EDO Principal Correspondence Control

FROM: DUE: / / EDO CONTROL: G20110334
DOC DT: 04/24/11
FINAL REPLY:

Candace Head-Dylla
Bluewater Valley Downstream Alliance

TO:

Chairman Jaczko,etal

FOR SIGNATURE OF : ** GRN ** CRC NO: 11-0270

DESC:

Homestake/Barrick Gold Uranium Mill Tailings
Superfund Site - Release Concerns
(EDATS: SECY-2011-0282)

ROUTING:

Borchardt
Weber
Virgilio
Ash
Muessle
OGC/GC
Collins, RIV
Brock, OEDO

DATE: 05/06/11

ASSIGNED TO: CONTACT:

FSME Moore

SPECIAL INSTRUCTIONS OR REMARKS:

For Appropriate Action.

Template: SECY-017

E-RIDS: SECY-01

EDATS

Electronic Document and Action Tracking System

EDATS Number: SECY-2011-0282 **Source:** SECY

General Information

Assigned To: FSME
OEDO Due Date: NONE
Other Assignees:
SECY Due Date: NONE
Subject: Homestake/Barrick Gold Uranium Mill Tailings Superfund Site - Release Concerns
Description:

CC Routing: RegionIV
ADAMS Accession Numbers - Incoming: NONE
Response/Package: NONE

Other Information

Cross Reference Number: G20110334, LTR-11-0270
Staff Initiated: NO
Related Task:
Recurring Item: NO
File Routing: EDATS
Agency Lesson Learned: NO
OEDO Monthly Report Item: NO

Process Information

Action Type: Appropriate Action
Priority: Medium
Sensitivity: None
Signature Level: No Signature Required
Urgency: NO
Approval Level: No Approval Required
OEDO Concurrence: NO
OCM Concurrence: NO
OCA Concurrence: NO
Special Instructions: For Appropriate Action.

Document Information

Originator Name: Candace Head-Dylla
Date of Incoming: 4/24/2011
Originating Organization: Bluewater Valley Downstream Alliance
Document Received by SECY Date: 5/6/2011
Addressee: Chairman Jaczko, et al.,
Date Response Requested by Originator: NONE
Incoming Task Received: Letter

OFFICE OF THE SECRETARY
CORRESPONDENCE CONTROL TICKET

Date Printed: May 05, 2011 16:09

PAPER NUMBER:	LTR-11-0270	**LOGGING DATE:**	05/05/2011
ACTION OFFICE:	EDO		
AUTHOR:	Candace Head-Dylla		
AFFILIATION:	NM		
ADDRESSEE:	Gregory Jaczko		
SUBJECT:	Concerns the problems as a a result of releases from the Homestake/Barrick site		
ACTION:	Appropriate		
DISTRIBUTION:	Chairman, Comrs		
LETTER DATE:	04/24/2011		
ACKNOWLEDGED	No		
SPECIAL HANDLING:			
NOTES:			
FILE LOCATION:	ADAMS		
DATE DUE:		**DATE SIGNED:**	

April 24, 2011

The Hon. Gregory B. Jaczko, Chairman
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Washington, DC 20555-0001

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Mr. Angelo Ortelli, Superfund Oversight
New Mexico Environment Department
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Dear Homestake/Barrick Gold Corporation Regulators:

The Bluewater Valley Downstream Alliance (BVDA) would like to thank the United States Environmental Protection Agency for their recent efforts on behalf of our community. Under Administrator Jackson's leadership, the Remedial System Evaluation was completed and a Risk Assessment is currently underway to

determine possible health effects currently associated with living near the Homestake/Barrick Gold Uranium Mill Tailings Superfund site.

After more than 30 years, this is the first time a federal regulatory agency has seriously considered the airborne health risks associated with living near this site. We hope Administrator Jackson will also relay our thanks to President Obama for moving this agency in this new direction.

Unfortunately, BVDA continues to have concerns about the future of our rural, economically depressed community. Our friends and family continue to suffer from health effects we believe are related to living next to this poorly managed site.

If the EPA were the lead regulator at this site, we might hold out some hope. Unfortunately the US Nuclear Regulatory Commission is the lead agency and the USNRC continues to work against the interests and health of our community.

We write to you today to address the latest examples of the USNRC failing to accurately or effectively address the problems facing our community as a result of releases from the Homestake/Barrick site. We will outline our concerns regarding the Remedial System Evaluation recently completed by the USEPA as well as the USNRC's response to our concerns about the inadequacy of proper sampling at the site.

