
 - b. Use stainless steel fasteners type 304, 304L, 316 or 316L.
 - 1) Bolts and Hex Head Cap Screws: ASTM F 593, Grade 2A.
 - 2) Nuts: ASTM F 594, Grade 2B.
 - 3) High Crown Acorn Nuts: AISI 300-series
 - c. In the event that fasteners are not readily available meeting the requirements of ASTM F 593 and ASTM F 594, then fasteners meeting the requirements of ASTM A 193/A 193M and ASTM A 194/A 194M, respectively may be substituted with prior approval by LANL.
 - d. Ensure graded stainless steel fasteners conform to the following standards: ANSI B18.2.1, SAE J429, and ASTM A 354.

6. Carbon Steel

- a. Carbon steel bolts per ASTM A 307 or ASTM A 325 and nuts per ASTM A 563. Ensure graded carbon steel fasteners conform to the following standards: ANSI B18.2.1, SAE J429, and ASTM A 354.

7. Stainless Steel Weld Studs

- a. Ensure Capacitive Discharge (CD) weld studs welded to the exterior of the enclosure are 300 series stainless steel and meet the chemical requirements of ASTM A 276. Ensure weld studs welded to the interior of the enclosure are of the same type stainless steel as the enclosure shell. Provide CoCs with CD weld studs.

N. UL-Rated Components:

- 1. Where certified products from Underwriters Laboratories Inc. (UL) or another nationally recognized testing laboratory are available, provide them in lieu of non-certified units. Request approval from LANL for the use of non-UL certified products.

O. Paint:

1. Primer

- a. Provide coating materials of the type and color specified on the subcontract drawings. If unspecified, use a heavy-duty primer (PLASITE 7102 Heavy Duty Primer by Wisconsin Protective Coatings, or equal). Provide a primer that meets the following requirements:

- 1) Minimum dry film thickness of 2.5 mils.
- 2) Heat resistance of 200° F.
- 3) Minimum volume solids content of 43%.

2. Finish

- a. Ensure coating materials are of a type and color specified on the subcontract drawings. If unspecified, use a cross-linked epoxy-phenolic cured finish with an alkaline curing agent (PLASITE 7122 by Wisconsin Protective Coatings, or equal). Provide a finish that meets the following requirements:

- 1) Pearl gray color.
- 2) Minimum dry film thickness of 5 mils.
- 3) Heat resistance of 200° F.

2.4 AS-BUILT DRAWINGS

- A. Prepare as-built drawings to reflect the enclosure, as fabricated. Provide as-built drawings consisting of either CADD generated drawings or a redline markup of the fabrication drawings. Submit as-built drawings as part of the QA Document Package in accordance with Exhibit I. Document the following in as-built drawings:

- 1. Modifications and Deviations: Reflect modifications and deviations to the subcontract drawings that have been approved by LANL and

subsequently implemented by the supplier. Do not note dimensional exceptions fabricated within the tolerances of the subcontract drawings.

2. Weld Locations on Weld Map: Indicate enclosure shell (primary confinement) weld locations on the weld map drawings. Do not depict other welds for stiffeners, stands, attachments, and outer skin. Provide numbering of welds and identification of welders and inspectors.
3. Material Identification: Identify material and heat number of each sheet (or piece – plate) of material used in the enclosure shell weldment on the weld maps.

PART 3 EXECUTION

3.1 GENERAL FABRICATION REQUIREMENTS

- A. Perform cutting with mechanical shop tools, plasma arc, laser, or water jet. Do not use carbon arc or iron powder cutting on stainless steel.
- B. Ensure cut or raw edges are deburred and smooth to the touch.
- C. Ensure shell bends have an inside radius of 5/8 inches with other bends having a minimum inside radius equal to the thickness of material, unless otherwise specified on the subcontract drawings.
- D. Chase coupling threads with tap after the coupling is welded into place.
- E. Use wire brushes made of stainless steel. Ensure grinding wheels and wire brushes are new or previously used only on stainless steel.
- F. Temporary carbon steel clamps, supports, braces, and fixtures used during fabrication are not be welded directly to, or come into direct contact with, any stainless steel surfaces. Do not use galvanized steel clamps or fixtures.
- G. Clean press brake dies with solvent before use in forming stainless steel materials. Ensure carbon steel parts of the press brake that will come in contact with the stainless steel material are masked or covered to control carbon contamination.
- H. Provide a weld fit-up inspection after the enclosure is formed and tack welded in place but before final welding. This inspection will also include the preliminary dimensional inspection. Provide LANL with a seven (7) working day advance written notice so that a LANL representative may witness the activity.

3.2 DIMENSIONAL CONTROL

- A. Ensure dimensions and tolerances specified on the subcontract drawings apply to the finished enclosure or component. Indicate compliance with all dimensions by developing and submitting a Dimensional Control Map. Verify all dimensions on drawings and document measured dimensions on Dimensional Control Map. Also document surface flatness measurement around sealed openings as required in Drawing 26Y-202001. Submit Dimensional Control Map with QA Document Package.

- B. Ensure flatness of the enclosure cutout surfaces is in accordance with Drawing 26Y-202001 by:
1. Providing a dimensional inspection report that takes a measurement every 6 inches around the perimeter of the cutouts. This inspection report (flatness grid map) must be submitted with QA Document Package.
 2. Ensuring the tooling and equipment used for determining surface flatness is verified to be flat within 0.10 of the minimum flatness tolerance defined in the general notes for Enclosures, Dryboxes & Introductory Boxes, 26Y-202001.
 3. Submitting to LANL for their review and approval the methodology/procedure to be used to verify cutout surface flatness.

3.3 SURFACE FINISHES

- A. In order to preserve the original finish of the stainless steel sheet material, exercise care to prevent scratching, abrading, nicking, and denting during receiving, storage, fabrication, and handling. Preserve the original protective coating as long as possible.
- B. After fabrication is completed and before testing and inspection, clean, de-scale, and degrease enclosures and associated components. Do not paint stainless steel surfaces, interior or exterior, unless specified on the subcontract drawings.
- C. Surface finishes for enclosures are specified below and on the subcontract drawings.
1. Exterior: Provide exterior surfaces with a 2B sheet finish except welds or damaged surfaces.
 2. Interior: Provide interior surfaces with a 2B sheet finish except welds or damaged surfaces.
 3. Cladding: Provide cladding surfaces with a 2B sheet finish except welds or damaged surfaces.
 4. Welds: Grind and polish welds parallel to the weld to a 32-microinch-roughness height (arithmetical average) finish and blended to the adjacent material. Limit grinding and polishing to the zone disturbed by the welding not exceeding a 2-in. width. Ensure welds covered by shielding are ground so that there is no unevenness in the shielding. Perform liquid penetrant testing on welds covered by shielding.
 5. Damaged Surfaces: Polish damaged surfaces to a 32-microinch-roughness height (arithmetical average) finish. Limit the extent of refinishing to the immediate damaged area.
 6. Plate: When plate stock is required, polish it to a 32-microinch-roughness height (arithmetical average) finish. Grind plate surfaces to remove pickled finish. Liquid penetrant plate surfaces to locate pits. Repair pits with weld. Grind repair welds and liquid penetrant test again, until pits are removed. Grind and polish repairs to blend with the surrounding material.
 7. Appurtenances: Finish appurtenances, such as, but not restricted to doors and door hardware, shelves, brackets, and machined components to a 32-microinch-roughness height (arithmetical average).

8. Openings: Polish a band 1-inch wide around window and panel openings to a 32-microinch finish such that the grain is parallel to the edge of the opening.

3.4 WELDING

- A. Welder Performance Qualification Records (WPQ): Ensure welders, welding operators, and tackers are qualified in accordance with ASME B&PV Code, Section IX. Use welders who have successfully performed welder certification tests in the 3G position. Use welders for welding pipe and tubing who have successfully performed welder certification tests in the 6G position. Provide WPQs for personnel performing welding operations on the enclosures. Submit these records to LANL for approval, prior to fabrication.
- B. Welding Procedure Specification (WPS): Use welding procedures specifying standard stainless steel (P8 to P8) WPS per ASME B&PV Code, Section IX. The range of material thickness covered by the procedure is 3/16 in. For carbon steel, use welding procedures meeting the requirements of ASME B&PV Code, Section IX or AWS D1.1/D1.1M. Use WPSs that cover the entire range of material thicknesses being welded. Provide a weld procedure that addresses weld repair and welding equipment. Submit the welding procedures to LANL for approval prior to fabrication.
- C. Welding Procedure Qualification Record (PQR): Use welding procedures, including weld repair procedures, meeting the requirements of ASME B&PV Code, Section IX. This record is a standard PQR for ASME B&PV Code, Section IX, which qualifies the supplier's procedure for welding stainless steel (P8 to P8). Submit the PQR to LANL for approval, prior to fabrication.
- D. Welding Processes:
 1. Unless otherwise stated on the subcontract drawings, do not weld carbon steel to stainless steel.
 2. Perform stainless steel welding using GTAW (TIG) methods on stainless steel plate. Optional welding methods using Flux Core Arc Weld, FCAW (MIG), or GTAW (TIG) as the root weld along with Submerged Arc Weld (SAW) to complete the weld are allowed. Submit welding procedure specifications (WPSs) to LANL for approval prior to fabrication.
 3. Use shielding gas as specified in the supplier's welding procedure specifications.
- E. Cleaning Before Welding: Prior to welding, interior and exterior surfaces, remove dirt, scale, corrosion, dust, grease, oil, water, or foreign material. Do not use a carbon steel brush for cleaning.
- F. Weld Joint Design:
 1. Material 1/8 in. or thinner may be fusion welded without joint spacing between work pieces. Bevel material of 1/8 in. or thinner if required to obtain the specified full penetration weld.
 2. Bevel material with thickness greater than 1/8 in., but less than 1/2 in., to provide a 1/16 in. flat nose with either a 60° V-type or 75° U-type butt joint.

3. On tee and corner joints or material 1/8-in thick or greater, provide one work piece with a 45° bevel and with a 1/16-in. flat nose.
- G. Butt Welds:
1. Provide butt welds with full penetration and with a uniform transition from the joined materials into the weld deposit. Ensure the welds are free of undercutting and un-fused overlap of the weld deposit.
 2. Ensure the width of the finish weld layer of butt welds are held to a minimum and do not exceed the width of the weld groove by more than 1/16 inch.
- H. Fillet Welds:
1. Provide fillet weld surfaces with a uniform transition from the joined material into the weld deposit. Provide welds free of undercutting and un-fused overlap of the weld deposit.
 2. Provide fillet welds, unless otherwise specified, symmetric with respect to the components they join.
 3. Ensure the minimum permissible length of each leg of a fillet weld is equal to the required size of the weld as called out on the procurement drawing, or equal to the thickness of the lighter section being joined if no size is specified. Seal welds are sufficient for sealing with no minimum size requirements.
- I. Weld Defects:
1. Provide welds free from defects including the following defects and conditions:
 - a. Cracks of any description in the weld or base metal.
 - b. Crater checks or cracks.
 - c. Slag inclusions, oxide inclusions, or gas holes.
 - d. Cold laps in the deposited weld metal.
 - e. Overlap of weld metal on the base metal.
 - f. Undercutting at the edge of the welds. Ensure no part of the finished face of weld in the area of fusion of welded joints lies below the surface of the base metal adjoining the weld.
 - g. Depressions in butt welds below the work piece surface on either side of the welded seam.
 - h. Unfilled weld craters or shrinkage cavities.
 - i. Evidence of damage to the weld metal through oxidation. Oxidation is defined as scaling of the metal that cannot be removed or restored to a bright metal by wire brushing with a stainless steel brush. Heat discoloration or blackening is not considered oxidation.
 - j. Weld spatter.
 - k. Arc burns or scars on the base metal caused by striking or dragging the welded arc across the base metal.

- I. Butt welds with less than 100% penetration. Butt joints normally welded from one side only may be welded from both sides to obtain 100% penetration, provided that no excessive warping occurs in the sections being joined.
 - m. Intermittent or skip welding, except on exterior stiffeners and unless specified as such on the subcontract drawings.
 - J. Stud Welding:
 - 1. Use only capacitive discharge (CD) weld studs, unless a stud size larger than 5/16-inch in diameter is specified on the subcontract drawings.
 - 2. Remove weld spatter.
 - 3. Provide base of male and female studs flush with the plate to which they are welded. Ensure the axis of studs is perpendicular to the plate to which they are welded within 2°.
 - 4. Perform stud gun testing whenever a series of male or female studs are to be welded. Provide a stud gun test procedure before fabrication.
 - 5. Submit test reports for each series of stud welding. Perform the setup and testing as described below:
 - a. Shoot five studs onto a test plate of the same material as the enclosure shell.
 - b. Submit each of the five studs to a torque test or a tensile test.
 - 1) Ensure the torque testing apparatus meets the requirements of ASME B&PV Code, Section IX, Paragraph QW-466.5. Provide tensile testing apparatus in accordance with ASME B&PV Code, Section IX, Paragraph QW-466.6.
 - 2) Ensure the acceptance criteria are as specified in ASME B&PV Code, Section IX, Paragraph QW-192.3.
 - 3) If female studs are to be tested, determine the stud size by the nominal thread size and not the diameter or base size.

- K. Stud Test Reports:
 - 1. Provide test reports for each series of stud welding operations. Ensure these tests comply with the supplier's stud test procedure. Include the following information in the test reports:
 - a. Enclosure identification.
 - b. Date of test.
 - c. Name and signature of test operator.
 - d. Stud gun make, model and settings.
 - e. Torque values at failure or tensile values at failure.
 - f. Failure mode of each of five test studs.

3.5 STAINLESS STEEL CUTTING

- A. Air arc cutting of stainless steel is not permitted.
- B. If plasma cutting is used, grind cut surfaces to remove fused surface.
- C. If stainless steel is nibbled, grind points.

- D. Shearing of material is acceptable.
- E. Laser or water jet cutting preferred.

3.6 CHLORIDE CONTENT CONTROL

- A. Exercise control during stages of fabrication to minimize exposure of stainless steel to contaminants, in particular any chloride that might cause stress-corrosion cracking.
- B. Avoid chloride-bearing compounds; however, if used, remove them completely by thorough cleaning. Use compounds, liquids, or markers that come into contact with stainless steel surfaces with no more than 250 ppm by weight chloride.
- C. Submit Material Safety Data Sheets or independent lab test reports showing chloride content as part of the QA Document Package in accordance with Exhibit I for cleaning solvents, tape adhesive, and marking pens.

3.7 PAINTING

- A. Scope: Paint carbon steel in accordance with this section and as required by the subcontract drawings. Do not paint stainless steel components.
- B. Surface Preparation:
 - 1. Clean and properly prepare surfaces to be coated before any coating is applied. Prevent rusting and/or contamination of cleaned or primed surfaces. Coat the cleaned surfaces the same day cleaning is done and before detrimental corrosion or recontamination occurs. Remove oil, grease, and other contaminants by solvent cleaning in accordance with SSPC SP-1 before any mechanical cleaning.
 - 2. Use abrasives for blast cleaning that are clean and dry. Select abrasives to provide a proper surface profile for the subsequent priming materials. Ensure air pressure supply lines for blasting have effective and proper moisture and oil trap filter devices. Perform blast cleaning in accordance with SSPC SP-6.
- C. Application:
 - 1. Apply paint to dry, clean, adequately prepared surfaces, in accordance with manufacturer's instructions. Properly cure each coat of paint according to manufacturer's instructions before applying additional coats.
 - 2. Ensure paint containers remain closed until required for use. Mix paint before use in accordance with manufacturer's instructions. Provide agitation during application where specified by the manufacturer.
 - 3. If the total dry film thickness is not obtained in one coat, apply additional coats until the specified thickness is provided.
 - 4. Apply coats in such a manner as to produce a film of uniform smoothness. Pay special attention to crevices, weld lines, bolt heads, corners, and edges to obtain the required thickness.
 - 5. Follow the manufacturer's instructions for thinning, mixing, handling, and applying the products as part of this section.

3.8 LABELING

- A. Attach an identification nameplate to each enclosure with the enclosure number and procurement drawing number on the first line and the grade of stainless steel and the weight of the enclosure on a second line as shown in the example below.

2001-GB-100	55Y-999999
304L	1200 LB
Date Fabricated: XX/XX/XXXX	

- B. Provide nameplate manufactured from 16-gauge stainless steel of the same grade as the enclosure shell. Provide nameplate with dimensions of 2-in. high and 5.5-in. long, fusion welded to the exterior of the enclosure. Etch or engrave lettering into the nameplate with 3/8-in. high letters and numbers. Place the nameplate at the lower right corner of the front of the enclosure if possible.
- C. A supplier identification nameplate may be attached to the enclosure above the welded nameplate. Ensure the supplier nameplate does not exceed eight (8) square inches.

3.9 ASSEMBLY

- A. Conditions:

1. Assemble enclosures in a clean, dust-free area of the supplier's shop.
2. Assemble multiple adjoining enclosures together in an upright position on a level surface.
3. Check to ensure the entire length and height of the enclosures are straight and plumb in accordance with the subcontract drawings.

- B. Support Stand:

1. Bolt the support stand frame to the enclosure to stabilize the enclosure structure before shop acceptance testing.
2. Completely fabricate, assemble, inspect, and paint the support stand before attachment to the enclosure. For support stands requiring field welds, do not paint support stand. Do not paint stainless steel support stands.
3. Keep support stand attached to the enclosure for subsequent fabrication operations, inspections, tests, packaging, and shipping.
4. The support stand or support stand legs, after being attached for verification to dimensions and tolerances specified by subcontract drawings, may be removed during enclosure shipping.
5. Use the support stand frame as a template for determining stud location on the enclosure.

3.10 CLEANING

- A. Procedure:

1. Submit, for review and approval, a cleaning procedure describing the methods, materials, controls, and inspections to be used to perform enclosure-cleaning operations.

2. Provide procedures that address cleaning enclosure surfaces to remove dirt, oils, and marking pen ink. Provide procedures that also include a specification of the solvents and/or detergents that will be used.
3. Clean both interior and exterior surfaces by removing weld spatter, oil, grease, markings, from pens and dyes, shop soil, and visible rust. Use cleaning methods that do not introduce iron or chloride contamination. Methods may include cleaning by hot water spray or solvent wiping. Submit the procedure to LANL for approval, prior to fabrication.
4. Ensure the cleanliness of the enclosure meets the approval of LANL at the time of the final inspection.

B. Detergent:

1. If a detergent is needed to ensure thorough cleaning, use a detergent that is low in chloride. Use fresh water for final wash and rinse. Ensure the detergent, wash, and rinse contains less than 250-ppm chlorides. After the water rinse, dry inside surfaces use heat, lint-free cloth, or other means to ensure cleanliness. If heat is used for drying, ensure the final rinse water is fully softened, low chloride water with less than 250-ppm chloride.

3.11 SHOP ACCEPTANCE TESTS

A. Perform the following:

1. Document torque of all fasteners on a torque map. Indicate on the torque map the location of fasteners on the enclosure, torque applied to each fastener, and the calibration data for the torque wrench. Provide the torque map as part of the QA Document Package.
2. Perform non-destructive examination including liquid penetrant testing where required by this section.
3. Perform dimensional inspection (overall dimensions only) required by this section.
4. Perform surface finish inspection required by this section.
5. Perform additional tests and inspection required by this section.
6. Provide the test location, equipment, and instrumentation of certified accuracy and any supplementary temporary connections and auxiliary parts necessary to fully execute the tests.
7. Provide test personnel qualified to conduct, record, and verify test results.
8. Provide LANL with a seven (7) working day advance written notice of shop acceptance tests.
9. Submit the test results as part of the QA Document Package in accordance with Exhibit I.

3.12 NON-DESTRUCTIVE EXAMINATIONS PERSONNEL (NDE) CERTIFICATIONS

- A. Provide NDE personnel performing liquid penetrant testing operations certified in accordance with the requirements of ASNT TC-1A.

- B. Unless witnessed by LANL, provide test reports with signatures by personnel who either performed or witnessed the test and who hold either Level II or Level III certification.
- C. Provide NDE certifications for personnel performing or witnessing the following non-destructive testing inspections:
 - 1. Liquid Penetrant Test.
- D. Submit the NDE certifications for test personnel for approval, prior to testing.

3.13 WELD INSPECTION

- A. Visually inspect welds at the supplier's shop during shop acceptance tests. Perform liquid penetrant testing on primary confinement interior welds and any welds so specified on the subcontract drawings in accordance with ASME B&PV Code, Section V.
- B. Perform liquid penetrant testing after grinding and polishing operations. Repair and re-test detected defects. Submit a liquid penetrant test procedure for approval prior to performing the work. Include test report forms as a part of this procedure. Submit the final liquid penetrant test reports as part of the QA Document Package in accordance with Exhibit I.
- C. Liquid Penetrant Test Reports: Provide liquid penetrant test reports for liquid penetrant inspection of welds or polished plate as required by the subcontract drawings and this section. Include the following information in the test report:
 - 1. Enclosure identification,
 - 2. Date of test,
 - 3. Name and signature of the certified test operator,
 - 4. Location and description of indications,
 - 5. Description of repairs and retest, and
 - 6. Signature of witness.

3.14 DIMENSIONAL INSPECTION

- A. Perform dimensional inspection on the enclosure with a LANL witness present. Verify that the fabricated enclosure is within the overall dimensions and tolerances required by this section and as shown on the subcontract drawings.
- B. Use the as-built drawings to document the dimensional inspection as required by Paragraph 2.3.

3.15 SURFACE FINISH INSPECTION

- A. Perform a surface finish inspection on enclosures to verify conformance of surface finishes to the requirements stated in Paragraph 3.3. Perform inspection with a LANL representative present to witness the inspection. Use a Surface Roughness Analyzer at random places for inspection of the weld and damaged areas. Polish scratches and imperfections detectable by touch.

Enclosure Drawing List	
Drawing #	Drawing Title
26Y-202001	General Notes
26Y-202002	Lead Shielding & Cladding for Zippered and Bolted Enclosures
26Y-202005	Lead Glass Shields for Zippered and Bolted Windows
26Y-202006	Zippered Window Assembly
26Y-202008	Bolted Window Assembly
26Y-202010	Shell Penetrations
26Y-202013	Typical Gloveport Ring
26Y-202014	Bolted Service Panel Assemblies
26Y-202015	Top Access Panel Assembly
26Y-202018	Bag Ring Assemblies
26Y-202019	Removable Shelf Assembly
26Y-202021	Cooling Well Assembly
26Y-202022	Resistance Furnace Well
26Y-202023	14" Dia. Airlock Assembly
26Y-202024	Standard Airlock Slide Tray Assembly
26Y-202026	Connector Ring Closure Cap Assy & Connector Assy
26Y-202031	14" Dia. Welded Connecting Ring Assembly
26Y-202032	Sample Taking Port Assembly
26Y-202034	Reagent Transfer Device Assembly
26Y-202035	Introductory Tube Assembly
26Y-202039	16" Square Connector Assembly
26Y-202046	Air Cylinder Mounting Assembly
26Y-202047	Air Operated Vertical Sliding Door Assembly
26Y-202048	14" Dia. Opening Counterbalanced Door Assembly 151 R/L
26Y-202049	16" Square Airlock Sliding Door--Hydraulic
26Y-202050	14" Dia. Opening Air Operated Vertical Sliding Door Assy
26Y-202052	Introductory Boxes and Hoods Exhaust Transition Piece
26Y-202053	Introductory Boxes and Hoods Upper & Lower Door Assy's
26Y-202057	8" Dia. Exhaust (HEPA) Filter Assembly
26Y-202059	8" Filter Housing Assembly
26Y-202060	Pressure Relief Device 161 Assembly
26Y-202066	Std. Hi-Vac System Diffusion Pump Mounting Flange Assy
26Y-202067	Dutchman Assembly
26Y-202075	Tunnel Dropbox Transition with Firedoor Assy (2 dr)
26Y-202076	Typical Dropbox Detail Bolt Pattern for Transition
26Y-202077	Tunnel Dropbox Transition with Firedoor Assy 167 (1 dr)
26Y-202121	2 x 3 Enclosure Support Stand Assy

Enclosure Drawing List	
Drawing #	Drawing Title
26Y-202122	2 x 2 Enclosure Support Stand Assy
26Y-202123	1 x 3 Enclosure Support Stand Assy
26Y-202124	1 x 2 Enclosure Support Stand Assy
26Y-202125	1 x 1 Enclosure Support Stand Assy
26Y-202130	12" Dia. Exhaust (HEPA) Filter Assembly
26Y-202131	Neutron Shielded Enclosure Details
26Y-202150	O-Ring Gasket Seal Tubing to Valve Joint
26Y-202151	3" and 2 1/4" I.D. Damper Assembly
26Y-202152	4" In-Line Filter Holding Bracket
26Y-202153	Open-Front Enclosure 7 1/2" Sash Assembly

Supplier Deviation Disposition Request		
SDDR Number:	Submittal Date:	Disposition Date:
SUPPLIER	Supplier Name: _____	
	Facility Address: _____	
	Telephone Number: _____ Facsimile Number: _____	
	LANL Purchase Order/Subcontract Number: _____	
	Deviation Description: <i>(Proposed exception, deviation or change. Reference existing requirement in this section or drawing. Attach additional sheets as necessary.)</i> _____ _____ _____	
	Suppliers Proposed Disposition: _____ _____ _____	
	Technical Justification for Deviation: _____ _____ _____	
	Cost and Schedule Justification for Deviation: _____ _____ _____	
	Supplier's Authorized Representative: _____ <div style="display: flex; justify-content: space-between; width: 100%;"> _____ Name _____ Date </div>	

Supplier Deviation Disposition Request		
SDDR Number:	Submittal Date:	Disposition Date:
LANL	LANL Disposition: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____	
	<div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> Approved <input type="checkbox"/> Disapproved <input type="checkbox"/> Approved as Noted </div>	
	<div style="display: flex; justify-content: space-between;"> <div style="width: 35%;"> Subcontract Administrator's Technical Representative: </div> <div style="width: 30%; text-align: center;"> _____ Name </div> <div style="width: 30%; text-align: center;"> _____ Date </div> </div>	
	<div style="display: flex; justify-content: space-between;"> <div style="width: 35%;"> Subcontract Administrator's QA Representative: </div> <div style="width: 30%; text-align: center;"> _____ Name </div> <div style="width: 30%; text-align: center;"> _____ Date </div> </div>	
	<div style="display: flex; justify-content: space-between;"> <div style="width: 35%;"> Contract Administrator: </div> <div style="width: 30%; text-align: center;"> _____ Name </div> <div style="width: 30%; text-align: center;"> _____ Date </div> </div>	

List of Required Submittals										
Section No: 11 5311.10			Type of Submittal			Submittal Schedule				
Section Title: Enclosure Fabrication						Number of Copies				
Description of Submittal Required		Specification Location	For information	For Engineering Review, Comment, and Approval	For Inspection and Acceptance	At Prefabrication Conference	Prior to Fabrication	With Shipment	7 Working Days Advance Notice	As Required
1.	As-Built Drawings		X					1		
2.	Lower Tier Services Plan		X			1		1*		
3.	Fabrication Schedule		X			1		1*		
4.	Bill of Lading		X					1		
5.	Quality Assurance Manual (Fabrication)		X			1		1*		
6.	Fabrication and Quality Control (QC) Procedures (Include Rev # or Date):									
	a. Welding Procedure Specifications (WPS)			X			1			
	b. Welding Procedure Qualification Record (PQR)			X			1			
	c. Material Control Procedure			X			1			
	d. Shop Traveler Procedure			X			1			
	e. Cleaning Procedure			X			1			
	f. Packaging Procedure			X			1			
	g. Leak Test Procedure			X			1			
	h. Liquid Penetrant Test Procedure			X			1			
	i. Stud Test Procedure			X			1			
	j. Calibration Procedure			X			1			
	k. Dimension Mapping Procedure			X			1			
	l. Welding and NDE Personnel List		X			1				
7.	Personnel Qualifications:									
	a. Welder Performance Qualification Records			X			1	1*		
	b. NDE Personnel Certifications			X			1	1*		
8.	Q.A. Document Package									

List of Required Submittals										
Section No: 11 5311.10			Type of Submittal			Submittal Schedule				
Section Title: Enclosure Fabrication						Number of Copies				
Description of Submittal Required		Specification Location	For information	For Engineering Review, Comment, and Approval	For Inspection and Acceptance	At Prefabrication Conference	Prior to Fabrication	With Shipment	7 Working Days Advance Notice	As Required
9.	Test Reports:									
	a. Stud Test				X			1		
	b. Liquid Penetrant Test				X			1		
	c. Torque Map				X			1		
	d. Dimensional Control Map				X			1		
	e. Cutout Flatness Grid Map				X			1		
10.	Material Certifications:									
	a. Stainless Steel for Shell				X			1		
	b. Other Stainless Steel Items				X			1		
	c. Lead				X			1		
	d. Weld Filler Materials				X			1		
	e. Chloride Content				X			1		
11.	Shop Traveler, Completed				X			1		
12.	Certificates of Compliance				X			1		
13.	Supplier Deviation Disposition Request			X				1*		1
14.	Notification for Inspection of Weld Fit-up		X						1	
15.	Notification for Acceptance Testing & Final Inspection		X						1	

*The one NQA-1 shipment copy is delivered to Facility Operations Directorate for record deposition.

Guide to Suspect Fasteners

From *LANL Purchase Order Quality Clauses*, January 1995, Form 838c (ST 2683), Page 4 of 5 (from <http://labs.ucop.edu/internet/sps/lanl.html>, select SI 46.1 at <http://labs.ucop.edu/internet/sps/lanl/46-1.pdf>, then pdf page 12):

"26. Suspect/Counterfeit Fasteners

LANL will not accept any hex-head cap screws (bolts) with any manufacturer's insignia identified on the attached Suspect Fastener Headmark List.

27. Suspect/Counterfeit Flanges

LANL will not accept any foreign manufactured flange and specifically any flange identified as China A-105 B16."

To access the Suspect/Counterfeit Fastener headmark list, open <http://twilight.saic.com/qawg/training.htm>, then open Suspect/Counterfeit Item booklet, click on View S/CI Booklet <http://www.qmo.bnl.gov/DOESCI/bkltview.pdf>, and open to page 23-24.

Inspection Data Sheet – Enclosure			
Supplier:	Purchase Order No.:	Date of Inspection:	Inspector:
Fabrication Phase: <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div><input type="checkbox"/> Review of QA Documentation</div> <div><input type="checkbox"/> Dimensional Inspection Weld Fit-up</div> <div><input type="checkbox"/> Placement of Lead Sheet prior to installation of stainless-steel cladding</div> </div>			
Shop Acceptance Test: <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div><input type="checkbox"/> Review of QA Documentation</div> <div><input type="checkbox"/> Inspection of Enclosure Welds</div> <div><input type="checkbox"/> Helium Leak Test</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div><input type="checkbox"/> Final Dimensional Inspection</div> <div><input type="checkbox"/> Inspection of Enclosure Surface Finish</div> </div>			
Shipping and Delivery: <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div><input type="checkbox"/> Inspection at the Delivery Site</div> <div><input type="checkbox"/> Review of QA Documentation Package</div> <div><input type="checkbox"/> Final Acceptance</div> </div>			
Inspection results and comments:			
Cite the specific QA documentation that was reviewed:			
Inspection Approvals: <input type="checkbox"/> Approved <input type="checkbox"/> Disapproved <input type="checkbox"/> Approved as Noted			
Inspector's Signature: _____ <div style="display: flex; justify-content: space-around; margin-top: 5px;"> Name Date </div>			
Subcontract Technical Representative Approval: _____ <div style="display: flex; justify-content: space-around; margin-top: 5px;"> Name Date </div>			

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 11 5311.10, Rev. 1, dated May 19, 2008.

SECTION 11 5311.12
ENCLOSURE INSTALLATION

PART 1 GENERAL

1.1 SCOPE

- A. This section applies to enclosures designated as project equipment ENC-1701 and ENC-1702. These enclosures are not enclosures in the strict definition. However enclosure criteria are being applied to define expected standard of care.
- B. This specification establishes the technical requirements for the on-site storage, rigging, handling, transportation, materials for installation, installation, examination, testing, inspection, and quality assurance (QA) of enclosures.
- C. Additional technical requirements are provided in the subcontract drawings.

1.2 SECTION INCLUDES

- A. The purpose of this specification is to provide installation requirements. In many cases, the specification will reference other sections of the LANL Construction Manual for more specific requirements, since enclosures typically interface with many different engineered systems.

1.3 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- C. Section 11 5311.08, "Enclosure Design."
- D. Section 11 5311.10, "Enclosure Fabrication."
- E. Section 11 5311.17, "Enclosure Instrumentation."
- F. Section 26 0519, "Low-Voltage Electrical Power Conductors and Cables."
- G. Section 26 0533, "Raceway and Boxes for Electrical Systems."
- H. Section 26 2726, "Wiring Devices."
- I. Section 40 0511, "Compression Fittings on Copper and Stainless-Steel Tubing."

1.4 PROCESS DOCUMENTS

- A. Drawing C55864, Sheet Q-1101, "Process Equipment Plan – North."

1.5 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.6 HOISTING AND RIGGING

- A. Perform onsite hoisting and rigging of enclosures in accordance with LANL P 101-4, "Forklifts and Powered Industrial Trucks," and DOE-STD-1090, "Hoisting and Rigging."

- B. Rig and hoist enclosures in a manner to prevent temporary or permanent distortion of the enclosure shell.

1.7 PREREQUISITES

- A. Prior to performing work, plan the installation process and perform work in accordance with LANL's Integrated Safety Management System (ISMS) as described in LANL HSD 100, Integrated Safety Management System Description Document with embedded 10 CFR 851 Worker Safety and Health Program.
- B. Review drawings, details, manuals, and other materials required for installation of enclosures prior to purchasing materials or performing installation work.

1.8 SUBMITTALS

- A. Provide reference to LANL Subcontract Number, Enclosure Number, Enclosure Title, and Drawing Number on correspondence.
- B. Provide submittals in accordance with Exhibit I requirements.
- C. For all materials used, provide Certified Material Test Report (CMTRs) or Certificates of Conformance (CoC) (if unavailable from manufacturer) indicating compliance with required chemical and physical properties and the test(s) performed to the applicable nationally recognized standards.
- D. Provide other submittals detailed in Quality Assurance below and throughout this section.

1.9 QUALITY ASSURANCE / QUALITY CONTROL

- A. Work identified in this section shall be done under a Quality Assurance Program in accordance with Section 01 4000, "Quality Requirements."

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Comply with Section 01 2500, "Substitution Procedures."

2.2 MATERIALS

- A. Anchors:
 - 1. The enclosures shall be welded to the 10" x 10" concrete floor embedment plates.
- B. Utility Penetration Plugs:
 - 1. Stainless steel of same grade as the enclosure shell material, type 304 or type 316 and that meet the physical requirements of ASME B16.11.
 - 2. Plugs shall also meet the chemical and physical requirements of ASTM A 182 and ASTM A 403 and be dual marked 304/304L or 316/316L accordingly.
 - 3. Do not use cast material for utility penetration plugs.
 - 4. For highly corrosive enclosure environments: high-density polyethylene (HDPE) utility plugs in lieu of stainless steel plugs on the interior of the enclosure only.

