Stage 2 Abatement Plan – Revision 1

Albuquerque Products Terminal
6356 Desert Road
Albuquerque, New Mexico

Phillips 66 Company

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1. Introduction

This Stage 2 Abatement Plan – Revision 1 presents the remedial approach by GHD Services Inc. (GHD) at the Phillips 66 Company (Phillips 66) Albuquerque Products Terminal located at 6356 Desert Road in Albuquerque, New Mexico (Site). Site location is presented on Figure 1. General features of the Site are depicted on Figure 2. This report summarizes:

- Current Site Conditions
- Development and Assessment of Abatement Options
- Description of Preferred Abatement Option
- Modification of Monitoring Program
- Site Maintenance Activities
- Abatement Schedule
- Public Notification Proposal
- Conclusion

2. Current Site Conditions

The Phillips 66 Albuquerque Products Terminal is an active bulk storage and distribution facility located in an industrial area approximately seven miles south of central Albuquerque in Bernalillo County. The Site encompasses approximately 16 acres and includes a tank farm, truck loading rack, and administrative building.

Remediation of petroleum hydrocarbon impacts at the Site is performed under the oversight of the New Mexico Environment Department (NMED). Groundwater quality standards are listed in Title 20, Chapter 6, Part 2, Section 3103 of the New Mexico Administrative Code (20.6.2.3103 NMAC[1]) for groundwater cleanup. The New Mexico Water Quality Control Commission (NMWQCC) Human Health Standards are presented below in Table 2.1.

Table 2.1 Groundwater Constituent of Concern Table

Constituent Of Concern	NMWQCC Standards (mg/L)
Benzene	0.005
Toluene	1.00
Ethylbenzene	0.70
Xylenes	0.62
1, 2-Dibromoethane (EDB)	0.00005
1, 2-Dichloroethane (EDC)	0.005
Naphthalenes	0.03

[1] New Mexico Water Quality Control Commission (http://164.64.110.134/parts/title20/20.006.0002.html)

Monitoring wells (MW) are located primarily by the loading rack and in the tank farm of the facility (Figure 2). Sampling is completed on a semiannual basis, with reporting completed semiannually as well. Groundwater flow direction is to the southeast with a hydraulic gradient of approximately 0.0020 feet per foot (Figure 3). Eleven monitoring wells are sampled at the Site. Samples are collected via low flow bladder pump and polyethylene tubing. Results show EDB present in northern monitoring wells and EDC present in the southern monitoring wells at the Site (Figure 4).

Two plumes of impacted groundwater are present at the Site. In the northern area of the Site, aviation gasoline was released. The northern plume, which encompasses MW-12 and MW-13, contains benzene, and xylenes, and EDB above the NMWQCC Standards. In 2014, light non aqueous phase liquid (LNAPL) was intermittently been observed at MW-12 and has also been observed historically at MW-10 and MW-13. This LNAPL is thought to consist of the heavier portion of the aviation gasoline. MW-12 currently contains 0.063 milligrams per liter (mg/L) benzene, 0.77mg/L xylenes, and MW-13 contains 0.00011mg/L EDB and exceeded the NMWQCC criteria for benzene, xylenes, and EDB, which are 0.005 mg/L, 0.62 mg/L, and 0.00005 mg/L, respectively.

The southern plume encompasses MW-9 and MW-11 and contains ethylene dichloride (EDC). The highest current concentration in the southern plume at MW-11 currently contains 0.16 mg/L of EDC. No LNAPL has been observed at this location. BTEX and petroleum hydrocarbons (diesel and gasoline range hydrocarbons as well as naphthalene and methyl naphthalenes) have been observed in vadose zone soil in this area.

3. Development and Assessment of Abatement Options

The potentially applicable in situ treatment technologies for the remediation of the chlorinated volatile organic compounds (CVOCs) in the soil and groundwater are:

- Monitored Natural Attenuation (MNA)
- Air Sparge/Soil Vapor Extraction (AS/SVE)
- In situ Enhanced Biodegradation (ISEB)
- Colloidal carbon with ISEB
- In situ Chemical Oxidation (ISCO)
- In situ chemical reduction (ISCR)

3.1 Monitored Natural Attenuation

MNA is a remedial approach that relies on natural subsurface mechanisms that are classified as either destructive or nondestructive. In certain circumstances, MNA can be sufficiently protective of human health and the environment. Biodegradation is the most important in situ destructive mechanism, while nondestructive mechanisms include sorption, dispersion, dilution, and volatilization. However, MNA has its inherent limitations and can be slow, making the time frame for completion relatively long. In order to support successful implementation of MNA at any given site, the United States Environmental Protection Agency (USEPA) recommends that the Site be thoroughly characterized and scientific evidence provided to demonstrate that the degradation of the Site hydrocarbons is occurring at rates sufficient to be protective of human health and the environment. Three lines of evidence are needed to support the occurrence of MNA:

- Documented loss of CVOC at the field scale.
- Geo chemical analytical data.
- Direct lab and field microbiological evidence for microbial biodegradation.

However, MNA is subject to many uncontrollable natural processes and Site conditions, which make it slow and sometimes inadequate. Site conditions, such as nutrient concentration, redox potential, and pH can be manipulated to enhance MNA and speed up the degradation rates of the Site contaminants.

3.1.1 Applicability for Groundwater Treatment

In the northern plume area, there is potential for MNA to reduce the concentrations of BTEX and naphthalene in the groundwater and compounds may degrade faster under aerobic conditions; however, EDB would not be degraded under aerobic conditions, but instead degrade under anaerobic conditions. The data suggest that concentrations of BTEX, naphthalene, and EDB are decreasing. The area may require a longer time period for MNA before concentrations reach acceptable levels. Due to the complexity of tanks, piping and secondary containment on the surface, MNA is considered further for this area.

In the southern plume, MNA has the potential to reduce concentrations of EDC in groundwater; however, the data for MW-11 do not show a decreasing trend for EDC, therefore, it appears that MNA is not adequate and EDC is likely to persist in the groundwater for an extended period of time. Therefore, MNA will not be considered for the southern plume.

3.2 Air Sparging/Soil Vapor Extraction

AS is accomplished by introduction of air above the groundwater and below the level of contamination. As the air rises through the soil, it volatilizes the contaminants in the vadose zone where they can be collected and treated by SVE techniques. The air may be heated to enhance vaporization of less volatile, higher boiling contaminants. SVE is an in situ process used to remove VOCs from soil. Typically, the vapor extraction occurs from a central location, and the air is supplemented by addition of air below the groundwater surface through well points located around the perimeter of the area to be treated. Also, the ground surface is covered by an impermeable liner to eliminate short circuiting of the system. The extraction wells are connected to a vacuum extraction unit through a surface collection manifold. The vacuum not only draws vapors from the unsaturated zone, but it also decreases the pressure in soil voids, thereby causing the release of additional VOCs. The extracted gas flows through the surface collection manifold and is either vented to the atmosphere or treated by one of various technologies such as thermal oxidation or activated carbon adsorption, depending on the nature and volume of VOC contamination. AS/SVE is a well understood technology that has been applied at many sites. It is applicable to sites that have high concentrations of contaminants present, including the potential for free phase product. AS/SVE can significantly reduce more volatile chemical concentrations in permeable soils in 3 to 6 months. As the concentrations decrease, it becomes less effective and may take an extended period to reach cleanup levels. Therefore, consideration should be given to other technologies, such as bioventing for polishing of the soils.

3.2.1 Applicability Groundwater Treatment

AS/SVE would be an effective treatment for the BTEX, naphthalene, and EDB present in the groundwater in the northern area of the Site. The ambient air temperature should be sufficient to volatilize these compounds for SVE; therefore, additional air heating is not required. AS/SVE has been applied successfully in the area of the aviation fuel release. AS/SVE is most effective for treatment of high concentrations of VOCs. The concentrations of BTEX, naphthalene, and EDB are all low in the northern area and generally within a few parts per billion of the NMWQCC criteria; therefore, AS/SVE would not be an effective option for continued treatment of this area and will not be considered further.

Similarly in the southern portion of the Site, AS/SVE would be an effective treatment option for EDC since it would be volatilized at ambient temperatures; however, As much of the high concentration area of the southern plume is covered by a building and the loading rack, access for installation of the AS/SVE system would not be achievable therefore this technology will not be considered further for the southern plume.