Our comments were made possible by the USEPA's TAG grant program. We would like to thank Janetta Coats for her help with this grant, and the Southwest Research and Information Center for their technical assistance, which has enabled us to understand and respond to these complicated issues.

RSE concerns:

1. BVDA has received a March 24, 2011 letter regarding "Focused Review of Specific Recommendations, Addendum to the Remediation System Evaluation Homestake Mining Company Site Final Report (RSE Final Report)– December 2010" from Charles Faultry, Associate Director of US Environmental Protection Agency (EPA) Region VI, Superfund Remedial Branch to Keith McConnell, Deputy Director, Decommissioning and Uranium Recovery Licensing Directorate, US Nuclear Regulatory Commission (NRC)(EPA 2011, NRC ADAMS ML 110960220). The EPA letter to NRC provided comments and recommendations to NRC regarding the full range of recommendations provided in the RSE Final Report. The RSE Final Report does not appear to be posted on the NRC ADAMS as yet.

2. EPA 2011 and the RSE Final Report are posted on the New Mexico Environment Department Homestake Groundwater Bureau, Superfund oversight Section web page at http://www.nmenv.state.nm.us/gwb/NMED-GWQB-SOS-HomestakeMine.htm

3. EPA 2011 identified EPA recommendations regarding NRC consideration of RSE Final Report Recommendations in future licensing actions at the Homestake site.

   EPA 2011 included EPA's recommendations on four RSE recommendations related to the effectiveness of the monitoring of groundwater quality in the alluvial aquifer at the HMC site:
   - "simplification of the extraction and injection system and significantly reduce dilution as a component of the remedy" (RSE Recommendation #2);
   - "assess[ment of] leakage under the evaporation ponds." (RSE Recommendation #8);
   - "develop[ment of] a comprehensive, regular and objectives based monitoring program" (RSE Recommendation 15);
   - and "quantitative long-term monitoring optimization techniques" (RSE Recommendation 16).

4. EPA 2011 states in its discussion of RSE Recommendation 8 that, "EPA does acknowledge HMC's assertion that water levels and contaminant concentrations in the downgradient monitoring well is an indication of evidence of leakage, and currently there is no such evidence."

5. The monitoring well discussed is Monitoring Well X (MW-X), the sole alluvial aquifer monitoring well at the HMC site downgradient of the tailings piles and evaporation ponds.

6. The EPA 2011 Response to RSE Recommendation 8 regarding leak detection fails to recognize or acknowledge the influence of "dilution as a component of the remedy," as identified in RSE Recommendation 2 and the EPA Response to RSE Recommendation 2, on the low contaminant concentrations detected at MW-X as identified in the RSE Final Report.

7. The EPA 2011 Response reference to HMC's assertion that "water levels and contaminant concentrations in the downstream monitoring well is an indication of evidence of leakage" fails to acknowledge or address the extent of dilution demonstrated at the HMC site as indicated in RSE Final Report at p. 11, "Some wells that have shown declines may be impacted by nearby injection of relatively clean water, including well X. This would make it difficult for this well to detect leakage from the ponds."

8. The EPA 2011 response to RSE Recommendation 8 ignores the data that demonstrates the significant influence of dilution at MW-X, as summarized in the RSE Final Report at p. 11 in Figure 3. The significant influence of dilution on the downgradient monitoring well is the technical basis for determination that "the water levels and contaminant concentrations in the downstream

monitoring well" are NOT CAPABLE of indicating "evidence of leakage" because MW-X is "impacted by injection of relatively clean water.

9. To address this important deficiency, EPA 2011 should be revised to more accurately reflect the need for NRC to address the extensive dilution at the HMC in its future permitting activities related to the HMC site, as the demonstrated dilution affects existing compliance monitoring wells and prevents the installation of an effective, simplified, comprehensive groundwater monitoring network at the HMC site.

10. To address the impact of dilution on MW-X, the sole downgradient monitoring well at the HMC site, EPA should revise its response to the RSE Final Report to include a recommendation to NRC to require establishment of a downgradient monitoring well that is not impacted by injection as a fundamental element for the effective implementation of the following RSE recommendations: reducing dilution as a component of the remedy (Recommendation 2), effective monitoring of evaporation pond leakage (Recommendation 8), comprehensive and objectives based monitoring' (Recommendation 15) and quantitative long-term monitoring optimizations (Recommendation 16).