5. Use Teflon tape and TruBlu sealant in conjunction with threaded utility plugs and caps.
- C. Piping:
1. Pipe to the enclosure and interior flex hose shall be supplied with process piping.
- D. Fittings:
1. Stainless Steel Pipe Fittings:
 - a. Forged stainless steel, ASTM-A182, Grade F316, 150# pattern, threaded ends, with general dimensions conforming to ANSI B16.3. Pipe fittings $\frac{3}{4}$ -in and smaller.
 - b. Seamless wrought stainless steel, ASTM-A403, Grade WP316L, schedule 40s, butt-welding ends. Pipe fittings $\frac{1}{4}$ -in through $\frac{3}{4}$ -in. piping.
 - c. Seamless wrought stainless steel, ASTM-A182, Grade F316, 3000#, socket-weld ends conforming to ANSI B16.11. Pipe fitting 1-1/2-in. and smaller.
 2. Stainless Steel Tube Fittings:
 - a. Type 316 stainless steel compression type with separate front back ferrules. Provide "Dryseal" type pipe threads, where pipe threads are required, conforming to ANSI B1.20.3.
 3. Refer to Section 40 0511, "Compression Fittings on Copper and Stainless-Steel Tubing," for specification of compression fittings on copper and stainless steel tubing.
 4. Provide face-seal fittings that utilize a metal gasket (copper) for radioactive material service tubing, including tubing that may carry or be contaminated with plutonium.
 5. Provide fitting components conforming to the materials physical and chemical properties identified in appropriate ASTM Standards.
 6. Do not connect, mix, or interchange fitting parts (caps, plugs, ferrules, bodies, etc) of tube fittings made by different manufacturers (such as Parker to Swagelok).
 7. Provide bent tubing in lieu of mechanical fittings for mere changes in routing direction, such as bends and offsets.
- E. Nipples:
1. Stainless steel nipples, type 316, in accordance with ASTM A 182 and ANSI/ASME B16.3, MNPT & FNPT 150# connection.
- F. Wiring:
1. Refer to Section 26 0519, "Low-Voltage Electrical Power Conductors and Cables."
- G. Conduit:
1. Refer to Section 26 0533, "Raceway and Boxes for Electrical Systems."
- H. Receptacles:

1. Refer to Section 26 2726, "Wiring Devices."
- I. Wireways:
 1. Refer to Section 26 0533, "Raceway and Boxes for Electrical Systems."
- J. Instruments
 1. Refer to Section 11 5311.17, "Enclosure Instrumentation."
- K. Light Fixtures:
 1. Provided with enclosures.
- L. Fasteners:
 1. Carbon steel and stainless steel fasteners as specified in Section 11 5311.10, "Enclosure Fabrication." Prevent the use of counterfeit or suspect fasteners by following the guidance in Section 11 5311.10.
 2. Provide Certified Material Test Reports (CMTR) for fasteners to LANL for review and approval. With prior LANL approval, provide Certificates of Conformance (CoC) in lieu of CMTRs for fasteners. Review and approval of submittals by qualified engineering authority.
- M. Welding Materials:
 1. Welding materials including filler rod meeting the requirements of Section 11 5311.10, "Enclosure Fabrication" and ESM, Chapter 13, "Welding and Joining."
 2. Provide Certified Material Test Reports (CMTR) for weld filler to LANL for review and approval. Review and approval of submittals by qualified engineering authority.

PART 3 EXECUTION

3.1 STRUCTURAL

- A. Provide shim packages underneath enclosure stand base plates for final alignment. Do not exceed 1/4-inch. If shims thicker than 1/4-inch are required, then weld shims to base of support stand legs in accordance with the following requirements:
 1. Provide continuous weld around perimeter of shim between shim and base pad of support stand leg.
 2. Provide half-bevel weld of thickness equal to the thickness of the thinnest material being welded (thickness of either the shim or support stand base pad, whichever is thinner).
 3. Perform welding and provide weld procedure specifications, procedure qualification records, and welder performance qualification records in accordance with ESM Chapter 13 Welding and Joining and Section 11 5311.10, "Enclosure Fabrication."

3.2 ENCLOSURE INTEGRITY

A. Windows:

1. If windows are shipped separately, install windows provided by the enclosure supplier on the enclosure in accordance with the manufacturers installation procedures.

B. Service and Access Panels:

1. Plug unused penetrations in service panels with plugs as defined in the Paragraph 2.2 of this section, both inside the enclosure and outside.
2. Attach pipe and tubing to female threaded couplings on service panels in accordance with requirements set forth in ASME B31.3. Apply Teflon tape and TruBlu sealant to threads of male pipe couplings prior to installation (other materials in high rad areas).
3. Attach service and access panels to enclosure using gaskets provided with the enclosure from the enclosure manufacturer.
4. Utilize high-crown acorn nuts, supplied with enclosure from enclosure manufacturer, for attachment of service and access panels.
5. Torque service and access panel nuts to 25-inch pounds +/- 5 inch pounds.
6. Document torque applied to fasteners on a Torque Map of the enclosure. Indicate the location of fastener, torque applied, and calibration data for torque wrench used to tighten fastener. Submit Torque Map for review and approval.
7. Use caution; over-tightening can crack the window or cause failure of the weld stud or screw.

C. Gaskets:

1. Install gaskets with all service panels, access panels, and enclosure primary confinement penetrations.
2. Compress gaskets 25% nominal and no more than 50% of its uncompressed thickness.

3.3 ELECTRICAL SERVICES

A. Connection to Circuits:

1. Documentation:

- a. Hardwire all connections to circuits.
- b. Provide calculations and theoretical diagrams to demonstrate that sufficient electrical capacity is available to operate equipment.
- c. Provide wiring diagrams for all electrical and instrumentation installations. Provide a number for each electrical conductor within an enclosure on wiring diagrams. Identify conductors within specific electrical enclosures on Wiring Diagrams.

2. Labeling:

- a. Label electrical components. Label electrical conductors with unique identification numbers.

- b. Appropriately label conduits located behind enclosures, airlocks and other obstructions.
 - c. Use equipment that is presently listed/labeled by a Nationally Recognized Testing Laboratory such as Underwriters Laboratory (UL) or Factory Mutual (FM).
 - d. Power to equipment or electrical/instrumentation racks must meet national Electrical Code (NEC) requirements.
 - 3. General Installation Guidelines:
 - a. All single section enclosures should contain a minimum of one 115V duplex outlet through a threaded coupling in a removable service panel. 115 V power should be hard wired through conduit or raceways to a junction box of similar metal mounted on the exterior of the enclosure, and directed through flexible insulated cable from the interior duplex outlet to the service.
- B. 120/208-VAC Power:
 - 1. Follow facility specific color code.
- C. Lighting:
 - 1. Utilize circuits dedicated for wiring.
 - 2. Provide lighting fixtures with rubber standoff spacers.
 - 3. Place lighting fixtures with approximately 4-in. of clearance around the perimeter of the fixture.
- 3.4 INSTRUMENTATION AND CONTROLS
 - A. Refer to Section 11 5311.17, "Enclosure Instrumentation."
- 3.5 EGRESS AND MAINTENANCE ACCESS
 - A. Install enclosures so that egress aisle ways are maintained in accordance with NFPA 101, Code for Safety to Life from Fire in Buildings and Structures (*Life Safety Code*).
 - B. Install enclosures so that maintenance access is maintained in accordance with 29 CFR 1910.120, "Occupational Safety and Health Administration" (OSHA) requirements.
- 3.6 WELDING
 - A. Perform welding of carbon steel and stainless steel enclosure components in accordance with ESM Chapter 13 and Section 11 5311.10, "Enclosure Fabrication."
 - B. Provide welding documentation to LANL for review and approval, in accordance with ESM Chapter 13 and Section 11 5311.10, including Welding Procedure Specification, Welding Procedure Qualification Records, and Welder Qualification Test Records.
 - C. Perform weld examination in accordance with ESM Chapter 13 and Section 11 5311.10.

3.7 POST INSTALLATION INSPECTION AND TESTING

A. Documentation and Reporting:

1. Provide inspection and testing reports for all post installation examination, inspection and testing as indicated below.

B. Personnel Qualifications:

1. Use only personnel trained to the same level as that required in Section 11 5311.10, "Enclosure Fabrication," for post installation inspection and testing. Use only equipment calibrated per the requirements of Section 11 5311.10.

C. Visual Weld Examination:

1. Stand Welds: Visually inspect welds performed during installation of the enclosure stand in accordance with requirements defined in AWS D1.1. Inspect welds from both sides, where feasible. Neither removal of the enclosure from the stand nor removal of legs from braces are required to inspect covered welds from the second side unless other indications are present that make the integrity of this weld suspect.
2. Repair welds not passing visual inspection using welding procedures defined in Section 11 5311.10, "Enclosure Fabrication."

D. Surface Finish Inspection:

1. Verify surface finish of enclosure in accordance with requirements defined on Drawing 26Y-202001.
2. Perform visual and tactile inspection of the entire enclosure exterior and spot check of accessible interior areas paying particular attention to any burrs or sharp edges. Look especially for deep scratches caused by shipping or installation damage or by components shipped inside the enclosure breaking loose during transit.
3. Perform visual and tactile inspection of entire enclosure exterior and spot check of accessible interior areas paying particular attention to any areas of surface finish that may have decontamination concerns.
4. Repair damage to the enclosure surface finish in accordance with the requirements set forth in Section 11 5311.10, "Enclosure Fabrication."

E. Fastener Inspection:

1. Window Clamp Strips: Visually inspect all bolted window clamp strip to enclosure connections to verify that all fasteners are in place. Verify by touch that no weld studs have been inadvertently broken by over tightening or shipping.
2. Miscellaneous: Visually inspect all other threaded mechanical connections to verify that all fasteners are in place. Verify by touch that no weld studs have been inadvertently broken by over tightening or shipping. Pay particular attention to joints that affect confinement such as flanges between enclosures, filter housing attachments, and bolted service panels.

3. Torque Map: Submit Torque Map identifying location of fastener, required torque, applied torque, and calibration data of torque wrench used to tighten fastener. Supply Torque Map for fasteners on windows, service panels, access panels, support stand anchors, support stand fasteners, and any other fastener with a specified torque in this specification.

F. Checklist:

1. Complete the Enclosure Certification Checklist provided in Attachment 1 prior to use of the enclosure.

Enclosure Installation Checklist. (3 sheets)

Enclosure ID:			DCP No.:	
Date of General Walk-Thru:			Date of Final Walk-Thru:	
Using Group:				
Enclosure Location:				
No.	Finding	Comment Y/N	Final Finding	Enclosure Requirement
1.0 Electrical Services:				
1.1				Circuits are properly identified at penetrations.
1.2				Circuits are properly identified at breaker panels.
1.3				Voltage and wiring has been checked.
1.4				Instrumentation receptacles and cables identified.
1.5				Instrument pass-throughs are site or factory tested and properly installed.
1.6				Photohelic and solenoid wiring has been checked.
1.7				Enclosure frame properly grounded.
1.8				Other.
2.0 Fire Safety: N/A				
3.0 Seismic Safety:				
3.1				Enclosure support properly attached to the floor.
3.2				Heavy objects on top of or inside enclosure properly secured.
4.0 Enclosure Integrity:				
4.1				Enclosure interior meets surface finish and flatness requirements as defined on Drawing 26Y-202001. Verify flatness around openings prior to installation and following any welding performed on enclosure shell during installation.
4.2				Service panels, filter hat and flanged penetrations have approved gaskets.
4.3				Window frame bolts have been torqued (25 ± 5 in-lb) and gasket surfaces appear smooth. Supply Torque Map to document fastener torques.
4.4				Unused penetrations plugged inside and outside.
4.5				Other.
5.0 Mechanical Services:				
5.1				All gas and liquid services are labeled.
5.2				Other.

Enclosure Installation Checklist. (3 sheets)

Enclosure ID:				DCP No.:
No.	Finding	Comment Y/N	Final Finding	Enclosure Requirement
6.0	Special Items for Inert Atmosphere Enclosures: N/A			
7.0	Radiation and Criticality Safety: N/A			
8.0	Maintenance Access: N/A			
9.0	Enclosure Glove Sharps (Ref. Lessons Learned # 2009-26):			
9.1				Area around iris ports is clear of pinch points or unplanned contact with equipment.
9.2				Equipment inside enclosure free from sharp corners, sharp edges, and abrasive surfaces.
9.3				Threaded fasteners inside enclosure do not have more than 1 to 2 exposed threads.
9.4				Other.
10.0	Summary Certification Finding:			
10.1				New enclosure installation.
Comments and Explanations: 				
Connection to Zone 1 (not for normal operations) is authorized:				
			Enclosure System Engineer	Date

Enclosure Installation Checklist. (3 sheets)

Enclosure ID:				DCP No.:
No.	Finding	Comment Y/N	Final Finding	Enclosure Requirement
Enclosure meets facility requirements for normal operations? <input type="checkbox"/> Yes <input type="checkbox"/> No				
			_____	_____
			Enclosure System Engineer	Date

Instructions and Abbreviations

Certification that enclosures, hoods, equipment, and mechanical and electrical services meet LANL TA-55 standards will be done by qualified personnel.

Inspections may be performed by individuals alone or by teams of qualified individuals. Inspections should be performed during appropriate phases of construction to avoid costly changes after construction is completed.

Findings may be:

- “Conforming” (C),
- “Not Applicable” (N/A),
- “Nonconforming - OK” (NC-OK),
- “Nonconforming - Must Correct” (NC-MC), or
- “Pending certification after connection to Zone 1” (P).

All findings, except “C”, must be addressed in the “Comments and Explanations” block.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 11 5311.12, Rev. 2, dated October 14, 2009.

SECTION 11 5311.17
ENCLOSURE INSTRUMENTATION

PART 1 GENERAL

1.1 SCOPE

- A. This section applies to the enclosures designated as project equipment ENC-1701 and ENC-1702. These enclosures are not enclosures in the strict definition. However enclosure criteria are being applied to define expected standard of care.
- B. This section establishes the technical requirements for the materials of construction, manufacturing, testing, shipment, and quality assurance (QA) of enclosure instrumentation installed at LANL.
- C. This section applies to new instruments associated with a enclosure or other enclosure related processes.

1.2 SECTION INCLUDES

- A. Miscellaneous Enclosure Instrumentation.

1.3 RELATED SECTIONS

- A. Section 01 4000, "Quality Requirements."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- C. Section 11 5311.08, "Enclosure Design."
- D. Section 11 5311.10, "Enclosure Fabrication."

1.4 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.5 SYSTEM DESCRIPTION

- A. Instruments must be suitable for service at 7,500 feet elevation above sea level. Any service derating factor that applies due to use at high altitude must be provided to LANL by the Supplier.

1.6 QUALITY ASSURANCE

- A. Work identified in this section shall be done under a Quality Assurance program in accordance with Section 01 4000, "Quality Requirements."
- B. Instruments with an electrical input or output must be UL listed.
- C. Receipt Inspection:
 - 1. Upon receipt the instrument will be visually inspected for cracks, dents, and other abnormalities that could affect the accuracy of the instrument.
 - 2. Calibration and material certifications listed below will also be checked.

D. Calibration and Material Certifications:

1. Instruments to be calibrated by manufacturer. Calibration must be traceable to NIST standards.
2. Additional instrument calibration used for Pit Manufacturing to be done by LANL.
3. Calibration documentation to be included with the instrument at time of delivery.
4. Material certification for all process-wetted materials to be included with the instrument at time of delivery.

E. Storage and Handling:

1. All openings must be capped, plugged or otherwise sealed against the intrusion of water, dirt and debris. Water must be removed from cavities to protect against damage caused by freezing, and desiccant inserted if appropriate.
2. Instruments must be handled with reasonable care to prevent damage to the instrument before installation.

F. Personnel Qualification:

1. Personnel installing instrumentation must be familiar with type of instrument and required installation practices. Refer to vendor's QA plan for additional requirements for installation personnel.

G. Nonconformances:

1. Nonconformance of an instrument must be documented and corrected before shipment; if found on receipt before installation.

1.7 SUBMITTALS

A. Provide the following in accordance with the requirements of Exhibit I:

1. Provide documentation of ISO 9001 certification (if applicable).
2. Catalog data and certificates of conformance (COC) for all instrumentation.
3. Calibration certification traceable to NIST standards for all instrumentation
4. Detailed installation instructions for the model of instrument supplied.
5. Functional test procedures and reports for all instrumentation.
6. Manufacturer's operation and maintenance instructions for the model of instrument supplied.
7. Operating procedures, maintenance procedures, service schedules, recommended spare parts, and warranties.
8. Manufacturer's assembly drawings, wiring diagrams, and electrical schematics.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Instruments installed in a radiation environment must be constructed of appropriate materials. Fluoropolymers (Teflon, PTFE), Fluoroelastomers (Viton), and Tygon tubing are not to be used if these materials have the possibility of coming in contact with radiation.
- B. Instruments exterior to the enclosure must use appropriate materials of construction between the instrument and the enclosure. Appropriate materials include stainless steel tubing or piping. Appropriate types of fittings include the use of compression type fittings (Swagelok), VCR fittings, or other Facility-approved fittings.

2.2 PRESSURE INSTRUMENTS

- A. None identified at this time.

2.3 MISCELLANEOUS INSTRUMENTS

- A. Drum scale and drum scale indicator, refer to Section 11 5311.08, "Enclosure Design" and Drawing 55864, Sheet Q-5104.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install instruments in accordance with the manufacturer's installation instructions and facility requirements.
- B. Instruments with an NPT connection must be installed per manufacturer requirements. Minimum basic requirements include: Verify that threads are clean, torque "snug tight" using Teflon tape and "Tru Blu" adhesive. Do not over tighten the instrument or use the instrument housing itself for tightening purposes.
- C. Miscellaneous instruments
 - 1. Drum scale and drum scale indicator.

3.2 FIELD QUALITY CONTROL

- A. Receipt Inspection Requirements:
 - 1. Verify correct model number with submitted design and required vendor documentation.
 - 2. Prior to release for installation the instrument must be visually inspected for cracks, dents, and other abnormalities that could affect the accuracy of the instrument.
- B. Test Out:
 - 1. Functionally test all instrumentation in accordance with an approved test procedure.
 - a. Instruments installed on a commissioned enclosure must be tested prior to installation.
 - b. Instruments installed on a new enclosure prior to commissioning must be tested after installation on the enclosure.

3.3 SCHEDULES

A. To be developed.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 11 5311.17, Rev. 1, dated May 19, 2008.

SECTION 12 3100
MANUFACTURED METAL CASEWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Modular component system used to create work space and storage assemblies. Furnish all cabinets and casework, including tops, ledges, supporting structures, and miscellaneous items equipment as listed in these specifications, or equipment schedules, including delivery to the building, setting in place, leveling, scribing to walls and floors as required. Furnishing and installing all filler panels, knee space panels and scribes as shown on drawings.
- B. Furnishing and delivering all utility service outlet accessory fittings, electrical receptacles and communication outlets, as listed in this specifications, or as shown on drawings as mounted on the laboratory casework. All electrical fittings will be packaged separately and properly marked for delivery to the appropriate contractor.
- C. Furnishing service strip supports where specified, and setting in place service tunnels, service turrets, supporting structures and reagent racks of the type shown on the details.
- D. Casework and worksurfaces are fixed and not intended to be movable.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- B. Section 26 2726, "Wiring Devices."
- C. Section 27 1000, "Structured Cabling."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Catalog data indicating component dimensions, configurations, standard colors, construction details, hardware, and utility and service requirements and locations.
- B. Manufacturer's installation instructions.
- C. Shop drawings indicating materials, component profiles and elevations, assembly methods, joint details, fastening method, accessory listing and hardware locations.

1.5 QUALITY ASSURANCE

- A. Use products of a company that specializes in the manufacture of the products specified in this section that has successfully completed at least 25 projects of the same size and scope as this project.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Kewaunee Scientific Corporation, GSA Program, Alpha Adaptable Laboratory Furniture, sinks molded-epoxy resin drop-in plumbing and electrical fixtures to be provided and prepared by the manufacturer. Provide basis of design product or equal in all respects.

2.2 MATERIALS

- A. Sheet Steel: ASTM A 446 (*Standard for Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process, Structural (Physical) Quality*), Grade D, stretcher leveled.
- B. Use safety glass conforming to ASTM C 1048 (*Standard Specification for Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass*), FT-fully tempered, uncoated, Type 1 transparent, 1/8 in. thick minimum.
- C. Use countertops, backsplash and sidesplash made of machine finished, acid-resistant, modified epoxy resin – Kewaunee “Kemresin,” 1 in. thick.
- D. Use sealant at joints in countertops and splashes as recommended by countertop material manufacturer.
- E. Use service fittings and fixtures as indicated on the drawings.
 - 1. Use stainless-steel cup sinks with waste fittings, 2-1/4 in. diameter, 2-1/2 in. deep.
 - 2. Stainless-steel trim escutcheons.
 - 3. Stainless-steel electrical outlet covers.

2.3 HARDWARE AND FITTINGS

- A. Hardware and fittings shall be manufacturer's standard items made of polished stainless-steel or polished chrome-plated steel.

2.4 FABRICATION

- A. Fabricate casework, assembled and welded.
- B. Fabricate corners and joints without gaps or inaccessible spaces where dirt or moisture could accumulate.
- C. Fabricate components of die formed sheet steel. Form each unit rigid, not dependent on adjacent units or building structure for rigidity.
- D. Form edges and seams smooth.
- E. Turn down edges of shelves 1 in. on each side and return 5/8 in. front and back.
- F. Electric spot weld casework, grind joints smooth and flush.
- G. Fabricate drawer and door fronts of sandwiched sheets of sheet steel and reinforced for hardware. Fill with sound deadening core.
- H. Fabricate countertops of full-length material, wherever possible.
- I. Component materials:
 - 1. Use 18 gauge steel for front and back panels, gusset plates, and rails.

- 2. Use 20 gauge sheet steel for drawers, door fronts, cabinet floors, shelves, filler panels, and drawer dividers.
- 3. Use 22 gauge steel sheet for backing sheet to drawer and door fronts.
- J. Set glass in doors with gasket and removable stops to minimize rattles or vibration.
- K. Cut and drill countertops, backs, and other components for service outlets and fixtures.
- L. Install fixtures and fittings built into or part of casework. Provide access panels for maintenance of utility service and mechanical and electrical components.

2.5 FINISHES

- A. Degrease and phosphate-etch steel sheet materials, followed by primer and baked electrodeposited-epoxy enamel.
- B. Shop finish all components.

2.6 STRUCTURAL MODULES

- A. Structural modules shall be designed to mount directly to the wall and provide the primary support structure for the worksurface frames, shelving, and suspended casework. Vertical adjustment for shelving shall be on 1" increments.
- B. Structural module shall also be used as a service riser which provides a wire partitionable chase and support structure for electrical, communication and plumbing services. Module shall provide a minimum of 4" unrestricted horizontal space between the module upright and wall for horizontal plumbing and electrical lines.
- C. Provide module uprights of extruded aluminum with a double slotted steel insert for adjustable shelving on 1" increments. Provide structural modules with heights and widths as indicated on the drawings (84" high modules typical).
- D. Module frames shall be manufactured of 16 gauge CRS steel and locked into uprights to form a rigid connection. Frames shall be designed to accommodate removable access panels, and be provided with cutouts for electrical or communication outlets as shown on the drawings.
- E. Removable access panels shall be 18 gauge CRS steel, and be removable without the use of tools.

2.7 ELECTRICAL AND COMMUNICATION SERVICE UMBILICAL.

- A. Provide service umbilical from upper structural module to ceiling in locations identified on the drawings. Service umbilical shall be a wire chase with an interior adjustable barrier which is used to separate electrical power wiring from communication wiring. Umbilical shall be a minimum of 4"x4" and attach to the support frame service riser on one end and the ceiling tile on the other end.

2.8 GENERAL PURPOSE ELECTRICAL RECEPTACLES

- A. Provide general purpose electrical receptacles in locations as indicated on the drawings. Each worksurface shall be provided with a minimum of two (2) NEMA 5-15R duplex receptacles. Additional receptacles are required to ensure that there is one receptacle for every 3 feet of worksurface.
- B. Provide GFCI protection for receptacles as indicated on the drawings.
- C. General purpose receptacles shall be mounted 2" to 4" above the worksurface.

- D. Receptacles and wiring shall be compliant with applicable requirements of Section 26 2726, "Wiring Devices."

2.9 DEDICATED RECEPTACLES

- A. Provide dedicated, special purpose, electrical receptacles in locations as indicated on the drawings. Receptacles shall be NEMA 5-15R duplex or single receptacles as indicated.
 - 1. Provide single receptacle on lab "islands" as indicated. Receptacle shall be located on upper shelf.
 - 2. Provide duplex receptacle on lab "islands" as indicated. Receptacle shall be mounted to work surface front supports or backpanel approximately 18" AFF.
- B. Receptacles and wiring shall be compliant with applicable requirements of Section 27 2726, "Wiring Devices."

2.10 COMMUNICATION OUTLETS

- A. Provide cutouts for telecommunication outlets as indicated on the drawings. Telecommunication outlets shall be mounted 2" to 4" above the worksurface.
- B. Telecommunication outlets and wiring shall be compliant with applicable requirements of Section 27 1000, "Structured Cabling."

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify presence of required utilities.
- B. Verify adequacy of support framing and anchors.

3.2 INSTALLATION

- A. Install casework, components and accessories in accordance with manufacturer's installation instructions and approved shop drawings.
- B. Use anchoring devices to suit conditions and substrate materials encountered.
- C. Set casework items plumb and square, securely anchored to building structure.
- D. Insulate to prevent electrolysis between dissimilar metals.
- E. Scribe to abutting surfaces and align adjoining components. Apply matching filler pieces where casework abuts dissimilar construction materials.
- F. Field touchup blemishes to match original finish.
- G. Close joints in units and countertops and splashes with sealant.

3.3 PROTECTION OF FINISHED WORK

- A. Protect finished casework from damage during continued construction activity.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 12 3100, Rev. 2, dated September 23, 2009.

SECTION 12 4813
ENTRANCE FLOOR MATS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Roll-up rail mats.
- B. Recessed frames.

1.2 RELATED SECTIONS

- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 COORDINATION

- A. Coordinate size and location of recesses in concrete to receive floor mats and frames.

1.5 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

A. Action Submittals:

- 1. Product Data: For each type of product.
 - a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for floor mats and frames.
- 2. Shop Drawings:
 - a. Items penetrating floor mats and frames, including door control devices.
 - b. Divisions between mat sections.
 - c. Perimeter floor moldings.
 - d. Custom Graphics: Scale drawing indicating colors.

B. Closeout Submittals:

- 1. Maintenance Data: For floor mats and frames to include in maintenance manuals.

PART 2 PRODUCTS

2.1 ENTRANCE FLOOR MATS AND FRAMES, GENERAL

- A. Structural Performance: Provide roll-up rail mats and frames capable of withstanding the following loads and stresses within limits and under conditions indicated:
 - 1. Uniform floor load of 300 lbf/ft².
 - 2. Wheel load of 350 lb per wheel.

- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities.

2.2 ROLL-UP RAIL MATS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following: Balco Inc., Arden Architectural, Specialties Inc., Kadee Industries Inc., Reese Enterprises Inc.
- B. Roll-up, Aluminum-Rail Hinged Mats: Extruded-aluminum tread rails 1-1/2 in. wide by 3/8 in. thick, sitting on continuous vinyl cushions.
 - 1. Tread Inserts: Envi Rontread mat by Arden or equal.
 - 2. Colors, Textures, and Patterns of Inserts: As selected by Architect from full range of industry colors.
 - 3. Rail Color: As selected by Architect from full range of industry colors and color densities.
 - 4. Hinges: Aluminum.
 - 5. Mat Size: As indicated on drawing.

2.3 FRAMES

- A. Recessed Frames: Manufacturer's standard extrusion.
 - 1. Extruded Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6061-T6 or Alloy 6063-T5, T6, or T52.
 - 2. Architectural Bronze: ASTM B 455, Alloy UNS No. C38500.

2.4 CONCRETE FILL AND GROUT MATERIALS

- A. Provide concrete fill and grout equivalent in strength to cast-in-place concrete slabs for recessed mats and frames. Use aggregate no larger than one-third fill thickness.

2.5 FABRICATION

- A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.
- B. Recessed Frames: As indicated, for permanent recessed installation, complete with corner pins or reinforcement and anchorage devices.
 - 1. Fabricate edge-frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.
- C. Coat concealed surfaces of aluminum frames that contact cementitious material with manufacturer's standard protective coating.

2.6 ALUMINUM FINISHES

- A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.007 in. or thicker.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and floor conditions for compliance with requirements for location, sizes, minimum recess depth, and other conditions affecting installation of floor mats and frames.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install recessed mat frames to comply with manufacturer's written instructions. Set mat tops at height recommended by manufacturer for most effective cleaning action; coordinate tops of mat surfaces with bottoms of doors that swing across mats to provide clearance between door and mat.
 - 1. Install necessary shims, spacers, and anchorages for proper location, and secure attachment of frames.
 - 2. Install grout and fill around frames and, if required to set mat tops at proper elevations, in recesses under mats. Finish grout and fill smooth and level.

3.3 PROTECTION

- A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION

SECTION 13 4800
SOUND, VIBRATION, AND SEISMIC CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Seismic protection measures for architectural, mechanical and electrical non-structural components and systems; and for non-building structures.
- B. Requirements specified herein are in addition to any other items specified in other sections of this specification.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions and References."
- C. Section 03 3001, "Reinforced Concrete."
- D. Section 03 1550, "Post-Installed Concrete Anchors – Installation and Testing,"
- E. Section 22 0548, "Vibration and Seismic Controls for Plumbing, Piping and Equipment."
- F. Section 26 0548, "Vibration and Seismic Controls for Electrical Systems."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Product Data: Submit catalog data and certificates of conformance for each type of product specified. If zinc-coated steel is required, but an alternative 'equal' is selected, include information substantiating equivalent corrosion resistance to zinc-coated steel of alternative treatment, finish, or inherent material characteristic.
- B. Shop Drawings
 - 1. Provide templates, and erection and installation details as appropriate for listed items. Ensure details are complete, to include indication of metal thickness, type, grade, class, and dimensions. Show construction details, reinforcement, anchorage and installation with relation to building construction.

1.5 CLOSE-OUT SUBMITTALS

- A. Record Documentation: Submit Project Record Documents to include actual layout of supports / braces, specified certifications, and field test reports of anchorage installation.

1.6 QUALITY ASSURANCE

- A. Provide hangars, supports, and seismic protection that conforms to the requirements of the following codes and standards:
 - 1. IBC
 - 2. ASCE 7.

PART 2 PRODUCTS

2.1 SUBSTITUTIONS

- A. Alternate products may be accepted; as follows:
 - 1. In accordance with Section 01 2500, "Substitution Procedures," substitutions are permitted unless noted otherwise; however, "approved equal" non-building structures and seismically-protected nonstructural components must be reviewed and approved by the structural-engineer-of-record.

2.2 SYSTEM DESCRIPTION

- A. General Requirements
 - 1. The requirements for seismic protection measures described herein shall be applied to the mechanical nonstructural components and systems listed in Section 22 0548, "Vibration and Seismic Controls for Plumbing, Piping and Equipment" (i.e., despite the title, it pertains to all mechanical nonstructural components); the electrical nonstructural components and systems listed in Section 26 0548, "Vibration and Seismic Controls for Electrical Systems;" and the nonbuilding structures and the architectural nonstructural components listed below. Where overlap exists, the more stringent of the requirements will govern.
- B. Nonbuilding Structures and Architectural Nonstructural Components
 - 1. Include the following nonbuilding structures and architectural nonstructural components, as well as the associated seismic control, to the extent required on plans or in other sections of these specifications:
 - a. Interior Nonstructural Walls and Partitions,
 - b. Exterior Nonstructural Wall Elements and Connections,
 - c. Veneer,
 - d. Ceilings,
 - e. Storage Cabinets and Laboratory Equipment,
 - f. Access Floors,
 - g. Appendages and Ornamentations, and
 - h. Signs.

2.3 MATERIALS

- A. Bolts
 - 1. High-Strength bolts, ASTM A 325; nuts, ASTM A 563; and washers, ASTM F 436.
 - 2. Common bolts, ASTM A 307; nuts, ASTM A 563; and washers, ASTM F 436.

3. Anchor rods, ASTM F 1554, Gr. 36; nuts, ASTM A 563; and washers, ASTM F 436.
 4. Bolts, nuts and washers used underground and/or exposed to weather shall be galvanized in accordance with ASTM A 153.
- B. Sway Bracing
1. Material used for members listed in this section and on the drawings shall be structural steel conforming with the following:
 - a. Plates, rods, and rolled shapes, ASTM A 36.
 - b. Wire rope, ASTM A 603.
 - c. Tubes, ASTM A 500, Grade B, 42- ksi yield strength.
 - d. Pipes, ASTM A 53, Grade B.
 - e. Light-gauge angles, less than 1/4-inch thickness, ASTM A 653.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive seismic control for compliance with installation tolerances and other conditions affecting performance of the system. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General

1. Install nonbuilding structures; and architectural, mechanical, and electrical nonstructural components and systems; as shown, and in accordance with the requirements in this and related sections, and manufacturer's instructions and recommendations.
2. Seismic control measures like guy wires, wire rope, etc. shall be installed such that they are taught (i.e., without slack) when the nonbuilding structure / nonstructural component/system they are protecting is 'at rest.'

B. Bracing

1. Bracing shall conform to the arrangements shown.

C. Fastening

1. Unless otherwise indicated, fasten nonstructural components, and their supporting hardware, securely to the building structure.
2. Select each fastener so that the load applied to the fastener does not exceed the manufacturer's recommended load for the fastener.
3. Powder-driven fasteners shall not be used for tension load applications unless approved by LANL.
4. Do not fasten supports to nonstructural components / systems (piping, ductwork, mechanical equipment, electrical conduit, etc.).

D. Anchor Rods

1. Refer to Section 03 1550, "Post-Installed Concrete Anchors – Installation and Testing," for post-installed concrete anchors and Section 03 3001,

"Reinforced Concrete," for cast-in-place concrete anchors. Written approval shall be on file with the Subcontractor, EOR and STR.

E. Sway Bracing

1. Suspended Equipment

- a. Sway bracing shall be provided and installed for items supported from overhead floor or roof structural systems.
- b. Braces shall consist of angles, rods, wire rope, bars, or pipes arranged as shown and secured at both ends as shown.

2. Floor- or Pad-Mounted Equipment

- a. Floor-/pad-mounted equipment shall be bolted to the floor/pad as shown.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 13 4800, Rev. 2, dated August 24, 2009.

SECTION 21 1313
WET-PIPE SPRINKLER SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Scope of Work: Provide design, shop drawings, project record drawings (as-built), equipment, fabrication, labor, transportation and supervision necessary to install, flush, test and place into service a complete hydraulically designed automatic wet pipe sprinkler system.
- B. Components: System shall consist of, but not be limited to, interconnecting piping, fittings, control valves, check valves, alarm valve with trim, fire department connection, sprinklers, hangers, bracing, Inspector's test stations, drains, alarms and other devices for a complete installation in accordance with codes, standards and recommended practice referenced in this section.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 3545, "Water Discharge Requirements."
- C. Section 01 4000, "Quality Requirements"
- D. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- E. Section 01 4444, "Offsite Welding & Joining Requirements."
- F. Section 01 4455, "Onsite Welding & Joining Requirements."
- G. Section 09 9100, "Painting."
- H. Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."
- I. Section 22 0813, "Testing Piping Systems."
- J. Section 22 0816, "Disinfection of Potable Water Piping."
- K. Section 28 3100, "Fire Detection and Alarm."
- L. Section 33 1000, "Water Utilities."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 LANL PERFORMED WORK

- A. LANL will coordinate with the fire department to provide the Subcontractor available water flow/pressure testing data of existing fire protection water supplies.

1.5 DESIGN

- A. The Subcontractor is responsible for performing hydraulic calculations for the sprinkler system in accordance with NFPA 13 that account for all flow and pressure requirements to the location of the flow test hydrant that was used to

determine the static and residual pressures. The Subcontractor is also responsible for determining the location and elevation of the static and residual test gauge relative to the riser reference point and providing this information on the sprinkler design plans in accordance with NFPA 13 [2010 Edition, Sections 22.2.1 and 22.1.3(10)].