3.3 In Situ Enhanced Biodegradation

In situ biodegradation (aerobic or anaerobic) is a treatment process whereby contaminants are metabolized into less toxic or nontoxic compounds by naturally occurring microorganisms. Site conditions can be manipulated to enhance in situ biodegradation processes and speed up degradation rates of Site VOCs. In this process, several techniques can be applied to enhance biodegradation of the hydrocarbons, such as:

i. Injection of air, oxygen, oxygen release compound (ORC), or magnesium, calcium, or hydrogen peroxide to enhance biodegradation of the hydrocarbons under aerobic conditions.

ii. Injection of an organic substrate such as soy lactate or hydrogen release compound (HRC) to stimulate enhanced biodegradation of certain compounds such as tetrachloroethene (PCE), trichloroethene (TCE), and highly chlorinated aromatic compounds under anaerobic conditions. Injection of nitrate and/or sulfate to enhance the biodegradation of hydrocarbons under anaerobic conditions by denitrification/sulfate reduction.

iii. Nutrient supplementation with suitable sources of nitrogen and phosphorus to enhance biodegradation of contaminants by indigenous microbial population.

iv. Bioaugmentation by injection of microbial cultures to improve the effectiveness of the microbial population in degrading the compounds of concern.

One or a combination of these techniques can be applied based on the groundwater conditions. Some technologies that are available for aerobic treatment of the soils and groundwater include ORC treatment and biosparging and denitrification. Biosparging and ORC are both technologies that supplement oxygen to enhance aerobic biodegradation. The injected oxygen would enhance the growth and metabolic activity of hydrocarbon degrading microorganisms, resulting in the oxidation of petroleum hydrocarbons to carbon dioxide and water. Emulsified vegetable oil (EVO) can be used to enhance chlorinated and brominated compound biodegradation under anaerobic conditions. Typically, the groundwater becomes nutrient deficient during enhanced biodegradation; therefore, nutrient supplementation is considered. Bioaugmentation is used when the natural microbial population has been shown to be unable to degrade all the contaminants present or where it is considered necessary to augment the natural biodegradation process.

In situ biosparging involves injection of pressurized gases into the subsurface at very low flow rates to enhance biodegradation. Oxygen or air is injected to enhance aerobic biodegradation. Injection of oxygen is controlled such that vapors are not generated or accumulated in the vadose zone. The gas flow can also be supplemented with injection of aqueous nutrients if needed to stimulate bacterial growth and enhance biodegradation of the hydrocarbons in the groundwater and soil. The aqueous nutrient injection could be performed through the same injection wells.

Bioventing is very similar in action to biosparging except that it is applied to soils instead of groundwater. A low level air or oxygen stream is sparged into the soils, which is sufficient to enhance aerobic biodegradation, but not enough to cause vaporization of the contaminants and loss to the atmosphere. Bioventing is accomplished by introduction of air or oxygen below the level of the contamination. As the air or oxygen mixture rises through the soil, it enhances biodegradation of the total petroleum hydrocarbons (TPH). This degradation occurs under aerobic conditions. The air or oxygen flow would be suitable for providing oxygen to the microbial population to enhance biodegradation, but not sufficient to cause volatilization of the BTEX and TPH.

Anaerobic biodegradation can be enhanced by the injection of a carbon source, such as EVO, nutrients, and a microbial inoculum into the soil. The EVO is used to provide the microorganisms with a suitable source of carbon for anaerobic biodegradation. The inorganic nutrients are used to provide the microorganisms with the necessary elements for growth and microbial activity. The injection of EVO into an aquifer has been found to stimulate the anaerobic biodegradation of a wide variety of compounds. The EVO works in two ways; it acts as a carbon source for various heterotrophic bacteria in the soil, which consume any available oxygen and create the anaerobic conditions necessary for degradation. As EVO is degraded, it releases hydrogen, which is the donor substance for the degradation. EVO preparations are commercially available and are easy to handle, have low viscosity, and do not clog aquifers. An injection of EVO will typically last in excess of 2 years.

3.3.1 Applicability for Groundwater Treatment

Biodegradation under aerobic conditions would be an effective treatment for the BTEX and naphthalene present in the groundwater in the northern area of the Site. However, the EDB would not biodegrade under aerobic conditions and would need to be biodegraded under anaerobic conditions. Since the presence of the petroleum derived hydrocarbons would assist in creating anaerobic conditions at the Site, a two-step treatment where EDB is degraded under anaerobic conditions followed by an aerobic step to treat the BTEX, and naphthalene would be recommended. EVO and nutrients would be added to enhance anaerobic conditions for anaerobic treatment. The addition of a microbial inoculum may also be required; however, this would need to be verified by a laboratory treatability study. After the anaerobic treatment step is complete in 2 to 3 years, aerobic conditions would be enhanced in the area by biosparging using traditional means or by iSOC.

Nutrients would also be added as part of the aerobic treatment. It is anticipated that the aerobic treatment step would take an additional 2 to 3 years to reduce concentrations of BTEX and naphthalene to acceptable levels.

In the southern area of the Site, the EDC would be treated by biodegradation under anaerobic conditions. EVO and nutrients would be added to enhance anaerobic conditions for anaerobic treatment. The addition of a microbial inoculum may also be required; however, this would need to be verified by a laboratory treatability study. It is expected that the EDC would be reduced to below NMWQCC levels within three to four years. The BTEX and petroleum hydrocarbons in vadose zone soil would not be treated by anaerobic biodegradation; however, these compounds would biodegrade under aerobic conditions and could be treated by bioventing. Oxygen or air would be injected into the soil below the levels of soil contamination but above the groundwater. Since the soil impacts are present between approximately 50 and 60 feet below ground surface (bgs) and groundwater is not encountered until 90 to 95 feet bgs, these two treatments would not interfere with each other and could be performed at the same time. It is estimated that bioventing would be performed for 2 to 3 years to achieve treatment of the soil.

The limitation for treatment in the southern plume is the delivery of the treatment. Due to the presence of the building and the loading rack traditional injection of the amendments cannot be performed over much of the southern plume and a more innovative delivery mechanism must be found. Either injections would be made only in accessible areas or a horizontal delivery system must be used to deliver the amendment under the building and loading rack. Injection into accessible areas only would mean that a long time period would be required for treatment. EVO would be effective for delivery into accessible areas such as a barrier in the downgradient area of the plume. However, EVO will harden into a “Crisco-like” material if exposed to air therefore it would have the potential to foul and clog a horizontal delivery system. An aqueous carbon source such as sodium lactate could be used to enhance biodegradation and could be delivered by a horizontal delivery system. Sodium lactate, however, is degrading quickly and would become depleted within a short time. It is expected that at least two injection events per year would be required to maintain biodegradation rates. A laboratory treatability study would be recommended to determine the amendments and doses required to optimize biodegradation. It is estimated that 6 or more years of ISEB treatment would be required to meet groundwater criteria if the amendment can be delivered to the treatment area. A longer time period would be required if treatment is performed using fewer wells.

3.4 Colloidal Activated Carbon with ISEB

Several injectable activated carbon products are currently available. They include both powdered activated carbon (PAC) and colloidal activated carbon (CAC) products. PAC products can be difficult to inject and disperse in groundwater; however, CAC products, such as PlumeStop™, are a highly dispersible, fast acting, sorption-based technology designed to capture and concentrate dissolved-phase contaminants within their structure. Once the contaminants are sorbed, biodegradation processes proceed at an accelerated rate. CAC has been shown to be an effective treatment for many organic contaminants including EDC. CAC would be injected and would adsorb the EDC from the groundwater. The higher concentrations of EDC accumulated on the CAC will support a microbial population, which will degrade the organic compounds and, therefore, free up binding sites on the carbon. In this way, CAC is expected to be effective over a long time period.

Biodegradation on the CAC can be enhanced by adding a biological amendment. A carbon source that will not sorb to the CAC such as lactate or HRC could be injected to stimulate anaerobic biodegradation of the EDC on the CAC.

3.4.1 Applicability for Groundwater Treatment

The EDC present in the groundwater in the southern plume would sorb quickly to the CAC and once sorbed, would be unlikely to desorb. A CAC such as PlumeStop™ contains a dispersant which helps the colloidal material disperse and could be delivered either using vertical wells in accessible areas or by a horizontal delivery system. Injection into accessible areas only would mean that a long time period would be required for treatment. A biological amendment such as sodium lactate would be injected to promote degradation of the sorbed material. PlumeStop™ may not be cost effective, however, for treatment of a large area and also must be injected by a subcontractor who is licensed by the vendor which will also add to treatment costs. A single injection of PlumeStop™ is expected to be sufficient for treatment if the amendment can be delivered to the treatment area. Additional injections would be required if treatment is performed using fewer wells. Additional injections of sodium lactate would be required to maintain biodegradation of the sorbed material.