11. There should be further discussion of moving this tailing pile to a fully lined, secure site that can be controlled and monitored into perpetuity to provide relief to our community and ensure the future safety of this waste. The US Army Corps of Engineers did not take the slurry option into serious consideration and we request this option be revisited.

12. We cannot take seriously the USACE's suggestion that moving the tailings pile would pose risks to worker health. With the slurry option, this risk would be less than what the current site workers face and would eliminate future risk to worker health. In terms of greenhouse gasses associated with a conventional relocation, the USACE's argument seems flawed again. First, the slurry option removes most of those outputs. Also, other federal agencies are promoting renewed nuclear options and uranium mining. The greenhouse gasses associated with these activities far surpass those involved in moving the tailings pile. How can our federal agencies talk at such cross purposes? Finally, the tailing pile at Moab, Utah is being moved as we speak. Why is it good for Moab residents but not for our community?

Statistical Sampling of Background Concerns:

1. BVDA has received a March 7, 2011 letter from US Nuclear Regulatory Commission (NRC) staff titled, "Response to Mr. Abitz's review of "Statistical Evaluation of Alluvial Groundwater Quality Upgradient of the Homestake Mining Company (HMC) Uranium Mill Superfund Site near Grants, New

Mexico: Molybdenum, Selenium, Uranium Docket 040-8903, License SUA-1471." ("NRC 2011", NRC ADAMS Accession Number ML110400179).

2. NRC 2011 provides comments from NRC at the request of the New Mexico Environment Department (NMED) and US Environmental Protection Agency (EPA) regarding an April 2009 memo prepared by Richard Abitz, Ph. D., Technical Assistance contractor to BVDA at that time. The NRC letter concludes, "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."

3. Dr. Abitz's April 2009 Review of "Statistical Evaluation of Alluvial Groundwater Quality Upgradient of the Homestake Mining Company (HMC) Uranium Mill Superfund Site near Grants, New Mexico: Molybdenum, Selenium, Uranium Docket 040-8903, License SUA-1471" is not locatable in NRC's ADAMS Public Library and is enclosed herewith.

4. BVDA requested that Dr. Abitz prepare a response to NRC 2011. Dr. Abitz's March 18, 2011 "Reply to NRC response on Abitz critique of ERG's 'Statistical Evaluation of Alluvial Groundwater Quality Upgradient of the Homestake Site Near Grants, NM' and Recommended Actions" is also attached. This Reply addresses each of the "NRC Response" comments on the five issues raised in the Abitz 2009 Review of the "HMC Statistical Evaluation of Groundwater Quality."

5. Dr. Abitz's March 18, 2011 Reply to the NRC 2011 Response to Issue 1 in his April 2009 Review states:

"REPLY TO NRC RESPONSE

On page 1, first paragraph, of the ERG report, it is noted that a natural source of Mo, Se and U influences the natural background groundwater quality. There is no discussion of the upgradient background water quality being both natural and anthropogenic, as stated by the NRC.

RECOMMENDED ACTIONS

1a) Do not use the term natural background. Define groundwater upgradient of the Barrick site as a mixture of mine water effluent and natural infiltration.

1b) Estimate the volume of mine effluent discharged to the San Mateo alluvial system upgradient of the Barrick site and the concentrations of Mo, Se and U in the effluent.

1c) Estimate the annual volume of natural precipitation that infiltrates into the San Mateo alluvial system upgradient of the Barrick site.

1d) Perform a mass balance between the upgradient Mo, Se and U concentrations in groundwater and the Mo, Se and U source terms from mine effluent and natural ore outcrops."

6. Dr. Abitz's March 18, 2011 Reply to the NRC 2011 Response to Issue 2 in his April 2009 Review states,

"REPLY TO NRC RESPONSE
The NRC letter demonstrates a fundamental misunderstanding of the protocols to obtain representative samples from an area. A homogenous system could be sampled at any point in the system, and the sample point would be representative. It is precisely because of the variation in the physical properties of the system (i.e., heterogeneity) that a standard grid is needed to ensure spatial coverage of the area. There is no basis for the argument that additional upgradient wells would add little to the understanding of the system. In fact, wells on a grid will provide more information on the subsurface heterogeneity than a cluster of wells located in one small area (i.e. near upgradient wells). Additionally, to state the present number of upgradient monitoring wells corresponds to a 'vast quantity' is overly dramatic when there are only 9 near upgradient wells addressed in the report; and 5 of the 9 wells are within a circle of radius 750 feet (P, P1, P2, P3, P4).