- B. Design the system in accordance with the 2010 Edition of NFPA 13.
 - 1. Design the system to protect an Ordinary Group II Hazard in accordance with NFPA 13. Provide a minimum 500 gpm hose stream allowance.
 - 2. System to operate at 7,500 feet altitude.
- C. Seismic Design: Design sprinkler system piping for protection against damage in accordance with NFPA 13 (Section 9.3 of the 2010 Edition) subject to the following modifications:
 - 1. In Paragraph 9.3.1.2, replace the phrase "at least equal to" with "greater than."
 - 2. In Paragraph 9.3.5.6.2, replace the phrase "where C_p is...intermediate values of S_s " with "where C_p is 0.53."
 - 3. If Paragraph 9.3.5.6.2.1 is used to determine the horizontal force, follow the guidance at the outset of Appendix E, Paragraph E.3 (i.e., the text prior to the discussion of the simplification of ASCE / SEI 7 F_p), and use $S_{DS} = 0.75$.
 - 4. Paragraph 9.3.5.6.3 is not applicable (due to Paragraph 2 above)

1.6 SUBMITTALS

- A. Submit the following in accordance with the requirements of Exhibit I:
 - 1. Catalog Data with selected options marked.
 - 2. Certifications for shop welders in accordance with NFPA 13. Field welding certifications by LANL.
 - 3. Installation Instructions.
 - 4. Materials Part List (Bill of Materials) with manufacturer, model number, and quantity.
 - 5. Shop Drawings using a minimum scale of $1/8" = 1'0"$ for plans and $1/4" = 1'0"$ for details. All lettering shall be a minimum of 1/8-inch high.
 - a. Show information required by NFPA 13, including piping, sprinklers, hangers, flexible couplings, roof construction, electro-mechanical devices, occupancy of each area, and ceiling and roof heights.
 - b. Base working plans on design drawings, details and specifications.
 - 6. Test Reports.
 - 7. Operation and Maintenance Manual: Submit system description, system final inspection, and Subcontractor's material and test certificates per NFPA 13, of the completed system project record documents.
 - a. Include in operation and maintenance manuals, instructions, a brief description of type of system installed, routine maintenance

- work defined by step-by-step instructions, and recommended frequency of performance.
 - b. Also include in instructions, possible malfunctions with diagnostic methods and suggested correction of each.
 - c. Describe function of each component or subassembly.
 - d. List recommended spare parts (manufacturer, model number, and quantity).
8. Project Record Drawings (As-Built) on CDs and prints reflecting as-built conditions showing Work completed under this section.
- a. Base as-built drawings on actual survey of the completed installation.
 - b. Provide revised hydraulic calculations demonstrating water supply restrictions have not been exceeded when conditions of installation are different from those anticipated during preparation of Project Record Documents.

1.7 QUALITY ASSURANCE

- A. Work identified in this section for the LLW Treatment Facility shall be done under a Quality Assurance Program (QAP) in accordance with Section 01 4000, "Quality Requirements."
- B. Provide proof that installation firm has satisfactorily performed at least ten projects of equivalent nature and scope of the Projects herein; and is licensed within the State of New Mexico to engage in design, fabrication and installation of automatic sprinkler systems for fire protection.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Materials and Equipment: Protect materials and equipment from damage during shipping, storage and installation.
- B. Plugs and Cover Plates: Protect threaded ends, flanged openings with gasketed metal cover plates to prevent damage during shipment and to prevent foreign materials from entering. Cap or plug drains, vents, small piping, and gauge connections.
- C. Sprinklers, valves and other equipment shall be stored in accordance with the manufacturer's requirements.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."

2.2 MATERIALS

- A. Provide new fire protection materials and equipment, UL Listed or FM Approved, conforming to NFPA 13.

2.3 PIPE AND FITTINGS (UNDERGROUND)

- A. Underground pipe from distribution system transition from PVC to riser shall be ductile iron, thickness Class 52 unless specified otherwise by local authorities or ANSI/AWWA C150/A21.50-81; 350 PSIG pressure rating; tar coated outside, cement mortar lined inside in accordance with ANSI/AWWA C104/A21.4-80. Full lengths of pipe shall be utilized to the greatest extent possible.
- B. Fittings for ductile iron pipe shall be 250 PSIG pressure rating in accordance with ANSI/AWWA C110-77, tar coated outside and cement lined inside in accordance with ANSI/AWWA C104/A21.4-80.
- C. Joints shall be push-on or mechanical type as per ANSI/AWWA C111/A21.11-80.

2.4 PIPING AND FITTING (INSIDE BUILDING)

- A. General: Refer to Paragraph 3.2C for identification of systems where the below specified pipe and fitting materials are used.
- B. Steel Pipe: ASTM A 53, A 795 or A 135, Schedule 40 or Schedule 10, U.S. manufacture, Black steel pipe, plain ends. Piping 2 inches and smaller shall be Schedule 40 minimum.
- C. Galvanized Steel Pipe: ASTM A 53, A 795 or A 135, Schedule 40 or Schedule 10, U.S. manufacture, black steel pipe, hot-dipped galvanized with plain ends. Piping 2 inches and smaller shall be Schedule 40 minimum.
- D. "Hot-dipped" galvanized piping shall meet the requirements of ASTM A 123. Weight of zinc coating must not average more than 1.8 oz per square foot and not less than 1.6 oz per square foot. Zinc coating shall be inside and out.
- E. Provide galvanized piping for fire department connections downstream of check valve.

2.5 FITTINGS (INSIDE BUILDING)

- A. Cast Iron Threaded Fittings: ANSI B16.4, Class 125 standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.
- B. Malleable Iron Threaded Fittings: ANSI B16.3, Class 300, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.
- C. Steel Fittings: ASTM A234, seamless or welded, for welded joints.
- D. Grooved Mechanical Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47 Grade 32510 malleable iron; or ASTM A53, Type F or Types E or S.
- E. Grooved Mechanical Couplings: Consist of ductile or malleable iron housing, a synthetic rubber gasket of a central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure roll-grooved pipe and fittings.
- F. Grooved Mechanical Fittings and Couplings for the entire fire protection system shall be of the same manufacturer as submitted in shop drawing equipment review.
 - 1. Provide flexible couplings to meet seismic requirements of NFPA 13.
- G. Cast Iron Threaded Flanges: ANSI B16.1, Class 250; raised ground face, bolt spot faced.

- H. Cast Bronze Flanges: ANSI B16.24, Class 300; raised ground face, bolt holes spot faced.
- I. Plain end, hooker type, or push-on fittings or couplings shall not be allowed.
- J. Bushings and reducing couplings shall not be allowed.
- K. UL listed and FM Global approved segmentally welded fittings are acceptable. Friction loss and flow data shall accompany hydraulic calculations.

2.6 JOINING MATERIALS

- A. Welding Materials: Conform to Sections 01 4444, "Offsite Welding & Joining Requirements" and 01 4455, "Onsite Welding & Joining Requirements."
- B. Gasket Materials: Thickness, materials and type suitable for fluid or gas to be handled, and design temperatures and pressures.

2.7 VALVES AND STRAINERS

- A. Provide Listed or Approved valves and strainers rated at 175 psig or greater working pressure.
- B. Strainers: Provide "Y" type strainers full line size of connecting piping, with ends matching piping system materials. Select strainers for 250 psig working pressure, with Type 304 stainless steel screens, with #30 mesh.
 - 1. Threaded Ends, 2-Inch and Smaller: Cast iron body, screwed screen retainer with centered blowdown fitted with pipe plug.
- C. Alarm Valve: Minimum acceptable size is 4 inches. Design calls for 6 inches to meet hydraulic supply requirements without a booster pump. Provide a retard chamber, two water pressure gauges and necessary valves and trim for a listed configuration.
 - 1. Provide lockable bypass valve in trim to allow test operation of pressure alarm switch.
 - 2. Equip alarm valve with retard chamber and pressure alarm switch with one normally open contact and one normally closed contact, suitable for 24 VDC where indicated by the Riser Detail.
 - 3. Provide check valve in retard chamber drain line when retard chamber drain line ties into main riser drain.
- D. Gate Valves - 2-Inch and Smaller: Body and bonnet of cast bronze, 175 pound cold water working pressure – non-shock, threaded ends, solid wedge, outside screw and yoke, rising stem, screw-in bonnet, and malleable iron handwheel. Valves shall be capable of being repacked under pressure, with valve wide open.
- E. Gate Valves - 2-1/2 Inch and Larger: Iron body; bronze mounted, 175 pound cold water working pressure – non-shock. Valves shall have solid taper wedge; outside screw and yoke, rising stem; flanged bonnet, with body and bonnet conforming to ASTM A 126 Class B; replaceable bronze wedge facing rings; flanged ends; and a packing assembly consisting of a cast iron gland flange, brass gland, packing, bonnet, and bronze bonnet bushing. Valves shall be capable of being repacked under pressure, with valve wide open.
- F. Butterfly Valves: 2-1/2 Inch to 8-inch gear operated type shall be listed to 175 PSIG with optional internal tamper switch. Body shall be ductile iron with a

corrosion resistant coating. Seat shall be field replaceable without the use of special tools. The valve shall be provided with stem bushings to isolate the stem from the stem journal. The valve body shall be machined with a retaining lip for positive retention of the seat to provide drip tight shutoff at full rated differential pressure with the downstream piping removed.

- G. Swing Check Valves: MSS SP-71; Class 175, cast iron body and bolted cap conforming to ASTM A 126, Class B; horizontal swing, with a bronze disc or cast-iron disc with bronze disc ring, and flanged ends. Valve shall be capable of being refitted while the valve remains in the line. In sizes 3 inch and larger, provide 3/4 inch NPT drainage taps.

2.8 PRESSURE GAUGES

- A. General: Provide pressure gauges of materials, capacities, and ranges indicated, designed and constructed for use in service indicated.
 - 1. Gauge Scale: White coated aluminum, with permanently etched markings. Dial marking subdivision no finer than 1 percent of maximum scale reading and accurate to 3 percent or less. Provide minimum scale range twice the maximum working pressure (when possible).
- B. Type: General Use, 1 percent accuracy, ANSI B40.1 Grade A, phosphor bronze bourdon type, bottom connection.
- C. Case: Stainless steel, drawn steel, or brass, glass lens, 4-1/2 inch diameter.
- D. Connector: Brass with 1/4-inch male NPT.
- E. Range: Conform to the following:
 - 1. Air: 0 - 100 PSIG.
 - 2. Water: 0 - 250 PSIG.
- F. Pressure Gauge Cocks:
 - 1. General: Provide pressure gauge cocks between pressure gauges and gauge tees on piping systems. Construct gauge cock of brass with 1/4-inch female NPT on each end, and "T" handle brass plug.

2.9 VALVE SUPERVISION (TAMPER SWITCHES)

- A. Equip valves which control water to automatic sprinklers with supervisory switches.
 - 1. Provide listed valve supervisory switches with single pole double throw switching contacts, housed in gasketed, weather-tight enclosure, suitable for 24 VDC.
 - 2. Supply supervisory device specifically designed to mount on, and operate reliably with, type of control valve being monitored.
 - 3. Adjust valve position switches to transmit a supervisory signal within two revolutions of valve operating hand wheel or crank (away from its full open position).
 - 4. Switches for normally closed valves shall be design as Supervised Closed tamper switches (transmits a supervisory signal within two revolutions of the valve operating hand wheel or crank away from its full closed position).

- B. Provide alarm control valve with supervisory switch, Potter Electric part number BVS, or approved equivalent, suitable for 24 VDC.

2.10 WATER FLOW SWITCHES

- A. Provide a Potter Model PS10A Pressure Switches, or approved equivalent, (suitable for 24 VDC) at the sprinkler riser to detect a water flow condition in the system.

2.11 SPRINKLERS AND ACCESSORIES

- A. All sprinklers shall be Listed by a nationally recognized testing laboratory and shall be selected in accordance with their Listing, manufacturer's instructions, and applicable NFPA requirements. Provide sprinklers as follows:
 - 1. Unfinished Areas: Brass finish, upright or pendant type, ordinary temperature rated (maximum 170 degrees F), standard response. Use in areas without suspended ceilings.
 - 2. Finished Areas: Chrome finish, pendant type, ordinary temperature rated (maximum 170 degrees F), standard response. Use below suspended ceilings. Provide two-piece escutcheon per manufacturer's recommendation for sprinkler type.
 - 3. Dry Sidewall Sprinklers: Ordinary hazard extended coverage type, brass or chrome finish, ordinary temperature rated (maximum 170 degrees F), standard or quick response. Use in area exposed to freezing as indicated on plans. Order length shall be based on compliance to Paragraph 3.2N.6.
 - 4. Sprinkler Guards: Provide as required by Paragraph 3.2N.5.
- B. Where indicated, provide other types of sprinklers in accordance with their Listing.
- C. Sprinkler Cabinet and Wrench: Finished steel cabinet, suitable for wall mounting, with hinged cover and space for spare sprinklers plus sprinkler wrench. Provide amounts of each style per NFPA 13. Locate sprinkler cabinet(s) on shop drawing submittal.

2.12 FIRE DEPARTMENT CONNECTIONS

- A. Wall-mounted—Type Siamese Connections: Cast brass, 2-way wall-mounted type, with wall escutcheon and having National Standard threads, for the connections size shall be 4-inch outlet and two (2) 2-1/2-inch inlets, as specified in NFPA 1963. Each inlet shall have a clapper valve, and cap and chain. Wall escutcheon to be cast-brass, with words "AUTO SPKR. - FIRE DEPT. CONNECTION" in raised letters.
- B. Locate 34 inches (plus or minus 2 inches) from grade level to center of inlet connection.
- C. Provide signage on west exterior of LLW Utility Building with words "FDC" and arrow pointing to south side of building. Sign to be located near roofline to make visible from fire lane over obstructions and other vehicles.

2.13 SPLASH BLOCKS

- A. Provide concrete splash blocks, approximately 12 inches by 24 inches by 4 inches thick.

2.14 CONTROLS

- A. Refer to Section 28 3100, "Fire Detection and Alarm."

2.15 SPRINKLER RISER BACKFLOW PREVENTER

- A. Manufacturers:
 - 1. FEBCO, Model 880V.
 - 2. Wilkins, Model 475.
- B. Reduced pressure type, vertical orientation, ductile iron body epoxy coated internal and external, with UL/FM OS&Y gate valves, flanged ends, test cocks for in-line field testing and relief valve air gap drain funnel. Maximum water temperature range 33 to 140 degrees F, maximum rated working pressure 175 psig. Assembly shall be Listed in the latest edition of Approved Backflow Prevention Assemblies by the University of Southern California Foundation for Cross Connection Control and Hydraulics Research. Size to match alarm check valve.
- C. Means shall be provided to drain backflow discharge to outside the building or to a floor drain with sufficient capacity to contain the discharge. The discharge drain pipe size shall be one size larger than the nominal diameter of the backflow preventer. The drain pipe shall be routed to the exterior of the building where the exposed pipe opening shall be covered by ¼-inch hardware cloth.
- D. A wall-mounted test header shall be provided downstream of all backflow prevention valves for flow tests at system demand (NFPA 13, 2010 ed., Section 8.17.4.6.1) to make sure the backflow prevention device operates correctly by allowing the fire sprinkler demand, including hose stream demand if required, through the device at the designed pressure loss.
 - 1. The test header shall be provided with 2-1/2 inch exterior connections with male national standard threads.
 - 2. The exterior connections shall be provided with 2-1/2 inch gate valves with caps and chains.
 - 3. Locate test header connection 34 inches (plus or minus 2 inches) from grade level to center of outlet connection.
 - 4. The test header connection shall be clearly and permanently marked as "BACKFLOW TEST CONNECTION"
 - 5. The interior test connection control valve shall be electronically supervised in the closed position.
 - 6. Means, such as an automatic ball drip valve, shall be provided to prevent accumulations of water at the test connection that are subject to freezing.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to installation carefully inspect installed Work of other trades, whether pre-existing or part of this Project, and verify that such work is complete to the point where installation of sprinkler system may start.
- B. Notify the LANL Subcontract Technical Representative (STR) should conditions exist, not resulting from Work of this Project, that prohibits the installation from conforming to referenced codes, regulations, standards and approved design.
- C. Install materials and equipment that are free of moisture, scale, corrosion, dirt and other foreign materials.

3.2 INSTALLATION

- A. General:
 - 1. Install system in accordance with NFPA 13.
 - 2. Do not locate sprinkler heads closer than 12 inches to supply air registers.
 - 3. Visually examine pipe, fittings, valves, equipment and accessories to ensure they are clean and free of burrs, cracks and other imperfections before installation. Clean pipe interiors by flushing.
 - 4. Verify dimensions in field.
 - 5. Drawings show only approximate building outlines and interior construction details as an aid in understanding the scope of Work. Investigate structural and finish conditions affecting the Work and arrange Work accordingly, providing such sprinkler heads, fittings, traps, draining valves, piping, and accessories as required to meet such conditions. Show relevant structural details on Drawings.
 - 6. Do not render inoperative any system without the prior approval of the LANL STR. Coordinate necessary shutdowns of existing systems by notifying the LANL STR a minimum of 7 working days before rendering such systems inoperative.
 - 7. Coordinate sprinkler piping, sprinkler heads and associated equipment with existing ceiling or roof materials, lighting, ductwork, conduit, piping, suspended equipment, structural and other building components.
 - 8. Dispose of equipment removed for completion of this Project as directed by the LANL STR.
 - 9. Provide access openings in areas where concealed sprinkler piping is installed.
- B. Piping:
 - 1. Mark and identify sprinkler piping in accordance with Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."
 - 2. Conceal sprinkler piping in areas with suspended ceilings. Install piping in exposed areas as high as possible using necessary fittings and auxiliary drains. Keep sprinkler piping a minimum of 7 feet 6 inches

above finish floor. Where not possible, run piping at same elevation as existing piping and ducts. Obtain prior approval from the LANL STR.

3. Install Inspector's Test piping at the hydraulically most remote point of automatic sprinkler system and discharge to the exterior of building. Where possible, conceal test piping in wall and provide access panels for valve and sightglass and protect from freezing. Locate Inspector's Test Station in an easily accessible location approved by the LANL STR.
4. Diamond core drill or sleeve concrete penetrations, then grout and seal with fire-resistive material, securely held in place. Use Listed/ through penetration fire stop system assemblies for piping penetrating fire resistance rated construction.
5. Provide a minimum cover for all underground pipe installations per Section 33 1000, "Water Utilities." Install in accordance with AWWA C600.
6. Use approved fittings to make all changes in direction, branch takeoffs from mains, and reductions in pipe sizes. Welded outlet branch pipe fittings are acceptable for black steel pipe only.
7. Use approved fittings to make all changes in direction, branch takeoffs from mains, and reductions in pipe sizes. Welded outlet branch pipe fittings are acceptable for black steel pipe only.
8. Fittings: Standard manufactured fittings. Field fabricated fittings and bushings are prohibited on all piping.
9. Install unions in pipe 2-inch and smaller, adjacent to each valve. Unions are not required on flanged devices or in piping installations using grooved mechanical couplings.
10. Install flanges or flange adapters on valves, apparatus, and equipment having 2-1/2-inch and larger connections.

C. Pipe Applications:

1. Install Schedule 40 steel pipe with threaded joints and fittings for 2-inch and smaller.
2. Install galvanized Schedule 40 steel pipe with roll-grooved ends and grooved mechanical couplings or threaded joints and fittings.
3. Acceptable alternates to Schedule 40 pipe shall be installed per manufacturer's recommendations.

D. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of piping systems. So far as practical, install piping as indicated. Drawings are diagrammatic in character and do not necessarily indicate every required offset, valve, fitting, etc.

1. Deviations from Construction Documents for sprinkler piping require written approval of the Engineer of Record. Written approval shall be on file with the Engineer prior to deviating from the approved Construction Documents.

E. Pipe Support: Install pipe hangers for pipe supports inside buildings in accordance with NFPA 13. For concrete double-tee roof, use pre-installed concrete anchors (no drilling) using UL Listed or FM anchors. Do not use

explosive-driven fasteners as a method of installing anchors or hangers in double-tee. Post installed anchors acceptable for walls and floors. Do not hang other piping or equipment from sprinkler pipe.

F. Pipe Joint Construction:

1. Welded Joints: Conform to Sections 01 4444, "Offsite Welding & Joining Requirements" and 01 4455, "Onsite Welding & Joining Requirements."
2. Threaded Joints: Conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Join pipe, fittings, and valves as follows:

Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.

- a. Align threads at point of assembly.
 - b. Apply appropriate tape or thread compound to the external pipe threads.
 - c. Assemble joint to appropriate thread depth. When using a wrench on valves, place the wrench on the valve end into which the pipe is being threaded.
 - d. Damaged Threads: Do not use pipe with threads which are corroded or damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.
3. Flanged Joints: Align flange surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly to appropriate torque specified by the bolt manufacturer.
 4. Mechanical Grooved Joints: Roll grooves on pipe ends dimensionally compatible with the couplings.
 5. End Treatment: After cutting pipe lengths, remove burrs and fins from pipe ends.

G. Hanging, Bracing and Restraint of System Piping:

1. Install pipe hangers for pipe supports inside buildings in accordance with NFPA 13.
2. Install the seismic protection of the system piping, including sway bracing, as indicated and in accordance with the version of NFPA 13 indicated. Include the required features identified therein that are applicable to the specific piping system.
3. All attachments to concrete double-tee roof by pre-installed anchors only.
4. Install concrete anchors in walls and floors as indicated and in accordance with Division 3, "Concrete," sections on post-installed anchors.
5. Do not hang other piping, wiring or equipment from sprinkler pipe, hangers or supports.

- H. Welding:
1. Shop weld pipe and fittings using approved welding fittings. Comply with NFPA 13 for welding methods and conform to Sections 01 4444, "Offsite Welding & Joining Requirements" and 01 4455, "Onsite Welding & Joining Requirements."
 2. Provide a blind flange or grooved cap at each end of welded headers.
 3. For welded pipe, all cutouts (coupons) shall be removed prior to installation.
 4. "Hot-Dipped" Galvanized Piping shall not be welded.
- I. Alarm Valve: Set plumb and unobstructed: Provide minimum clear distances from walls to centerline of alarm valve as follows:
1. Rear - 12 inches
 2. Sides - 20 inches
 3. Front - 36 inches
- J. System Riser: Install riser from underground so that no joint or fitting occurs within the bearing zone of foundation structures or occurs at least 5 feet from any foundation structure.
- K. Control Valves: Provide Listed OS&Y or butterfly type fire protection control valves. Installed so open or closed status can be readily seen from finish floor.
- L. Fire Department Connection Installations:
1. Install automatic drip valves at the check valve on the fire department connection to the mains. Route drain to exterior.
 2. Install mechanical sleeve seal at pipe penetration in outside walls.
 3. LLW Facility
 - a. Install water motor gong for sprinkler system on west wall of fire valve room.
 - b. Install fire department connection on exterior of west wall of fire valve room.
 4. LLW Utility Building
 - a. Install water motor gong for sprinkler system on south wall.
 - b. Install wall-mounted fire department connection on exterior of south wall.
- M. Backflow Preventer Forward Flow Test Header Installation:
1. Install automatic drip valves for butterfly valve to the mains. Route drain to exterior.
 2. Install mechanical sleeve seal at pipe penetration in outside walls.
 3. Install wall-mounted Test Header on exterior of the west wall of the fire riser room of the LLW Treatment Facility.
 4. Install wall-mounted Test Header on exterior of the south wall of the LLW Utility Building.

N. Sprinklers and Accessories:

1. In unfinished areas, exposed piping below ceiling or roof is acceptable.
2. In finished areas, route supply piping above suspended ceiling.
3. Align sprinklers below ceiling parallel to ceiling features and walls, and locate as close to center as possible in halls and corridors.
4. Provide chrome finish escutcheons where exposed piping passes through finished floors, walls, partitions and ceilings. Secure to pipe with set screws or spring clips.
5. Protect sprinklers subject to mechanical injury with guards as follows:
 - a. Provide guards in mechanical equipment rooms, electrical equipment rooms, janitor's closets, and storage areas where distance from sprinkler deflector to finish floor is less than 15 feet.
 - b. In all other areas, provide guards where distance from sprinkler deflector to finish floor is less than 7 feet.
6. To prevent freezing, extend dry sprinklers a minimum of 6 inches into heated area before connection to wet sprinkler piping.
7. Provide one spare sprinkler cabinet, complete with sprinklers of assorted temperature ratings of the type necessary and in use throughout the installation, at each main riser valve. Equip each cabinet per NFPA 13.

O. Signs:

1. Install as required by NFPA 13.
2. Post indicator valves (PIVs) shall be provided with a permanent weatherproof placard identifying the building or area protected by the sprinkler system for which the PIV controls the water supply.
3. Provide a permanent, weatherproof sign noting "BACKFLOW TEST CONNECTION" located on the exterior of the building in the immediate vicinity of the backflow test connection valves.

P. Painting: Paint sprinkler risers, unfinished pumper connection piping, exposed sprinkler piping in stairwells, and sprinkler piping in all equipment rooms with 2 coats of Fire Protection Red. Do not paint sprinkler heads. Any sprinkler heads receiving paint require replacement. Comply with Section 09 9100, "Painting."

Q. Unsupervised Water Supplies: Install approved water flow detection device on underground water supplies entering buildings when fire protection riser is more than 10 lineal feet from exterior of building.

R. Water Supply Control Valve: Where not otherwise provided for, provide water supply control valve(s) conforming to the requirements of NFPA 24.

1. Provide UL Listed or FM valves, with Listed indicating post. Post Indicator Valves (PIVs) shall be located at minimum of 40 feet from building in accordance with NFPA 24. PIVs may be located closer than 40 feet from building providing they are located outside the collapse area of the building's walls. Fire hydrants and PIVs proposed to be located closer than 40 feet away from a building shall receive prior approval of the location from LANL Fire Protection.

2. When a PIV is located less than 20 feet from building, or when a wall PIV is provided, the wall 10 feet in all directions of the valve shall be blank masonry or one-hour fire-resistance-rated construction.
 3. PIVs shall be set so that the top of the post is 32 inches to 40 inches above the final grade.
 4. PIVs shall be protected against mechanical damage (e.g., bollards).
- S. Special Tools and Devices: Provide one complete set of special tools or special devices required for operation, testing and/or maintenance of equipment furnished under this section.

3.3 EQUIPMENT INSTALLATION

- A. Install devices or equipment not specifically covered by these specifications in accordance with manufacturer's instructions.

3.4 CONNECTIONS TO EXISTING SYSTEMS

- A. Final connection of new systems to existing underground piping systems will be made by LANL with materials furnished by the Subcontractor.
- B. Final connection of new systems to other existing systems above grade shall be done by the Subcontractor after contacting the LANL STR who will implement LANL Fire Protection Impairment Procedure. Do all final connections of this type with only one outage per existing system.

3.5 STERILIZATION

- A. For sprinkler systems supplied by the site domestic/fire water distribution system, sterilize the sprinkler system underground piping upstream of alarm valve in accordance with Section 22 0816, "Disinfection of Potable Water Piping."
- B. Do not sterilize sprinkler system downstream of alarm valve.

3.6 EXISTING CONDITIONS

- A. Area Restoration: Restore areas disturbed by the fire protection system installation to the condition existing prior to start of construction.
- B. Field Inspection: Field inspect areas of sprinkler installation for potential interference with ducts, cable trays, electrical or mechanical equipment, and other similar interferences. Carefully coordinate Work under this section with other Work.

3.7 TESTING

- A. Hydrostatically test piping in accordance with Section 22 0813, "Testing Piping Systems," and NFPA 13.
- B. Flush system with water in accordance with NFPA 13 and 24.
- C. Comply with the discharge requirements in Section 01 3545, "Water Discharge Requirements."
- D. Notify LANL STR, LANL Fire Protection Division, and LANL Facility Operations Director (FOD) representative at least 5 working days in advance to witness all system tests.

3.8 INSPECTION

- A. Inspect new fire protection system in accordance with NFPA 13 and 24, in the presence of the LANL STR. Give advance notice, as specified below, to the STR prior to any tests.
 - 1. Notify the LANL STR upon completion of installation of all materials and equipment. LANL STR will schedule inspection of installation within 5 working days after Subcontractor notification.
 - 2. Correct deficiencies noted during this inspection and correct prior to further testing.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 21 1313, Rev. 3, dated March 23, 2010.

SECTION 22 0529

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Furnish and install pipe hangers, supports, hanger rods, inserts, and sleeves, and other positive fastenings for mechanical non-structural components such that gravity loads are safely transferred to the structure.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4000, "Quality Requirements."
- C. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- D. Section 01 4444, "Offsite Welding & Joining Requirements."
- E. Section 01 4455, "Onsite Welding & Joining Requirements."
- F. Section 09 9100, "Painting."
- G. Section 22 0713, "Plumbing and HVAC Insulation."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Manufacturer's catalog data of hangers and supports including load capacity.
- B. Shop Drawings showing system layout with location including critical dimensions, sizes, and pipe hanger and support locations and detail of trapeze hangers.
- C. Manufacturer's installation instruction for special procedures and assembly of components if required.
- D. Certification of welders and qualified welding procedures per Section 01 4444, "Offsite Welding & Joining Requirements" and Section 01 4455, "Onsite Welding & Joining Requirements."

1.5 QUALITY ASSURANCE

- A. Work identified in this section shall be in accordance with Section 01 4000, "Quality Requirements."
- B. Hangers and supports shall conform to the requirements of the following codes and standards as applicable:
 - 1. ASME B31.3, Process Piping
 - 2. ASME B31.5, Refrigeration Piping and Heat Transfer Components
 - 3. ASME B31.8 Gas Transmission and Distribution Piping
 - 4. ASME B31.9, Building Services Piping
 - 5. Uniform Mechanical Code, (UMC)

6. 49 CFR 192 Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards
7. Uniform Plumbing Code, (UPC)
8. NFPA-13, Standard for the Installation of Sprinkler System
9. NFPA 54, National Fuel Gas Code
10. MSS SP-58, Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application, and Installation

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."

2.2 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 inches: Malleable iron or carbon steel, adjustable swivel, split ring.
- B. Hangers for Cold Pipe Sizes 2 inches and over: Carbon steel, adjustable, clevis.
- C. Hangers for Hot Pipe Sizes 2 to 4 inches: Carbon steel, adjustable, clevis.
- D. Hangers for Hot Pipe Sizes 6 inches and over: Adjustable steel yoke, cast iron roll, double hanger.
- E. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- F. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 inches and over: Steel channels with welded spacers and hanger rods, cast iron roll.
- G. Wall Support for Pipe Sizes to 3 inches: Strut clamp or cast iron hook.
- H. Wall Support for Pipe Sizes 4 inches and over: Welded steel bracket and wrought steel clamp.
- I. Wall Support for Hot Pipe Sizes 6 inches and over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
- J. Vertical Support: Steel riser clamp.
- K. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- L. Floor Support for Hot Pipe Sizes to 4 inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- M. Floor Support for Hot Pipe Sizes 6 inches and over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
- N. Copper Pipe Support: Copper-plated, carbon steel ring.

2.3 HANGER RODS

- A. Mild steel threaded both ends, threaded on one end, or continuous threaded.
- B. Rods for trapeze hangers shall be a minimum 3/8-inch. The use of pipe hooks, chains, perforated iron strapping, or wire for pipe supports are NOT permitted.

2.4 INSERTS

- A. Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment; top slot for reinforcing rods; lugs for attachment to forms; size inserts to suit threaded hanger rods.

2.5 SLEEVES

- A. Sleeves for Pipes through Non-Fire Rated Beams, Walls, Footings, and Floors: Steel pipe or 18 gage galvanized steel.
- B. Sleeves for Pipes through Fire Rated and Fire Resistive Floors, Walls, and Roof: Prefabricated fire rated sleeves including seals, approved by a nationally recognized testing laboratory (UL listed).
- C. Sleeves for Ductwork: Galvanized steel.

PART 3 EXECUTION

3.1 INSERTS

- A. Install inserts for placement in concrete forms.
- B. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
- E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut.

3.2 PIPE HANGERS AND SUPPORTS

- A. Support piping to maintain its alignment, and prevent sagging.
- B. Place hangers within 12 inches of each horizontal elbow.
- C. Support vertical piping with riser clamps secured to the piping and resting on the building structure at each floor.
- D. Install hangers to provide minimum 1/2 inches space between finished covering and adjacent work.
- E. Use hangers with 1-1/2 inches minimum vertical adjustment.
- F. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- G. Support riser piping independently of connected horizontal piping.
- H. Provide copper plated hangers and supports for copper piping.
- I. Provide insulation continuous through hangers and rollers. Protect insulation by protection saddles and shields in accordance with Section 22 0713, "Plumbing and HVAC Insulation."
- J. Provide hangers on piping on each side of, and within 6 inches of, hubless pipe couplings so the couplings will bear no weight.

- K. Provide supports that allow free axial movement and only support the weight of the piping or tubing. Provide additional hangers or brackets to support valves, flanges, specialties, etc., to prevent excessive deflection.
- L. Prime coat exposed steel hangers and supports. Refer to Section 09 9100, "Painting." Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.3 SLEEVES

- A. Provide sleeves for all pipe penetrations through walls, roof, or slab above grade.
- B. Neatly cut holes in existing walls, floors, or roof for placement of sleeves. Place sleeve and grout and caulk annular space to provide finished appearance.
- C. Extend sleeves through floor slab 2 inches above finished floor level. Caulk sleeves full depth and provide floor plate.
- D. Seal space between pipe and sleeve watertight for all sleeves penetrating the roof.
- E. Where piping or ductwork penetrates a fire rated wall or floor, provide fire-stopping insulation so that the assembly when complete retains the fire rating of construction penetrated by the sleeve.

3.4 HANGER SPACING

A. Process Piping

- 1. Comply with the requirements of ASME B31.3 for hanger spacing and material. This includes ASME B31.3 Category M piping even if pressures are below 150 psig.
- 2. Pneumatic testing is only allowed by owner approval and for a maximum pipe volume of 2 cubic feet (ft³).
- 3. Maximum Hanger Spacing:

Size (in.)	1/4 to 1/2	5/8 to 7/8	1	2	3	4	6
Steel Pipe Spacing Steam, Gas or Air Service (ft)	6	6	9	13	15	17	21
Steel Pipe Spacing Steam, Water Service (ft)	6	6	7	10	12	14	17

B. Plumbing Piping – Potable and Nonpotable Water, Drain, Waste and Vent (DWV)

- 1. Comply with the requirements of the Uniform Plumbing Code, (IAPMO), Hangers and Supports.

C. Fire Protection Piping

- 1. Comply with the requirements of NFPA-13, for hanger spacing and materials.
- 2. Maximum Hanger Spacing:

Nominal Size (in.)	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4	5	6	8
Steel Pipe Spacing (ft), except threaded lightwall	N/A	12	12	15	15	15	15	15	15	15	15	15
Steel Pipe Spacing (ft), threaded lightwall	N/A	12	12	12	12	12	12	N/A	N/A	N/A	N/A	N/A
Copper Tube Spacing (ft)	8	8	10	10	12	12	12	15	15	15	15	15
CPVC Spacing (ft)	5.5	6	6.5	7	8	9	10	N/A	N/A	N/A	N/A	N/A
Ductile Iron Pipe Spacing (ft)	N/A	N/A	N/A	N/A	N/A	N/A	15	N/A	15	N/A	15	15

D. Hydronic Piping, up to 150 psig (Heating and Cooling)

1. Comply with the requirements of ASME B31.9, Building Services Piping.
2. Maximum Hanger Spacing:

Size (in.)	< 1	1	1-1/4	1-1/2	2	3	4	6	8
Steel Pipe Spacing (ft)	6	9	11	12	13	15	17	20	21
Copper Tube Spacing (ft)	5	7	7	8	9	10	12	14	16

E. Air and Laboratory Gas Building Services Piping, up to 150 psig

1. Comply with the requirements of ASME B31.9, Building Services Piping.
2. Maximum Hanger Spacing:

Size (in.)	1/4 to 1/2	5/8 to 7/8	1	1-1/4	1-1/2	2	3	4	6	8
Steel Pipe Spacing (ft)	6	6	9	11	13	15	17	21	25	28
Copper Tube Spacing (ft)	3	5	7	9	10	12	15	17	21	24

F. Refrigeration Piping

1. Comply with the requirements of the Uniform Mechanical Code, (ICBO) Refrigeration Supports and ASME B31.5 Refrigeration Piping and Heat Transfer Components.