3.5 In Situ Chemical Oxidation

ISCO is an effective method for destroying localized high concentrations of a wide range of organic compounds, particularly benzene and total petroleum hydrocarbons gasoline range organics (TPH GRO). In an oxidation reaction, the oxidizing agent breaks the carbon bonds in the compounds and converts them into nonhazardous or less toxic compounds, primarily carbon dioxide and water. Commonly used oxidizing reagents include potassium permanganate (KMnO4), Fenton's Reagent (hydrogen peroxide in a solution of ferrous salts), catalyzed sodium persulfate, and ozone.

KMnO4, Fenton's Reagent, and catalyzed sodium persulfate are effective when delivered in an aqueous solution and react with a wide range of organic compounds. These oxidants are readily available in large quantities. ISCO is Site-specific, and successful treatment is typically a function of the effectiveness of the delivery system (being able to deliver sufficient amounts of oxidant to the impacted soil and groundwater and making sufficient "contact") and subsequent transport of the oxidant within the soil and groundwater. The treatment performance is dependent to a great extent on the soil chemistry. A critical factor in the evaluation of ISCO treatment is determining the dosages of oxidant that are required to effectively oxidize the hydrocarbon compounds present (referred to as stoichiometric demand) as well as the competing reactions. The competing reactions are typically caused by the presence of natural organic materials such as humates and fulvates, as well as reduced metal species. The consumption of oxidants by these non-target compounds is defined as natural oxidant demand (NOD). In order to determine the optimum dosage, treatability studies are required. Large quantities of oxidizing chemicals require regulated handling and pose health and safety concerns. Chemical oxidation may cause mobilization of metals, possible formation of toxic byproducts, heat, gas, and biological perturbation.

KMnO4 does not exhibit a high solubility and requires a large delivery volume. Fenton's Reagent is effective for the treatment of VOC. However, the Fenton's Reagent reaction is exothermic, and the heat generated can cause volatilization of the VOC. It also requires a pH of 5 pH units and ferrous sulfate catalyst. Base catalyzed sodium persulfate can be injected at concentrations up to 30 percent. It can oxidize a wide range of organic compounds including VOC and will continue to oxidize organic material for up to a month.

Another product which is being considered was developed by DeepEarth Technologies, Inc. (DTI) which is *Cool-Ox*®. *Cool-Ox*® is a patented in situ and ex-situ remediation process that uses a patented solution of calcium peroxide that generates hydrogen peroxide slowly and facilitates the oxidation of petroleum hydrocarbons. The *Cool-Ox*® treatment facilitates an accelerated biodegradation of petroleum hydrocarbons following the oxidation phase by releasing nutrients without any exothermic reaction and reduces the mobility, toxicity and volume of the hydrocarbon impacts. The process is based on using hydrogen peroxide as the generator of the oxidizing radicals; however, unlike the traditional Fenton Reaction, or Fenton-like processes that use liquid hydrogen peroxide, the *Cool-Ox*® process generates hydrogen peroxide from solid, food-grade, peroxygens that are injected into the soil and/or groundwater in an aqueous suspension. Once in place, the peroxygens react to produce hydrogen peroxide without an exothermic reaction as would occur with a Fenton-like process. The *Cool-Ox*® process eliminates Fenton-like problems because the peroxygens employed are only sparingly soluble in aqueous solutions, and thus, the dissolution rate is quite slow. Once injected, they remain in the impacted media for an extended period of time before undergoing hydrolysis. The low solubility coupled with the buffered solution and the process taking place at a slightly basic pH eliminates the need to inject iron salts and results in greater control over the process. The *Cool-Ox*® process treats a wide range of chemicals due to the controlled nature of the process and the slightly alkaline pH of 8 and also works well in calcareous soils.

3.5.1 Applicability for Soil and Groundwater Treatment

This technology would be an effective treatment for groundwater in the northern area of the Site by oxidizing benzene, naphthalene, EDC, and residual free product hydrocarbons to carbon dioxide, chloride ions, and water. Catalyzed sodium persulfate is the most effective oxidant for the treatment of the compounds that are present in the northern plume and would be the recommended oxidant. It would be injected into the Site groundwater using injection wells. A laboratory treatability study is recommended in order to determine the oxidant and dose that are optimum oxidant concentration for effective treatment. It is estimated that quarterly oxidant injections over two years would be required for groundwater treatment in the northern plume.

In the southern area of the Site, ISCO using catalyzed sodium persulfate or *Cool-Ox*® would be effective treatments for the EDC in the groundwater and would be injected into Site groundwater using injection wells or direct push methods. Since petroleum hydrocarbons are not present in groundwater in this area, the required dose would be relatively low.

Treatment of vadose zone soil by ISCO can be more difficult, particularly in the sandy soil present at the Site where injected oxidant is likely to percolate through the treatment zone quickly and may not be retained long enough to complete oxidation of the contaminants present. There is also a risk that the oxidant injections would mobilize the BTEX and petroleum hydrocarbons into the groundwater. Treatment of the vadose zone soil would be performed by the injection of catalyzed sodium persulfate above the contaminated zone. A relatively dilute oxidant solution would be recommended, and the volume would be limited to minimize the potential of mobilizing the contaminants into the groundwater. It is estimated that quarterly injections for one year would be required to treat groundwater in the southern plume and quarterly injections for two years would be required to treat the vadose zone soil. Another treatment option would be to inject *Cool-Ox*® above and within the contaminated zone. It is estimated that up to two treatments, assuming good interaction with the contamination, would be required to treat groundwater in the southern plume and one injection for would be required to treat the vadose zone soil.

ISCO using NaOH-activated sodium persulfate has been shown to be effective for the oxidation of EDC in the laboratory study and also in the scientific literature (ITRC 2005; Chen et al. 2016) and in field applications. As discussed in Section 2 ISCO treatment has not reduced EDC concentrations at the monitor wells because the monitor wells are located too far away from the injection wells. NaOH-activated sodium persulfate is an aqueous material that could be injected using vertical injection wells installed in accessible. Injection into accessible areas only would mean that a long time period would be required for treatment.

Quarterly oxidant injections over 2 to 3 years would be sufficient for treatment if the amendment can be delivered to the treatment area. Injections over a longer time period would be required if treatment is performed using fewer wells.

3.6 In Situ Chemical Reduction

Zero valent iron (ZVI) can be used to treat CVOCs including EDC in soil and groundwater. ZVI dechlorinates organic compounds by creating reducing conditions as the Fe^{2+} is oxidized to Fe^{3+}. Under these conditions, a proton can replace a chlorine atom on organic molecules. ZVI may also stimulate anaerobic biodegradation and serve as a proton donor for reductive dechlorination. ZVI dechlorinates chlorinated compounds by replacing chlorine atoms with hydrogen atoms in a process known as reductive dechlorination.

A number of injectable ZVI products are available that use micro or nano scale ZVI particles to make a product that has a low viscosity. These products include emulsified zero valent iron (EZVI), EHC, EOS ZVI, AquaZVI. EHC-L contains dissolved iron rather than particulate iron and uses a combined abiotic/biological mechanism for reductive dechlorination.

3.6.1 Applicability for Groundwater Treatment

ZVI treatment would be effective for the treatment of EDC in the southern plume by abiotic dechlorination. Delivery of the material would again be a concern. More viscous ZVI products such as EZVI are delivered using direct push, however the groundwater at the Site is too deep for direct push to be a viable option. The newer ZVI products which contain very small ZVI particles can be delivered using injection wells. The EHC-L product that may be an option for enhancement of reductive dechlorination in this area. Injection into accessible areas only would mean that a long time period would be required for treatment.

It is estimated that 6 or more years of ISCR treatment would be required to meet groundwater criteria if the amendment can be delivered to the treatment area. A longer time period would be required if treatment is performed using fewer wells.

4. Description of Preferred Abatement Option

4.1 Northern Plume - Monitored Natural Attenuation

The preferred abatement technology selected for the northern plume is MNA.

Consistent with the guidelines presented in the USEPA's "Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water" (Technical Protocol; USEPA, 1998), a weight-of-evidence approach was used to evaluate the occurrence of natural attenuation (NA) processes at the Site. This evaluation included examining trends in the geochemical and redox indicator parameter data along a common groundwater flow path to evaluate the performance of and potential type(s) of NA processes occurring at the Site.