RECOMMENDED ACTIONS
2a) Evaluate the drilling logs of upgradient wells to determine grain size distributions and the depth and length of the screens to assess preferential flow channels and whether groundwater samples are obtained from similar horizons.

2b) Place a uniform grid over Sections 23 and 24 to identify locations for additional monitoring wells (i.e., obtain uniform coverage) across the near upgradient area and sample the new wells for sediment distribution and groundwater quality to gain an understanding of the alluvial heterogeneity.

2c) Construct a fence diagram or develop a 3D-model to illustrate the sediment deposits and preferential flow paths in the alluvial deposits.

2d) Re-evaluate upgradient water quality using the new wells and proper statistical protocols."

7. Dr. Abitz's March 18, 2011 Reply to the NRC 2011 Response to Issue 3 in his April 2009 Review states,

"REPLY TO NRC RESPONSE
The first sentence of the NRC response does not address Issue 3. Issue 3 is not about temporal variation of groundwater ions: it is about differences in

analytical results between laboratories for samples collected on or near the same date. There are significant differences between the analytical results reported in the ERG report, which covers the period 1976 to 1998. Prior to performing the statistical analysis, samples from the same date from different laboratories were simply added together and averaged. This violates statistical protocol unless it can be shown that the data sets from the individual laboratories are similar. As noted in the original Abitz critique:

"Statistical tests were not performed to compare results from independent laboratories prior to grouping the data. Using the duplicate results for Homestake and NMEID for Well DD (14 samples each), the two data sets were found to follow a normal distribution (Shapiro-Wilks Test). Therefore, a t-test group comparison (unequal variances) was performed and the results indicate a significant difference between the two data sets at the 95 percent confidence level. As expected from the analysis in the preceding section on laboratory QA/QC, there is no statistical justification to combine and average the split sample results or different sampling round results from two laboratories."

Based on the NRC statement that HMC agreed to use a 10-year data set from 1994 to 2004, it is apparent that an additional statistical study has been performed, which has not been reviewed by Abitz. However, if such a report exists, it has no bearing on the original issue raised on the 1976 to 1998 data sets in the ERG report.

RECOMMENDED ACTIONS
3a) Reject the statistical results in the 1999 ERG report for lack of data on laboratory QA/QC and invalid data manipulation prior to performing the statistical analysis.

3b) Obtain the statistical study on the 1994-2004 data set that is referenced by NRC and perform an independent analysis of the data and results."

8. Dr. Abitz's March 18, 2011 Reply to the NRC 2011 Response to Issue 4 in his April 2009 Review states

"REPLY TO NRC RESPONSE
As noted in the response to the NRC response on Issue 3, the 10-year data set referenced by NRC is not the same as the data set in the ERG report (1976 to 1998). Therefore, the NRC response does not address the concern raised in Issue 4.

RECOMMENDED ACTIONS
Same as 3a and 3b."

9. Dr. Abitz's March 18, 2011 Reply to the NRC 2011 Response to Issue 5 in his April 2009 Review states

"RESPONSE TO NRC RESPONSE
Again, the first sentence in the NRC response indicates a fundamental misunderstanding of statistical methods applied to groundwater monitoring. It is precisely because of heterogeneity that the data sets from individual wells must be evaluated to determine if the data from multiple wells can be grouped together. Because it is known that anthropogenic contamination exists in the alluvial aquifer, it is expected that there will be significant differences in the data sets from individual wells, as preferential flow paths are likely to exist in the alluvial deposits.

The use of nonparametric methods should be limited to those data sets that do not follow normal or lognormal distributions. Clearly, parametric methods are applicable to individual wells, but not all wells when the data are grouped. Contrary to the NRC statement that NRC determined that grouping the wells was appropriate (there was no justification for this decision), using nonparametric methods on a grouping of wells to avoid parametric analysis of individual well data sets is not standard industry practice for groundwater monitoring programs.

NRC states that multiple background values (presumably from individual wells) are used to enable prompt indication of possible groundwater contamination, yet this methodology is not appropriate when setting down-gradient background values. These statements present a confusing and conflicting picture with respect to the heterogeneity of the alluvial deposits and groundwater monitoring objectives. The objective should be to understand the preferential upgradient flow paths via grain-size analysis and monitoring of contamination trends at individual wells.