G. Natural Gas Piping

1. Comply with the requirements of NFPA 54, National Fuel Gas Code, ASME B31.8 Gas Transmission and Distribution Piping and 49 CFR 192 Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards.
2. Maximum Hanger Spacing:

Nominal Size (in.)	1/2	5/8 or 3/4	3/4 or 1	7/8 or 1 (horiz.)	1 or larger (vert.)	1-1/4 or larger (horiz.)	1-1/4 or larger (vert.)
Steel Pipe Spacing (ft)	6	--	8	--	--	10	Every Floor Level
Tube Spacing (ft)	4	6	--	8	Every Floor Level	--	--

3.5 HANGER ROD SIZE

A. Process Piping

1. Comply with the requirements of ANSI/MSS SP-58, *Pipe Hangers and Supports – Materials, Design and Manufacture, Selection, Application, and Installation*, as required in ASME B31.3.

Pipe Size (in.)	1/2 to 2-1/2	2-1/2 to 3-1/2
Rod Size (in.)	3/8	1/2

B. Plumbing (UPC) Piping (Water, Gas, DWV)

Pipe Size (in.)	1/2 to 4	5 to 8
Rod Size (in.)	3/8	1/2

C. HVAC Piping (Condensate, Hydronics)

Pipe or Tubing Size (in.)	3/8 to 2	2-1/2 to 3-1/2	4 to 5	6 to 8	10 to 12
Rod Size (in.)	3/8	1/2	5/8	3/4	7/8

D. Natural Gas Piping

1. Comply with the requirements of ANSI/MSS SP-58, *Pipe Hangers and Supports – Materials, Design and Manufacture*, as required in NFPA 54.

Pipe Size (in.)	Up to 4	5 to 8	10 to 12
Rod Size (in.)	3/8	1/2	5/8

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 22 0529, Rev. 3, dated September 1, 2009.

SECTION 22 0535
ELECTRIC HEAT TRACING SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Electric heat tracing systems for the freeze protection of potable, non-potable, and process piping.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4000, "Quality Requirements."
- C. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- D. Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."
- E. Section 22 0713, "Plumbing and HVAC Insulation."
- F. Section 26 0519, "Low-Voltage Electrical Power Conductors and Cables."
- G. Section 26 0526, "Grounding and Bonding for Electrical Systems."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 REGULATORY REQUIREMENTS

- A. Comply with the *National Electrical Code* (NEC) (NFPA 70) for components and installation.
- B. Provide products that are listed and labeled by a nationally recognized testing laboratory (NRTL) for the application and environment in which installed.

1.5 SUBMITTALS

- A. Submit the following in accordance with the requirements of Exhibit I:
 - 1. Catalog Data: Submit catalog data for heater cable, thermostat, controls, fittings, indicator light, and pipe markers.
 - 2. Shop Drawings: Submit composite wiring and/or schematic diagrams of the complete system as proposed to be installed (standard diagrams will not be acceptable). Include the following:
 - a. Actual location length, routing, and rating of each heating cable.
 - b. Location of branch circuit connections, including conductor size and overcurrent rating recommended for each branch circuit.
 - c. Location of terminations, thermostats, pipe markers, etc.
 - d. Expected current draw of each heating cable (Data to be used in conjunction with system acceptance test).
 - e. Bill of materials.

3. Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, installation, and starting of Product.
4. Operation and Maintenance Instructions: Submit operation and maintenance instructions.
5. Warranty: Provide a 3-year parts warranty, on materials and workmanship, and 1-year labor warranty beginning on the date of acceptance by LANL. This warranty is in addition to, and not a limitation of, other rights and remedies LANL may have under the Subcontract Documents.
6. Submit records of inspections, tests, and adjustments described in Paragraph 3.4.

1.6 RECEIVING, STORING AND PROTECTING

- A. Receive, store, and protect, and handle products according to NECA 1, *Standard Practices for Good Workmanship in Electrical Construction* and NECA 202, *Standard for Installing and Maintaining Industrial Heat Tracing Systems*.

1.7 QUALITY ASSURANCE

- A. Work identified in this section shall be in accordance with Section 01 4000, "Quality Requirements."

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."

2.2 GENERAL

- A. Furnish electric heat tracing system(s) as shown on the drawings with all components, controls, and accessories required for a complete and operating system.

2.3 HEATER CABLE

- A. Furnish NRTL-listed self-regulating heater cable that will vary its power output relative to the temperature of the surface of the protected pipe. The cable shall be designed such that it can be crossed over itself and cut to length in the field.
- B. Furnish heater cable that is capable of operating at 120 volts, or as shown on the drawings, without the use of special transformers.
- C. Furnish heater cable with nominal power output 3 watts per foot at 50°F or not less than that indicated on the drawings.
- D. The heating cable shall consist of two 16 AWG or larger stranded, plated copper bus wires, embedded in a polymeric conductive core that controls heat output.
- E. An inner thermoplastic jacket shall be extruded over the core and bonded to the heating core to prevent moisture penetration and wicking along the core.

- F. A second electrical dielectric thermoplastic jacket shall be extruded over the inner jacket.
- G. A tinned copper braid shall be applied over the second dielectric jacket.
- H. The braid shall be protected by a flame retardant fluoropolymer outer jacket.
- I. Suggested Manufacturers:
 - 1. Nelson Heat Tracing Systems.
 - 2. Thermon.

2.4 TEMPERATURE CONTROL

- A. Furnish NRTL-listed mechanical, ambient thermostat as indicated on the drawings that are suitable for the location, voltage, and load.
- B. Thermostat enclosure shall be NEMA 4X.
- C. Thermostat contacts shall be rated for not less than 22 A at 250 VAC.
- D. Suggested Manufacturers:
 - 1. Nelson Heat Tracing Systems.
 - 2. Thermon.

2.5 DISTRIBUTION PANEL

- A. The power distribution panels shall be located close to the physical location of the heat trace cables as the branch circuit breakers shall serve as local disconnect means for each heat trace circuit. Wherever practical, the panels shall be located in unclassified, non-corrosive areas
- B. A ground connection to the plant ground grid shall be provided for the distribution panel and each heater circuit's ground braid.
- C. Protect electric heat tracing systems with "ground-fault equipment protection" (GFEP) circuit breakers that are sensitive to leakage currents at a 30 milliampere level.
- D. Breakers shall be oversized for self-regulating heater cables to prevent tripping from cold start-up inrush currents.
- E. No more than five heater segments shall be grouped on a single branch circuit breaker for other types of circuits.
- F. All electrical connections shall be moisture proofed to eliminate nuisance tripping from condensation.
- G. Manufacturer: Nelson Heat Tracing Systems Type AP-12-P-4X-MB100-D, or approved equivalent.

2.6 CONNECTION KITS

- A. Furnish non-metallic connection kits that are suitable for interfacing the building wiring with the heater cables, connecting two heater cables in an in-line configuration, or connecting three heater cables in a tee splice configuration.
- B. Furnish an end-of circuit indicating light assembly at the end of each heater cable. Assembly shall contain low-temperature LEDs and be suitable for operation on 120 VAC systems.

- C. Suggested Manufacturers:
 - 1. Nelson Heat Tracing Systems.
 - 2. Thermon.

2.7 PIPE MARKERS

- A. Furnish pipe markers with the words "ELECTRIC TRACED" printed with UV-stable black ink on a durable yellow background. Meet the requirements of the ASME (ANSI) A13.1, Scheme for the Identification of Piping Systems. Provide materials and styles that meet the Project requirements and that are suitable for indoor and outdoor environments.
- B. Manufacturers: Labelmaster, Nelson Heat Tracing Systems, Compliance Signs.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that work of other trades likely to damage heater cable has been completed.
- B. Verify that field measurements are as shown on drawings.

3.2 PREPARATION

- A. Examine equipment and building finishes that are to receive grounding and bonding material for compliance with installation tolerances and other conditions. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Do not install heater cable before piping system has been tested and accepted by LANL.

3.3 INSTALLATION

- A. Comply with the requirements of the NEC (NFPA 70, Article 427); this section; and the drawings.
- B. Install electric heat tracing system according to manufacturer's instructions. Have the manufacturer's installation instructions available at the construction site.
- C. Install electric heat tracing system in accordance with NECA 202, Standard for Installing and Maintaining Industrial Heat Tracing Systems.
- D. Install electric heating cables after piping has been tested and before insulation is installed.
- E. Install heater cable to allow easy removal on maintenance items such as pumps, valves, strainers, or filters.
- F. Waterproof all terminations and electrical connections.
- G. Attach heater cable directly to the pipe using the heating cable manufacturer's adhesive backed glass fiber tape at one foot intervals.
- H. Attach thermostat bulb directly to the pipe using the heating cable manufacturer's adhesive backed glass fiber tape. Set thermostat to 40°F.

- I. Connect wiring in accordance with Section 26 0519, "Low-Voltage Electrical Power Conductors and Cables."
- J. Ground equipment in accordance with Section 26 0526, "Grounding and Bonding for Electrical Systems."
- K. Install insulation over piping with electric heating cables in accordance with Section 22 0713, "Plumbing and HVAC Insulation."
- L. Label Piping in accordance with Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."
- M. Install signs at maximum 20 foot intervals along pipe insulation reading: "ELECTRIC TRACED." Install labels so they will be visible during normal operations.

3.4 FIELD QUALITY CONTROL

- A. Inspect, test, and adjust electric heat tracing system in accordance with NECA 202, Standard for Installing and Maintaining Industrial Heat Tracing Systems.
 - 1. Notify the LANL Subcontract Technical Representative (STR) ten (10) working days in advance of the expected completion of the system installation. Verification and testing can be scheduled in parts or by area depending on the system and construction schedule.
 - 2. In addition to standard acceptance tests, perform insulation resistance testing in accordance with NECA 202.
- B. Remove and replace defective, incorrect, or improperly installed heat tracing system components. Re-inspect and re-test replacement components.
- C. For each electric heat tracing system, keep a record of inspections, tests and adjustments using the "Heater Commissioning Record" in NECA 202. Submit test and inspection records to the LANL STR.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Specification 22 0535, Rev. 0, dated October 1, 2009.

SECTION 22 0548
VIBRATION AND SEISMIC CONTROLS FOR
PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

A. General Requirements

1. The requirements for seismic control measures described in this section shall be applied to the mechanical nonstructural components and systems listed below.

B. Mechanical Nonstructural Components

1. Include the following mechanical nonstructural components, as well as the associated seismic control, to the extent required on plans or in other sections of these specifications:
 - a. Piping
 - b. Ductwork
 - c. Air-side HVAC
 - d. Hydronics
 - e. Pumps
 - f. Compressors
 - g. Roof-mounted Stacks

1.2 SECTION INCLUDES

- A. Provide hangers, supports, anchors, concrete bases, vibration isolators, sleeves, inserts, seals, and other positive fastenings for mechanical nonstructural components such that in-service loads and seismic forces are safely transferred to the structure and relative seismic displacements of the components are adequately accommodated.
- B. Exception: Provide design for the items listed above (in 1.2.A) that are applicable to piping and HVAC ductwork in accordance with paragraph 1.6.A herein.

1.3 ITEMS NOT COVERED BY THIS SECTION

- A. Fire Protection Systems: Seismic protection of piping for fire suppression systems shall be installed per those sections.

1.4 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- C. Section 03 3001, "Reinforced Concrete."
- D. Section 03 1550, "Post-Installed Concrete Anchors—Installation and Testing."
- E. Section 07 8400, "Firestopping."
- F. Section 13 4800, "Sound, Vibration, and Seismic Control."
- G. Section 22 0529, "Hangers and Supports for Plumbing Piping and Equipment."
- H. Section 22 0713, "Plumbing and HVAC Insulation."

1.5 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.6 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Design: Submit a design calculation, performed by a licensed Professional Engineer, and project record drawings ('as-builts') for installation of support and anchorage of piping and HVAC ductwork that is in accordance with all applicable requirements in IBC 2009 Chapters 16, 19 and 22; and ASCE 7-05 Chapter 13.
1. At a minimum, the following must be included in the design:
 - a. Design spectral response acceleration parameters: five-percent damped design spectral response acceleration at short periods, $SDS = 0.75g$, ; and at 1-second period, $SD1 = 0.64 g$.
 - b. Seismic Design Category (SDC) D.
 - c. Importance Factor, $I_p = 1.0$.
 - d. Determine demand-to-capacity (D/C) ratios for the elements /components included in the design, and ensure each D/C value complies with that required by the respective code / standard.
 - e. Determine whether or not the Seismic Relative Displacements of ASCE 7 Chapter 13 apply. If so, determine whether or not the piping and ducts are capable of accommodating the displacements. If the piping and ducts can't accommodate these displacements, ensure that alternate means are included in the Shop Drawings (i.e., para. 1.6.D herein), and the 'as-built' drawings.
- B. Catalog Data: Submit catalog data for each type of product specified. Include information substantiating equivalent corrosion resistance to zinc coated steel of alternative treatment, finish, or inherent material characteristic.
- C. Material List: Submit hanger and support schedule showing manufacturer's figure number, size, spacing, features, and application for each required type of hanger, support, sleeve, seal, and fastener to be used.
- D. Shop Drawings: Submit shop drawings showing details of fabricated hangers, supports, and seismic control of all mechanical nonstructural components such as the ones listed below. Provide detail drawings along with catalog cuts, templates, and erection and installation details, as appropriate, for the components listed below. Submittals shall be complete in detail; shall indicate thickness, type, grade, class of metal, and dimensions; and shall show construction details, reinforcement, anchorage, and installation with relation to the building construction.
1. Boilers and furnaces;
 2. storage tanks inside of, or on top of, buildings;
 3. water heaters;
 4. expansion air separator tanks;
 5. valves and fittings for piping;
 6. heat exchangers;
 7. water chiller units;
 8. air and refrigerant compressors;

9. refrigerant piping;
10. air handling units;
11. pumps with motors;
12. ducts;
13. exhaust and return fans;
14. fuel piping outside of buildings;
15. all water supply systems;
16. storm and sanitary sewer systems;
17. pneumatic tube distribution system;
18. chilled water distribution systems outside of buildings;
19. heat distribution systems (supply, return, and condensate return) outside of buildings; and
20. all piping inside the building except as specifically stated above in Paragraph 1.3.

PART 2 PRODUCTS

2.1 GENERAL

- A. Refer to Section 13 4800, "Sound, Vibration, and Seismic Control," for general seismic control products.

2.2 SUBSTITUTIONS

- A. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."

2.3 SWAY BRACING MATERIALS

- A. Sway bracing materials (e.g. rods, plates, rope, angles, etc.) shall be as specified in Section 13 4800, "Sound, Vibration, and Seismic Control."

2.4 CONCRETE FORMWORK

- A. Refer to Section 03 3001, "Reinforced Concrete."

2.5 CONCRETE REINFORCEMENT

- A. Refer to Section 03 3001, "Reinforced Concrete."

2.6 CAST-IN-PLACE CONCRETE

- A. Refer to Section 03 3001, "Reinforced Concrete."

2.7 VIBRATION ISOLATORS

- A. Furnish vibration isolators as required or as shown on the drawings. The mechanical equipment shall be mounted on, or suspended from, vibration isolators to reduce the transmission of vibration and mechanically transmitted sound to the building structure. Vibration isolators shall be selected in accordance with the weight distribution so as to produce reasonably uniform deflections.
- B. All vibration isolators shall be furnished by the same manufacturer.

PART 3 EXECUTION

3.1 GENERAL

- A. Refer to Section 13 4800, "Sound, Vibration, and Seismic Control," for general seismic protection installation requirements.
- B. Install hangers, supports, and seismic control according to the project drawings, the requirements in this section, and the requirements of Section 22 0529, "Hangers and Supports for Plumbing Piping and Equipment." Where overlap exists, the more stringent of the requirements will govern.
- C. Conform to manufacturer's instructions and recommendations for installation of hangers, supports, and seismic control.
- D. Do not use wire or perforated strap for permanent mechanical supports.
- E. Attach each item of rigid mechanical equipment as shown.
- F. Provide piping, ducts, etc., which cross an expansion joint to rigid mechanical equipment, with flexible joints as shown on the drawings and as defined in piping-specific specifications.

3.2 EXAMINATION

- A. Examine surfaces to receive hangers, supports, and seismic control for compliance with installation tolerances and other conditions affecting performance of the system. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 COUPLING AND BRACING.

- A. Provide bracing and coupling as shown and as specified below.

3.4 FLEXIBLE COUPLINGS OR JOINTS

- A. Building Piping
 - 1. Provide flexible couplings/joints in building piping as shown on the drawings and as defined in piping-specific specifications.

3.5 PIPE SLEEVES AND SEALS

- A. Provide pipe sleeves in concrete slabs and walls and all other fire-rated floors and walls for piping installations.
- B. Sleeves through fire-rated wall or floor construction shall conform to the requirements in Section 07 8400, "Firestopping." Follow manufacturer's instructions to restore original fire rating of wall or slab.
- C. Pipe sleeves in interior non-fire-rated walls shall be sized as indicated on the drawings to provide clearances that will permit differential movement of piping without the piping striking the pipe sleeve.
- D. Provide seals for pipe penetrations of slabs on grade and exterior walls below grade and where indicated. Tighten sleeve seal screws until sealing grommets have expanded to form watertight seal.
- E. At least 2 days prior to firestopping installation, notify LANL Subcontractor Technical Representative (STR) so that arrangements can be made for

inspection during installation. Do not proceed with the firestopping installation unless a LANL inspector is present.

3.6 SPREADERS

- A. Provide spreaders between adjacent piping runs as shown.
- B. Spreaders shall be applied to surface of bare pipe, and over insulation on insulated pipes, utilizing high-density inserts and pipe protection shields in accordance with the requirements of Section 22 0713, "Plumbing and HVAC Insulation."

3.7 SWAY BRACES FOR PIPING

- A. Transverse Sway Bracing for Piping
 - 1. Transverse sway bracing for piping shall be provided and installed as shown.
- B. Longitudinal Sway Bracing for Piping
 - 1. Longitudinal sway bracing shall be provided and installed as shown.
- C. Vertical Runs
 - 1. Run is defined as length of pipe between end joints.
 - 2. Sway bracing for vertical runs of piping shall be provided and installed as shown.
- D. Anchor Rods, Angles, and Bars
 - 1. Anchor rods, angles, and bars shall be bolted to either pipe clamps or pipe flanges at one end and to cast-in-place concrete or masonry insert, or clip angles bolted to the steel structure, on the other end.
 - 2. Provide bolts for attachment of anchors to pipe and structure shall be as shown.
 - 3. Rods shall be solid metal or pipe.
- E. Clamps and Hangars
 - 1. Clamps or hangers on uninsulated pipes shall be applied directly to pipe.
 - 2. Clamps or hangers on insulated pipes shall be applied over insulation vapor barrier with high-density inserts and metal protection shields under each clamp/hanger.

3.8 SWAY BRACES FOR DUCTS

- A. Braced Ducts
 - 1. Transverse Sway Bracing
 - a. Provide transverse sway bracing at intervals not to exceed those shown.
 - 2. Longitudinal Sway Bracing
 - a. Provide longitudinal sway bracing at intervals not to exceed those shown.
- B. Unbraced Ducts
 - 1. Hangers for unbraced ducts shall be attached to the duct within 2 inches of the top of the duct with a minimum of two #10 sheet metal screws.
 - 2. Unbraced ducts shall be installed with a 6-inch minimum clearance to vertical ceiling hanger wires.
- C. Angles and Bars

1. Provide bracing angles and bars for ducts as shown.

3.9 ANCHOR BOLTS

- A. Refer to Section 03 1550, "Post-Installed Concrete Anchors—Installation and Testing," on post-installed concrete anchors.

3.10 FASTENING

- A. Refer to Section 13 4800, "Sound, Vibration, and Seismic Control."

3.11 VIBRATION ISOLATION

- A. Install and adjust vibration isolators as indicated on the drawings in accordance with the manufacturer's installation instructions.
- B. Installation of vibration isolators shall not cause any change of position of equipment, piping or ductwork resulting in stresses or misalignment.
- C. Make flexible mechanical connections to equipment supported by vibration isolators.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 22 0548, Rev. 2, dated September 14, 2009.

SECTION 22 0554

IDENTIFICATION FOR PLUMBING, HVAC, AND FIRE PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Valve Tags.
- B. Pipe Markers/Arrow Tape Above Ground.
- C. Underground Piping Warning Tape.
- D. Ceiling Tacks.
- E. Duct Markers.
- F. Mechanical Equipment and HVAC Controls Identification.
- G. Safety Signs.
- H. Fire Hydrants and Isolation Valves Numbering.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4000, "Quality Requirements."
- C. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- D. Section 31 2000, "Earth Moving."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 LANL PERFORMED WORK

- A. LANL Utilities will identify hydrants and hydrant isolation valves. Refer to PART 3 of this section.

1.5 SUBMITTALS

- A. Submit the following in accordance with the requirements of Exhibit I:
 - 1. Catalog data.
 - 2. Installation instructions.

1.6 QUALITY ASSURANCE

- A. Work identified in this section shall be in accordance with Section 01 4000, "Quality Requirements."

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."

2.2 MANUFACTURER

- A. W. H. Brady Co. catalog numbers are used as a basis of identification.
- B. Stock catalog numbers are listed in PART 2 and PART 3 schedules. Subcontractor is responsible to review schedules and provide required markers. In some instances, "non-stock" markers (special) may be required.

2.3 VALVE TAGS

- A. Metal Tags: Brass or aluminum with stamped or engraved letters; tag sizes minimum 2 inches (round, square, or rectangle) with smooth edges. Thickness 19 gauge (.040 inches) minimum.
- B. Beaded Chain: Size 6, brass or aluminum, 4 1/2 inches long with locking link.

2.4 PIPE MARKERS/ARROW TAPE ABOVE GROUND

- A. Color: Conform to ANSI A13.1.
- B. Self-Sticking Pipe Markers/Arrow Tape: Material B-946, flexible, vinyl film tape with pressure sensitive permanent adhesive backing and printed markings.
 - 1. Suitable for indoor/outdoor application.
 - 2. Temperature range: Minus 40 degrees to 180 degrees F.

2.5 UNDERGROUND PIPING WARNING TAPE

- A. Comply with Section 31 2000, "Earth Moving."

2.6 CEILING TACKS

- A. No. 23250 series, steel with 7/8-inch diameter color-coded head.
- B. Color code as follows:

Yellow	HVAC Equipment
Red	Fire Dampers / Smoke Dampers
Green	Plumbing Valves, Trap-Priming Devices, etc.
Blue	Heating / Cooling Valves

2.7 DUCT MARKERS

- A. Plastic Tape Duct Marker and Arrows: Material No. B-946, flexible vinyl film tapes with pressure sensitive permanent adhesive backing and printed markings.
 - 1. Suitable for indoor/outdoor application.
 - 2. Temperature range: Minus 40 degrees to 180 degrees F.
- B. Letter style block, 2 inches height minimum.

2.8 MECHANICAL EQUIPMENT AND HVAC CONTROLS IDENTIFICATION

- A. Labeling shall be furnished and installed by the Subcontractor.
- B. Engraved signs shall be dark letters on light background.

- C. Identify mechanical equipment and HVAC controls, e.g., air handling units, pumps, heat transfer equipment, water treatment devices, controls instruments, stationary tanks/containers, and similar items, with nameplates or tags.
1. Provide engraved nameplates made of rigid plastic laminate in which colored top and bottom layers of the material are thermoset with a contrasting color core. Minimum thickness 0.062 inch.
 - a. Size: 2 x 4 inches.
 - b. Material Color: White background/ black lettering.
 - c. Manufacturer: Brady, No. B-1.
 2. Provide lettering as follows:
 - a. Size: 10 point minimum (larger preferred).
 - b. Spacing: 1/4 inch from top, 1/8 inch from bottom, 1/16 inch between lines.
 3. Provide nameplate with component nomenclature as noted in the Subcontract Documents.
 - a. As a minimum, identify the system, e.g., HVAC (heating, ventilating, and air conditioning), the component, e.g., FGF (furnace, gas fired), and the sequence number.
 - b. Refer to the ESM, Chapter 1, Section 230, for component nomenclature for new and major modifications to facilities.
- D. Provide fume hoods (FH) and other local exhaust ventilation (LEV) systems with nameplates as specified below to indicate the following information:
1. Fume hood and other local exhaust ventilation system inlets.
 - a. Served by nameplates: Exhaust fan information.
 2. Exhaust fan data.
 - a. Fan static pressure
 - b. Fan RPM
 - c. Motor current.
 3. Coordinate equipment nameplates with equipment numbering scheme provided by Subcontract Technical Representative.
 4. Provide nameplates made of one of the following materials.
 - a. Laminated plastic adhesive tape with machine printed letters. (Indoor Applications Only) Manufacturer: Brother, Seton, Brady.
 - b. Two-ply plates with letters engraved through surface color showing core color. Use UV stabilized material for outdoor applications. Manufacturer: Seton Nameplate Corp.
 5. Provide 10 point minimum size lettering.
 6. Provide nameplates with black letters on a white background.
 7. Dimensions of nameplates shall be 1 inch by 2-1/2 inch minimum.

- E. Stationary Tanks/Containers of Hazardous Materials: Identify the hazardous material and label to comply with NFPA 704, Standard System for the Identification of Hazards of Materials for Emergency Response.
 - 1. Name of Hazardous Material: Provide 2 inch high minimum lettering. Use same material as pipe identification markers, yellow background with black letters.
 - 2. Hazardous Material Signal and Characters: Provide 2 inch high minimum characters and a 5 inch square (overall size) diamond shaped material signal made of outdoor grade pressure sensitive vinyl. Refer to the Material Safety Data Sheet (MSDS) for the hazardous material for numbers, letters, or symbols to be used within the NFPA 704 hazardous material signal. Material signal: Brady catalog number 58501. Characters: Brady catalog numbers 5050-5.

2.9 SAFETY SIGNS

- A. Colors associated with specific words such as "Danger," "Warning," "Caution," or "Notice" shall conform to ANSI Z35.1.
- B. Provide signage identifying each fixture, including fume hood cup sinks, being served by non-potable water.

PART 3 EXECUTION

3.1 FIRE HYDRANTS

- A. LANL Utilities and Infrastructure will number fire hydrants and the hydrant isolation valves (valve box lids).

3.2 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.3 INSTALLATION

- A. Valve Tags:
 - 1. Install with brass beaded chain.
 - 2. Steel stamp or engrave valve tag in accordance with schedule herein.
 - 3. Letter style block, 1/4-inch height minimum.
 - 4. Tag all valves in concealed or exposed areas except isolation and bypass valves installed adjacent to the equipment they serve.
 - 5. Provide typewritten letter size list of applied tags and location.
- B. Pipe Markers Above Ground:
 - 1. Install in accordance with manufacturer's instructions.
 - 2. Seal markers with clear lacquer.
 - 3. Identify piping in exposed or concealed areas in accordance with schedule herein.
 - 4. Pipe marker consists of pipe contents identification with flow direction arrow tape. Provide consistent color scheme, unless otherwise noted.

5. Wrap arrow tape completely around pipe at both ends of pipe markers.
6. Install in clear view and align with axis of piping.
7. Label piping at intervals of not more than 20 feet on horizontal and vertical runs, at each branch connection, and where pipe penetrates walls, ceilings and floors (both sides).
8. Label waste piping below laboratory sinks to indicate destination.
9. Size of label depends on outside diameter (OD) of pipe. Pipe OD includes insulation or protective coating.
10. Minimum length of marker including arrows:

Outside Diameter	Length (inches)
2 inches or smaller	8
Greater than 2 inches to less than 8 inches	12
8 inches to 10 inches	24
Over 10 inches	32

- C. Ceiling Tacks: Provide ceiling tacks to locate HVAC equipment, valves or dampers above accessible suspended ceilings. Locate tacks in corner of panel closest to equipment.
- D. Duct Markers:
 1. Install in accordance with manufacturer's instructions.
 2. Seal markers with clear lacquer.
 3. Identify ducts in exposed or concealed areas in accordance with the schedule.
 4. Duct markers consist of duct identification name with flow direction arrows. Provide consistent color scheme.
 5. Install in clear view and align with axis of duct.
 6. Label ducts at intervals of not more than 20 feet on horizontal and vertical runs, at each branch connection, and where duct penetrates walls, ceilings and floors (both sides).
- E. Mechanical Equipment and HVAC Controls Identification:
 1. Install component identification tag on the front of each piece of mechanical equipment including fans, pumps, compressors, fume hoods, LEVs, etc.
 2. Position tags so they can be read from floor.
- F. Safety Signs: Install in clear view.

3.4 SCHEDULES

A. Pipe Markers and Valve Tag Legend:

Pipe Identification	Background Color/Letter Color	Outside Diameter (Letter Height)				Valve Tag Legend
		6" or greater (3-1/2" high) Style 1HV*	3" to less than 6" (2" high) Style 1*	1" to less than 3" (3/4" high) Style 4*	Less than 1" (5/16" high) Style 3C*	
		Pipe Marker Catalog Numbers				
Argon	Grn/Wht	7015				AR
Chemical/Supply	Yel/Blk	7042/7311				CS
Chilled Water Return	Grn/Wht	7046				CWR
Chilled Water Supply	Grn/Wht	7047				CWS
Compressed Air	Yel/Blk	7058				CA
Condensate Pump Discharge	Yel/Blk	7064				CONPM P
De-ionized Water/Drain	Grn/Wht	7073/7090				DIWD
De-ionized Water Return	Grn/Wht	7074				DIWR
De-ionized Water Supply	Grn/Wht	7075				DIWS
Drain	Grn/Wht	7090				D
Drain	Yel/Blk	7091				D
Fire Protection Water	Red/Wht	7110				F
Fire Water Drain	Red/Wht	7110				FD
Electric Traced	Yel/Blk	7096				-----
Heat Recovery Return	Yel/Blk	Special				HRR
Heat Recovery Supply	Yel/Blk	Special				HRS
Heating Water Return	Yell/Blk	7129				HWR
Heating Water Supply	Yel/Blk	7130				HWS
High Pressure Natural Gas (Above 5 psig)	Yel/Blk	7139				NG
Instrument Air	Blu/Wht	7168				IA
Low Pressure Natural Gas (Less than 14" w.c.)	Yel/Blk	7177				NGL
Medium Pressure Natural Gas (14" w.c. to 5 psig)	Yel/Blk	7190				NGM

Pipe Identification	Background Color/Letter Color	Outside Diameter (Letter Height)				Valve Tag Legend
		6" or greater (3-1/2" high) Style 1HV*	3" to less than 6" (2" high) Style 1*	1" to less than 3" (3/4" high) Style 4*	Less than 1" (5/16" high) Style 3C*	
		Pipe Marker Catalog Numbers				
Non-Potable/Cold Water	YelBlk/GrnWht	7203/7055				NPWC
Non-Potable/Hot Water	Yel/Blk	7203/7146				NPWH
Non-Potable/Make-up Water	Yel/Blk Grn/Wht	7203/7182				NPWMU
Non-Potable/Hot Water Recirculation	Yel/Blk	7203/7147				NPWHR
P-10 Gas	Grn/Wht	Special				P-10
Potable/Cold Water	Grn/Wht	7217/7055				PWC
Potable/Hot Water (Use Grn/Wht Arrows)	GrnWht/ YelBlk	7217/7146				PWHS
Potable/Hot Water Recirculation (Use Grn/Wht Arrows)	GrnWht/ YelBlk	7217/7147				PWHR
Process/Cooling Water Return	Grn/Wht	7224/7071				PCWR
Process/Cooling Water Supply	Grn/Wht	7224/7072				PCWS
Process Liquid Waste-Hazardous	Yel/Blk	Special				PLWH
Process Liquid Waste- Non Hazardous	Grn/Wht	Special				PLWNH
Radioactive Liquid Waste	Yel/Blk	Special				RLW
Radioactive Liquid Waste Vent	Yel/Blk	Special				RLWV
Refrigerant Discharge (Hot Gas)	Yel/Blk	7234				RFND
Refrigerant Liquid	Yel/Blk	7235				RFNL
Refrigerant/Relief	Yel/Blk	7235/7239				RFNR
Refrigerant Suction	Yel/Blk	7236				RFNS

Pipe Identification	Background Color/Letter Color	Outside Diameter (Letter Height)				Valve Tag Legend
		6" or greater (3-1/2" high) Style 1HV*	3" to less than 6" (2" high) Style 1*	1" to less than 3" (3/4" high) Style 4*	Less than 1" (5/16" high) Style 3C*	
		Pipe Marker Catalog Numbers				
Sanitary Vent	Yel/Blk	7252				SWV
Sanitary Waste	Yel/Blk	7253				SW
Sanitary Wastewater Treated Effluent	Yel/Blk	Special				SWTE
Storm Water	Grn/Wht	7275				STW
Sump Pump Discharge	Yel/Blk	7280				SPD
Vacuum	Yel/Blk	7291				VAC
Vacuum/Pump Discharge	Yel/Blk	7291/7280				VACPD
* Include style number in parenthesis () following the catalog number.						

B. Air Duct Markers:

Duct Identification	Background Color/Letter Color	Catalog Number
Air Return	Blu/Wht	7008
Air Supply	Blu/Wht	7010
HEPA Exhaust Air	Yel/Blk	Special/7098/7005
Lab Exhaust Air	Yel/Blk	Special
Process Exhaust Air	Yel/Blk	Special
Outside Air	Blu/Wht	7206
Relief Air	Blu/Wht	7240
Toilet Exhaust Air	Blu/Wht	Special/7100
Vacuum Exhaust Air	Yel/Blk	7291/7098/7005

C. Safety Signs:

Location	Wording	Size/Catalog Number
Each fixture served by non-potable water	NOTICE Non-Potable Water not to be used for drinking, washing or cooking purposes.	7 X 10/40925
Fire Hydrant served by non-potable water	CAUTION Non-Potable Water – Do Not Drink.	7 X 10/40846

END OF SECTION
FOR LANL USE ONLY

This project specification is based on LANL Master Specification 22 0554, Rev. 2, dated June 4, 2009.

SECTION 22 0713
PLUMBING AND HVAC INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Piping insulation.
- B. Ductwork insulation.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4000, "Quality Requirements."
- C. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.1 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Product Data: Submit product description, thermal characteristics and list of materials and thickness for each service, and location.
- B. Manufacturer's Installation Instructions: Submit manufacturers published literature indicating proper installation procedures.

1.4 QUALITY ASSURANCE

- A. Work identified in this section shall be in accordance with Section 01 4000, "Quality Requirements."
- B. Materials: Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E 84 and UL 723.
- C. Provide insulation material 100 percent asbestos free.
- D. Provide products that do not promote or support the growth of mold, fungi, or bacteria.
- E. Piping and ductwork insulation work shall be in accordance with the following:
 - 1. ASTM C 533 - Calcium Silicate Block and Pipe Thermal Insulation
 - 2. ASTM C 534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
 - 3. ASTM C 547 - Mineral Fiber Pipe Insulation
 - 4. ASTM C 612 - Mineral Fiber Block and Board Thermal Insulation
 - 5. ASTM C 1290 - Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Duct
 - 6. ASTM E 84 - Surface Burning Characteristics of Building Materials

- 7. ASTM E 96 - Water Vapor Transmission of Materials
- 8. UL 723 - Surface Burning Characteristics of Building Materials

1.5 QUALIFICATIONS

- A. Installers: Company specializing in performing work of this section with minimum of 3 years experience.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesive, mastic, and insulation cements.
- B. Maintain temperature during installation per manufacturer's instructions.
- C. Install insulation only when ambient temperature and humidity conditions are within range recommended by manufacturer.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."