The USEPA defines NA as naturally occurring processes in soil and groundwater that act without human intervention to reduce the mass, toxicity, mobility, volume, and concentration of contaminants in those media (USEPA, 1998). MNA is recognized as an effective remedial technology that can reduce contaminant concentrations to levels that are protective of human health and the environment. NA processes are classified as destructive and non-destructive. Destructive processes include chemical degradation (where organic compounds are chemically transformed to degradation products) and biological degradation (where the activity of bacteria naturally present in subsurface environments transforms organic compounds to degradation products). Non-destructive processes include adsorption, dispersion, dilution, and volatilization. Biodegradation is one of the most important destructive processes acting to reduce organic contaminant concentrations in groundwater.

4.1.1 Background on Bidegradation Processes

EDB can be naturally biodegraded in the environment by a number of strains of bacteria and in a number of different ways (Yang et al., 2019). Under aerobic conditions, EDB can be used by the bacteria directly as an energy source, or cometabolized along with other carbon sources (e.g., phenol, ethane). In cometabolism, EDB is degraded by enzymes produced by the bacteria for other purposes. Under anaerobic conditions, EDB may be used as a terminal electron acceptor for bacterial respiration in the same way as tetrachloroethylene (PCE) and its degradation products are degraded, via dehalogenation.

Any or all of these biodegradation mechanisms may be active at any given site. EDB has been shown to biodegrade under both aerobic and anaerobic conditions (Yang et al., 2019). Under field conditions, reductive dechlorination appears to be the most important mechanism and occurs under anaerobic conditions. Evaluating the distribution of naturally occurring electron acceptors can provide evidence of where and how biodegradation is occurring (USEPA, 1998). Naturally occurring electron acceptors available in groundwater are: dissolved oxygen (DO), nitrate, manganese and iron coatings on soil sediments, dissolved sulfate, and carbon dioxide.

4.1.2 Natural Attenuation Evaluation Process

Consistent with the Technical Protocol, the lines of evidence evaluated consist of the following:

- Changes in plume conditions over time.

- Changes in concentrations over time at individual wells.
- Geochemical and redox indicator parameters demonstrating the occurrence of biodegradation processes.

The presence of degradation products and/or metabolic end products is generally a good indicator of biodegradation, however, these data are not available for review at the time of this evaluation.

This preliminary MNA assessment of EDB was conducted to determine if MNA could be a viable remedial technology for the Site, per the Technical Protocol. The data used in evaluating MNA at the Site were collected from two background/upgradient wells (MW-7 and MW-8), a source area well (MW-12), and three near source/downgradient wells (MW-13, MW-14, and MW-4).

4.1.2.1 Concentrations over Time and Distance

An assessment of changes in EDB plume conditions over time and distance and changes in individual wells over time was conducted, and the results are presented on Figures 5 and 6.

The changes in the size of the plume determined from the 2012 and 2020 data is presented on Figure 5. The data indicate that the areal extent of the plume has decrease over that time, which is good evidence that NA processes are effective at the Site.

Concentrations in the center of the plume were greater than 1 mg/L in 2012 and have decreased to just over 0.0001 mg/L in 2020; a decrease in concentration of approximately four orders of magnitude. Figure 6 presents the changes in EDB concentrations over time within individual wells. The data on the figure show that EDB concentrations at each well have decreased over time.

Concentrations of EDB at MW-12 and MW-13 were close to 1 mg/L in 2012 (1.61 and 0.407 mg/L, respectively). Concentrations at each well exhibited a steady decrease over time, as presented on Figure 6. In 2020, MW-13 remained just above criteria, while EDB was detected at MW-14. Concentrations at MW-4 had already decreased to below detection limits by 2012. At MW-14, EDB concentrations increased from 2012 to 2015, and subsequently decreased from 2015 to 2020. EDB was not detected at either MW-4 or MW-12 in 2020.

Decreases in the size of the plume and concentrations within individual wells is excellent evidence that NA processes are effectively limiting the migration of EDB in the Site groundwater.

4.1.2.2 Geochemical Conditions

The redox parameters measured at the Site were dissolved oxygen (DO) and oxidation-reduction potential (ORP). Background conditions, as represented at MW-7 and MW-8, had concentrations of DO of 6.6 and 1.8 mg/L, respectively. ORP values for each background well were 38 and 28 mV, respectively. These measurements are generally consistent with historical observations at these wells, and the data indicate that the redox conditions upgradient of the impacted area are aerobic.

At the source area well (MW-12), redox conditions are reducing, with DO and ORP measurements of 0.04 mg/L and -141 mV, respectively. This indicates that there is strong microbial activity in the area of the wells, suggesting that biodegradation processes are active in the impacted area and dehalogenation can occur. Downgradient from the source area well, redox conditions become increasingly aerobic. At MW-13, DO and ORP values (0.03 mg/L and 211 mV, respectively) indicate that fairly reducing conditions persist. Farther downgradient, conditions return to more aerobic conditions (MW 14: DO = 3.7 mg/L; ORP = 49 mV; MW 4: DO= 0.66 mg/L; ORP = 25 mV).

4.1.3 Natural Attenuation Conclusion

The above MNA assessment indicates that there is good evidence that natural attenuation of EDB is occurring, and that NA may be an effective remedial technology for the Site. This conclusion is based on the following:

- Concentrations of EDB have decreased over time.
- The size of the plume has decreased over time.
- Redox conditions within the impacted area have shifted toward more reducing conditions.

4.2 Southern Plume - ISCO Injections

The preferred abatement technology for the southern plume selected is ISCO to treat the contaminated groundwater still present at the Site. A chemical oxidant will be delivered by using direct push injections or permanent vertical well injections.

To determine the preferred chemical oxidant, a pilot test will be performed with the effectiveness evaluated.

4.2.1 Cool-Ox®

The first ISCO product injected will be Cool-Ox®. With oversite from GHD, DTI will inject approximately 320 gallons into three points at depths between 85 and 105 feet below ground surface. The direct push points will be spaced approximately 6 feet apart and will occur up gradient of MW-11 which will provide a point to measure water quality data and be able to estimate an effective radius of influence while also allowing data to be collected from down gradient MW-16.

4.2.2 Catalyzed Sodium Persulfate

If the ISCO treatment of Cool-Ox® proves to be ineffective, GHD will perform an additional pilot test consisting of approximately 5,250 gallons of solution containing 15 percent catalyzed sodium persulfate is injected into wells IW-1, IW-2, IW-3, and IW-4. A total of 5,510 pounds (lb) of sodium persulfate would be dissolved in 3,800 gallons of water. To this, 1,166 gallons of 25% sodium hydroxide would be added to reach the total injected volume of 5,266 gallons. The solution will be mixed in batches and injected using a small pump to promote movement of the injected solution into the soil around the well. The volumes recommended for injection are designed to affect a 30 foot radius around each injection well. This would be a single, isolated event to evaluate the effectiveness of the sodium persulfate solution.

4.2.3 Pre and Post Injection Monitoring

Before and after each pilot test groundwater will be monitored in monitor wells MW-5, MW-11 and MW-16 to observe any quantitative changes. Groundwater parameters for pH, DO and ORP will be measured 30, 60, and 90 days post injections. During the 90 day parameter measurement, samples for arsenic, iron, manganese, sulfate, total dissolved solids and EDC concentrations will be analyzed via samples collected in accordance with low-flow sampling techniques. The groundwater samples will be decanted into clean containers supplied by the analytical laboratory, placed on ice in an insulated cooler, and chilled to a temperature of approximately 40°F (4°C). The coolers will be sealed for transport and shipped to under chain of custody protocol. Pace Analytical Services in Lenexa, Kansas will perform the analysis. The results of the laboratory analysis will be evaluated to determine the effectiveness of each ISCO treatment.

4.2.4 Pilot Test Evaluation

Based on the results from the Cool-Ox® and sodium persulfate injections, it will be determined which ISCO treatment is more effective, and full scale injections will then occur to address the EDC plume. Direct push injections will be the preferred injection method if the pilot test demonstrates the effectiveness. If the required injection depths are not able to be achieved, additional injection wells will be installed in locations within the EDC plume to maximize interaction between the EDC and ISCO product chosen.

5. Modification of Monitoring Program

The monitoring program will remain unchanged. Semiannual sampling will continue with the same 11 wells (MW-4, MW-5, MW-7, MW-8, MW-9, and MW-11 through MW-16) to monitor the remediation at the Site. Semiannual reporting will continue as requested by NMED.

6. Site Maintenance Activities

Following successful remediation of the groundwater impacts, and prior authorization from NMED, all monitoring well and injection wells will be abandoned in accordance with 20.6.2.4107.C NMAC. Prior to any work being completed, proposal shall be sent by certified mail to the secretary for approval, unless such approval is required from the State Engineer. Further, no work to abandon wells will be completed prior to NMED approval, pre-closure notification and closure requirements will be completed in accordance with 20.6.2.5005 NMAC.

