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GROUND WATER

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BUREAU

Ms. Candace Head-Dylla, President
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SUBJECT: RESPONSE TO MR. ABITZ REVIEW OF "STATISTICAL EVALUATION OF ALLUVIAL GROUNDWATER QUALITY UPGRADIENT OF THE HOMESTAKE MINING COMPANY URANIUM MILL SUPERFUND SITE NEAR GRANTS, NEW MEXICO: MOLYBDENUM, SELENIUM, URANIUM" DOCKET: 040-8903, LICENSE: SUA-1471

Dear Ms. Head-Dylla:

By letter dated November 10, 2009 (ML093240126), the New Mexico Environment Department (NMED) requested that the U.S. Nuclear Regulatory Commission (NRC) and the U.S. Environmental Protection Agency (EPA) review Mr. Richard Abitz's evaluation of a paper entitled, "Statistical Evaluation of Alluvial Groundwater Quality Upgradient of the Homestake Site Near Grants, New Mexico: Molybdenum, Selenium, Uranium" prepared by Environmental Restoration Group, Inc. (ERG), dated December 2001. Technical staffs from NRC, EPA and NMED have had a number of discussions regarding the conclusions in Mr. Abitz's paper. In January 2011, the agencies agreed that NRC was the appropriate agency to address Mr. Abitz's comments.

In his evaluation, Mr. Abitz concludes that ERG's report is invalid for the following five reasons:

1. The upgradient groundwater in the alluvial deposits has been contaminated by uranium mining waters discharged over decades of past underground operations; and this is the primary source of contamination, rather than the unsupported conclusion that natural outcrops of uranium ore provided a sufficient mass of contaminants to contribute to the observed elevated concentrations;
2. Upgradient wells placed in the alluvial aquifer have not been located using a valid statistical approach (e.g., systematic grid or random location on a grid);
3. There is no discussion of laboratory quality assurance practices to address the significant differences in analytical results between laboratories for samples collected on or near the same date;
4. Results from all laboratories for a given well were grouped together to perform the statistical calculations, yet sample splits analyzed by different labs on the same date show significantly different results, which precludes averaging the grouping together;

5. All near upgradient (or far upgradient) wells were grouped together to determine a single background value for the parameter of interest, yet samples from different wells show significantly different means (based on the t test for sample sets with a normal distribution), which precludes grouping the wells together.

NRC has reviewed Mr. Abitz's evaluation of the ERG report and acknowledges Mr. Abitz's concerns. Based on our review, NRC responds to Mr. Abitz's concerns as follows:

1. The established alluvial aquifer background values are not intended to be representative of pre-mining conditions. Rather, the background values established represent upgradient alluvial aquifer conditions, which have been un-impacted by operations conducted at the Homestake Mining Company (HMC) site. The origin of the upgradient conditions have not been definitively established but the origin is believed to include both natural and anthropogenic sources such as naturally released constituents from ore deposits upgradient of the site and the discharge of mine water effluent, respectively. Therefore, HMC cannot be held responsible for remediating the alluvial aquifer to constituent levels below the upgradient levels which are uninfluenced by HMC milling operations.
2. Using systematic grids to locate ground water monitoring wells assumes a homogeneous system (rare in nature) and ignores the physical properties of the system being monitored (i.e., areal extent of the area being monitored, flow regime, lithology of the formation, etc.). Given the size of the area being monitored and the number of existing upgradient monitoring wells, it was determined that the installation of additional upgradient wells would add little to the understanding of the ground water flow regime or to the nature and extent of the existing contamination due to the vast quantity of monitoring wells currently used for monitoring and characterization validation.
3. Differences in ground water quality results over time from the same well can be attributed to a number of physical factors including temporal differences in the release(s) of the contaminant and the dispersion of the contaminant following release. Significant differences in analytical results for split samples were also a concern for both the NRC and NMED. To counter this issue, HMC agreed to use a 10 year data set, which spanned from 1994 to 2004. This 10 year data set did not show significant differences between split samples and is considered to be representative of pre-milling conditions, which have been impacted by the release of natural and anthropogenic sources of constituents hydraulically upgradient of the HMC site.
4. The final alluvial background values were calculated from the 10 year data set, which eliminated sample data from multiple labs. The sampling results used for the 10 year data set were from a single laboratory, which consistently performed quality assurance checks to ensure the accuracy of the reported results. As mentioned in comment number 3, split samples did not show significant differences in results for the 10 year data set. Therefore, statistically averaging the split samples is considered acceptable.
5. Differences in contaminant concentrations between monitoring wells located hydraulically upgradient of the HMC site can be attributed to the natural heterogeneity within the alluvial aquifer resulting in a spatially variable constituent distribution. Since

the focus of the effort was revising existing background constituent levels for HMC's NRC-issued Materials License, it was determined that deriving single upgradient background levels for the contaminants of interest was consistent with the proposed amendment and HMC's down-gradient remedial efforts (i.e., one down-gradient remedial system) as opposed to determining separate background values for multiple wells. The use of multiple background values is typically used for detection monitoring programs to enable prompt indication of possible groundwater contamination. The use of this methodology would not be appropriate for the determination of background values, which will be used to set cleanup levels down-gradient of the background location.

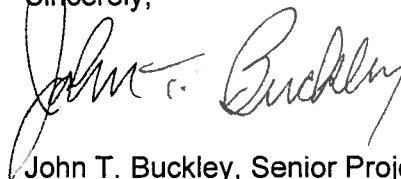
Furthermore, distribution analyses were performed on the individual data sets to determine the appropriate statistical methods. The results indicated that non-parametric (i.e. no assumed distribution) statistical methods were an ideal and scientifically acceptable approach due to the spatially variable conditions observed upgradient of the HMC site.

NRC acknowledges and understands Mr. Abitz's concerns. However, NRC disagrees with Mr. Abitz's conclusion that the ERG report is invalid and believes that existing data do not support re-opening the alluvial aquifer background values established in July 2006.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

If you have any questions regarding this letter, please contact John Buckley at (301) 415-6607 or by e-mail to john.buckley@nrc.gov.

Sincerely,



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Docket No.: 40-8903
License No.: SUA-1471

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Homestake Distribution List

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