2.2 GENERAL

- A. K-factors (thermal conductivity) shown are expressed in Btu•in/hr•ft²•F.

2.3 MANUFACTURERS

- A. Knauf Fiber Glass.
- B. Owens/Corning Fiberglass.
- C. Armstrong.
- D. CertainTeed.
- E. Johns Manville.
- F. Rockwool Manufacturing.
- G. Armacell.

2.4 FIBERGLASS PIPE INSULATION

- A. Insulation: Rigid molded in compliance with ASTM C 547, Class 1, minimum density 3.5 pounds/cubic foot (pcf), K-factor of approximately 0.23 at 75 °F, suitable for temperatures from 0 to 850 °F.
- B. Jacket: Factory applied vapor barrier reinforced foil kraft with self-sealing adhesive joints, ASTM C 1136.
- C. Valves and Fitting Covers: Pre-molded PVC covers with fiber glass insert. Manufacturers: Proto Corp., Ceelco.

2.5 ELASTOMERIC PIPE INSULATION

- A. Insulation: Cellular closed cell in compliance with ASTM C 534, Type 1, minimum density 5 pcf, K-factor of approximately 0.30 at 75 °F, suitable for temperatures up to 300 °F.

- B. Valve and fitting covers: Same as pipe insulation, cut to fit.
- C. Weather Resistant Protective Finish: Acrylic latex enamel paint. Manufacturer: Armacell, WB Armaflex finish.

2.6 HYDROUS CALCIUM SILICATE PIPE INSULATION

- A. Insulation: Rigid, in compliance with ASTM C 533, Type 1, minimum density 13 pcf, K-factor of approximately 0.45 at 200 degrees F, suitable for temperature from 140 degrees F to 1200 degrees F.
- B. Valve and Fitting Covers: Same as pipe insulation or "Quick Set" insulating cement.

2.7 UNDERSINK PIPING COVERS

- A. Provide ADA compliant resilient molded white vinyl covers for wheelchair accessible lavatory/sink P-traps and angle valve/supply line (hot and cold) assemblies.

2.8 GLASS FIBER BLANKET DUCT INSULATION

- A. Insulation: Flexible blanket, in compliance with ASTM C 1290, Type III, minimum density 3/4 pcf, K-factor of approximately 0.30 at 75 degrees F, suitable for temperature up to 250 degrees F.
- B. Jacket: Factory applied reinforced aluminum foil jacket meeting ASTM C 1136.
- C. Fittings: Same material as insulation.
- D. Insulation materials shall be free of halogenated hydrocarbons.

2.9 GLASS FIBER BOARD DUCT INSULATION

- A. Insulation: Rigid glass fiber, in compliance with ASTM C 612, Type IA or IB,, minimum density of 3 pcf, K-factor approximately 0.23 at 75 degrees F, suitable for temperature up to 450 degrees F.
- B. Jacket: Factory applied metalized polypropylene scrim kraft facing meeting ASTM C 1136.
- C. Fittings: Same material as insulation.

2.10 METAL JACKETING - PIPING/DUCTWORK

- A. Jacketing: Aluminum, 0.016 inches thick, embossed surface, with factory bonded moisture barrier.

1. Jacket thickness per the following:

Outer Insulation Diameter (in)	Minimum Aluminum Jacket Thickness, inches	
	Rigid Insulation	Non-Rigid Insulation
≤ 8	0.016	0.016
Over 8 thru 11	0.016	0.020
Over 11 thru 24	0.016	0.024
Over 24 thru 36	0.020	0.032
Over 36	0.024	0.040

- B. Valve and Fitting Insulation Covers: Fabricate from same material as jacketing or use prefabricated insulation covers made in two matching halves.

- C. Metal Jacketing Bands: 3/8 inch wide, 0.010 inch thick stainless steel.
- D. Manufacturer: Pabco-Childers Metals.

2.11 PROTECTION SADDLES AND SHIELDS

- A. Provide factory engineered galvanized steel hanger shields on horizontal insulated pipe complying with MSS SP-58 and MSS SP-59 standards for gauge and length of saddle.
- B. Saddles (Piping/tubing up to 2 inches):
 - 1. Use 180 degree saddle on systems utilizing teardrop type hangers.
 - 2. Use 360 degree saddle on systems utilizing trapeze hangers or clamps.
- C. Inserts and Shields (Piping/tubing over 2 inches):
 - 1. Use 360 degree calcium silicate insert with a 180 degree shield on systems utilizing clevis or teardrop type hangers.
 - 2. Use 360 degree calcium silicate with a 360 degree shield on systems utilizing trapeze hangers or clamps.
 - 3. The unit shall have an integral moisture barrier consisting of a tri-laminate All-Service Jacket equal and similar to the jacketing on the adjoining insulation.
 - 4. Insert: Calcium silicate, minimum density 9 pcf.
- D. Manufacturers: Value Engineered Products, Piping Technology and Products (PPT), Cooper B-Line.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that items to be insulated have been pressure tested and approved before applying insulation material.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION - GENERAL

- A. Install materials in accordance with manufacturer's instructions.
- B. Do not insulate factory-insulated equipment.
- C. Do not insulate nameplates.
- D. Fit insulation tightly against surface to which it is applied.
- E. Do not insulate flexible connections.
- F. For non-fire rated barriers (e.g., wall, floor, ceiling, or roof) continue insulation and vapor barrier through penetrations. For fire rated barriers, provide UL/FM approved through penetration stop systems.
- G. Weatherproof outdoor installations of piping or ductwork covered with aluminum jacket. Provide watershed lap joints and seal with mastic as required.
- H. Do not install metal jacketing with raw edges; provide a safety edge.

- I. Replace existing insulation where it has been damaged or removed as a result of modifications. Vapor barrier shall be continuous. Thickness of insulation that is replaced shall match new.
- J. Do not install insulation until the Testing, Adjusting and Balancing (TAB) has been completed and the TAB test report accepted by the LANL STR.

3.3 INSTALLATION - PIPING

- A. On exposed piping located in finished areas, locate insulation and cover seams in least visible area.
- B. Provide continuous insulation through pipe hangers or supports. Do not notch insulation. Provide shields or saddles to prevent crushing insulation.
- C. Where insulation terminates, taper to pipe and finish with insulating cement or acrylic mastic.
- D. Cover insulated pipes located outdoors or in utility tunnels with aluminum jacket. Secure with aluminum bands and screws as required.
- E. Tape circumferential joints of pipe insulation with 3 inch wide white vinyl tape.
- F. Insulate fitting and valves where required with same material thickness as specified for adjacent pipe.
- G. Insulate potable and non-potable cold water piping within walls, chases, or ceiling plenums where return air is present.
- H. Insulate potable and non-potable cold water piping in equipment rooms.
- I. Do not insulate unions, flanges and valves in potable or non-potable piping systems of 140 degrees F or less, except for chilled water.
- J. Insulate refrigerant discharge line (hot gas discharge) when there is a danger of personnel coming in contact with piping or when the line is passing through a conditioned space. Insulate refrigerant liquid line when it is passing through spaces having temperatures greater than the refrigerant condensing temperatures.
- K. Insulate storm water piping inside building.

3.4 INSTALLATION - DUCTWORK

- A. Secure rigid board insulation to ductwork with metal fasteners (stick-clip) and scrim washer on 12 inch centers each way. Secure fasteners to duct work with recommended adhesive.
- B. Tape ductwork insulation joints and penetrations caused by mechanical fasteners with 3 inch wide FSK tape.
- C. Cover insulated ductwork located outdoors with aluminum jacketing. Secure with bands as required.
- D. Provide continuous insulation through hangers or supports. Do not notch insulation.
- E. Use blanket insulation on round ductwork and board insulation (rigid) on rectangular ductwork. Exception: In concealed areas blanket insulation may be used on rectangular ductwork.

- F. Stop insulation around access doors and damper operators to allow operation without disturbing wrapping.

3.5 INSULATION SCHEDULE

- A. Piping Systems: Use fiberglass pipe insulation.

Service	Nominal Pipe Diameter (inches)	Insulation Thickness (inches)	
		Indoor	Outdoor
Heating hot water (to 200 degrees F)	Up to 1-1/2 Over 1-1/2	1-1/2 2	2 2-1/2
Potable hot water (105 degrees F & greater)	Up to 1-1/2 over 1-1/2	1 1-1/2	1-1/2 2
Non-potable hot water (105 degrees F & greater)	Up to 1-1/2 over 1-1/2	1 1-1/2	1-1/2 2
Chilled water (40-55 degrees F)	All Sizes	1-1/2	2
Potable cold water	All sizes	1	1-1/2
Non-potable cold water	All sizes	1	1-1/2
Roof drain bowl and storm water piping	All sizes	1	1-1/2
Compressed Air Piping	All sizes	N/A	1-1/2

- B. Refrigerant Piping: Use elastomeric piping insulation. Protect insulation exposed to weather with aluminum jacket or weather resistant protective finish.

Service	Nominal Pipe Diameter (inches)	Insulation Thickness (inches)
Refrigerant suction	Up to 1-1/4	1/2
	Over 1-1/4	1
Refrigerant discharge	Up to 1-1/4	1/2
	Over 1-1/4	1
Refrigerant liquid	Up to 1-1/4	1/2
	Over 1-1/4	1

- C. Handicapped Lavatory Piping: Use elastomeric pipe insulation meeting ADA Standard Section 4.19.4, ANSI/ICC A117.1:

Service	Pipe Sizes (inches)	Insulation Thickness (inches)
Exposed drain and hot water lines	All sizes	1/2

- D. Concealed Ductwork: Use glass fiber (flexible blanket) duct insulation.

Service	Insulation Thickness (inches)
Supply and return air	1-1/2

- E. Exposed Rectangular Ductwork: Use glass fiberboard (rigid) duct insulation on the exterior of the ductwork.

Note: Use 2-inch-thick insulation for ductwork exposed to outdoor temperatures.

Service	Insulation Thickness (inches)
Supply and return air	1-1/2

- F. Exposed Round Ductwork: Use glass fiber (flexible blanket) duct insulation.

Note: Use 2-inch-thick insulation for ductwork exposed to outdoor temperatures.

Service	Insulation Thickness (inches)
Supply and return air	1-1/2

- G. Outdoor Exhaust Ductwork: Use glass fiber (flexible blanket) duct insulation with aluminum jacket.

Service	Insulation Thickness (inches)
Exhaust, duct to heat recovery coil	2

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 22 0713, Rev. 4, dated September 1, 2009.

SECTION 22 0813
TESTING PIPING SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pressure testing and holiday testing of the following systems:
 - 1. Fire protection piping
 - 2. Plumbing piping (sewer lines, water lines, rainwater lines, fire water drainage lines)
 - 3. Natural gas piping
 - 4. Compressed air piping
 - 5. Hydronic piping
 - 6. Refrigerant piping
 - 7. Vacuum piping
 - 8. Process double-wall containment piping
 - 9. Laboratory gas piping
 - 10. Reverse Osmosis (RO) Water piping.
 - 11. Holiday testing (buried coated steel piping)
 - 12. Process piping
 - 13. Instrument air
 - 14. Fire water drain

1.2 RELATED SECTIONS

- A. Section 01 3545, "Water Discharge Requirements."
- B. Section 01 4000, "Quality Requirements."
- C. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBCONTRACTOR REQUIREMENTS

- A. Notify LANL Subcontract Technical Representative (STR) at least 24 hours (1 working day) in advance to arrange for onsite witnessing by LANL inspector of the piping test (a hold/witness point).
- B. For discharge requirements of water used for pressure testing comply with Section 01 3545, "Water Discharge Requirements."
- C. Notify LANL STR immediately in the event of any accidental discharge.

1.5 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. System Test plan(s) for approval for each test medium used that includes:
 - 1. Material of construction
 - 2. Design pressure
 - 3. Test pressure and duration of test
 - 4. Test medium and method of achieving the test pressure
 - 5. Certification on calibration of pressure gauges
 - 6. Method to exclude personnel from the area containing the system to be tested.
 - 7. Over pressurization protection/prevention: Device make/model number, certification, pressure relief set point, point of installation in system.
- B. Test Reports: Submit test results within 10 working days of successful test.

1.6 QUALITY ASSURANCE

- A. Work identified in this section shall be done in accordance with Section 01 4000, "Quality Requirements."

PART 2 PRODUCTS

2.1 MATERIALS

- A. Furnish instruments, equipment, material and labor necessary to conduct tests.
- B. Calibrate testing equipment at reasonable intervals with devices of accuracy traceable to National Institute of Standards and Technology (NIST).
- C. Test gauges used in conducting test shall be in accordance with Engineering Standards Manual Chapter 17.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Piping being tested shall remain exposed until LANL has approved the piping test results.
- B. Trenches may be backfilled between joints before testing to prevent movement of pipe during testing. Ensure that thrust blocks are sufficiently hardened before testing.
- C. Piping being tested shall not leak nor show any loss in test pressure for duration specified unless otherwise noted.
- D. Where portion of piping system is to be concealed before completion, the portion shall be tested separately as specified for the entire system.
- E. Ensure piping supports are in place.

- F. Isolate system gages, sensors, etc., from pressure tests so instruments and devices are not damaged. Test pressure shall not exceed the maximum allowable test pressure for any vessel, pump, valves, or other component in the system. B31.3, 345.5.3(b) requires that pneumatic testing have owner's approval.
- G. Hydrostatic (Water) Testing:
 - 1. Use potable water as test medium. Do not fill system until the LANL STR has approved the source of water supply.
 - 2. Provide vents at high points to release trapped air while filling system.
 - 3. Provide drains at low points for complete removal of test liquid.
 - 4. Drain system if there is a potential for freezing, i.e., no heat in building, coil in outside air stream, or other similar situations. ASME B31.9 paragraph 937.3.1 does not allow low freezing point liquids.
- H. Pneumatic (Air) Testing – B31.3 345.1(c) pneumatic testing is only allowed by owner approval and is currently set at a maximum of 2 cubic feet (ft³)
 - 1. Use clean dry air (Excluded from use with natural gas pipe testing) (ISO quality class 4 or better) or inert gas as the test medium.
 - 2. Barricade the area around the system to be tested.
 - 3. Prior to application of full air test pressure, apply a preliminary test of not more than 10 psig to reveal possible major leaks.
 - 4. After preliminary test, raise pressure in stages not more than 25 percent up to full test pressure, allowing at least 10 minutes for equalization of strain and detection of major leaks at each intermediate stage. Hold final test pressure for time specified.
 - 5. Examine piping for leakage using ASTM E515 Standard Practice for Leaks Using Bubble Emission Techniques, or by test gage monitoring.
- I. If leaks are found, they shall be eliminated by reducing pressure to zero, then tightening, repair, or replacement, as appropriate and test repeated until no leakage is found.
- J. Where repairs or additions are made to piping system following the pressure test, the affected piping shall be tested. Minor repairs and additions are not required to be pressure tested, provided that the work is inspected and connections are tested with a noncorrosive leak-detecting fluid or other leak-detecting methods. Testing will not be required in cases where it does not include addition to, replacement, alteration or relocation of, any piping, or in any cases where piping is set up temporarily for exhibition purposes.

3.2 PRESSURE TESTING

- A. Fire Protection Piping:
 - 1. Below Grade: Test with water in accordance with NFPA 24 at 200 psig, or 50 psig in excess of the system working pressure, for 2 hours. Piping shall maintain test pressure +/- 5 psi for the duration of the test and there shall be no visible signs of leakage.

2. Above Grade: Test with water in accordance with NFPA 13 at 200 psig, or 50 psig in excess of the system working pressure, for 2 hours and shall maintain that pressure without loss.

B. Plumbing Piping:

1. Sanitary Waste and Vent Piping Within Building to Building Wall, including condensate drain line from cooling coils:
 - a. Test with water in accordance with the IAPMO UPC to a minimum of 10 foot head of water. Keep water in system for at least 1 hour before inspection starts.

- b. Acceptable Alternate: Test with air at 5 psig and hold pressure for at least 15 minutes.

Note: This alternative method may not be used for plastic piping.

- c. For modifications to existing plug the outlet of the drain piping, and fill pipe with water to the point of overflow. After 15 minutes, check piping for leaks. No loss of water from the piping for the duration of the test indicates that the system meets the requirements of the project.

2. Sanitary Sewer Piping Beyond Building Wall (other than Force Main): Completely fill system with water and let stand for at least 1 hour before inspection starts, then visually inspect to ensure that all joints are tight.

- a. For partial system tests, test with water in accordance with the IAPMO UPC to a minimum of 10 foot head of water. Keep water in system for at least 1 hour before inspection starts.

- b. Acceptable Alternate: Test with air at 5 psig and hold pressure for at least 15 minutes.

Note: This alternative testing method may not be used for plastic piping.

3. Sanitary Sewer Force Main: Test with water at 25 psig minimum for 2 hours.
4. Potable Water Inside Building: Test with water at 120 psig for 30 minutes.
5. Potable Water Site Main to Building Backflow Preventer: Test with water at 120 psig for 2 hours.
6. Non-potable Water: Leak test in accordance with the ASME B31.9, 937.3.
7. Rainwater Piping:

- a. Rainwater Piping Inside Building to 5 Feet Outside Building: Test with water in accordance with the IAPMO UPC. Fill the entire system with water to the point of overflowing. Keep water in system for at least 1 hour before inspection starts. If the system is tested in sections, no piping (except the uppermost 10 foot of the system) shall have been submitted to a test of less than 10 foot head of water.

Acceptable Alternate: Test with air at 5 psig and hold pressure for at least 15 minutes.

Note: pneumatic testing may not be used for plastic piping.

- b. Rainwater Piping Beyond 5 feet of Building: Completely fill system with water and let stand for at least 1 hour before inspection starts, then visually inspect to ensure that all joints are tight.

C. Natural Gas Piping

1. Test in accordance with NFPA 54, ASME B31.8, and CFR 192..
2. Test pipe connections to gas regulator per ASME B31.8.
3. Operating Pressure: Test with air, nitrogen, CO₂, or an inert gas with a pressure of at least 1-1/2 times the proposed maximum working pressure. Test duration shall be not less than 1/2 hours for each 500 ft³ of pipe volume or fraction thereof. The duration of the test shall not be required to exceed 24 hours.

D. Compressed Air

1. Test with air in accordance with ASME B31.3, Paragraph 345.5 The test pressure shall be not less than 1.1 times the design pressure of 217 psig and shall not exceed the lesser of (a) 1.33 times the design pressure (b) the pressure that would produce a nominal pressure stress or longitudinal stress in excess of 90% of the yield strength of any component at the test temperature.
2. If using ASTM E515 Standard Practice for Leaks Using Bubble Emission Techniques, for detecting leaks, hold pressure for a minimum of 10 minutes then reduce pressure prior to applying test medium solution. A qualified examiner with a procedure that is compliant with ASME Section V and which must be written by the engineer is required.

E. Instrument Air

1. Test with air at 125 psig, not to exceed 150 psig, in accordance with ASME B31.9, Paragraph 937.4. for 30 minutes.
2. If using ASTM E515 Standard Practice for Leaks Using Bubble Emission Techniques for detecting leaks, hold pressure for a minimum of 10 minutes prior to applying test medium. A qualified examiner with a procedure that is compliant with ASME Section V and which must be written by the engineer is required.

F. Hydronic Piping (heating hot water, chilled water, make-up water and equipment drains)

1. Test with water in accordance with ASME B31.9, 937.3 at 1-1/2 times the design pressure with the maximum test pressure not to exceed the maximum test pressure of any component within the system under the test.

G. Refrigerant Piping:

1. Perform leak and pressure tests in accordance with ASME B31.5, *Refrigerant Piping and Heat Transfer Components*, paragraphs 538.4.2 and 538.4.3.

H. Vacuum Piping: Evacuate to 1mm Hg (1 Torr or 1000 microns) measured with an electronic manometer or thermocouple gauge. After 2 hours, if vacuum level

has risen to no higher than 2.5 mm Hg (2.5 Torr or 2500 microns), the leak test is acceptable.

I. Fire Water Drain and Process Double-Wall Containment Piping:

1. Inner Pipe and Vent: Test with air at 5 psig for 30 minutes.
2. Outer Pipe: Test in accordance with ASME B31.3 category normal.

J. Laboratory Gas Piping:

1. Test piping with oil-free, dry cylinder nitrogen up to 1.25 times the design; pressure of 100 psig, not to exceed 150 psig, in accordance with ASME B31.9, paragraph 937.4 for 30 minutes.

K. RO Water Piping:

1. RO piping shall be leak tested with deionized water at 1-1/2 times system design pressure and shall show no drop in pressure in a two-hour period. ASME Section V requires the use of a qualified examiner and a qualified procedure. Calibrated gauges are also required.
2. Upon completion of the leak testing, all piping installed shall be cleaned with chlorinated water (sodium hypochlorite, 500 ppm) for a four-hour period.

L. Process Piping

1. Process piping shall be pneumatically leak tested at 120 psig, not to exceed 133 psig in accordance with ASME B31.3, 345.5 "Normal" Fluid Service after owner's approval per paragraph 345.5. A leak test shall be maintained for at least 10 minutes, and all joints and connections shall be examined for leaks as required in paragraph 345.2.2 (a).
2. Category D piping shall be tested in accordance with ASME B31.3, 345.7.

M. Category M Fluid Service Piping:

1. Category M Fluid Service Piping shall be leak tested and sensitive leak tested in accordance with ASME B31.3, Paragraphs M345 and 345.8.

N. Non-Metallic Pipe:

1. Non-Metallic (plastic) pipe shall be tested in accordance with ASME B31.3.

3.3 TESTING FOR HOLIDAYS:

A. Test the following buried coated steel piping systems for holidays:

1. Natural gas.

B. Perform holiday test in accordance with ASTM G62 standard test methods for holiday detection in pipeline coatings and the following procedure:

1. After pipe has been welded, joints wrapped, and pipe is ready for lowering into trench, test coating for flaws (holidays). Test coated piping system throughout its length for flaws in coating system by means of a high-potential flaw detector that can impress a maximum of 8,000 volts across coating. One electrode of tester shall maintain complete circumferential contact with coating while transversing entire length of coating system and other electrode shall be the underlying metal pipe.

An electrical discharge through coating detected visually or by instrument, shall constitute failure of this test.

- a. Actual working voltage of detector on pipe will depend upon thickness of coating and size of pipe. A thin coating on a large pipe will offer a capacitive load to the detector that will drop the working voltage several thousand volts below the "no-load" voltage. Detector output may also have to be increased to overcome conditions such as extremely dry rock, or sandy soil.
 - b. Important! Do not cut ground cable to a shorter length. The length supplied is important to proper operation of the detector. Keep as much of the cable as possible in contact with the earth. Straighten out kinks where possible and do not let it ride up over skids. In dry areas it will help to drag the cable in the ditch where there is more moisture. The pipe must be grounded.
2. Mark holidays as they are found and repair prior to lowering pipe into trench. Repair holidays in factory coating by removing initial coating and undercoating for a minimum of 4 inches on each side of holiday. Remove coating around holiday and feather edge to pipe wall for sufficient distance to make a satisfactory repair. Apply primer (Polyken 1027) to the holiday to form a bond over the entire surface of the holiday and then spirally wrap pipe with a double layer of half-lapped 35 mil polyethylene tape (Polyken 934) for a minimum of 2 inches on each side of the holiday.
 - a. Repair holidays in joint wrappings by removing field applied coating in area of holiday and rewinding. LANL STR or designated representative will approve all areas of joint coating.

3.4 RETESTING

- A. If piping does not pass test, locate, depressurize and repair leaks and repeat testing procedure until satisfactory results are obtained.
- B. Make repairs to piping with new materials. Caulking on screwed joints, cracks, or holes is not acceptable.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 22 0813, Rev. 3, dated September 23, 2009.

SECTION 22 0816
DISINFECTION OF POTABLE WATER PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Disinfection requirements for the following new, repaired, or modified systems:
 - 1. Potable water distribution piping on TA-50-230 Project site and within the TA-50-230 and TA-50-251 buildings.
 - 2. Fire protection piping below grade to base of riser.

- B. Dechlorination procedures for chlorinated water discharges

Note: Disinfection of non-potable water piping including fire protection piping downstream of alarm check valve or fire line backflow preventer is not required.

1.2 RELATED SECTIONS

- A. Section 01 3545, "Water Discharge Requirements."
- B. Section 01 4000, "Quality Requirements."
- C. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 LANL PERFORMED WORK

- A. Water quality testing: LANL Subcontract Technical Representative (STR) will coordinate water quality testing of water samples taken from piping systems for chlorine concentrations and bacteriological quality. LANL will approve use of disinfected piping when test results demonstrate conformance with water quality requirements of the Safe Drinking Water Act as described in Paragraph 1.5D of this section, furnishing disinfection report to Subcontractor.

1.5 DESCRIPTION

- A. Disinfection Requirements
 - 1. Protect interiors of pipes, fittings, and valves against contamination during construction.
 - a. Pipe delivered for construction shall be strung so as to minimize entrance of foreign material.
 - b. Close openings of pipeline when pipe-laying is stopped at end of workday or for other reasons, such as rest breaks or meal periods.

2. Do not disinfect any pipe until source of potable water supply used for flushing or disinfection is approved by LANL Subcontract Technical Representative (STR).
 3. LANL will perform water quality testing of water samples taken from piping systems for chlorine concentrations and bacteriological quality as described in Paragraph 1.5D of this section. Samples for testing are not compliance samples and should be marked as "special purpose."
 4. Do not place piping in service until notified by LANL STR that water quality test results are approved by LANL, as described in Paragraph 1.5D of this section.
 5. Re-flush and retest disinfected potable water piping that has been allowed to stand stagnant for more than 30 days before being placed in service.
 6. Disinfect piping within building with service taps and fixtures installed. Flow chlorinated water and flush water through lavatories, sinks, drinking fountains, showers, and hose bibs.
- B. Water Discharge Requirements – Subcontractor
1. Refer to Section 01 3545, "Water Discharge Requirements."
 2. Neutralize chlorinated water used for disinfection prior to discharge as described in "Dechlorination of Discharges (Neutralization)" Paragraph 3.4 of this section.
 3. To discharge chlorinated/dechlorinated water, notify LANL STR, as described in Paragraph 1.5D of this section, to arrange for a total chlorine concentration test.
 4. Obtain approval from LANL STR prior to ANY discharges.
- C. Water Discharge Requirements – LANL STR
1. Refer to Section 01 3545, "Water Discharge Requirements."
- D. Water Quality Testing Requirements -- Subcontractor
1. Notify LANL STR at least 5 working days in advance to arrange for a bacterial quality or free or total chlorine concentration test.
 2. Requirements for demonstration of water quality conformance.
 - a. Total chlorine concentration of less than 1 mg/L (1 ppm).
 - b. The absence of any coliform bacteria.
 - c. At discretion of LANL STR a heterotrophic plate count (HPC) bacteria less than 500 colony-forming units (cfu) per mL sample.
- E. Water Quality Testing Requirements – LANL STR
1. LANL STR will make advance arrangement for a total chlorine concentration test, bacterial quality test, or for monitoring batch treated discharge for pH and chlorine.

2. LANL STR shall verify that water samples taken for piping in the LANL water distribution system (public water system) is accomplished by a Water Sampler Technician certified in accordance with New Mexico NMAC 20.7.4.12.C, it is recommended that a qualified sampler collect all the testing samples.

1.6 REFERENCES

- A. American Water Works Association, C651 Disinfecting Water Mains.
- B. New Mexico Administrative Code, Title 20.7.10 Drinking Water, Section 400.

1.7 SUBMITTALS

- A. Submit the following:
 1. Free Chlorine Residual Concentration.
 2. Results of Bacteriological Test (coliform bacteria).
 3. Residual Free Chlorine Concentration, after flushing chlorinated water.
- B. Test Reports: Submit test results within 5 working days of successful test to LANL STR and LANL Utilities and Institutional water system representative.

1.8 QUALITY ASSURANCE

- A. Work identified in this section shall be in accordance with Section 01 4000, "Quality Requirements."

PART 2 PRODUCTS

2.1 MATERIAL SAFETY DATA SHEETS

- A. Maintain on site Material Safety Data Sheets (MSDS) for chemical products, including disinfection and dechlorination products.

2.2 ACCEPTABLE DISINFECTANTS

- A. Sodium hypochlorite solution (bleach) contains approximately 5 – 6 percent available chlorine, or 50,000 to 60,000 ppm. Thus, a 1:1000 dilution of bleach in water results in a chlorine concentration of about 50 ppm. Use care in control of conditions and length of storage to minimize its deterioration.
- B. Calcium hypochlorite $\text{Ca}(\text{OCl})_2$ granules and tablets per AWWA B300. This contains approximately 65 percent available chlorine by weight. It will not readily dissolve in water with a temperature of less than 41 deg F. Store in a cool, dry, and dark environment to minimize its deterioration. Direct placement of solid phase into piping is not permitted. Do not use calcium hypochlorite intended for swimming pools (e.g., HTH), as this material has been sequestered and is extremely difficult to eliminate from the pipe.
- C. Disinfection with pure chlorine gas or liquid is not permitted.

2.3 ACCEPTABLE DECHLORINATION (NEUTRALIZING) AGENTS

- A. Use Vitamin C salt (sodium ascorbate, Vita-D-Chlor brand or equal) for discharges to a live stream. Sodium thiosulfate (technical grade, prismatic rice) is acceptable for discharges elsewhere.
- B. Sulfur dioxide gas use is not permitted.

2.4 PRECAUTIONS

- A. Calcium hypochlorite is corrosive and is a strong oxidizer. Reducing agents (e.g., sodium ascorbate or thiosulfate), concentrated acids, and organic compounds (e.g., antifreeze, gasoline), can oxidize, burn or explode if they come into contact with solid-phase calcium hypochlorite.
- B. Do not use calcium hypochlorite on solvent-welded plastic pipe or on screwed-joint steel pipe because of danger of fire or explosion from reaction with joint compounds (exception: PFTE "Teflon" tape).
- C. Disinfecting solutions containing chlorine shall not exceed 12% active chlorine; greater concentrations can chemically attack and degrade polyethylene.

PART 3 EXECUTION

3.1 DISINFECTION OF NEW WATER MAINS

- A. Preliminary flushing
 - 1. Prior to disinfection, fill main with water to eliminate air pockets.
 - 2. Follow Section 01 3545, "Water Discharge Requirements," when discharging water.
 - 3. Flush new mains, including fire service mains and lead-in connections to fire system risers, thoroughly before connection is made to system piping in order to remove foreign materials that might have entered the main during the course of the installation or that might have been present in existing piping.
 - 4. The minimum rate of flow shall be greater than the water demand rate of the system, which is determined by the system design. Where the main supplies a fire supply sprinkler system (common at LANL), flow shall provide an NFPA 24 velocity of 10 ft/s (3 m/s) even if the demand rate may be less. Flow/velocity table below.
 - 5. Follow AWWA C651, "Disinfecting Water Mains," using Continuous Feed Method where practical.
 - a. Exception: For mains supplying fire systems, when the flow rate as listed in table below cannot be verified or met, supply piping shall be flushed at the maximum flow rate available to the system under fire conditions. This maximum rate shall be calculated by the water sprinkler system designer for each situation with the existing system limitations, if any, taken into account. The designer shall then submit the water demand rate of the new system to FIRE Group so they can set both the minimum rate of flow and the parameters for the test and flow rates. If such designer is not involved in the project, then FIRE will determine flush rate.

- b. Flow Required to Produce a Velocity of 10 Ft per Second (3 m/s) in Pipes (NFPA 24)

Nominal Pipe Size		Flow Rate
(in.)	(gpm)	(L/min)
4	390	1,476
6	880	3,331
8	1,560	5,905
10	2,440	9,235
12	3,520	13,323

6. For all systems, the flushing operation shall be continued for a sufficient time to ensure thorough cleaning.
7. Obtain verification from LANL STR that system has been thoroughly cleaned (flushed) and is ready for chlorination.
8. Perform piping pressure test before disinfection to avoid possible discharge of heavily chlorinated water due to pipe or joint failure during a pressure test.

B. Chlorination of the Main

1. Inject chlorinated water, with a free chlorine concentration of not less than 25 mg/L, into main at a point no more than 10 feet downstream from beginning of new main. Verify free chlorine concentration of not less than 25 mg/L by an initial free chlorine concentration test as described in Paragraph 1.5D of this section.
2. Leave chlorinated water in main for at least 24 hours during which time valves and hydrants in system shall be operated to ensure disinfection of the appurtenances.
3. At end of 24-hour period, treated water in all portions of main shall have a free chlorine concentration of not less than 10 mg/L. Verify this by a residual free chlorine concentration test as described in Paragraph 1.5D of this section.
4. After residual free chlorine concentration test has been completed, flush system with potable water until total chlorine concentration in main is less than 1 mg/L (1 ppm).
5. After final flushing, contact LANL STR to arrange for final total chlorine concentration and bacteriological quality tests as described in Paragraph 1.5D of this section.
6. After final total chlorine concentration and bacteriological quality tests have been completed, LANL STR will furnish disinfection report to Subcontractor. If water quality tests do not show conformance with water quality requirements of the Safe Drinking Water Act as described in Paragraph 1.5D of this section, repeat 1, 2, 3, 4, and 5 until test results demonstrate conformance.

3.2 DISINFECTION OF NEW INTERIOR POTABLE WATER SYSTEM

- A. Flush until discolored water is eliminated and water flows clear, discharging per Section 01 3545, "Water Discharge Requirements."

B. Chlorination of piping

1. Use chlorinated water, with free chlorine concentration of not less than 25 mg/L. Verify this by an initial free chlorine concentration test as described in Paragraph 1.5D of this section.
2. Retain chlorinated water in piping for at least 24 hours, during which time lavatories, sinks, drinking fountains, showers, and hose bibs shall be operated to ensure disinfection of appurtenances.
3. At end of 24-hour period, treated water in all portions of piping shall have a free chlorine concentration of not less than 10 mg/L. Subcontractor shall verify this minimum concentration by a residual free chlorine concentration test as described in Paragraph 1.5D of this section.
4. After residual free chlorine concentration test has been completed, flush system with potable water until total chlorine concentration in piping is less than 1 mg/L (1 ppm), discharging as follows.
 - a. If total quantity of chlorinated waters is less than 20 gallons, it may be discharged directly to sanitary wastewater collection system without regard to chlorine concentration or Section 01 3545, "Water Discharge Requirements."
 - b. If total quantity of chlorinated water for disinfection is over 20 gallons, then:
 - 1) Neutralize and test disinfection water prior to discharge as described in Paragraph 1.5D and Paragraph 3.4 below, and
 - 2) Discharge to environment or sanitary sewer per Section 01 3545, "Water Discharge Requirements."

3.3 DISINFECTION DURING AND FOLLOWING REPAIR OR MINOR MODIFICATION OF EXISTING MAINS OR INTERIOR PIPING

A. Before Repair

1. Where practical, isolate a section of affected line and shut off all service connections.
2. Swab or spray the inside of new pipe and fittings with a minimum of 1 percent (10,000 ppm) hypochlorite solution before they are installed. Disinfect tools to be used in same manner.

B. Flushing after Repair

1. Prior to disinfection, flush affected line to clean out contamination introduced during repairs. If possible, flush from both directions. Flush until discolored water is eliminated and water flows clear. If line segment cannot be isolated, thoroughly flush the segment to a tank or through a fire hydrant. Follow requirements in Section 01 3545, "Water Discharge Requirements," for notification and possible dechlorination requirements.
2. Obtain verification from LANL STR that affected line has been thoroughly cleaned (flushed) and is ready for chlorination.