7. Abatement Schedule

Following NMED approval for the abatement options to address the on-Site plumes, a Cool-Ox® pilot test will be performed with pre and post sampling to test effectiveness of the chemical. Should it prove to be ineffective (reduction of EDC less than 20%), then a Peroxy Chemical pilot test will be performed, with pre and post sampling to test effectiveness. The delivery method will be evaluated to determine if direct push injections are feasible or if permanent injection wells will need to be installed based on Site conditions. During this time, monitoring of the EDB plume will continue on a semiannual basis to evaluate the continued effectiveness of MNA.

In 2021, once the injection method and remedial product have been determined, the full scale treatment will be implemented for the EDC plume.

The full scale implementation of Cool-Ox® via direct push injection would include advancing approximately 49 injection points within the 0.15 mg/L contour as shown on Figure 4. Approximately 280 gallons of Cool-Ox® will be injected at each point between 80 and 100 feet below the ground surface. An additional 1,000 gallons will be injected directly into each injection well IW-1 through IW-4. If direct push is not feasible, new injection wells will be installed within the EDC footprint. DTI will inject approximately 1,000 gallons of Cool-Ox® into each injection well. Injections would occur every six to twelve months until concentrations of EDC are below the cleanup standard or the Cool-Ox® no longer appears effective

The full scale catalyzed sodium persulfate injections would consist of installing additional injection wells within the EDC footprint. Each event would consist of injecting approximately 2,500 gallons of solution containing 15 percent catalyzed sodium persulfate into each injection well. The solution will be mixed in batches and injected using a small pump to promote movement of the injected solution into the soil around the well. Injections would occur on a quarterly basis until concentrations of EDC are below the cleanup standard or the sodium persulfate no longer appears to be effective.

Evaluation of post injection results will occur looking at parameters 30, 60, and 90 days post injection, and at 90 days samples will be collected to evaluate concentrations of arsenic, iron, manganese, sulfate, total dissolved solids and EDC. Treatment of the EDC plume will continue on a the schedules discussed above until concentrations reach the NMWQCC standards or the ISCO product chosen to remediate the EDC plume no longer appears effective (reduction of less than 20% of pre-injection EDC concentrations). GHD will continue to monitor the EBD plume to ensure that MNA is still occurring.

Following treatment of the southern plume, GHD will continue to monitor chemicals of concern in the groundwater to evaluate if future treatment is needed. Once all monitor wells show levels below the NMWQCC Groundwater Standards, closure monitoring will occur and the wells will be abandoned accordingly following approval from NMED.

8. Public Notification Proposal

A public notice will be designed to satisfy the requirements of Subsections B and C of Sections 20.6.2.4108 and 20.6.2.4108 NMAC.

The notice will be distributed:

- Through publication of a notice in newspaper of general circulation in the county where the abatement will occur.
- In areas with large percentages of non-English speaking people, through the mailing of the public notice in English to a bilingual radio station serving the area where the abatement will occur with a request that it be aired as a public service announcement in the predominant non-English language of the area.
- To those persons who have requested notification, will be notified through mail or email.
- The New Mexico Trustee for Natural Resources, and any other local, state, or federal government agency affected will be notified by certified mail.

- To owners and residents of surface property located inside and within 1 mile from the perimeter of the geographic area where the standards and requirements set forth in Section 20.6.2.4103 NMAC are exceeded who shall be notified by a means approved by the secretary.
- To the Governor or President of each Indian Tribe, Pueblo or Nation within the state of New Mexico, as identified by the secretary, who shall be notified by mail or email.

See Appendix A for a copy of the public notice that will be posted.

9. Conclusion

Following approval of Stage 2 Abatement Plan – Revision 1 and underground injection permit, GHD plans to move forward with the pilot tests to determine the most effective abatement procedure for ISCO injections.

Based on the recent groundwater chemical concentrations and their relation to the property boundary, the EDB plume in the tank farm area appears to be stable and/or declining. GHD and Phillips 66 will focus on active remediation in southern plume for reducing EDC concentrations while continuing to monitor MNA parameters and EDB concentrations in the northern EDB plume.

All of which is Respectfully Submitted,

GHD

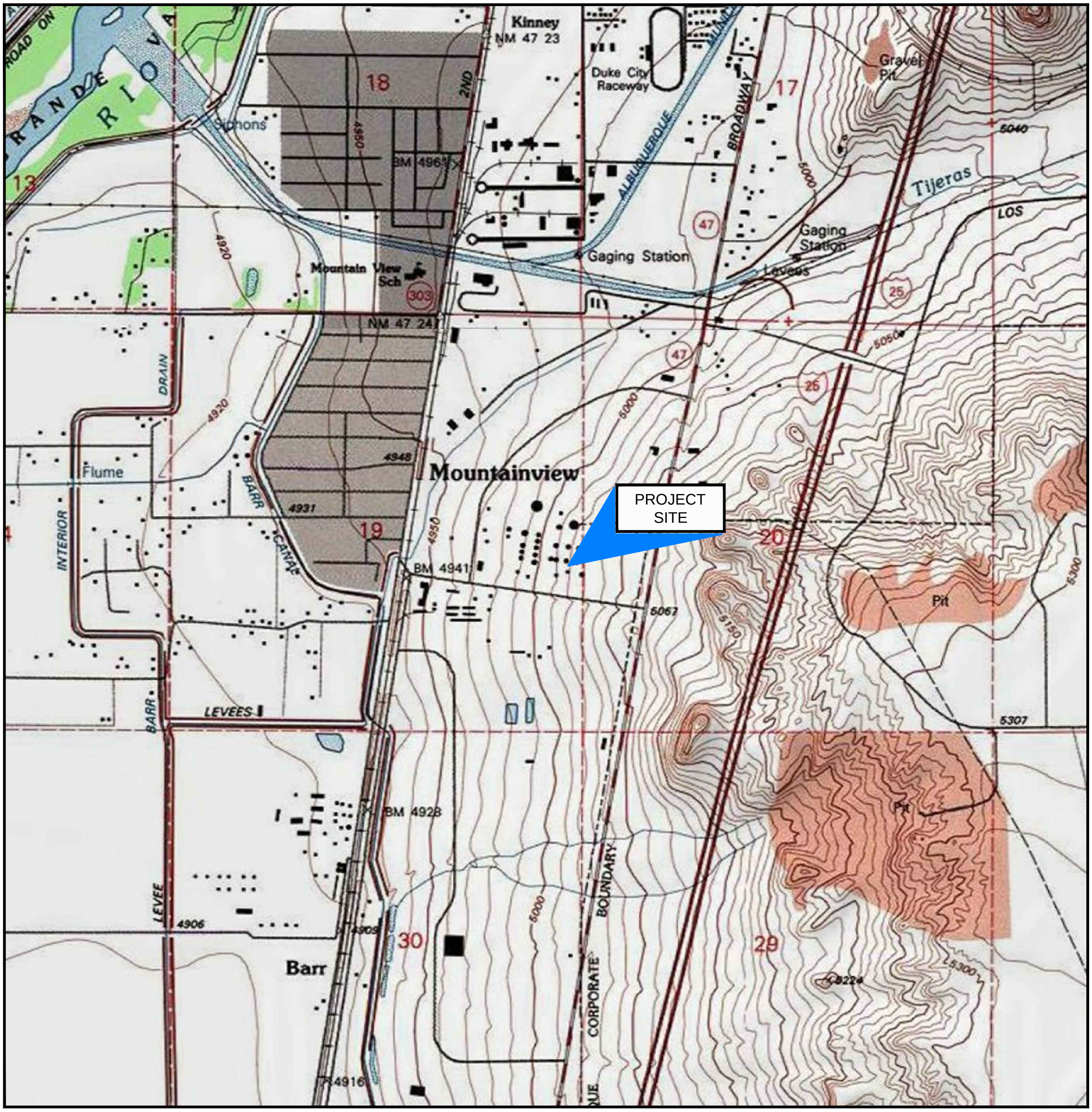
David Bonga, PE	Christina Ruby
Project Manager	Portfolio Manager

10. References

United States Environmental Protection Agency, 1998. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water, Office of Research and Development, Washington, DC, EPA/600/R 98/128, September.

Wang, Q., Yang, M., Song, X., Tang, S., Yu, L. 2019. Aerobic and Anaerobic Biodegradation of 1,2-Dibromoethane by a Microbial Consortium under Simulated Groundwater Conditions. Int. J. of Environ. Res. and Public Health, (16)3775-3790.