- C. Apply chlorine to water to expose interior surfaces of affected segment at the chlorine concentration and contact times as follows; verify total chlorine concentration by an initial total chlorine concentration test as described in Paragraph 1.5D of this section:

Chlorine Concentration (mg/L, ppm)	Contact Time
300	15 minutes
250	1 hour
200	1.5 hours
150	2 hours
100	3 hours

- D. Retain chlorinated water in main, or piping, for above prescribed contact time. At the end of prescribed time period, flush affected line with potable water until total chlorine concentration in main is less than 1 mg/L (1 ppm).
- E. After flushing, contact LANL STR to arrange for final total chlorine concentration and bacteriological quality tests as described in Paragraph 1.5D of this section.
- F. After final total chlorine concentration and bacteriological quality tests have been completed, LANL STR will furnish disinfection report to Subcontractor. If water quality tests do not show conformance with water quality requirements of the Safe Drinking Water Act as described in Paragraph 1.5D of this section, repeat steps C thru E above until test results demonstrate conformance.

3.4 DECHLORINATION OF DISCHARGES (NEUTRALIZATION)

- A. Provide mixing tank to allow dechlorination of water prior to discharge. Stir in neutralizer crystals allowed per PART 2 of this section manually.
- B. If this is not practical or safe, contact LANL STR for coordination and to arrange for direct injection into chlorinated water discharge pipe using a metering pump or venturi injector.
- C. Approximate dosage rate of neutralizer may be calculated from the following table:

Free Chlorine Residual Concentration	Sodium Ascorbate (Vita-D-Chlor)	Sodium Thiosulfate
10 mg/L	2.2 lb/10,000 gal	1.2 lb/10,000 gal
50 mg/L	11 lb/10,000 gal	6 lb/10,000 gal
500 mg/L	110 lb/10,000 gal	60 lb/10,000 gal

- D. Do not dose neutralizing chemical beyond the minimum required to neutralize the chlorine actually present in discharge. *Allowable residual chloride varies depending on discharge avenue (watercourse, flat land, or sanitary wastewater system); see Section 01 3545, "Water Discharge Requirements," for requirements.*

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 22 0816, Rev. 2, dated August 13, 2009.

SECTION 22 1100
FACILITY WATER DISTRIBUTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Building potable and non-potable water piping, valves, fittings, hot water circulator pump, and accessories within the building envelope.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4000, "Quality Requirements."
- C. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- D. Section 22 0529, "Hangers and Supports for Plumbing Piping and Equipment."
- E. Section 22 0548, "Vibration and Seismic Controls for Plumbing, Piping and Equipment."
- F. Section 22 0535, "Electric Heat Tracing Systems."
- G. Section 22 0554, "Identification of Plumbing, HVAC, and Fire Piping and Equipment."
- H. Section 22 0713, "Plumbing and HVAC Insulation."
- I. Section 22 0813, "Testing Piping Systems."
- J. Section 22 0816, "Disinfection of Potable Water Piping."
- K. Section 31 2000, "Earth Moving."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

- A. Submit the following in accordance with the requirements of Exhibit I:
 - 1. Catalog Data—pipe materials, pipe fittings, valves, circulator pump, and accessories.
 - 2. Shop Drawings—submit shop drawings showing pump type, capacity, and certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include Net Positive Suction Head (NPSH) curve when applicable. Include electrical characteristics and connection requirements.
 - 3. Manufacturer's Installation Instructions—pumps, water heater, valves, and accessories.

4. Pressure Design Certification, for pressure containing components made of listed materials but not made in accordance with a specification or standard listed in Table 926.1 of ASME B31.9 shall be substantiated by at least one of the following:
 - a. Engineering calculation(s)
 - b. Experimental stress analysis such as described in Appendix 6 in Section VIII, Division 2 of the ASME B&PV Code.
 - c. Proof test in accordance with UG-101 in Section VIII, Division 1 of the ASME B&PV Code.

1.5 QUALITY ASSURANCE

- A. Comply with NSF 61, *Drinking Water System Components - Health Effects*, for materials for water-service piping and specialties for domestic potable water.
- B. Comply with NSF 14, *Plastics Piping Components and Related Materials*, for plastic potable-water-service piping.
- C. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- D. Work identified in this section shall be in accordance with Section 01 4000, "Quality Requirements."
- E. Comply with *Uniform Plumbing Code* (UPC 2009) for potable water piping and ASME B31.9 for non-potable water piping.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."

2.2 PIPING, BURIED WITHIN THE BUILDING ENVELOPE (WITHIN 5 FT OF BUILDING)

- A. Ductile Iron Pipe: AWWA C153, *Standard for Ductile-Iron Compact Fittings for Water Service*.
 1. Fittings—AWWA C110, *Standard for Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (76mm Through 1,219mm) for Water, Class 350* or AWWA C153, *Standard for Ductile-Iron Compact Fittings for Water Service, Class 350*.
 2. Joints—AWWA C111, *Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings*.
 3. Jackets—AWWA C105, *Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems*, polyethylene jacket.
- B. Copper Tubing: ASTM B 88, *Standard Specification for Seamless Copper Water Tube, Type K*, hard drawn or annealed.
 1. Fittings—ASME B16.22, *Wrought Copper and Copper Alloy Solder Joint Pressure Fittings*.

2. Joints—Brazed, AWS A5.8/A5.8M, *Specification for Filler Metals for Brazing and Braze Welding*, BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 °F.

2.3 PIPING ABOVE GRADE

- A. Copper Tubing: ASTM B88, Type L, hard drawn or annealed.
 1. Fittings—ASME B16.22, wrought copper and copper alloy solder-joint.
 2. Joints—ASTM B 32, *Standard Specification for Solder Metal*, solder, alloy Grade Sb5 tin-antimony, or alloy Grade Sn95 tin and silver, with melting range 430 to 535 °F.
- B. Carbon Steel Pipe: Standard wall, galvanized steel, ASTM A 53/A 53M, *Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless*. Threaded for pipe sizes 4 in. and less.
 1. Fittings—Galvanized Malleable iron, threaded-type, ASME B16.3, *Malleable Iron Threaded Fittings Classes 150 and 300*.

2.4 UNIONS AND FLANGES

- A. Union for Pipe 2 in. and under:
 1. Copper Tubing—ASME B16.22, Class 150, wrought copper, solder joint.
 2. Fittings—Galvanized Malleable iron, threaded-type, ASME B16.3, *Malleable Iron Threaded Fittings Classes 150 and 300*.
- B. Flanges for Pipe over 2 in.:
 1. Copper Tubing—ASME B16.24, Class 150, slip-on bronze flanges.
 2. Flanges—Steel, threaded, Class 150, raised face, ASME B16.5, *Pipe Flanges and Flanged Fittings*.
 3. Gaskets—EPDM durometer hardness 75 to 85, NSF 61 and ASTM D 1330, Grade I and II certified.
- C. Dielectric Unions:
 1. Union with galvanized- or plated-steel threaded end, copper solder end, and water-impervious isolation barrier, ASME B16.39

2.5 VALVES, ABOVE GRADE

- A. Ball Valves up to 2 in.:
 1. Manufacturer—NIBCO, Series 585-70.
 2. Subject to compliance with Paragraph 1.4A.4 of this specification section , Ball Valves Threaded, Solder Joint, 600 psi non-shock cold working pressure (CWP), bronze, two-piece body, chrome-plated, brass-ball, full-port, teflon seats; blowout-proof stem, lever handle; solder or threaded ends to suit piping.
- B. Butterfly Valves over 2 in.:
 1. Manufacturer—NIBCO, Series LD 2000.
 2. MSS SP-67, *Butterfly Valves*, 200 psi, ductile iron body, aluminum-bronze disc, resilient, replaceable, ethylene propylene diene monomer (EPDM)

seat, lug-style, extended-neck, lever handle for use between American National Standards Institute, Inc. (ANSI) Class 125 and 150 flanges.

C. Gate Valves Over 2 in.:

1. Manufacturer—Milwaukee, Model Gate 105.
2. MSS SP-80, 200 psi, Class 125, bronze body, general service, solid wedge disc, non-rising stem, threaded bonnet, gland packed, threaded ends.

2.6 SWING CHECK VALVES

A. Sizes up to 2 in.:

1. Manufacture—NIBCO 433 Series.
2. MSS SP-80, Class 150, bronze body, horizontal swing, Y-pattern, renewable seat and disc. Solder or threaded ends to suit piping.

B. Sizes over 2 in.:

1. Manufacture—NIBCO F-918-B.
2. MSS SP-71, *Gray Iron Swing Check Valves, Flanged and Threaded Ends*, Class 125, cast iron body, fluid to 450 °F, bolted bonnet, horizontal swing, renewable disc seal and seat, flanged end.

2.7 SILENT CHECK VALVE

A. Size up to 2 in.:

1. Manufacturer—NIBCO 480 Series.
2. MSS SP-80, Class 125, bronze body, in-line lift-type, spring-actuated, polytetrafluoroethylene (TFE) seat and disc, solder or threaded ends to suit piping.

2.8 CIRCULATOR PUMP, HOT WATER

A. Manufacturer: Bell & Gossett, Series NBF-22.

B. Bronze body, brass impeller, steel shaft, suitable for 125-psi working pressure and 225 °F water temperature, mechanical seal, direct drive, and oil-lubricated drip-proof motor, 1750 rpm.

C. Performance:

1. Flow—1.25 gpm at 14-ft head.
2. Electrical—92 watts, 0.80 full load amperes, 115 volts, 1-phase, 60 Hz.

D. Automatic Timer Kit: Underwriters Laboratories, Inc. (UL)-listed, installed on the connection box of the circulator, suitable for 115/120-volt, 60-Hz operations. Timer shall provide automatic ON-OFF control at minimum interval of every 15 minutes. It shall also have the option of providing manual ON-OFF control. Bell & Gossett Model No. TC-1.

E. Aquastat:

1. To fit 1/2-in. pipe.
2. Operating parameters: Adjustable, Range 65 °F–200 °F, adjustment differential 5 °F to 30 °F.

2.9 STRAINERS

- A. Sizes up to 2 in.:
 - 1. Manufacturer—Watts, Series LF777SI.
 - 2. Threaded bronze body; 400 psi at 210 °F water, oil, or gas; Y-pattern with standard 20-mesh, stainless-steel screen. Subject to compliance with Paragraph 1.4A.4 of this specification section.
- B. Size over 2 in.:
 - 1. Manufacturer—Watts, Series 77F-SS.
 - 2. Class 150; flanged stainless-steel body; 200 psi at 150 °F water, oil, or gas; Y-pattern with standard 1/16-in., stainless-steel, perforated screen. Subject to compliance with Paragraph 1.4A.4 of this specification section.

2.10 HOSE BIB (WALL HYDRANT)

- A. Manufacturer: J.R. Smith Mfg. Co., Model 5609QT.
- B. ASME A112.21.3M, *Hydrants for Utility and Maintenance Use*, non-freeze, integral vacuum breaker, bronze or brass nickel-plated, 3/4-in. exposed hose connection, 1/4 turn, T-handle key.

2.11 BACKFLOW PREVENTER, THREADED ENDS

- A. Provide models listed in the latest edition of *Approved Backflow Prevention Assemblies* by the University of Southern California Foundation for Cross Connection Control and Hydraulic Research.
 - 1. Suggested Manufactures—
 - a. Conbraco, Series 40-200;
 - b. Wilkins, Series 975XL; and
 - c. Watts, Series 909.
- B. Assembly, reduce pressure-type, bronze body with ball-type shutoff valves, female national pipe thread (NPT) ends, test cocks for in-line field testing, integral unions between body and shut-off valves, and air-gap drain funnel. Maximum water temperature range 33 to 140 °F, maximum rated working pressure 175 psi.
 - 1. Size
 - a. Utility Building—2 in.
 - b. Effluent Sample Building—1 in.

2.12 BACKFLOW PREVENTER, FLANGED ENDS

- A. Provide models listed in the latest edition of *Approved Backflow Prevention Assemblies* by the University of Southern California Foundation for Cross Connection Control and Hydraulic Research.
 - 1. Suggested Manufactures—
 - a. Conbraco, Series 40-200 and
 - b. Watts, Series 909.
- B. Assembly, reduced pressure-type, cast iron body epoxy-coated internal and external, with outside screw and yoke (OS&Y) shut-off valves, flanged ends, test

cocks for in-line field testing, and an air-gap drain funnel. Maximum water temperature range 33 to 140 °F, maximum rated working pressure 175 psi.

1. Size—4 in.

2.13 PRESSURE GAUGE

- A. Manufacturer: Ashcroft, Type 1009.
- B. Subject to compliance with Paragraph 1.4A.4 of this specification section, Accuracy Grade 1A, maximum plus or minus 1 percent full-scale accuracy, minimum 2-1/2-in. dial, stainless-steel case, phosphor bronze bourdon tube, and 1/4 in. NPT brass-bottom connection. Furnish with brass ball valve.
 1. Range—0-100 psi.

2.14 EXPANSION TANK

- A. Manufacturer: Amtrol, Model ST, ASME coded, NSF 61 approved.
- B. Vertical flow-mount tank with removable and replaceable butyl rubber bladder, steel shell, rated for 125 psig and 240 °F. Optional features include seismic-mounted clips.
 1. Tank, Acceptance Volume, and Precharge—See drawings.

2.15 AIR VENT

- A. Manufacturer: Bell & Gossett, Model No. 87.
- B. Subject to compliance with Paragraph 1.4A.4 of this specification section, Automatic float-type with overflow connection, brass, rated for 150 psi and 240 °F.

2.16 WATER HAMMER ARRESTERS

- A. Manufacturer: Wilkins Model 1250, Comply with ASSE 1010, *Performance Requirements for Water Hammer Arresters* or PDI-WH 201, *Water Hammer Arresters*.
- B. Copper body with brass male pipe threaded inlet, precharged and sealed at the factory.
 1. Room 1011 Potable Water—Size B
 2. Room 1011 Non-Potable Water—Size B
 3. Lav/Rated Corridor Area Potable Water Cold—Size B
 4. Lav/Rated Corridor Area Potable Water Hot—Size A
 5. Room 1012 Potable Water Cold—Size A
 6. Room 1012 Potable Water Hot—Size A
 7. Room 1012 Non-Potable Water Cold—Size A

2.17 TRAP PRIMER VALVES

- A. Manufacturer: Precision Plumbing Products.
- B. Machined brass, 1/2-in. male NPT inlet, 1/2-in. female NPT outlet, with integral vacuum breaker ports. PPP Model PR-500.
- C. Electronic Trap Priming Assembly: Per ASSE 1044, Featuring atmospheric vacuum breaker, preset 24-hour time clock with field adjustable timer, manual override switch/test button, 120V ac solenoid valve, 3/4-in. female NPT inlet

connection, calibrated distribution manifold with minimum six 5/8-in. compression fittings to feed up to six floor drains. Complete with 12-in. by 12-in. by 4-in. NEMA 1 cabinet with cover plate, circuit breaker/fuse, and the assembly shall be UL-listed. PPP Model PTS-6.

PART 3 EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt on inside and outside of pipe before assembly.
- C. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.2 BURIED PIPING

- A. Provide earth cover, bedding, and warning tape per drawings and Section 31 2000, "Earth Moving."

3.3 INSTALLATION

- A. Comply with International Association of Plumbing and Mechanical Officials (IAPMO) *Uniform Plumbing Code* (UPC), and as applicable with AWWA C600, *Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances*; and AWWA M41, *American National Standard for Ductile-Iron Pipe Fittings*.
- B. Comply with the UPC and AWWA M14, *Recommended Practice for Backflow Prevention Criterion*, for cross-connection control from non-potable sources or substances.
- C. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- D. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- E. Install piping to maintain headroom and neither interfere with use of space nor take more space than necessary.
- F. Group piping whenever practical at common elevations.
- G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- H. Provide access where valves and other equipment are not exposed.
- I. Install valves with stems upright or horizontal, not inverted.
- J. Pipe relief from safety valves and backflow preventers to nearest floor drain.
- K. Slope water piping and provide drain valves at low points.
- L. Sleeve and caulk pipes penetrating exterior walls or interior bearing walls. Provide waterproof installation for exterior walls. Provide UL/FM approved through-penetration firestop system when penetrating fire-rated barriers (e.g., walls, floors).
- M. Paint exposed piping in occupied spaces to match background color.

- N. Install chrome-plated steel escutcheons where pipes are not insulated in finished areas.
- O. Provide stops on waterlines for plumbing fixtures.
- P. Above Grade Piping: Provide ball valves in piping 2 in. and smaller and butterfly valves in piping 2-1/2 in. and larger.
- Q. Support piping system in accordance with Section 22 0529, "Hangers and Supports for Plumbing Piping and Equipment."
- R. Sleeve pipe penetration and caulk in accordance with Section 22 0548, "Vibration and Seismic Controls for Plumbing, Piping and Equipment."
- S. Disinfect water distribution system in accordance with Section 22 0816, "Disinfection of Potable Water Piping."
- T. Pressure test piping system, prior to applying insulation, in accordance with Section 22 0813, "Testing Piping Systems."
- U. Heat-trace piping as indicated on drawings in accordance with Section 22 0535, "Electric Heat Tracing Systems."
- V. Label piping system in accordance with Section 22 0554, "Identification of Plumbing, HVAC, and Fire Piping and Equipment."
- W. Insulate piping system in accordance with Section 22 0713, "Plumbing and HVAC Insulation."

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 22 1100, Rev. 3, dated September 15, 2009.

SECTION 22 1316
SANITARY WASTE AND VENT PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Building piping, fittings, and accessories within 5 ft of building wall.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Proc."
- B. Section 01 4000, "Quality Requirements."
- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- C. Section 22 0529, "Hangers and Supports for Plumbing Piping and Equipment."
- D. Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."
- E. Section 22 0813, "Testing Piping Systems."
- F. Section 31 2000, "Earth Moving."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

- A. Submit the following in accordance with the requirements of Exhibit I:
 - 1. Catalog Data – pipe materials, fittings, and accessories.
 - 2. Manufacturer's Installation Instructions – piping and accessories.
 - 3. Certifications – welders.

1.5 QUALITY ASSURANCE

- A. Welders Certifications and Qualified Procedure Standards per American Society of Mechanical Engineers, *ASME Boiler and Pressure Vessel Code* (B&PV Code) (Section IX, "Welding and Brazing Qualifications").
- B. Comply with provisions in the *Uniform Plumbing Code* (UPC 2009).
- C. Certify that each welder has passed ASME qualification tests for welding processes involved and that certification is current.
- D. Comply with NSF 14, *Plastics Piping Systems Components and Related Materials*, for polyvinyl chloride (PVC) piping components.
- E. Work identified in this section shall be in accordance with Section 01 4000, "Quality Requirements."

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."

2.2 SANITARY WASTE PIPING, BURIED WITHIN 5 FT OF BUILDING

- A. Cast Iron Pipe and Fittings: ASTM A 74, *Standard Specification for Cast Iron Soil Pipe and Fittings*, service weight, bell, and spigot ends.
 - 1. Joints – Hub and spigot, Cast Iron Soil Pipe Institute (CISPI) HSN compression-type with ASTM C 564, *Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings*.
- B. PVC Pipe and Fittings: ASTM D 2665, *Standard Specification for Poly(Vinyl Chloride)(PVC) Plastic Drain, Waste, and Vent Pipe and Fittings*, PVC material, Schedule 40 drain, waste, and vent (DWV).
 - 1. Joints – ASTM D 2855, *Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride)(PVC) Pipe and Fittings with* ASTM D 2564, *Standard Specification for Solvent Cements for Poly(Vinyl Chloride)(PVC) Plastic Piping System*.

2.3 SANITARY WASTE AND VENT PIPING, ABOVE GRADE INSIDE BUILDING

- A. PVC Pipe and Fittings: ASTM D 2665, PVC material, Schedule 40 DWV.
 - 1. Joints – ASTM D 2855, solvent weld with ASTM D 2564. solvent cement.

2.4 FLOOR DRAINS

- A. ASME A112.6.3, *Floor and Trench Drains*, cast-iron, 2-in.-diameter drain with light-duty, cast-iron grate and cast-iron bucket, double-drainage flange, reversible-clamping collar, adjustable nickel-bronze strainer.

2.5 CLEANOUTS

- A. ASME A112.36.2M, *Cleanouts*, cast-iron, cleanout assembly with round adjustable, scoriated, cast-iron, nickel-bronze cover with threaded spanner wrench cover.

PART 3 EXECUTION

3.1 PREPARATION

- A. Ream pipe ends and remove burrs.

3.2 BURIED PIPING

- A. Provide earth cover, bedding, and warning tape per drawing and Section 31 2000, "Earth Moving."

3.3 INSTALLATION – ABOVE GROUND PIPING

- A. Comply with the International Association of Plumbing and Mechanical Officials (IAPMO) *Uniform Plumbing Code (UPC)*.

- B. Extend cleanouts to finish floor or wall surface. Lubricate threaded cleanout plugs with non-hardening thread lubricant. Ensure clearance at cleanout for snaking drainage system.
- C. Encase exterior cleanouts in concrete, flush with grade.
- D. Install floor cleanouts at elevation to accommodate finished floor.
- E. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- F. Route drain piping from equipment close to walls or equipment to minimize tripping hazard.
- G. Install piping penetrating roofed areas to maintain integrity of roof assembly.
- H. Install bell and spigot pipe with bell-end upstream.
- I. Sleeve and caulk pipes penetrating exterior walls or interior bearing walls. Provide waterproof installation for exterior walls. Provide Underwriters Laboratories, Inc. (UL)/Factory Mutual (FM) approved through-penetration firestop system when penetrating fire-rated barriers (i.e., walls, floors).
- J. Test piping system with water in accordance with Section 22 0813, "Testing Piping Systems."
- K. Label piping in accordance with Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."
- L. Support piping in accordance with Section 22 0529, "Hangers and Supports for Plumbing Piping and Equipment."
- M. Install cast-iron, soil piping according to CISPI's *Cast Iron Soil Pipe and Fittings Handbook* (Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings").
- N. Install PVC DWV piping per IAPMO UPC Installation Standard IS 9-2003.

3.4 LANL ACCEPTANCE INSPECTION

- A. Notify LANL Subcontract Technical Representative (STR) at least 10 working days in advance to schedule inspection of piping system.
- B. LANL STR to ensure all drains or buildings connected to the sanitary collection system has an approved Waste Profile Form (WPF) for discharge to the sanitary sewer for all anticipated wastewater. Documentation shall be submitted to the LANL Utilities and Infrastructure Group wastewater representative.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 22 1316, Rev. 3, dated September 23, 2009.

SECTION 22 1413
FACILITY STORM DRAINAGE PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Building storm drainage piping, fittings, and accessories within building wall.
- B. Double containment piping, fittings, and accessories.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4000, "Quality Requirements."
- C. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- D. Section 22 0529, "Hangers and Supports for Plumbing Piping and Equipment."
- E. Section 22 0535, "Electric Heat Tracing Systems."
- F. Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."
- G. Section 22 0813, "Testing Piping Systems."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

- A. Submit the following in accordance with the requirements of Exhibit I:
 - 1. Catalog Data – pipe materials, fittings, and accessories.
 - 2. Manufacturer's Installation Instructions – piping and accessories.
 - 3. Certifications – welders.

1.5 QUALITY ASSURANCE

- A. Welders Certifications and Qualified Procedure Standards per American Society of Mechanical Engineers, *ASME Boiler and Pressure Vessel Code* (B&PV Code) (Section IX, "Welding and Brazing Qualifications").
- B. Comply with provisions in the *Uniform Plumbing Code* (UPC 2009).
- C. Certify that each welder has passed ASME qualification tests for welding processes involved and that certification is current.
- D. Comply with NSF 14, *Plastics Piping Systems Components and Related Materials*, for polyvinyl chloride (PVC) piping components.
- E. Comply with ASME B31.3, *Process Piping*, for materials, products, and installation.
 - 1. Design, fabricate and install double-containment piping to meet ASME B31.3 where applicable manufacturer shall provide thermal stress analysis demonstrating the ability of the double-containment piping

system to handle the stated piping conditions with a restrained or a flexible design, as follows:

a. Restrained Design

The system shall be restrained with no accommodation for inner-pipe movement. Manufacturer or Design Engineer should be consulted for the proper location of anchors.

b. Flexible Design

The system shall be a flexible design with provisions to allow inner and outer pipe ability to move independent of one another. Anchors will be selectively used to direct thermal expansion into expansion loops, and/or offsets, etc. Manufacturer or Design Engineer should be consulted for the proper location of anchors and expansion compensation design.

- F. Work identified in this section shall be in accordance with Section 01 4000, "Quality Requirements."

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."

2.2 STORM DRAINAGE PIPING, ABOVE GROUND

- A. Cast Iron Pipe and Fittings: Cast Iron Soil Pipe Institute (CISPI) 301, *Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications*.
1. Joints – CISPI 310, *Couplings for use in connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications*, neoprene gaskets and stainless-steel clamp/shield assemblies.
- B. Cast Iron Pipe and Fittings: ASTM A 74, *Standard Specification for Cast Iron Soil Pipe and Fittings*, service weight, bell, and spigot ends.
1. Joints – Hub and spigot, CISPI HSN compression-type with ASTM C 564, *Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings*.

2.3 STORM DRAINAGE PIPING, BELOW GRADE

- A. PVC Pipe and Fittings: ASTM D 3034, *Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings*, SDR 35, PVC material.
1. Joints – ASTM D 2855, *Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride)(PVC) Pipe and Fittings with ASTM D 2564, Standard Specification for Solvent Cements for Poly(Vinyl Chloride)(PVC) Plastic Piping System*.

- B. PVC Pipe and Fittings: ASTM D 2665, *Standard Specification for Poly(Vinyl Chloride)(PVC) Plastic Drain, Waste, and Vent Pipe and Fittings*, PVC material.
 - 1. Joints – ASTM D 2855, *Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride)(PVC) Pipe and Fittings with ASTM D 2564, Standard Specification for Solvent Cements for Poly(Vinyl Chloride)(PVC) Plastic Piping System*.
- 2.4 ROOF DRAINS
 - A. ASME A112.6.4, *Roof, Deck, and Balcony Drains*, cast-iron body and strainer with removable dome, connection sizes shown on drawing.
- 2.5 OVERFLOW ROOF DRAINS
 - A. ASME A112.6.4, cast-iron body, flashing clamp, and gravel stop with PVC standpipe and polyethylene dome, connection sizes shown on drawing.
- 2.6 DOWNSPOUT NOZZLE
 - A. Cast bronze nozzle and flange with slide over connection and bird screen, connection sizes shown on drawings.
- 2.7 FIRE WATER FLOOR DRAINS
 - A. Trench Drain: 0.6 percent pre-sloped, 4-in. nominal inside width, polyester resin polymer concrete. Drain minimum invert depth shall be 6.96 in. Drain and associated grate shall withstand load Class E.
 - 1. Manufacturer: ACO Polymer Products, Model K100S.
 - B. Trench Drain Sump: Custom 4-ft-wide by 6-ft-long by 5-ft-deep, vinyl-ester fiberglass sump box. Sump box and associated grate shall withstand load Class E. Locate as specified on drawing.
 - 1. Manufacturer: ACO Polymer Products.
- 2.8 CLEANOUTS
 - A. ASME A112.36.2M, *Cleanouts*, cast-iron, cleanout assembly with round adjustable, scoriated, cast-iron, nickel-bronze cover with threaded spanner wrench cover.
- 2.9 DOUBLE-CONTAINMENT PIPE AND FITTINGS
 - A. Manufacturers: Subject to compliance with Paragraph 1.5E of this specification section, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Ameron International; Fiberglass Pipe Group.
 - 2. Fischer, George Inc.
 - 3. IPEX Inc.; Guardian Division.

- B. Description: Factory-fabricated, double-wall pipe and fittings. Sizes indicate carrier-pipe size; with carrier (inner) pipe and fittings; annular-space, carrier-pipe supports; containment (outer) pipe and fittings; and joining materials and fasteners. Include manufacturer's standard piping materials according to the following:
 - 1. Polyvinyl Chloride (PVC), Double-Containment Pipe and Fittings:
 - a. PVC Carrier Pipe – Schedule 40 per ASTM D 1785.
 - b. PVC Carrier-Pipe Fittings – Schedule 40 per ASTM D 2466.
 - c. PVC Containment Pipe – Schedule 40 per ASTM D 1785.
 - d. PVC Containment Pipe Fittings – Schedule 40 per ASTM D 2466.
- C. JOINING MATERIALS
 - 1. Couplings, Adapters and Transition Fittings: Per manufacturer system.
 - 2. Solvent Cement for Joining PVC Piping: Per ASTM D 2564. Include primer according to ASTM F 656, *Standard Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride)(PVC) Plastic Pipe and Fittings*.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify excavations are to required grade. Do not over excavate.

3.2 PREPARATION

- A. Ream pipe ends and remove burrs.

3.3 INSTALLATION

- A. Install PVC piping in accordance with International Association of Plumbing and Mechanical Officials (IAPMO) *Uniform Plumbing Code* (UPC) Installation Standard IS 9-2003 and Manufacturers recommended installation instructions.
- B. Comply with IAPMO *Uniform Plumbing Code* for roof drain and roof drain overflow piping.
- C. Comply with ASME B31.3 for double-containment piping.
- D. Extend cleanouts to finish floor or wall surface. Lubricate threaded cleanout plugs with non-hardening thread lubricant. Ensure clearance at cleanout for snaking drainage system.
- E. Install floor cleanouts at elevation to accommodate finished floor.
- F. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- G. Install piping penetrating roofed areas to maintain integrity of roof assembly.
- H. Install bell and spigot pipe with bell-end upstream.
- I. Sleeve and caulk pipes penetrating exterior walls or interior bearing walls. Provide waterproof installation for exterior walls. Provide Underwriters Laboratories, Inc. (UL)/Factory Mutual (FM) approved through-penetration firestop system when penetrating fire-rated barriers (i.e., walls, floors).

- J. Test piping system with water in accordance with Section 22 0813, "Testing Piping Systems."
- K. Label piping in accordance with Section 22 0554, "Identification of Plumbing, HVAC, and Fire Piping and Equipment."
- L. Support piping in accordance with Section 22 0529, "Hangers and Support for Plumbing, Piping and Equipment."
- M. Provide splash blocks under downspout nozzle when required to control erosion.
- N. Install cast-iron, soil piping according to CISPI's *Cast Iron Soil Pipe and Fittings Handbook* (Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings").
- O. Downspouts located on north side of buildings shall be located within the building with the spout penetrating the building wall and heat traced in accordance with Section 22 0535, "Electric Heat Tracing Systems" at the discharge to prevent ice buildup.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 22 1413, Rev. 2, dated September 23, 2009.

SECTION 22 1500
COMPRESSED-AIR SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe fittings, valves, and accessories.
- B. Air compressors.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4000, "Quality Requirements."
- C. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- D. Section 01 4444, "Offsite Welding & Joining Requirements."
- E. Section 01 4445, "Onsite Welding & Joining Requirements."
- F. Section 22 0548, "Vibration and Seismic Controls for Plumbing, Piping and Equipment."
- G. Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."
- H. Section 22 0813, "Testing Piping Systems."
- I. Section 26 0700, "Induction Motors – 500HP or Smaller."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

- A. Submit the following in accordance with the requirements of Exhibit I:
 - 1. Manufacturer's catalog data;
 - 2. Manufacturer's installation instructions;
 - 3. Materials/Parts list;
 - 4. Design, Operational, and Maintenance data;
 - 5. Warranties;
 - 6. Certifications of welders; and
 - 7. Welding Inspection Reports, as applicable.
 - 8. Pressure Design Certification, for pressure containing components made of listed materials but not made in accordance with a specification or standard listed in Table 326.1 of ASME B31.3 shall be substantiated by at least one of the following:
 - a. Engineering calculation(s)

- b. Experimental stress analysis such as described in Appendix 6 in Section VIII, Division 2 of the ASME *Boiler and Pressure Vessel* (B&PV) Code.
- c. Proof test in accordance with UG-101 in Section VIII, Division 1 of the ASME B&PV Code.

1.5 QUALITY ASSURANCE

- A. Welders Certifications and Qualified Procedure Standards per ASME B&PV Code (Section IX, "Welding and Brazing Qualifications").
 - 1. Certify that each welder has passed ASME qualification tests for welding processes involved and that certification is current.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum 5 years experience and having maintenance service based within 200 miles radius of installation.
- C. Material and Installation: Conform to ASME B31.3, *Process Piping*.
- D. Work identified in this section shall be in accordance with Section 01 4000, "Quality Requirements."
- E. Subcontractor shall use listed components unless calculations are provided in accordance with ASME requirements for unlisted components.

1.6 WARRANTIES

- A. Provide a minimum of 1-year manufacturer's warranty, parts and labor, for air compressor system.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTION

- A. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."

2.2 COPPER TUBING AND FITTINGS (UP TO 2 INCHES)

- A. Tubing: Copper, hard drawn or annealed, ASTM B 88, Type L, UNS C10200.
- B. Fittings: Wrought copper, ASME B16.22.
- C. Joints:
 - 1. Solder, ASTM B 32, Alloy 95-5 tin-antimony.
 - 2. Brazed, filler material per AWS A5.8, in accordance with Section 333 of ASME B31.3. Brazing shall be in accordance with 01 4444 "Offsite Welding & Joining Requirements" and 01 4445 "Onsite Welding & Joining Requirements."

2.3 STEEL PIPE AND FITTINGS (2 INCHES AND OVER)

- A. Pipe: Black steel, ASTM A 53, Schedule 40.
- B. Fittings: Steel, ASTM A 234, Grade WPB, Schedule 40, butt-welding type.
- C. Joints: Welded.

2.4 VALVES

- A. Ball Valves: In accordance with Paragraph 1.4A.8 of this specification section. Class 150, bronze, chrome-plated brass ball, full port, teflon seats and stuffing box ring, lever handle, solder or threaded ends to suit piping.
- B. Swing Check Valve: MSS SP-80 Class 150, bronze body and cap, bronze swing disc with rubber seat, solder or threaded ends to suit piping.
- C. Pressure Regulating Valve: Reduced pressure type, range 0 to 125 psig, diaphragm operated, relieving spring adjustment mechanism, rated at 300 psig maximum, temperature range 40 to 120 °F.

2.5 STRAINER

- A. "Y" type, Class 150, 20 mesh stainless steel perforated screen, bronze body (ASTM B 62), with blowoff gate valve and plug, solder or threaded ends to suit piping in accordance with Paragraph 1.4A.8 of this specification section.

2.6 UNIONS AND FLANGES

- A. Unions
 - 1. Ferrous Pipe: ASME B16.39, Class 150, malleable iron, threaded unions.
 - 2. Copper Tube and Pipe: ASME B16.22, Class 150, bronze unions with soldered joints.
- B. Dielectric Unions
 - 1. Union with galvanized or plated steel threaded end, copper solder end, water-impervious isolation barrier, ASME B31.3, Section A329 and ASME B16.39.
- C. Flanges (N/A to copper)
 - 1. Forged carbon steel, ASTM A 234, Grade WPB, Schedule 40, butt welding, Class 150.

2.7 FLEXIBLE CONNECTOR

- A. Manufacturer: Flex-Hose, Pumpsaver Connectors.
- B. Braided bronze or stainless steel flexible connector, with corrugated metal hose, minimum working pressure 200 psi at 70 °F, minimum temperature rating 400 °F, with brazed or threaded ends to suit piping in accordance with Paragraph 1.4A.8 of this specification section.