Figures



SOURCE: USGS 7.5 MINUTE QUAD
"ALBUQUERQUE AND ISLETA, NEW MEXICO"

0 1000 2000ft

Figure 1

SITE VICINITY MAP
6356 DESERT ROAD
ALBUQUERQUE, NEW MEXICO
Phillips 66 Company

USGS 2008 0.15M Res Aerial Photograph.

LEGEND

Monitoring Well

Abandoned Monitoring Well

Injection Well

Fence/Property Line

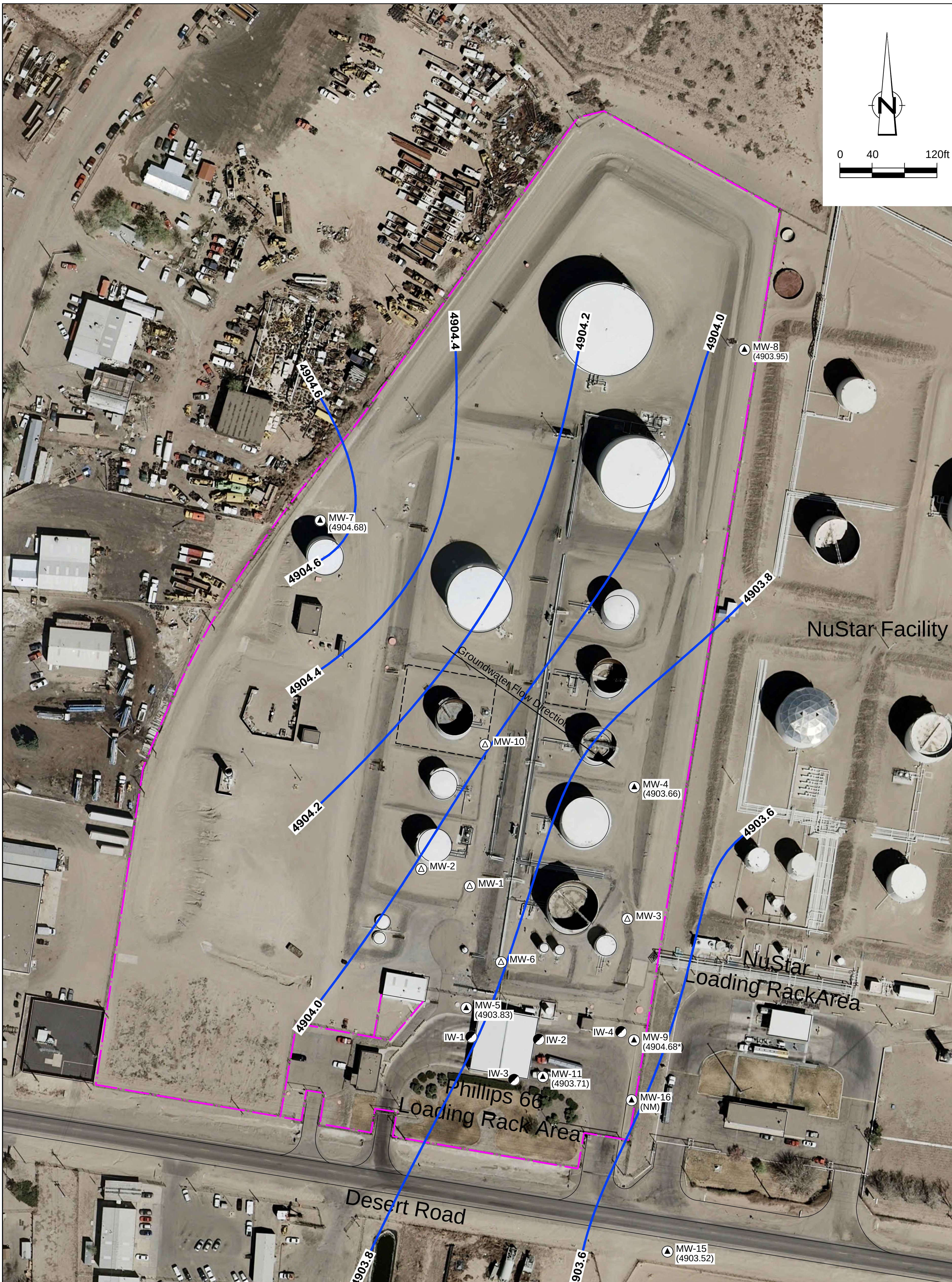
Approximate Foot Print of December 2009 AVGAS Releases

* Well Not Located on Site Property

Figure 2

SITE PLAN
6356 DESERT ROAD
ALBUQUERQUE, NEW MEXICO
Phillips 66 Company

I:\CAD\Files\Eight Digit Job Numbers\1119----\11197776-P66-Albuquerque Products T\11197776-00(002)\11197776-00(002)GN-DL002_Site Plan Jun 10, 2020



USGS 2008 0.15M Res Aerial Photograph.

LEGEND

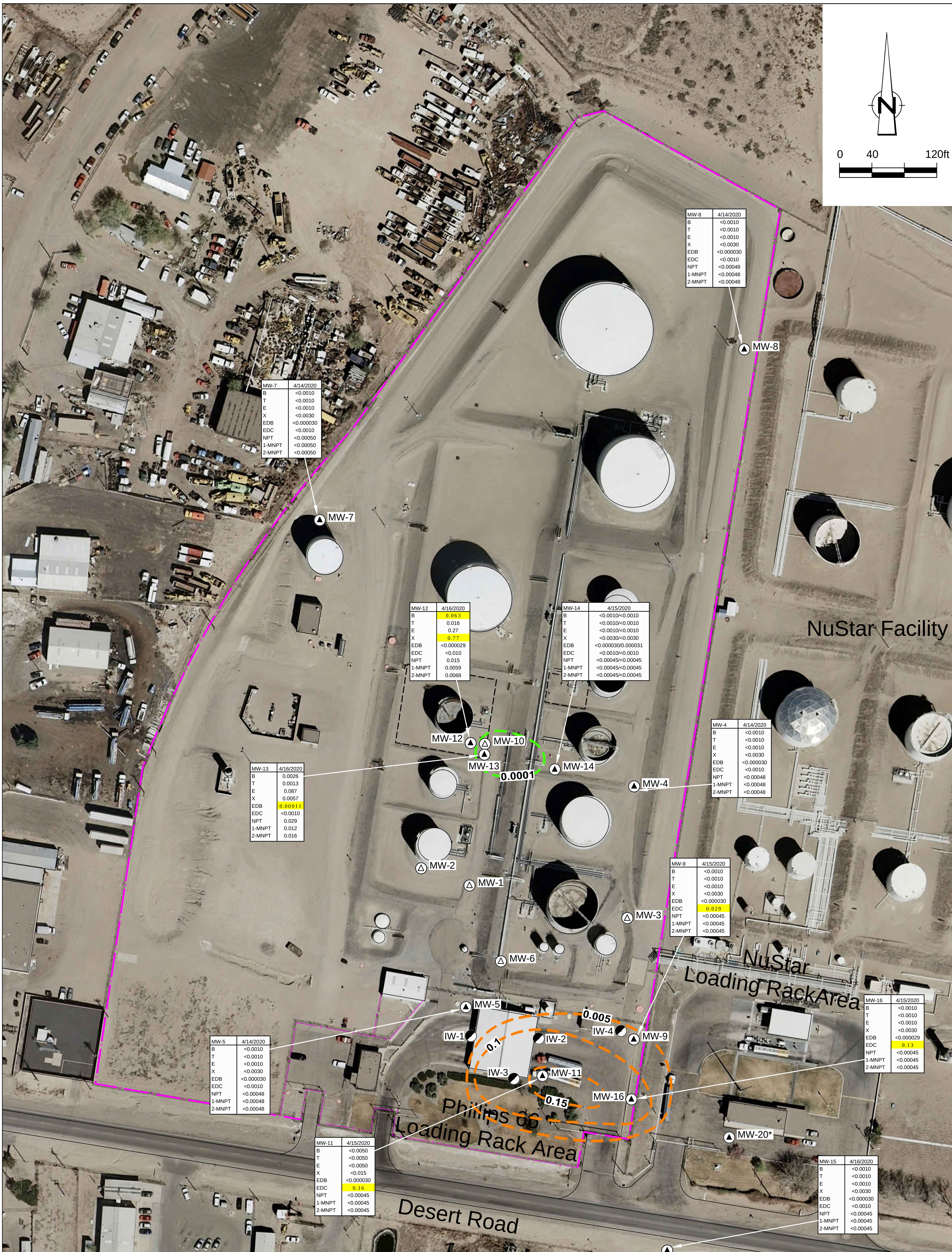
◬	Monitoring Well
◬	Abandoned Monitoring Well
◐	Injection Well
Fence/Property Line	
- - - - - - -	Approximate Footprint of December 2009 AVGAS releases
(4903.52)	Groundwater Elevation, Ft
4903.8	Groundwater Elevation Contour, Ft
◄——	Groundwater Flow Direction
(NM)	Not Measured
*	Not Used in Contouring

GHD

Figure 3

APRIL 2020 GROUNDWATER POTENTIOMETRIC SURFACE MAP
6356 DESERT ROAD
ALBUQUERQUE, NEW MEXICO
Phillips 66 Company

I:\CAD\Files\Eight Digit Job Numbers\1119----\11197776-P66-Albuquerque Products T\11197776-00(002)\11197776-00(002)GN-DL003_GW Potentiometric Surface Map Jun 10, 2020



USGS 2008 0.15M Res Aerial Photograph.