2.8 PRESSURE GAUGE

- A. Manufacturer: Ashcroft, Type 1009.
- B. Grade 1A, minimum 2-1/2 inch dial, 1/4 inch NPT brass bottom connection, maximum plus or minus 1 percent full scale accuracy, stainless steel case, phosphor bronze bourdon tube, and isolation valve in accordance with Item Paragraph 1.4A.8 of this specification section.
 - 1. Range: 0 to 200 psi unless otherwise specified on drawings.
 - 2. Cock Valve: 1/4 inch brass plug, 250 psi working pressure valve. Manufacturer: Anderson Metals, PAC-56NB, Part No. 138-00110.

2.9 COMMERCIAL OFF-THE-SHELF AIR COMPRESSOR

- A. Description: Factory-assembled, -wired, -piped, and -tested; electric-motor-driven; air-cooled; continuous-duty compressor with receiver for compressed air service. Also includes an air dryer, automatic condensate drain.
- B. Manufacturer: Kaeser Compressors model SK 20T Air Center.
- C. See datasheet in Attachment 1 for specific design and operating data.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install compressor unit on vibration isolators. Level and bolt in place. Refer to Section 22 0548, "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- B. Route condensate drains to nearest floor drain.
- C. Provide drain valves at low points of piping system.
- D. Slope piping to low-point drains or as specified on drawings.
- E. Install take-offs to outlets from top of main, with shutoff valve after take-off. Slope take-off piping to outlets.
- F. Install compressed air couplings, female quick connectors, and pressure gauges where branch outlets are indicated.
- G. Labeling: Refer to Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."
- H. Pressure Testing: Refer to Section 22 0813, "Testing Piping Systems."
- I. Cap or seal ends of piping when not connected to mechanical equipment to ensure contamination by foreign material does not occur.

Air Compressor, LLW Utility Building Data Sheet

AECOM	DS-001, Air Compressor, LLW Utility Building				Specification No. 22 1500	
	Rev.	By	Date	Comment	Sheet	Date
	~~~	~~~	~~~	~~~	1 of 1	~~~
					Checked By	Approved By
					~~~	~~~
Project RLWTF-UP				Purchase Order:		
				Requisition No.:		
Tag No.	CA-5401					
P&ID #	C55865 P-6202	Quality Assurance Level			General Service	
Operating Data		Rev.	Component Data (continued)			
Duty Service	Continuous	~~~	Dryer (2)			
Fluid	Air	~~~	Dryer Type		Refrigerated	~~~
Ambient Pressure (psia)	11.1	~~~	Dryer Rating (psig)		230	~~~
Elevation (ft)	7,500.0	~~~	Integrated Dryer moisture separator		Yes	~~~
Operating Pressure (psig)	125.0	~~~	Dryer moisture separator drain Type		electronic	~~~
Maximum Pressure (psig)	135.0	~~~	Motors (2) (ea.)			
Normal Temperature (deg F)	80	~~~	Motor Speed		1,800	~~~
Temperature Range (deg F)	50-85	~~~	Insulation		Class F	
Ambient Temperature Range (deg F)	40-115	~~~	Size (Hp)		20	
Operating Capacity (SCFM @ 125 psig)	88	~~~	Controls			
Maximum Capacity (SCFM @ 125 psig)	176	~~~	Cut in (psig)		105	~~~
Component Data			Cut out (psig)		125	~~~
Compressor			Temperature range		-4 to +140	~~~
Compressor Configuration	Duplex	~~~	Compressor shall have load/unload controls with automatic dual control as standard. Switchable Modulation control shall be an acceptable option.			
Compressor Type	1 Stage Rotary	~~~				
Lubrication	Oil Flooded	~~~				
Receiver			Control shall be capable of manually sequencing/ alternating compressors for maximum flow and to allow for even load hours.			
Receiver Size (gallons)	(2) 100	~~~				
Receiver Rating (psig)	210	~~~				
Material	Carbon Steel		Compressors shall have controls available for automatic sequencing. Compressor shall automatically load after starting if system demands it. Compressor shall have time delay relay to shut down the compressor after running unloaded for a pre-determined period to avoid excessive motor starting.			
Design Code (ASME B&PV)	Section VIII Div 1					
Code Stamp	"U"					
Condensate Drain Type	Automatic		Class I or II ozone depleting substances not allowed.			
Safety Valves						
Pressure Relief setting (psig)	150	~~~				
Filters			All Condensate shall be routed through a model KCF filter for oil/water separation.			
Air Inlet Filter (micron)	4	~~~				
Coalescing Filter (% Efficiency)	99.99	~~~				
Condensate Filtration			Compressor motors shall be per specification section 26 0700.			
			Electrical			
			Volts		460	~~~
			Phase		3	~~~
			Frequency (Hz)		60	~~~
			Amps		29	~~~
Comments/Notes:						
Compressor is defined as a duplex unit but is essentially 2 simplex units tied together.						
*Vendor to provide/verify this information						

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 22 1500, Rev. 3, dated September 1, 2009.

SECTION 22 3700
DOMESTIC WATER HEATERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Gas-fired, water heaters.
- B. Electric, tankless, water heaters.
- C. Water heater accessories.

1.2 RELATED SECTIONS

- A. Section 01 4000, "Quality Requirements."
- B. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- C. Section 03 3001, "Reinforced Concrete."
- D. Section 03 3053, "Miscellaneous Cast-in-Place Concrete."
- E. Section 22 0548, "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- F. Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."
- G. Section 22 1100, "Facility Water Distribution."
- H. Section 23 1123, "Facility Natural-Gas Piping."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 LANL PERFORMANCE REQUIREMENTS

- A. Water Heaters shall perform satisfactorily in the following service conditions:
 - 1. Elevation: 7500 feet above sea level.
 - 2. Maximum ambient temperature: 104 degrees F.
 - 3. Minimum ambient temperature: Minus 20 degrees F.
 - 4. 24-hour average temperature: not exceeding 86 degrees F.
- B. Seismic Protection and Performance: The seismic protection and performance of Water Heaters shall be in accordance with Section 22 0548, "Vibration and Seismic Controls for Plumbing Piping and Equipment."

1.5 SUBMITTALS

Submit the following in accordance with the requirements of Exhibit I:

- A. Product Data: For each type and size of water heater indicated, include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories. Include documentation indicating that units comply with applicable requirements in ASHRAE/IESNA 90.1, Section 7, Service Water Heating.
- B. Shop Drawings: Wiring Diagrams for power, signal, and control wiring.

- C. Operation and Maintenance Data: Include emergency, operation, and maintenance manuals.
- D. Product Certificates: For each type of water heater from manufacturer.
- E. Warranty: Provide documentation of a minimum of a One year warranty unless otherwise specified.
- F. Test Reports: For each type of water heater.
- G. Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.
- H. Energy Efficiency:
 - 1. Indicate EER (Energy Efficiency Rating) or Energy Factor (EF) for equipment provided under work of this section.
 - 2. Submit documentation for EnergyStar qualifications for equipment provided under work of this section.
- I. Pressure Design Certification, for pressure containing components made of listed materials but not made in accordance with a specification or standard listed in the *Uniform Plumbing Code* (UPC 2009) shall be tested and submitted for equivalency approval.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a Nationally Recognized Testing Laboratory (NRTL) recognized under 29 CFR 1910.7.
- B. ASHRAE/IESNA Compliance: Fabricate and label -water heaters to comply with ASHRAE/IESNA 90.1.
- C. ASME Compliance: Where ASME-code construction is indicated, fabricate and label water heater storage tanks to comply with Section IV, Part HLW of the ASME code.
- D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, Drinking Water System Components - Health Effects.
- E. Work identified in this section shall be in accordance with Section 01 4000, "Quality Requirements."

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric water heaters that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including storage tank and supports.
 - b. Faulty operation of controls.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Periods: From date of Substantial Completion:
 - a. Storage Tank: 10-year coverage for manufacturing or material defects, leaks and /or the production of rusty water.
 - b. Heat exchanger: 5 year coverage for manufacturing or material defects, leaks, and/or the production of rusty water
 - c. Burner and all heater parts: 1 year

PART 2 PRODUCTS

2.1 GAS-FIRED, WATER HEATERS

- A. Manufacturers: Subject to compliance with requirements: PVI Industries, LLC., TURBOPOWER® Model 1000 N 225A-TPL.
- B. Commercial, Power-Burner, Storage, Gas Gas-Fired, Water Heaters: Comply with ANSI Z21.10.3/CSA 4.3.
 1. Natural gas fired, automatic, vertical storage water heater, welded steel, ASME stamped.
 2. The storage and heating sections will be completely factory packaged, requiring only job site hookup to utilities, venting, and plumbing. The heater will be insulated, jacketed with enameled steel panels, and mounted on heavy-duty channel skids.
- C. See datasheet in Attachment 1 for required specification data.

2.2 ELECTRIC, WATER HEATERS (HWE-5900)

- A. Electric Water Heaters
 1. Manufacturers: Subject to compliance with requirements, provide products by:
 - a. Rheem Manufacturing Company. Model EGSP10-3.
 2. Standard: UL 174.
 3. Tank Construction: Corrosion-resistant metal or steel with corrosion-resistant coating vertical arrangement.
 - a. Tappings: ASME B1.20.1 pipe thread.
 - b. Pressure Rating: 150 psig.
 - c. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.
 4. Factory-Installed Tank Appurtenances:
 - a. Anode Rod: Replaceable magnesium.
 - b. Drain Valve: Corrosion-resistant metal if tank has drain outlet. Provide hose-end drain valve in piping for -water heaters without drain outlet.
 - c. Tank shall be insulated with rigid polyurethane foam.

- d. Heat-Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
 - e. Heating Elements: Electric, screw-in immersion type.
 - f. Temperature Control: Adjustable thermostat.
 - g. Safety Controls: High-temperature-limit and low-water cutoff devices or systems.
 - h. Relief Valve: AGA/ASME rated and stamped for combination temperature-and-pressure relief valve
- 5. Capacity and Characteristics:
 - a. Storage Capacity: 10 gallons.
 - b. Minimum Recovery Rate: 12 gph at 100°F temperature rise.
 - c. Temperature Setting: 120 deg F.
 - d. Power Demand: 3 kilowatts.
 - e. Heating Elements:
 - 1) Number of Elements: One.
 - 2) Kilowatts Each Element: 3 kilowatts.
 - 3) Number of Stages: One.
 - f. Electrical Characteristics:
 - 1) Volts: 208.
 - 2) Phases: Single.
 - 3) Hertz: 60.
- B. Electric, Tankless, Water Heaters:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by:
 - a. Keltech, Inc., SN63/480D-HLW (ASME rated)
 - 2. Standard: UL 499 for electric, tankless, water heater and ANSI Z358.1.
 - 3. Construction: Copper piping or tubing complying with NSF 61 barrier materials for potable water, without storage capacity.
 - a. Connections: ASME B1.20.1 pipe thread.
 - b. Pressure Rating: 150 psig.
 - c. Heating Element: Resistance heating system.
 - d. Temperature Control: Flow-control fitting.
 - e. Safety Control: High-temperature-limit cutoff device or system.
 - f. Jacket: Aluminum or steel with enameled finish or plastic.
 - 4. Capacity and Characteristics:
 - a. Flow Range: 20 - 30 gpm.
 - b. Water Delivery Temperature range: 60 - 90 deg F.
 - c. Temperature control: ± 1 °F.
 - d. Power Demand: 63 kilowatts.

- e. Electrical Characteristics: Provide with Ground Fault.
 - 1) Volts: 480.
 - 2) Phases: Three.
 - 3) Hertz: 60.
 - 4) Amps: 65

2.3 WATER HEATER ACCESSORIES

- A. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1.
- B. Heat-Trap Fittings per the requirements of section 1.5.I of this specification.
- C. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.
- D. Gas Shutoff Valves: Manually operated. Furnish for installation in piping. Per the requirements of section 1.5.I of this specification.
- E. Gas Pressure Regulators: Include 2-psig pressure rating as required to match gas supply. Per the requirements of section 1.5.I of this specification.
- F. Automatic Gas Valves: appliance, electrically operated, on-off automatic valve. Per the requirements of section 1.5.I of this specification.

2.4 SOURCE QUALITY CONTROL

- A. Factory Tests: Test and inspect water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
- B. Hydrostatically test water heaters to minimum of one and one-half times pressure rating before shipment.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Water Heater Mounting: Install water heaters on concrete base. Comply with requirements for concrete bases specified in Section 03 3001, "Reinforced Concrete" or Section 03 3053, "Miscellaneous Cast-in-Place Concrete."
 - 1. Exception: Omit concrete bases for water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
 - 2. Maintain manufacturer's recommended clearances.
 - 3. Arrange units so controls and devices that require servicing are accessible.
 - 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 - 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

7. Install anchor bolts to elevations required for proper attachment to supported equipment.
8. Anchor water heaters to substrate.
- B. Install water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
 1. Install shutoff valves on water-supply piping to water heaters and on hot water outlet piping.
- C. Install gas-fired, water heaters according to NFPA 54.
 1. Install gas shutoff valves on gas supply piping to gas-fired, water heaters.
 2. Install gas pressure regulators on gas supplies to gas-fired, water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.
 3. Install automatic gas valves on gas supplies to gas-fired, water heaters if required for operation of safety control.
 4. Comply with requirements for gas shutoff valves, gas pressure regulators, and automatic gas valves specified in Section 23 1123, "Facility Natural-Gas Piping."
- D. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as water piping in continuous downward pitch, and discharge by positive air gap into closest floor drain.
- E. Install combination temperature-and pressure relief valves in water piping for electric -water heaters without storage. Extend commercial-water-heater relief-valve outlet, with drain piping same as water piping in continuous downward pitch, and discharge by positive air gap into closest floor drain.
- F. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for electric water heaters that do not have tank drains.
- G. Install thermometers on outlet piping of electric water heaters.
- H. Assemble and install inlet and outlet piping manifold kits for multiple electric water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each electric water heater. Include shutoff valve and thermometer in each water heater inlet and outlet, and throttling valve in each electric water heater outlet.
- I. Install piping-type heat traps on inlet and outlet piping of electric water heater storage tanks without integral or fitting-type heat traps.
- J. Fill water heaters with water.

3.2 CONNECTIONS

- A. Comply with requirements for piping specified in Section 22 1100, "Facility Water Distribution." Drawings indicate general arrangement of piping, fittings, and specialties.

- B. Comply with requirements for gas piping specified in Section 23 1123, "Facility Natural-Gas Piping."
- C. Where installing piping adjacent to water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of water heaters.

3.3 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification specified in Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."

3.4 FIELD QUALITY CONTROL

- A. Perform tests.
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist. If water heater leaks, do not attempt repair.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Water heaters will be considered defective if they do not pass tests.
- C. Prepare test reports.

Gas Water Heater, LLW Utility Building Data Sheet

AECOM	DS-001, Gas Water Heater, LLW Utility Building				Specification No.	
					22 3700	
	Rev.	By	Date	Comment	Sheet	Date
	~~~	~~~	~~~	~~~	1 of 1	~~~
					Checked By	Approved By
					Purchase Order:	
Project	RLWTF-UP				Requisition No.:	
Tag No.	HWG-5604					
P&ID #	P-6201	Quality Assurance Level			General Service	
Data		Rev.	Special Requirements			
Capacity (gallons)	225	~~~	Tank plated with electroless nickel (EN). Plating will occur after the pressure vessel is completely fabricated and all welding is completed. The EN plating will be a high-phosphorus (10%) and nonporous composition suitable for submersion service (ASTM B733 standard may be used as a guideline).			
Recovery (gph @ 100 deg F temperature rise)	800	~~~				
Temperature Setting (deg F)	140.0	~~~	The electroless nickel plating shall have a high-dielectric-strength polymer overcoat.			
Gas Demand (CFH)	800.0	~~~				
Gas Input (BTU/Hr)	800,000.0	~~~	The lined tank shall not require sacrificial anode rods.			
Gas pressure @ burner (in WC.)	6.0	~~~				
NOx certified emissions (ppm)	<30	~~~	Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.			
Vent Diameter (inches)	8	~~~				
Design Code (ASME B&PV)	Section IV, Part HLW	~~~	Factory-Installed, Storage-Tank Appurtenances shall include: Drain Valve: Corrosion-resistant metal complying with ASSE 1005.			
Pressure Relief setting (psig)	125	~~~				
Electrical			Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.			
Volts	120	~~~				
Phase	1	~~~	Jacket: Steel with enameled finish.			
Frequency (Hz)	60	~~~				
Amps	8	~~~	Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating.			
			Select one relief valve with sensing element that extends into storage tank.			
			Safety Controls: As a minimum, the heater will be equipped with the following:			
			Automatic reset high temperature limiting thermostat factory set at 195°F.			
			One-hundred percent safety shut-off pilot and thermocouple, intermittent electronic ignition monitoring pilot and main flame, trial for re-ignition for momentary loss of flame, shut down of pilot and main burner in 2 to 4 seconds after loss of flame, automatic flue damper and power vent.			
			Control circuit 120 VAC with 24 VAC transformer.			
			Automatic, high-temperature-limit and low-water cutoff devices or systems.			
Comments/Notes:						

*Vendor to provide/verify this information

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 22 3700, Rev. 0, dated February 14, 2011.

SECTION 22 4200  
PLUMBING FIXTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Water closets.
- B. Urinals.
- C. Lavatories and insulation kits.
- D. Sinks.
- E. Showers.
- F. Electric water coolers.
- G. Service sinks.
- H. Emergency Combination Shower with Eye and Face Wash.
- I. Emergency Eye and Face Wash.
- J. Tepid Water Blending System.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures"
- B. Section 01 4000, "Quality Requirements."
- C. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- D. Section 01 7700, "Closeout Procedures."
- E. Section 07 9200, "Joint Sealants."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

- A. Submit the following in accordance with the requirements of Exhibit I:
  - 1. Product Data: Submit catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
  - 2. Manufacturer's Installation Instructions: Submit installation methods and procedures.
  - 3. Manufacturer's Certificate: Certify products meet or exceed specified requirements (e.g., flow test for gpm).
  - 4. Components made of listed materials but not made in accordance with a specification or standard listed in the *Uniform Plumbing Code* (UPC 2009) shall be tested and submitted for equivalency approval.

1.5 CLOSEOUT SUBMITTALS

- A. Submit in accordance with Section 01 7700, "Closeout Procedures."

- B. Operation and Maintenance Data: Submit fixture, trim, exploded view and replacement parts lists.

## 1.6 QUALITY ASSURANCE

- A. Work identified in this section shall be in accordance with Section 01 4000, "Quality Requirements."
- B. Provide products requiring electrical connections listed and classified by a nationally recognized testing laboratory (e.g., Underwriters Laboratories Inc.) as suitable for purpose specific and indicated.
- C. Provide ADA-compliant products.
- D. Provide water conserving fixtures and fittings complying with the Uniform Plumbing Code or exceeding UPC where noted.
- E. ANSI Standard: Comply with ANSI Z358.1, "Emergency Eyewash and Shower Equipment."
- F. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

## PART 2 PRODUCTS

### 2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."

### 2.2 FLUSH VALVE WATER CLOSETS

- A. Bowl: ASME A112.19.2; white, wall hung, vitreous china closet bowl, with elongated rim, 1-1/2 inch top spud, china bolt caps.
  - 1. Manufacturer: Kohler, Model K-4325, Kingston.
- B. Sensor Operated Flush Valve: ASME A112.18.1, ADA compliant; concealed, diaphragm type with battery- and solar-operated solenoid operator, infrared sensor and dual flush controls, wheel handle stop and vacuum breaker; maximum flow is either 1.6-gallon per flush volume or 1.1-gallon per flush volume.
  - 1. Manufacture: Sloan, Model 8111-1.6/1.1, Solis.
- C. Seat: Solid white plastic, open front, self-sustaining hinge, brass bolts, without cover.
  - 1. Manufacturer: Kohler, Model K-4670-SC.
- D. Wall Mounted Carrier: ASME A112.6.1M; adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.

### 2.3 WALL HUNG URINALS

- A. Urinal: ASME A112.19.2; vitreous china, wall hung, washout urinal with shields, integral trap, removable stainless steel strainer, and 3/4 inch top spud, steel supporting hanger. Urinal shall use 1/2 gallons per flush.
  - 1. Manufacturer: Kohler, Model K-4960-ET, Bardon.

- B. Sensor Operated Flush Valve: ASME A112.18.1; exposed chrome plated, diaphragm type with battery operated solenoid operator, infrared sensor and over-ride button in chrome plated plate; maximum 1/4-gallon flush volume.
  - 1. Manufacturer: Sloan, Model 8186-0.25, Solis.
- C. Wall Mounted Carrier: ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment and threaded fixture studs for fixture hanger.

## 2.4 LAVATORIES

- A. Vitreous China Countertop Lavatory: ASME A112.19.2; vitreous china self-rimming countertop lavatory, 20 1/4 x 17 1/2 inches with single-hole drillings, front overflow, seal of putty, caulking, or concealed vinyl gasket.
  - 1. Manufacturer: Kohler, Model K-2196-1, Pennington.
- B. Metered Faucet: ASME A112.18.1; chrome-plated, metered mixing faucet, maximum 0.25 gallons per use, 30 second automatic shut off, battery-operated solenoid operator and infrared sensor, aerator, trim plate, open grid strainer, back check for hot and cold supply, and thermostatic mixing valve.
  - 1. Manufacturer: Sloan, Model EAF-275, Solis.
- C. Accessories:
  - 1. Chrome plated 17-gauge brass P-trap with clean-out plug and arm with escutcheon.
  - 2. Chrome plated rigid supplies to fixtures with chrome plated brass screwdriver stops, reducers, and escutcheons.
  - 3. Offset waste with perforated open strainer.
  - 4. Trap and waste insulated and offset to meet ADA compliance.
- D. Wall Mounted Carrier: ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, concealed arm supports, bearing plate and studs.

## 2.5 SINKS

- A. Single Compartment Bowl: ASME A112.19.3, Commercial Grade, 25 x 21 1/4 x 10 inch outside dimensions, 18 gauge, Type 304 stainless steel. Self-rimming and undercoated, with 1-1/2 inch chrome brass drain, 3-1/2 inch crumb cup and chrome brass tailpiece, ledge back drilled for trim.
  - 1. Manufacturer: Elkay, Model DLR252110
- B. Single Compartment Bowl: ASME A112.19.3, Commercial Grade, 33 x 22 x 10-1/8 inch outside dimensions 18 gauge, Type 304 stainless steel. Self-rimming and undercoated, with 1-1/2 inch chrome brass drain, 3-1/2 inch crumb cups and chrome brass tailpiece, ledge back drilled for trim.
  - 1. Manufacturer: Elkay, Model DLRS332210
- C. Trim: ASME A112.18.1; chrome plated brass supply with rigid/swing spout with spring return handle.
  - 1. Manufacturer: Chicago Faucet, 927-103484cp.

D. Accessories:

1. Chrome plated 17-gauge brass P-trap with clean-out plug and arm with escutcheon.
2. Chrome plated rigid supplies to fixtures with chrome plated brass screwdriver stops, reducers, and escutcheons.

2.6 SHOWERS

- A. Wheelchair Accessible Cabinet: ANSI Z124.2; reinforced glass fiber, 40 x 40 x 84 inch high, soap dish, integral seat, ADA compliant grab bars, removable chrome plated strainer, tail piece, color as selected.
  1. Manufacturer: Florestone, Model 40-40H.
- B. ADA Compliant Shower Valve: Concealed shower supply, pressure balanced, anti-scald, brass body, with single lever handle, ceramic disc cartridge, integral stops, with flow control and adjustable spray ball joint showerhead with maximum 2.5 gpm flow, and escutcheon, hand held shower, 70 inch metal clad shower hose and 24 inch slide bar, female inlet and vacuum breakers.
- C. Decontamination Shower: Walk through shower, cabinet shall be constructed of 14 ga all-welded Type 304 stainless steel, #4 satin finish; base shall be fabricated from 11 ga type 304 stainless steel with non-slip glass blast finish. Cabinet shall have rounded floor/wall and wall/wall interfaces. Cabinet shall include sound reducing insulation on each panel. Shower shall be 36 x 36 x 88 inch high, complete with top, soap ledge, and threshold on both sides. Fixture shall be free standing, provide with threshold anchors. Shower valve and shower head shall be mounted on a removable access panel. Provide with shower curtain rods and tepid water blending system.
  1. Manufacturer: Frigo Design.
  2. Tepid Water Blending System
    - a. Product Description: Provide an assembly with two backup valves, separate high temperature sensing shut-off valve, separate full-flow pressure relief bypass, and temperature and pressure-compensating blending valve to plus or minus 3 degrees F. Water delivery temperature range 60 to 90 degrees F per ANSI Z358.1, Appendix A, over a range of flows to 35 gpm.
      - 1) Manufacturer: HAWS, TWBS.SH.

2.7 ELECTRIC WATER COOLERS

A. Water Cooler:

1. Lead-free materials, handicapped wall mounted electric water cooler with stainless steel top and stainless steel cabinet, elevated anti-squirt bubbler with stream guard, automatic stream regulator, mounting bracket, energy efficient cooling system.
2. Capacity: 8 gph of 50 degrees F water, based upon 80 degrees F inlet water and 90 degrees F ambient.
3. UL listed in accordance with ANSI/NSF 61, Section 9.

4. Electrical: Provide with electric cord and 3 prong rubber plug.
  - a. Manufacturer: Elkay, Model VRCGRN8 (High Efficiency Single Station).
- B. Accessories:
  1. Chrome plated 17-gauge brass P-trap with clean-out plug and arm with escutcheon.
  2. Chrome plated rigid supplies to fixtures with chrome plated brass screwdriver stops, reducers, and escutcheons.

## 2.8 SERVICE SINKS

- A. Bowl: 24 x 24 x 10 inch high white molded stone, floor mounted, with one inch wide shoulders, stainless steel strainer.
  1. Manufacturer: Fiat, Model MSB-2424.
- B. Trim: ASME A112.18.1 exposed wall type supply with cross handles, spring assist normally closed, spout wall brace, vacuum breaker, hose-end spout, strainers, integral screwdriver stops with covering caps and adjustable threaded wall flanges.
  1. Manufacturer: Fiat, Model 830-AA
- C. Accessories:
  1. 5 feet of 1/2 inch diameter plain end reinforced rubber hose, and bracket. Manufacturer: Fiat, Model 832-AA.
  2. Mop hanger, Manufacturer: Fiat, Model 889-CC.
  3. Stainless steel wall guards, three panels. Manufacturer: Fiat, Model MSG 2424.

## 2.9 EMERGENCY EYE AND FACE WASH

- A. Sink Mounted barrier-free eye/face wash with ABS eye/face wash heads, integral flow-controls and dust covers, polished chrome brass single action pull-down valve body, universal sign, and 1/2" O.D. slip joint inlet. Provide temperate water blending valve. Model must meet ANSI Z358.1.
  1. Manufacturer: Haws Model 7610 with Model 9201EF thermostatic mixing valve.

## 2.10 EMERGENCY COMBINATION SHOWER WITH EYE AND FACE WASH

- A. Shower: ANSI Z358.1; free standing, self- cleaning, non-clogging 8 inch diameter plastic drench shower head, instant action stay open valve actuated by rigid stainless steel pull rod.
- B. Eyewash: ANSI Z358.1; stainless steel bowl with elbow, instant action stay open valve actuated by push flag or foot pedal, twin spray heads.
- C. Supply and Waste Piping: 1-1/4 inch IPS.
- D. Furnish universal emergency sign.
- E. Manufacturer: Haws, 8300 Series.
- F. Piping: Schedule 40 galvanized steel.

- G. Unit Drain: Outlet at side near bottom.
- H. Shower Capacity: Deliver potable water at rate not less than 20 gpm (76 L/min.) for at least 15 minutes.
- I. Eyewash Capacity: With capacity to deliver potable water at rate not less than 3.0 gpm (11.4 L/min.) for at least 15 minutes.

#### 2.11 LAVATORY INSULATION KIT

- A. Product Description: Where lavatories are noted to be insulated for ADA compliance, furnish the following: Safety Covers conforming to ASTM E 84 and consisting of insulation kit of molded closed-cell vinyl construction, 1/8 inch nominal thick, white color, for insulating tailpiece, P-trap, valves, and supply piping. Furnish with weep hole and angle valve access covers. Per requirements of Paragraph 1.4A.4 of this specification section.
  - 1. Manufacturer: Truebro, Lav-Guard.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify walls and floor finishes are prepared and ready for installation of fixtures.
- B. Verify electric power is available and of correct characteristics.
- C. Confirm millwork is constructed with adequate provision for installation of counter top lavatories and sinks.

#### 3.2 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.
- B. Review millwork shop-drawings. Confirm location and size of fixtures and openings before rough in and installation.
- C. Verify installation of wall supports and/or wall carriers for plumbing fixtures.

#### 3.3 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Install fixture supplies with smooth bends and no kinks.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with bolts.
- E. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 9200, "Joint Sealants," color to match fixture.
- F. Solidly attach water closets with lag screws. Lead flashing is not intended to hold fixture in place.
- G. Provide chrome plated rigid or flexible supplies to fixtures with stops, reducers, and escutcheons.
- H. For water closets, install flush valve with handle to wide side of stall.



### 3.4 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

### 3.5 CLEANING

- A. Clean plumbing fixtures and equipment.

### 3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Do not permit use of fixtures before final acceptance.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 22 4200, Rev. 4, dated September 23, 2009.

SECTION 22 6213  
VACUUM PIPING FOR LABORATORY FACILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Laboratory vacuum piping, designated "laboratory vacuum."

1.2 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Section 01 2500, "Substitution Procedures."
- C. Section 01 4000, "Quality Requirements."
- D. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- E. Section 22 0529, "Hangers and Supports for Plumbing Piping and Equipment."
- F. Section 22 0548, "Vibration and Seismic Controls for Plumbing, Piping and Equipment."
- G. Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."
- H. Section 22 0813, "Testing Piping Systems."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

- A. Submit the following in accordance with the requirements of Exhibit I.:
  - 1. Product Data: For each type of product.
  - 2. Qualification Data: For Installer and testing agency.
  - 3. Brazing certificates.
  - 4. Field quality-control test reports.
  - 5. Operation and Maintenance Data: For vacuum piping specialties to include in emergency, operation, and maintenance manuals.
  - 6. Pressure Design Certification, for pressure containing components made of listed materials but not made in accordance with a specification or standard listed in Table 926.1 of ASME B31.9 shall be substantiated by at least one of the following:
    - a. Engineering calculation(s)
    - b. Experimental stress analysis such as described in Appendix 6 in Section VIII, Division 2 of the ASME B&PV Code.

- c. Proof test in accordance with UG-101 in Section VIII, Division 1 of the ASME B&PV Code.

## 1.5 QUALITY ASSURANCE

- A. Brazing: Qualify processes and operators according to ASME *Boiler and Pressure Vessel Code* (B&PV), Section IX, "Welding and Brazing Qualifications" or AWS B2.2, *Standard for Brazing Procedure and Performance Qualification*.
- B. Work identified in this section shall be in accordance with Section 01 4000, "Quality Requirements."
- C. Material and Installation: Conform to ASME B31.9, *Building Services Piping* for systems operating at pressure of 150 psig or less and at temperature of 200 °F or less.

## PART 2 PRODUCTS

### 2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."

### 2.2 PIPES, TUBES, AND FITTINGS

- A. Copper Tube: ASTM B 88, Type L, seamless, drawn temper that has been manufacturer cleaned, purged, and sealed for gas service.
- B. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type or MSS SP-73, with dimensions for brazed joints.
- C. Copper Unions: ASME B16.22, wrought-copper or cast-copper alloy.
- D. Compression Type Fittings:
  - 1. Manufacturers: Swagelok, Inc.
- E. Extruded-Tee Outlets: ASTM F 2014 procedure for making branch outlets in copper tube.
  - 1. Manufacturers:
    - a. Parker, Inc.
    - b. T-DRILL Industries Inc.

### 2.3 JOINING MATERIALS

- A. Solder Filler Metals: ASTM B 32, Grade 95TA, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- B. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys.
- C. Threaded-Joint Tape: PTFE.

### 2.4 VALVES

- A. Copper-Alloy Ball Valves:
  - 1. Standard: MSS SP-110.
  - 2. Description: Three-piece body, brass or bronze.
  - 3. Pressure Rating: 300 psig minimum.

4. Ball: Full-port, chrome-plated brass.
5. Seats: PTFE or TFE.
6. Handle: Lever type with locking device.
7. Stem: Blowout proof with PTFE or TFE seal.
8. Ends: Manufacturer-installed copper-tube extensions.

B. Check Valves:

1. Standard: MSS SP-80.
2. Description: In-line pattern, bronze.
3. Pressure Rating: 300 psig minimum.
4. Operation: Spring loaded.
5. Ends: Manufacturer-installed copper-tube extensions.

## 2.5 FLEXIBLE PIPE CONNECTORS

A. Available Manufacturers: Subject to compliance with Paragraph 1.4A.6 of this specification section, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Flex-Hose Co., Inc.
2. Flexicraft Industries.
3. Hyspan Precision Products, Inc.
4. Mercer Rubber Co.
5. Metraflex, Inc.
6. Proco Products, Inc.
7. Unaflex.
8. Universal Metal Hose; a Hyspan Co.

B. Description: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.

1. Working-Pressure Rating: 200 psig (1380 kPa) minimum at 70 degree F, minimum temperature rating 400 degree F.
2. End Connections: Threaded copper pipe or solder-end copper tube.

## 2.6 ESCUTCHEONS

A. General Requirements for Escutcheons: Manufactured wall and ceiling escutcheons and floor plates, with ID to closely fit around pipe and tube and OD that completely covers opening.

B. One-Piece, Deep-Pattern Escutcheons: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Escutcheons: With set screw.

1. Finish: Rough brass.

D. Split-Casting, Cast-Brass Escutcheons: With concealed hinge and set screw.

1. Finish: Rough brass.

E. One-Piece, Stamped-Steel Escutcheons: With set screw or spring clips and chrome-plated finish.

F. Split-Plate, Stamped-Steel Escutcheons: With exposed-rivet hinge, set screw or spring clips, and chrome-plated finish.

G. One-Piece, Floor-Plate Escutcheons: Cast iron.

- H. Split-Casting, Floor-Plate Escutcheons: Cast brass with concealed hinge and set screw.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Cleaning of vacuum Tubing: If manufacturer-cleaned and -capped fittings or tubing are not available or if precleaned fittings or tubing must be recleaned because of exposure, have supplier or separate agency acceptable to authorities having jurisdiction perform the following procedures:
  - 1. Clean tube and fittings, valves, gages, and other components of oil, grease, and other readily oxidizable materials.
  - 2. Wash tubing and components in hot, alkaline-cleaner-water solution of sodium carbonate or trisodium phosphate in proportion of 1 lb (0.453 kg) of chemical to 3 gal. (11.3 L) of water.
    - a. Scrub to ensure complete cleaning.
    - b. Rinse with clean, hot water to remove cleaning solution.

### 3.2 PIPING INSTALLATION

- A. Install piping in accordance with ASME B31.9, drawing plans, schematics, and diagrams indicate general location and arrangement of vacuum piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, vacuum producer sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on construction drawings.
- B. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and coordinate with other services occupying that space.
- E. Install piping adjacent to equipment and specialties to allow service and maintenance.
- F. Install vacuum piping with 1 percent slope downward in direction of flow.
- G. Install nipples, unions, special fittings, and valves with pressure ratings same as or higher than piping pressure rating used in applications specified in Paragraph 3.8 unless otherwise indicated.
- H. Install eccentric reducers, if available, where vacuum piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.
- I. Provide drain leg and drain trap at end of each main and branch and at low points.
- J. Install thermometer and vacuum gage on inlet piping to each vacuum producer and on each receiver and separator.
- K. Install piping to permit valve servicing.

- L. Install piping free of sags and bends.
- M. Install fittings for changes in direction and for branch connections. Extruded-tee branch outlets in copper tubing may be made where specified.
- N. Piping Restraint Installation: Install seismic restraints on vacuum piping. Seismic-restraint devices are specified in Section 22 0548, "Vibration and Seismic Controls for Plumbing, Piping and Equipment."
- O. Connect vacuum piping to vacuum producers and to equipment requiring vacuum service.
- P. Install unions in copper vacuum tubing adjacent to each valve and at final connection to each machine, specialty, and piece of equipment.
- Q. Install sleeves for piping penetrations of walls, ceilings, and floors.
- R. Install escutcheons for piping penetrations of walls, ceilings, and floors.

### 3.3 VALVE INSTALLATION

- A. Install shutoff valve at each connection to and from vacuum equipment and specialties.
- B. Install check valves to maintain correct direction of vacuum flow to vacuum-producing equipment.
- C. Install valve boxes recessed in wall and anchored to substrate. Single boxes may be used for multiple valves that serve same area or function.
- D. Install zone valves and gages in valve boxes. Rotate valves to angle that prevents closure of cover when valve is in closed position.
- E. Install flexible pipe connectors in suction inlet piping to each vacuum producer.

### 3.4 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from outside of cleaned tubing and fittings before assembly.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Threaded Joints: Apply appropriate tape to external pipe threads.
- E. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" chapter. Do not use flux. Continuously purge joint with oil-free dry nitrogen during brazing.
- F. Soldered Joints: Apply water-flushable flux to tube end. Join copper tube and fittings according to ASTM B 828.
- G. Extruded-Tee Outlets: Form branches in copper tube according to ASTM F 2104, with tools recommended by tube manufacturer.
- H. Pressure-Sealed Joints: Join copper tube and copper and copper-alloy fittings with tools recommended by fitting manufacturer.

### 3.5 ESCUTCHEON INSTALLATION

- A. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
  - 1. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
  - 2. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, stamped steel with set screw or spring clips.
  - 3. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece or split plate, stamped steel with set screw.
  - 4. Bare Piping in Unfinished Service Spaces: One piece, stamped steel with set screw or spring clips.
  - 5. Bare Piping in Equipment Rooms: One piece, stamped steel with set screw or spring clips.
  - 6. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.

### 3.6 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements in Section 22 0548, "Vibration and Seismic Controls for Plumbing, Piping and Equipment" for seismic-restraint devices.
- B. Comply with requirements in Section 22 0529, "Hangers and Supports for Plumbing Piping and Equipment," for pipe hanger and support devices.

### 3.7 LABELING AND IDENTIFICATION

- A. Install identifying labels and devices for laboratory vacuum piping, valves, and specialties. Comply with requirements in Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."

### 3.8 FIELD QUALITY CONTROL FOR LABORATORY FACILITY VACUUM PIPING

- A. Testing Agency: Engage qualified testing agency to perform field tests and inspections of vacuum piping in nonmedical laboratory facilities and to prepare test and inspection reports.
- B. Tests and Inspections:
  - 1. Piping Leak Tests for Vacuum Piping: per ASME B31.9 per the applicable portion of Section 22 0813, "Testing Piping Systems."
  - 2. Repair leaks and retest until no leaks exist.
- C. Remove and replace components that do not pass tests and inspections and retest as specified above.

### 3.9 PROTECTION

- A. Protect tubing from damage.
- B. Retain sealing plugs in tubing, fittings, and specialties until installation.
- C. Clean tubing not properly sealed, and where sealing is damaged, according to Paragraph 3.1.

END OF SECTION

SECTION 22 6219  
VACUUM EQUIPMENT FOR LABORATORY FACILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Packaged, rotary-vane vacuum pumps.
- B. Computer interface cabinets.

1.2 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Section 01 2500, "Substitution Procedures."
- C. Section 01 4000, "Quality Requirements."
- D. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- E. Section 03 3053, "Miscellaneous Cast-In-Place Concrete."
- F. Section 22 0548, "Vibration and Seismic Controls for Plumbing, Piping and Equipment."
- G. Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."
- H. Section 22 1316, "Sanitary Waste and Vent Piping."
- I. Section 22 6213, "Vacuum Piping for Laboratory Facilities."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 DEFINITIONS

- A. Actual Air: Air delivered at vacuum producer inlet. Flow rate is air measured in expanded cfm (expanded L/s).
- B. Laboratory Vacuum Equipment: Equipment and accessories for nonmedical laboratory facilities.
- C. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.
- D. Standard Air: Free air at 68 deg F and 1 atmosphere (29.92 in. Hg) before compression or expansion and measured in scfm.

1.5 LANL PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Vacuum equipment shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
  - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."



## 1.6 SUBMITTALS

- A. Submit the following in accordance with the requirements of Exhibit I:
  - 1. Manufacturer's catalog data;
  - 2. Manufacturer's installation instructions;
  - 3. Materials/Parts list;
  - 4. Operational and Maintenance data;
  - 5. Warranties;
  - 6. Certifications of welders; and
  - 7. Welding Inspection Reports, as applicable.

## 1.7 QUALITY ASSURANCE

- A. Work identified in this section shall be in accordance with Section 01 4000, "Quality Requirements."
- B. Welders Certifications and Qualified Procedure Standards per ASME Boiler and Pressure Vessel Code: Section IX.
  - 1. Certify that each welder has passed ASME qualification tests for welding processes involved and that certification is current.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum 5 years experience and having maintenance service based within 200 miles radius of installation.
- D. Material and Installation: Conform to ASME B31.9, Building Services Piping for systems operating at pressure of 150 psig or less and at temperature of 200°F or less.

## 1.8 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

## PART 2 PRODUCTS

### 2.1 REQUIREMENTS FOR COMMERCIAL OFF-THE-SHELF VACUUM PUMPS

- A. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."
- B. Description: Factory-assembled, -wired, -piped, and -tested; electric-motor-driven; air-cooled; continuous-duty vacuum pumps with receiver.
- C. Manufacturer: Becker Pumps Corp. model ST 100 L3 (vertical tank).
- D. See datasheets in Attachment 1 for specific design and operating data.
- E. Certified test data shall be furnished.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Clean vacuum equipment, accessories, and components that have not been cleaned for oxygen service and sealed or that are furnished unsuitable for laboratory vacuum applications, according to CGA G4.1, "Cleaning Equipment for Oxygen Service."

### 3.2 VACUUM EQUIPMENT INSTALLATION

- A. Equipment Mounting: Install vacuum producers using elastomeric mounts. Comply with requirements in Section 03 3053, "Miscellaneous Cast-In-Place Concrete." Comply with requirements for vibration isolation devices specified in Section 22 0548, "Vibration and Seismic Controls for Plumbing, Piping and Equipment."
  - 1. Minimum Deflection: 1/4 inch.
  - 2. For supported equipment, install epoxy-coated anchor bolts and anchor into structural concrete floor.
  - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
- B. Install vacuum equipment anchored to substrate.
- C. Orient equipment so controls and devices are accessible for servicing.
- D. Maintain manufacturer's recommended clearances for service and maintenance.
- E. Install the following devices on vacuum equipment:
  - 1. Thermometer, Vacuum Gage, and Pressure Relief Valve: Install on each vacuum pump receiver.
  - 2. Drain Valves: Install on receivers and separators. Discharge receiver condensate over nearest floor drain. Discharge separator or evacuation fluids by direct connection into sanitary waste piping system.

### 3.3 CONNECTIONS

- A. Comply with requirements for drain piping specified in Section 22 1316, "Sanitary Waste and Vent Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Comply with requirements for vacuum piping specified in Section 22 6213, "Vacuum Piping for Laboratory Facilities." Drawings indicate general arrangement of piping, fittings, and specialties.
- C. Install piping adjacent to equipment to allow service and maintenance.
- D. Connect vacuum piping to vacuum equipment, accessories, and specialties with shutoff valve and union or flanged connection.

### 3.4 LABELING AND IDENTIFICATION

- A. Install identifying labels and devices for laboratory vacuum equipment system components. Comply with requirements in Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."

### 3.5 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
  - 1. Complete installation and startup checks according to manufacturer's written instructions.

2. Check for lubricating oil in lubricated-type equipment.
  3. Verify that vacuum producer outlet piping is clear.
  4. Check for equipment vibration-control supports and flexible pipe connectors and verify that equipment is properly attached to substrate.
  5. Check safety valves for correct settings.
  6. Check for proper seismic restraints.
  7. Drain receiver and separator tank(s).
  8. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
  9. Test and adjust controls and safeties.
- B. Verify that vacuum equipment is installed and connected according to the Contract Documents.
  - C. Verify that electrical wiring installation complies with manufacturer's submittal and written installation requirements in electrical sections.
  - D. Prepare written report documenting testing procedures and results.

### 3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain vacuum producers.

## Laboratory Vacuum System, LLW Treatment Building Data Sheet

<b>AECOM</b>	DS-001, Laboratory Vacuum System, LLW Treatment Building				Specification No. 22 6219	
	Rev.	By	Date	Comment	Sheet	Date
	~~~	~~~	~~~	~~~	1 of 1	~~~
					Checked By	Approved By
					~~~	~~~
Project RLWTF-UP				Purchase Order:		
				Requisition No.:		
Tag No. PV-5002						
P&ID # C55864 P-6006						
Quality Assurance Level				General Service		
<b>Operating Data</b>						
Duty Service	UL-listed	Continuous	Rev.	Component Data (continued)		
Fluid	Air	~~~	Motor (ea.)	1,740	~~~	
Ambient Pressure (psia)	11.1	~~~	Insulation	Class F		
Operating Pressure (inHgV)	19.0	~~~	Size (hp)	5		
Maximum Pressure (inHgV)	18.0	~~~	Type	TEFC		
Minimum Pressure (inHgV)	20	~~~	Filters			
Normal Temperature (deg F)	80	~~~	Air Inlet Filter (micron)	5	~~~	
Temperature Range (deg F)	50-85	~~~	Controls			
Ambient Temperature Range (deg F)	40-115	~~~	Electric controls shall be automatic and consist of the following:			
Operating Capacity (SCFM @ 19 inHgV)	12					
Elevation (ft)	7,500		Magnetic motor starter, complete with a UL approved motor branch-circuit disconnect, and thermal, magnetic, and short circuit protection.			
<b>Component Data</b>						
<b>Pump</b>			~~~ Low voltage control transformer with fused primary and secondary			
Pump Configuration	Simplex	~~~	Hand off-auto switch with LED run light.			
Pump Type	Rotary Vane	~~~	Pressure transducer			
Lubrication	Oil Flooded		Minimum run timer			
<b>Receiver</b>			~~~ NEMA 12 enclosure			
Receiver Size (gallons)	120	~~~	UL-listed			
Receiver Rating (psig)	210		The pump shall be set to come on when the vacuum level reaches the low set point and shall shut off when the vacuum level reaches the high set point, providing a programmed time delay (provided to prevent excessive motor cycling) has elapsed.			
Material	Carbon Steel					
Design Code (ASME B&PV)	Section VIII Div 1					
Code Stamp	"U"					
Condensate Drain Type	manual					
<b>Electrical</b>			~~~			
Volts	460	~~~				
Phase	3	~~~				
Frequency (Hz)	60					
Comments/Notes:						
*Vendor to provide/verify this information						

END OF SECTION

SECTION 22 6313  
GAS PIPING FOR LABORATORY FACILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. P-10 piping and specialties designated "P-10".
- B. Argon piping and specialties designated "AR".
- C. Owner-Furnished Material:
  - 1. Bulk gas/liquid storage tanks.

1.2 RELATED DOCUMENTS/SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Section 01 4000, "Quality Requirements."
- C. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- D. Section 07 8400, "Firestopping."
- E. Section 22 0529, "Hangers and Supports for Plumbing Piping and Equipment,"
- F. Section 22 0548, "Vibration and Seismic Controls for Plumbing, Piping and Equipment."
- G. Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."
- H. Section 22 0813, "Testing Piping Systems."
- I. Section 40 0511, "Compression Fittings on Copper and Stainless-Steel Tubing."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 DEFINITIONS

- A. Specialty Gas: Gas, other than medical gas, for nonmedical laboratory facility applications.

1.5 LANL PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Gas manifolds and piping/tubing shall withstand the effects of earthquake motions determined according to Engineering Standards Manual Chapter 5.
  - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

## 1.6 SUBMITTALS

- A. Submit the following in accordance with the requirements of Exhibit I:
  - 1. Product Data: For the following:
    - a. Tubes and fittings,
    - b. Valves,
    - c. Electrical service connections,
    - d. Gas manifolds, and
    - e. Gas cylinder storage racks.
  - 2. Manufacturer Seismic Qualification Certification: Submit certification that gas manifolds, accessories, and components will withstand seismic forces defined in Section 22 0548, "Vibration and Seismic Controls for Plumbing, Piping and Equipment." Include the following:
    - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  - 3. Field quality-control test reports.
  - 4. Operation and Maintenance Data: For specialty gas piping specialties to include in emergency, operation, and maintenance manuals.
  - 5. Pressure Design Certification: Design for unlisted pressure containing components shall be substantiated in accordance with ASME B31.3, Paragraph 304.7.2.

## 1.7 QUALITY ASSURANCE

- A. Work identified in this section shall be done in accordance with Section 01 4000, "Quality Requirements."
- B. Material and Installation: Unless specified otherwise, conform to ASME B31.3, Normal fluid service.
- C. Subcontractor shall use listed components unless calculations are provided in accordance with ASME requirements for unlisted components.

## PART 2 PRODUCTS

### 2.1 PIPES, TUBES, AND FITTINGS

- A. Specialty Gas Tube: ASTM A 269, Minimum wall thickness 0.035 inches for 1/8" to 3/8" tubing, seamless, Type 316 stainless steel.
  - 1. Compression Tube Fittings: Swagelok, Type 316 stainless steel, minimum 3,000 psi pressure rating. Use for ASME B31.3 piping. Fittings are unlisted for ASME B31.9 and calculations are to be provided in accordance with ASME requirements for unlisted components.
  - 2. Pipe Fittings: ASTM A 182 (see Table 2 for UNS Designation) or ASTM A 276 (see Table 1 for UNS Designation) Type 316 stainless steel, NPT male or female threads based on ASME B1.20.1.

### 2.2 JOINING MATERIALS

- A. Threaded-Joint: PTFE tape or anaerobic PTFE thread sealant.

## 2.3 VALVES

- A. Ball Valves: 3-piece body, Type 316 Stainless Steel, Swagelok Series 62
  - 1. Pressure Rating: 300 psig minimum.
  - 2. Ball: Full-port, Type 316 Stainless Steel.
  - 3. Seats: Reinforced PTFE.
  - 4. Handle: Lever type with locking device.
  - 5. Stem: Blowout proof with reinforced PTFE or TFE seal.
  - 6. Ends: Manufacturer-installed tube compression fittings.
- B. Check Valves: In-line pattern, stainless steel, Swagelok.
- C. Pressure Regulators: Per Drawings.

## 2.4 GAS MANIFOLDS

- A. Specialty Gas Manifolds:
  - 1. Basis-of-Design Product: In accordance with Paragraph 1.6A.5 of this specification section. Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
    - a. Acme Cryogenics.
    - b. Airgas, Inc.
    - c. Air Products and Chemicals, Inc.
    - d. BeaconMedaes.
    - e. BOC Group, Inc.; BOC Gases.
    - f. Linde Gas LLC.
    - g. Matheson Tri-Gas.
    - h. MG Industries.
    - i. Praxair Technology, Inc.
    - j. Scott Specialty Gases, Inc.
    - k. Spectra Gases, Inc.
  - 2. Central Control Panel Unit: Supply and delivery pressure gages, manifold connection, line-pressure regulator, automatic changeover valve, shutoff valves, safety valve, and flex hose restraints as required by Engineering Standards Manual Chapter 17, Page 50.
  - 3. Manifold and Headers: Duplex, nonferrous-metal header for number of cylinders indicated, divided into two equal banks. Include cylinder bank headers with inlet (pigtail) connections complying with CGA V-1, individual inlet check valves, shutoff valve, pressure regulator, check valve, and pressure gage.
  - 4. Operation: Automatic, pressure-switch-activated changeover from one cylinder bank to the other when first bank becomes exhausted, without line-pressure fluctuation or resetting of regulators and without supply interruption by shutoff of either cylinder bank header.
  - 5. Label manifold control unit with permanent label identifying specialty gas type and system operating pressure.
  - 6. Mounting: Wall with mounting brackets for manifold control cabinet and headers.

## 2.5 GAS CYLINDER STORAGE RACKS

- A. Freestanding Storage Racks: Provide manufactured storage racks as indicated on Drawings or provide equivalent manufactured or fabricated storage racks.

## 2.6 ESCUTCHEONS

- A. General Requirements for Escutcheons: Manufactured wall and ceiling escutcheons and floor plates, with ID to closely fit around pipe and tube and OD that completely covers opening.
- B. One-Piece, Deep-Pattern Escutcheons: Deep-drawn, box-shaped brass with polished chrome-plated finish.

## 2.7 PRESSURE RELIEF VALVES

- A. Pressure Relief Valves:
  - 1. Basis-of-Design Product: In accordance with Paragraph 1.6A.5 of this specification section. Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
    - a. Kunkle.
    - b. Watts
- B. Carbon steel body, Teflon seat/seal, 1/2" inlet, ASME Section VIII UV stamped, rated for minimum 79 SCFM at 150 psig.
- C. Kunkle model 264P.

# PART 3 EXECUTION

## 3.1 PIPING APPLICATIONS

- A. Specialty Gas Piping: Type 316, stainless steel tube; compression joints.

## 3.2 PIPING INSTALLATION

- A. Install piping and components in accordance with ASME B31.3 unless design documents reference ASME B31.9 as the governing standard.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of gas piping. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and coordinate with other services occupying that space.
- E. Install piping adjacent to equipment and specialties to allow service and maintenance.
- F. Install nipples, unions, and special fittings, and valves with pressure ratings same as or higher than system pressure rating used in applications below unless otherwise indicated.



- G. Do not use organic solvents, adhesives, or sealants (including RTV silicone) in areas or on components that are in direct contact with, or carry P-10 gas.
- H. Install piping to permit valve servicing.
- I. Install piping free of sags and bends.
- J. Install fittings for changes in direction and branch connections.
- K. Install seismic restraints on gas piping. Seismic-restraint devices are specified in Section 22 0548, "Vibration and Seismic Controls for Plumbing, Piping and Equipment."
- L. Connect gas piping to gas sources and to gas outlets and equipment requiring gas service.
- M. Install sleeve seals for piping penetrations of concrete walls and slabs. Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Section 07 8400, "Firestopping."
- N. Install escutcheons for piping penetrations of walls, ceilings, and floors.
- O. Protect pressure relief valves for environmental phenomenon. Vent ports shall be covered with metallic screens or other type of device to inhibit exhaust ports being blocked by environmental phenomenon (e.g., insect nests). Screens/covers must not inhibit the flow capacity of the vent valve.

### 3.3 VALVE INSTALLATION

- A. Install shutoff valve at each connection to gas laboratory equipment and specialties.
- B. Install pressure regulators on gas piping where reduced pressure is required.

### 3.4 JOINT CONSTRUCTION

- A. Remove scale, slag, dirt, and debris from outside of cleaned tubing and fittings before assembly.
- B. Threaded Joints: Apply appropriate tape to external pipe threads.
- C. Pressure-Sealed Joints: Join tube and compression-type fittings with tools recommended by fitting manufacturer and in accordance with the requirements in Section 40 0511, "Compression Fittings on Copper and Stainless-Steel Tubing."

### 3.5 GAS SERVICE COMPONENT INSTALLATION

- A. Install gas manifolds anchored to substrate.
- B. Install gas cylinders and connect to manifold piping.
- C. Install gas manifolds with seismic restraints.

### 3.6 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements in Section 22 0548, "Vibration and Seismic Controls for Plumbing Piping and Equipment," for seismic-restraint devices.
- B. Comply with requirements in Section 22 0529, "Hangers and Supports for Plumbing Piping and Equipment," for pipe hanger and support devices.
- C. Support horizontal piping/tubing within 12 inches of each fitting and coupling.

- D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- E. Install hangers for tubing with the following maximum horizontal spacing and minimum rod diameters:
  - 1. 1/2-inch OD and smaller: 60 inches with 3/8-inch rod.
- F. Install supports for vertical tubing every 10 feet.

### 3.7 LABELING AND IDENTIFICATION

- A. Install identifying labels and devices for specialty gas piping, valves, and specialties. Comply with requirements in Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."

### 3.8 FIELD QUALITY CONTROL FOR LABORATORY FACILITY SPECIALTY GAS

- A. Perform field tests and inspections of specialty gas piping for non-healthcare laboratory facilities and prepare test reports.
- B. Tests and Inspections:
  - 1. Test piping per Section 22 0813, "Testing Piping Systems" and ASME B31.3.
  - 2. Repair leaks and retest until no leaks exist.
  - 3. Inspect specialty gas regulators for proper operation.
- C. Remove and replace components that do not pass tests and inspections and retest as specified above.

### 3.9 PROTECTION

- A. Protect tubing from damage.
- B. Retain sealing plugs in tubing, fittings, and specialties until installation.
- C. Clean tubing not properly sealed, and where sealing is damaged.

END OF SECTION

SECTION 22 6653  
LABORATORY WASTE AND VENT PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Laboratory piping, fittings, and accessories within 5 ft of building wall.

1.2 RELATED SECTIONS

- A. Section 01 2500, "Substitution Procedures."
- B. Section 01 4000, "Quality Requirements."
- A. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- C. Section 22 0529, "Hangers and Supports for Plumbing Piping and Equipment."
- D. Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."
- E. Section 22 0813, "Testing Piping Systems."
- F. Section 31 2000, "Earth Moving."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

- A. Submit the following in accordance with the requirements of Exhibit I:
  - 1. Catalog Data – pipe materials, fittings, and accessories.
  - 2. Manufacturer's Installation Instructions – piping and accessories.
  - 3. Certifications – welders.

1.5 QUALITY ASSURANCE

- A. Welders Certifications and Qualified Procedure Standards per American Society of Mechanical Engineers, *ASME Boiler and Pressure Vessel Code* (B&PV Code) (Section IX, "Welding and Brazing Qualifications").
- B. Certify that each welder has passed ASME qualification tests for welding processes involved and that certification is current.
- C. Comply with NSF 14, *Plastics Piping Systems Components and Related Materials*, for polyvinyl chloride (PVC) piping components.
- D. Work identified in this section shall be in accordance with Section 01 4000, "Quality Requirements."
- E. The following shall be used in making evaluations:
  - 1. Material evaluation using ASTM D 4101 per 923.1.2.
  - 2. Material evaluation using ASTM F 1412 per 923.1.2.
  - 3. Material evaluation using ASTM D 3311 per 923.1.2 and 904.7.2.
  - 4. Material evaluation using ASTM D 4101 per 923.1.2 and 904.7.2.

5. Material evaluation using ASTM F 1673 per 923.1.2 and 904.7.2.
6. No material evaluation per 923.1.2 and 904.7.2.

## PART 2 PRODUCTS

### 2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."

### 2.2 LABORATORY WASTE PIPING, BURIED WITHIN 5 FT OF BUILDING

#### A. Double Containment Pipe

1. Primary (Carrier) and secondary containment pipe shall be manufactured from a Copolymer polypropylene resin (Type II resin according to ASTM D 4101).
2. Primary (carrier) pipe shall be Schedule 40 wall thickness according to ASTM F 1412.
3. Secondary containment pipe shall be SDR 11 dimensions according to DIN 8077.
4. Supports shall be designed and factory installed by the manufacturer. No field-assembled supports will be allowed. The manufacturer shall design and fabricate the system taking into account pressure and temperature requirements when placing the pipe supports. Double supports will be required throughout the system to minimize stresses due to point loading. All pipe supports shall be circular and welded to the carrier pipe. Pipe supports will have leak detection ports at ninety degrees. The supports at both ends of every straight section shall be factory welded to both the carrier and containment pipes in order to facilitate the simultaneous welding of all secondary contained pipe and fittings. Support clips will not be allowed.

#### B. Double Containment Fittings

1. Primary (carrier) fittings shall be injection-molded and/or seamless drainage pattern fittings with layout dimensions according to ASTM D 3311.
2. All secondary contained fittings shall be of unitized construction with the carrier and containment integrally anchored together to prevent the movement of the carrier relative to the containment within the fitting.

### 2.3 LABORATORY WASTE AND VENT PIPING, ABOVE GRADE INSIDE BUILDING

#### A. Above ground pipe and fittings not located within spaces utilized as air plenums.

1. Manufacturer: IPEX, "Labline", or approved equivalent.
2. Connections between polypropylene pipe and matched fittings shall be made using the "Labline" Joint.
3. Manufactured from NSF listed Type 1, flame retardant Schedule 40 polypropylene conforming to ASTM D 4101, with a maximum average flame spread of zero seconds and a maximum extent of burning of 13 mm, in accordance with ASTM D 635.
4. Matched fittings shall be manufactured from NSF listed flame retardant polypropylene with average maximum burn time of 80 seconds and maximum extent of burning of 20 mm in accordance with ASTM D 635.

5. Fittings shall be designed to lock into a machined groove on the mating piping. All fittings shall have integrally molded union connections. No metallic grab rings or clamps shall be allowed. Fittings containing EVA (ethylene vinyl acetate) are strictly prohibited.
  6. Couplings shall not be added to make mechanical joint fittings.
- B. Above ground pipe and fittings located within spaces utilized as air plenums.
1. Manufacturer: IPEX, "Plenumline", or approved equivalent.
  2. Pipe and fittings shall be IAPMO listed, Schedule 40, FR-PVDF manufactured from Kynar 740-02, flame retardant Polyvinylidene Fluoride (PVDF) conforming to ASTM F 1673, with a limiting oxygen index (LOI) of 60, Resin must have a vertical burn rating of 94 V-0. Kynar 740-02 resin based on testing to ASTM E 84 (UL 723) must have surface burning characteristics greater than or equal to a flame spread 5 and smoke development 35.
  3. Fittings shall be third party certified to ASTM F 1673 and ASTM E 84, and IAPMO approved, with a tapered elastic retaining ring designed to lock into a machined groove on the mating piping.
  4. All fittings shall have integrally molded union connections. No metallic grab rings or clamps shall be allowed.

## 2.4 TRAPS

- A. Manufacturer: Labline
- B. Polypropylene traps under sinks shall be two-piece p-traps.
- C. Polypropylene traps for cup sinks and for special areas that may contain a high content of solids in waste shall be universal type trap.

## 2.5 FLOOR DRAINS

- A. ASME A112.6.3, *Floor and Trench Drains*, high silicon content corrosion-resistant cast-iron, 2-in.-diameter drain with light-duty, cast-iron grate and cast-iron bucket, double-drainage flange, reversible-clamping collar, adjustable nickel-bronze strainer.

## 2.6 CLEANOUTS

- A. ASME A112.36.2M, *Cleanouts*, cast-iron, cleanout assembly with round adjustable, scoriated, cast-iron, nickel-bronze cover with threaded spanner wrench cover.
- B. Cleanout ferrules and plugs shall be of the same material or have chemical resistance equal to or greater than the piping material.
- C. Cleanouts shall be provided of adequate size to allow rodding of system. Cleanouts incorporating cover screws that extend completely through access plugs are not acceptable.

# PART 3 EXECUTION

## 3.1 PREPARATION

- A. Ream pipe ends and remove burrs.

### 3.2 BURIED PIPING

- A. Provide earth cover, bedding, and warning tape per drawing and Section 31 2000, "Earth Moving."

### 3.3 INSTALLATION – ABOVE GROUND PIPING

- A. Comply with the International Association of Plumbing and Mechanical Officials (IAPMO) *Uniform Plumbing Code* (UPC).
- B. Extend cleanouts to finish floor or wall surface. Lubricate threaded cleanout plugs with non-hardening thread lubricant. Ensure clearance at cleanout for snaking drainage system.
- C. Encase exterior cleanouts in concrete, flush with grade.
- D. Install floor cleanouts at elevation to accommodate finished floor.
- E. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- F. Route drain piping from equipment close to walls or equipment to minimize tripping hazard.
- G. Install piping penetrating roofed areas to maintain integrity of roof assembly.
- H. Install bell and spigot pipe with bell-end upstream.
- I. Sleeve and caulk pipes penetrating exterior walls or interior bearing walls. Provide waterproof installation for exterior walls. Provide Underwriters Laboratories, Inc. (UL)/Factory Mutual (FM) approved through-penetration firestop system when penetrating fire-rated barriers (i.e., walls, floors).
- J. Test piping system with water in accordance with Section 22 0813, "Testing Piping Systems."
- K. Label piping in accordance with Section 22 0554, "Identification for Plumbing, HVAC, and Fire Piping and Equipment."
- L. Support piping in accordance with Section 22 0529, "Hangers and Supports for Plumbing Piping and Equipment."
- M. Install piping per IAPMO UPC Installation Standard IS 9-2003.

### 3.4 LANL ACCEPTANCE INSPECTION

- A. Notify LANL Subcontract Technical Representative (STR) at least 10 working days in advance to schedule inspection of piping system.
- B. LANL STR to ensure all drains or buildings connected to the sanitary collection system has an approved Waste Profile Form (WPF) for discharge to the sanitary sewer for all anticipated wastewater. Documentation shall be submitted to the LANL Utilities and Infrastructure Group wastewater representative.

END OF SECTION

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 22 1316, Rev. 3, dated September 23, 2009.

SECTION 22 6700  
PROCESS WATER SYSTEMS FOR LABORATORY FACILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Materials and operations required for the installation of reverse osmosis (RO) water piping system with less than 3 ppm dissolved solids and of 10 mega ohm or less resistivity including fittings, valves, equipment, joints and tests.

1.2 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Section 01 2500, "Substitution Procedures."
- C. Section 01 4000, "Quality Requirements."
- D. Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."
- E. Section 01 4444 "Offsite Welding & Joining Requirements"
- F. Section 01 4445 "Onsite Welding & Joining Requirements"
- G. Section 22 0813, "Testing Piping Systems."

1.3 ABBREVIATIONS AND ACRONYMS, DEFINITIONS, AND REFERENCES

- A. Refer to Section 01 4200, "Abbreviations and Acronyms, Definitions, and References."

1.4 SUBMITTALS

- A. Submit the following in accordance with the requirements of Exhibit I.:
  - 1. Catalog Data.
  - 2. Manufacturer's Installation Instructions.
  - 3. Pipe joint examiner's certificate.
  - 4. Piping system examiner's certificate per A341.4.1 (c).

1.5 QUALITY ASSURANCE

- A. Work identified in this section shall be in accordance with Section 01 4000, "Quality Requirements."
- B. Bonding Materials and Procedures:
  - 1. Conform to ASME B31.3, Chapter VII.
- C. Subcontractor shall use listed components unless calculations are provided in accordance with ASME B31.3 A304.7.2 requirements for unlisted components.

## PART 2 PRODUCTS

### 2.1 ACCEPTABLE DISTRIBUTORS

- A. The firms mentioned herein are of acceptable type, quality and performance. All material shall be equal to Heflin-Harrington Plastics Company, Ryan Herco Company, Siemens Company, or Albuquerque Windustrial Company Products.
- B. Alternate products may be accepted; follow Section 01 2500, "Substitution Procedures."

### 2.2 MATERIALS

- A. Commercial Off-The-Shelf DI Water System
  - 1. Manufacturer: Siemens model Protegra CS PROTC750B
    - a. System shall produce Type II water and
    - b. Minimum final product flow shall be 3.3 gpm.
  - 2. Piping:
    - a. Schedule 80 PVC pipe, manufactured specifically for deionized water use, furnished in 20-foot lengths, cylindrical and straight. Pipe material shall be Type 1, Grade 1 PVC conforming to ASTM D 1785 and shall comply with ASME B31.3.
  - 3. Fittings:
    - a. Schedule 80 PVC fittings, socket ends, conforming to ASTM D 2467, cleaned and packaged.
  - 4. Valves:
    - a. Ball: True Union PVC valve, socket ends, teflon seat, cleaned and packaged individually.
    - b. Check Valve: Ball type PVC valve, socket end, cleaned and packaged individually.

## PART 3 EXECUTION

### 3.1 PACKAGED EQUIPMENT INSTALLATION

- A. Packaged equipment shall be installed per manufacturer's instructions unless approved otherwise.

### 3.2 PIPING INSTALLATION

- A. General:
  - 1. Plastic pipe must meet ASME B31.3 paragraph A328.5.3 for solvent bonding.
  - 2. The piping shall be coordinated with respect to space available with the HVAC, plumbing and electrical installation.
    - a. In every instance where there is a conflict in the routing or the piping and the HVAC ducting, the routing of the HVAC ducting shall have priority.



- b. The installed piping shall not interfere with the operation or accessibility of doors and windows; shall not encroach on aisles, passageways, and equipment; and shall not interfere with the servicing or maintenance of equipment.
  - 3. The pipe shall be cut accurately and square to measurements established at the construction site and shall be worked into place without springing or forcing, properly clearing all openings and equipment.
    - a. Cutting or weakening of structural members to facilitate piping installation is not permitted.
    - b. Pipes shall have burrs removed by reaming and shall be so installed as to permit free expansion and contraction without damage to joints or hangers.
  - 4. All piping shall be run parallel with the lines of the building unless otherwise noted on the drawings.
  - 5. Unless otherwise shown on the drawings, horizontal piping shall pitch down in the direction of flow with grade of not less than 1/8 inch per foot. A valved drain connection shall be provided at all low points.
  - 6. Piping connections to equipment shall be in accordance with details shown on the drawings.
  - 7. Service pipe, valves, and fittings shall be kept a sufficient distance from other work to permit finished covering not less than 1/2 inch from such other work, and not less than 1/2 inch between finished covering on the different services.
  - 8. Interconnecting piping for the water treatment equipment shall be furnished and installed by the Subcontractor.
    - a. The water treatment equipment supplier shall provide start-up service, make adjustments, and instruct Los Alamos National Laboratories (LANL) maintenance personnel on proper operation.
    - b. The contractor shall supply all charging chemicals required for initial start-up and testing.
    - c. All relief valve discharge piping shall be piped to the storage tank unless otherwise shown on drawings.
- B. Installation of Valves:
  - 1. Valves shall be installed at the locations shown on the drawings and where specified.
  - 2. All valves shall be installed with their stems horizontal or above.
- C. Pipe Hangers:
  - 1. Refer to Specification Section 22 0529 for hangers and supports.
- D. Hanger Spacing:
  - 1. Hangers shall be spaced in accordance with the following schedule.
  - 2. If pipe is insulated, the maximum spans shall be reduced 35% to accommodate the weight of insulation.

3. Axial movement is not allowed for seismically ridged systems.

Maximum Span (ft) Schedule 80 Pipe		
Pipe Size (in.)	Temperature °F (70)	120 and Above
1/2	5	continuous
3/4	5	continuous
1	5-1/2	continuous
1-1/2	5-1/2	continuous
2	6	continuous
3	7	continuous
4	7-1/2	continuous
6	8-1/2	continuous
8	9	continuous
10	9-1/2	continuous

E. Joints:

1. Joints shall be socket-welded using solvent cement in accordance with manufacturer's installation recommendations. Screwed joints shall be permitted only if called for on drawings.

F. Storage:

1. Pipe and fittings shall be stored before installation indoors and away from direct sunlight.

### 3.3 TESTS

A. General:

1. Before insulation is applied, all piping, equipment and accessories installed under this contract shall be inspected and tested by the Subcontractor in the presence of the Inspector, and approved before acceptance.
2. All labor, material and equipment required for testing shall be furnished by the Subcontractor.
3. The Subcontractor shall be responsible for all repairs and retesting as required.
4. All instruments and other equipment whose safe pressure range is below that of the test pressure shall be removed from the line or blanked off before applying the tests.
5. Subcontractor to provide a valved pressure tap with a 150 psi gauge and a one inch valved connection point for leak testing and cleaning of system.