LEGEND

▲	Monitoring Well	**0.0076**	Groundwater Concentration, mg/L
△	Abandoned Monitoring Well	(orange line)	1,2 Dichloroethane Concentration Contour (mg/L)
◐	Injection Well	(green line)	1,2 Dibromoethane Concentration Contour (mg/L)
(magenta line)	Fence/Property Line	EDB	1,2 - Dibromoethane
(dashed line)	Approximate Footprint of December 2009 AVGAS Releases	EDC	1,2 - Dichloroethane
*	Well Not Located on Site Property	NPT	Naphthalene
ND	Not Detected	1-MNPT	1 - Methylnaphthalene
NA	Not Analyzed	2-MNPT	2 - Methynaphthalene

GHD

Figure 4

APRIL 2020
GROUNDWATER CONCENTRATION MAP
6356 DESERT ROAD
ALBUQUERQUE, NEW MEXICO
Phillips 66 Company

I:\CAD\Files\Eight Digit Job Numbers\1119----\11197776-P66-Albuquerque Products T\11197776-00(002)\11197776-00(002)GN-DL004_GW Concentration Map Jun 10, 2020

LEGEND

●	MONITORING WELL	0.0076	2012 GROUNDWATER CONCENTRATION, mg/L
● (grey)	ABANDONED MONITORING WELL	0.0076	2020 GROUNDWATER CONCENTRATION, mg/L
	INJECTION WELL	**0.0076**	2012 GROUNDWATER CONCENTRATION EXCEEDANCE, mg/L
—— x ——	FENCE/PROPERTY LINE	**0.0076**	2020 GROUNDWATER CONCENTRATION EXCEEDANCE, mg/L
- - - - -	APPROXIMATE FOOTPRINT OF DECEMBER 2009 AVGAS RELEASES	— — — (purple)	2012 1,2-DIBROMOETHANE CONCENTRATION CONTOUR (mg/L)
*	WELL NOT LOCATED ON SITE PROPERTY	— — — (green)	2020 1,2 DIBROMOETHANE CONCENTRATION CONTOUR (mg/L)
		<0.0005	NOT DETECTED AT THAT VALUE

0 60 120 ft

Coordinate System:
NEW MEXICO CENTRAL STATE PLANE
NAD83 FEET

N

GHD

PHILLIPS 66 COMPANY
6356 DESERT ROAD
ALBUQUERQUE, NEW MEXICO

CHANGES IN EDB
IMPACTED AREA OVER TIME

Project No. 11197776
Date June 2020

FIGURE 5

Filename: N:\US\Golden\Projects\562\11197776\Digital_Design\ACAD 2020\Figures\PRES001\11197776(PRES001)GN-WA001.DWG
Plot Date: 11 June 2020 9:43 AM

Data Source: USGS 2008 0.15M RES AERIAL PHOTOGRAPH.

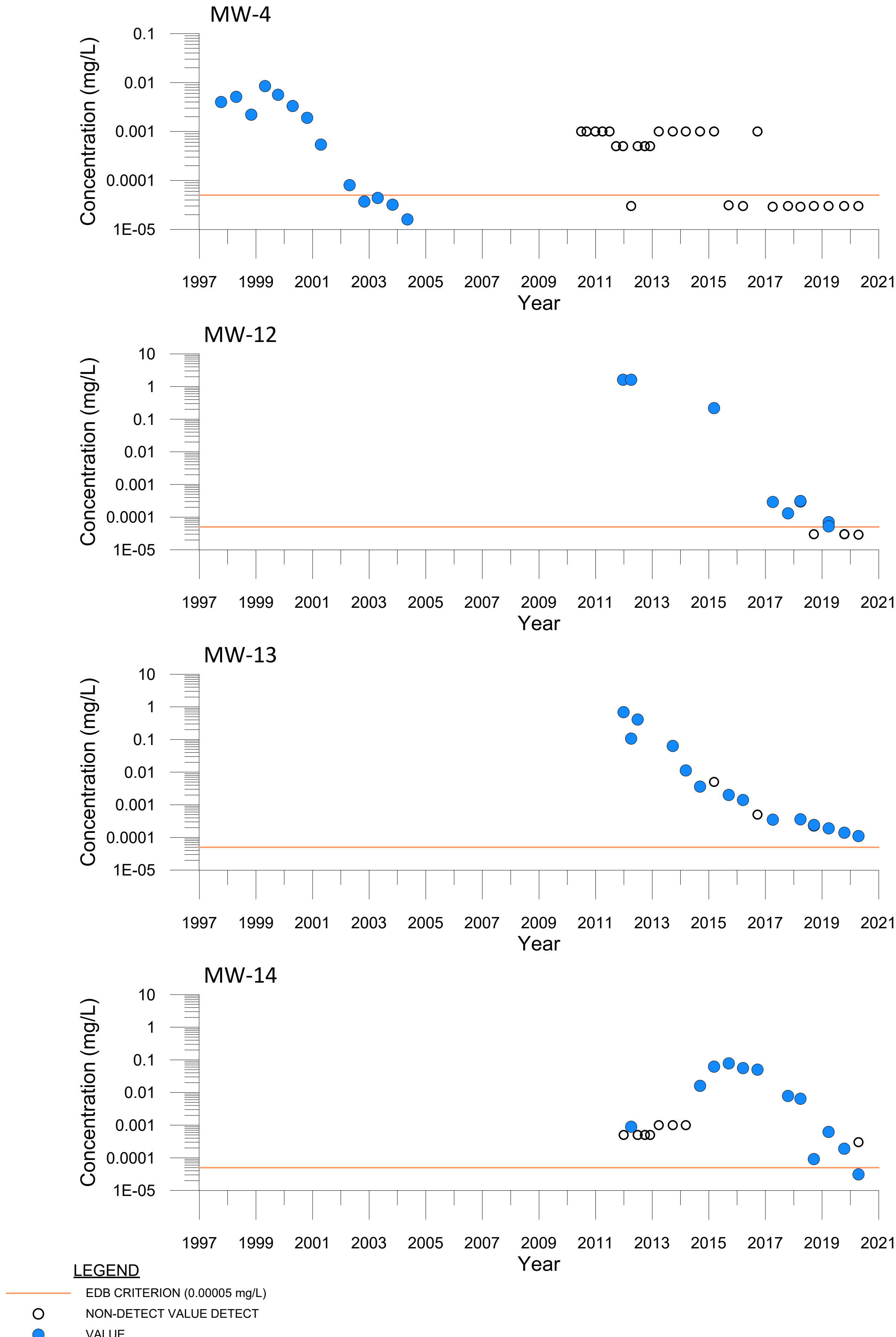


figure 6

CONCENTRATIONS OVER TIME - 1,2-DIBROMOETHANE
6356 DESERT ROAD
ALBUQUERQUE, NEW MEXICO
Philips 66 Company

Appendices

Appendix A
Public Notice

NOTICE FOR NEWSPAPER AD

This is to inform you that Phillips 66 Company (Phillips 66), located at 6356 Desert Road, Albuquerque, New Mexico, has submitted a Stage 2 Abatement Plan – Revision 1, pursuant to the New Mexico Water Quality Control Commission (NMWQCC) requirements for the treatment of groundwater, containing benzene, xylenes, 1, 2-dibromoethane (EDB), 1, 2-dichloroethane (EDC), and naphthalenes (petroleum products) in excess of the NMWQCC standards.

This contamination is found in the groundwater beneath and beyond the Phillips 66 boundaries as a result of past releases of transmix and aviation fuel. On October 18, 2019, NMED notified Phillips that it required a remediation proposal or Stage 2 Abatement Plan to further address the past releases.

The submitted Stage 2 Abatement Plan – Revision 1 proposal consists of: 1) pilot test injections of two in-situ chemical oxidation products to determine the most effective treatment product and the method of delivery, 2) full scale injections to treat the contamination, 3) long-term monitoring, and 4) monitored natural attenuation of the groundwater plumes.

The Secretary of the NMED will consider the proposed plan and comments received by the public in his decision to approve or notify Phillips 66 of the proposal's deficiency.

Persons interested in reviewing the Stage 2 Abatement Plan – Revision 1 proposal, and/or obtaining additional information, may do so by contacting the Department's Ground Water Quality Bureau office in Albuquerque (505-222-9522). A copy of the plan is available on the NMED web page at https://www.env.nm.gov/gwb/NMED-GWQB-PublicNotice.htm.

The Secretary of the NMED will accept written statements or comments regarding the proposed Stage 2 Abatement Plan as well as requests for a public meeting or hearing, with details regarding reasons why a meeting or hearing should be held, until May 5, 2020. Written statements, comments and/or requests for a public meeting or hearing must be submitted to:

> Paul Chamberlain, Project Manager Ground Water Quality Bureau
> New Mexico Environment Department 1190 S. Saint Francis Drive
> Santa Fe, NM 87505
> Paul.Chamberlain@state.nm.us

NMED maintains a Public Involvement Plan (PIP) to plan for providing public participation opportunities and information that may be needed for the community to participate in this process. PIPs may be viewed on-line at https://www.env.nm.gov/gwqb/public-involvement-plans/, or at the NMED field office in Albuquerque at 121 Tijeras Avenue, NE.

If you are a non-English speaker, do not speak English well, or if you have a disability, you may contact the NMED Contact to request assistance, an interpreter, or an auxiliary aid in order to learn more about the process, or to participate in activities associated with the process. Requested interpretation services and accommodations or services for persons with disabilities will be arranged to the extent possible. Telephone conversation assistance is available through Relay New Mexico at no charge for people who are deaf, hard of hearing, or have difficulty speaking on the phone, by calling 1-800-659-1779; TTY users: 1-800-659-8331; Spanish: 1-800-327-1857. NMED does not discriminate on the basis of race, color, national origin, disability, age or sex in the administration of its programs or activities, as required by applicable laws and regulations. NMED is responsible for coordination of compliance efforts and receipt of inquiries concerning non-discrimination requirements implemented by 40 C.F.R. Parts 5 and 7, including Title VI of the Civil Rights Act of 1964, as amended; Section 504 of the Rehabilitation Act of 1973; the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, and Section 13 of the Federal Water Pollution Control Act Amendments of 1972. If you have any questions about this notice or any of NMED's non- discrimination programs, policies or procedures, you may contact: Kristine Yurdin, Non-Discrimination Coordinator, New Mexico Environment Department, 1190 St. Francis Dr., Suite N4050, P.O. Box 5469, Santa Fe, NM 87502, (505) 827-2855, nd.coordinator@state.nm.us. If you believe that you have been discriminated against with respect to a NMED program or activity, you may contact the Non-Discrimination Coordinator identified above or visit our website at https://www.env.nm.gov/non-employee-discrimination-complaint-page/ to learn how and where to file a complaint of discrimination.

NMED mantiene un Plan de Participación Pública (PIP, por sus siglas en inglés) para cada acción de permiso para planificar la facilitación de oportunidades de participación del público e información que pueda ser necesaria para que la comunidad participe en el proceso. Los PIP se pueden ver en línea en https://www.env.nm.gov/gwqb/public-involvement-plans/, en la oficina local de NMED en Las Cruces encuentren a 121 Tijeras Avenue, NE.

Si usted no habla inglés, no habla bien inglés, o si tiene una discapacidad, puede comunicarse con el contacto de permisos de NMED para solicitar asistencia, un intérprete o un dispositivo auxiliar con el fin de aprender más sobre el proceso, o para participar en actividades asociadas con el proceso. Los servicios de interpretación solicitados y las acomodaciones o servicios para personas con discapacidades serán organizados en la medida de lo posible. Hay disponible asistencia para conversaciones telefónicas a través de Relay New Mexico de forma gratuita para las personas sordas, con problemas de audición o con dificultades para hablar por teléfono llamando al 1-800-659-1779; los usuarios de TTY: 1-800-659-8331; español: 1-800-327-1857.

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Control de Contaminación del Agua de 1972. Si usted tiene preguntas sobre este aviso o sobre cualquier programa, política o procedimiento de no discriminación de NMED, usted puede comunicarse con la Coordinadora de No Discriminación: Kristine Yurdin, Non-Discrimination Coordinator, New Mexico Environment Department, 1190 St. Francis Dr., Suite N4050, P.O. Box 5469, Santa Fe, NM 87502, (505) 827-2855, nd.coordinator@state.nm.us. Si usted piensa que ha sido discriminado/a con respecto a un programa o actividad de NMED, usted puede comunicarse con la Coordinadora de No Discriminación antes indicada o visitar nuestro sitio web en https://www.env.nm.gov/non-employee-discrimination-complaint-page/ para aprender cómo y dónde presentar una queja de discriminación.

PUBLIC NOTICE PSA FOR RADIO

GHD SERVICES, INC., ON BEHALF OF PHILLIPS 66 COMPANY, HAS PREPARED A PROPOSED STAGE 2 ABATEMENT PLAN – REVISION 1 FOR TREATMENT OF GROUNDWATER; CONTAINING, BENZENE XYLENES, 1,2 DIBROMOETHANE (EDB), 1,2-DICHLORETHANE (EDC), AND NAPHTHALENES IN EXCESS OF THE NEW MEXICO WATERQUALITY CONTROL COMMISSION (NMWQCC) STANDARDS. THE PHILLIPS 66 ALBUQUERQUE PRODUCTS TERMINAL IS LOCATED AT 6356 DESERT ROAD IN ALBUQUERQUE, NEW MEXICO.

QUESTIONS, COMMENTS OR REQUESTS FOR A PUBLIC HEARING ABOUT THE ABATEMENT PLAN MUST BE SUBMITTED IN WRITING BY MAY 5, 2020 WRITTEN STATEMENTS, COMMENTS AND/OR REQUESTS FOR A PUBLIC MEETING OR HEARING MUST BE SUBMITTED TO:

NEW MEXICO ENVIRONMENT DEPARTMENT GROUND WATER QUALITY BUREAU
1190 S. SAINT FRANCIS DRIVE
SANTA FE, NM 87505

COMMENTS CAN ALSO BE MADE BY CALLING PAUL CHAMBERLAIN AT 505-827-9669.

Dear Property Owner:

This is to inform you that Phillips 66 Company (Phillips 66), located at 6356 Desert Road, Albuquerque, New Mexico, has submitted a Stage 2 Abatement Plan – Revision 1, pursuant to the New Mexico Water Quality Control Commission (NMWQCC) requirements for the treatment of groundwater containing benzene, xylenes, 1, 2-dibromoethane (EDB), 1, 2-dichloroethane (EDC), and naphthalenes (petroleum products) in excess of the NMWQCC standards.

This contamination is found in the groundwater beneath and beyond the Phillips 66 boundaries as a result of past releases of transmix and aviation fuel. On October 18, 2019, NMED notified Phillips that it required a remediation proposal or Stage 2 Abatement Plan to further address the past releases.

The submitted Stage 2 Abatement Plan – Revision 1 proposal consists of: 1) pilot test injections of two in-situ chemical oxidation products to determine the most effective treatment product and the method of delivery, 2) full scale injections to treat the contamination, 3) long-term monitoring, and 4) monitored natural attenuation of the groundwater plumes.

The Secretary of the NMED will consider the proposed plan and comments received by the public in his decision to approve or notify Phillips 66 of the proposal's deficiency.

Persons interested in reviewing the Stage 2 Abatement Plan – Revision 1 proposal, and/or obtaining additional information, may do so by contacting the Department's Ground Water Quality Bureau office in Albuquerque (505-222-9522). A copy of the plan is available on the NMED web page at https://www.env.nm.gov/gwb/NMED-GWQB-PublicNotice.htm.

The Secretary of the NMED will accept written statements or comments regarding the proposed Stage 2 Abatement Plan – Revision 1 until May 5, 2020. Requests for a public meeting or hearing should include the reasons why the meeting or hearing should be held. Written statements, comments and/or requests for a public meeting or hearing must be submitted to:

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about

GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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