The NRC closing statement on Issue 5 notes that distribution analyses were performed on individual data sets. This is not the case in the ERG report. Data from all laboratories were grouped together for near upgradient wells, far upgradient wells and both groups prior to the statistical analysis. This is an invalid approach, as described in the Abitz critique:

"Statistical tests to compare the near upgradient and far upgradient well sets were performed (page 2, paragraph 5 of the ERG report), but the authors should have performed a comparison of individual wells within each set to determine if the individual wells could be grouped together for statistical analysis. A preliminary nonparametric analysis of uranium concentrations for the near upgradient wells (DD, ND, P, P1, P2, Q and R) indicates that all wells cannot be grouped into a single population. The Kruskal-Wallis Rank Test (EPA, 1992) indicates 4 distinct groups of wells (R&P2, P1&Q, P&ND, and DD). Therefore, the conclusions in Section 5 of

the report are invalid, and uranium levels in individual wells must be assessed to determine if they represent pre-mining background.

The statistical demonstration of distinct populations for the uranium concentration measured in near upgradient wells implies that the contamination from upstream discharges is following preferential flow paths, and the uranium concentration in the wells is dependent on the location of the well with respect to plume migration. Well R is the least impacted by the contamination, and a comparison of all water-quality data from this well should be made to earlier water-quality studies that investigated wells in the subdivisions SW of the HMC tailing piles. For example, the USEPA Office of Radiation Programs evaluated pre-mining data to determine a value of 7.7 pCi/L for uranium-238 (see Table 5 in EPA, 1975), which is equivalent to 0.023 mg/L natural uranium, in the alluvial aquifer below the subdivisions. This compares well with a uranium median value of 0.018 mg/L (Energy Laboratory, Table 1) for Well R."

Recommended actions on the Sampling Issue
Same as 3a and 3b."

10. BVDA recommends that NRC, NMED and EPA review the attached "Reply to the NRC Response" as soon as possible and take action to implement the recommendations provided in the Reply.

We are attaching the relevant documents and plead here for some relief from what is clearly continued disregard of our community by the USNRC.

Many of us are ill now. As a result of living near this Superfund site, most of us suffer severe psychological stress from worrying about our health and the future health of our children, grandchildren, and, now, great grandchildren. We want our Federal government to force this multi-billion dollar company to live up to its responsibility. We want the EPA to commit even more fully to this project. We want the USNRC to start advocating for our community rather than Homestake/Barrick Gold, a well-financed corporation that could solve this toxic waste problem if it committed the resources.

Sincerely,

Candace Head-Dylla, President
Bluewater Valley Downstream Alliance
6 Ridgerunner Rd.
Grants, NM 87020

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505-401-4349

Enclosures: Abitz response to NRC; Latest Barrick Gold Acquisition

MEMO

Reply to NRC response on Abitz critique of ERG's 'Statistical Evaluation of Alluvial Groundwater Quality Upgradient of the Homestake Site Near Grants, NM' and Recommended Actions

Prepared on Behalf of
Bluewater Valley Downstream Alliance

Richard Abitz, Ph. D.
March 18, 2011

In April 2009, a review of "Statistical Evaluation of Alluvial Groundwater Quality Upgradient of the Homestake Site Near Grants, New Mexico: Molybdenum, Selenium, Uranium" ("HMC Statistical Evaluation of Alluvial Groundwater Quality") was provided to the Nuclear Regulatory Commission (NRC), New Mexico Environment Department (NMED), and the United States Environmental Protection Agency (EPA) on behalf of the Bluewater Valley Downstream Alliance (BVDA). The Abitz 2009 Review is attached to this memo.

On March 7, 2011, NRC provided BVDA a response to the April 2009 Review of the HMC Statistical Evaluation of Alluvial Groundwater Quality" ("NRC Response") [Letter - John Buckley NRC to Candace Head-Dylla BVDA, March 7, 2011 (NRC ADAMS ML110400179]. This memo addresses each of the issues raised in the NRC Letter to BVDA and provide recommendations regarding future investigations to address issues.

Abitz 2009 Issue 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.

NRC response to Abitz [Letter - John Buckley NRC to Candace Head-Dylla BVDA, March 7, 2011 (NRC ADAMS ML110400179]:

> 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) ste. The origin of the upgradient conditions have not been definitively established but the origin is believed to include both natural and anthopogenic 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.

Reply to NRC response

On page 1, first paragraph, of the ERG report, it is noted that a natural source of Mo, Se and U influence the natural background groundwater quality. There is no discussion of the upgradient background water quality being both natural and anthropogenic, as stated by the NRC.

RECOMMENDED ACTIONS

1a) Do not use the term natural background. Define groundwater upgradient of the Barrick site as a mixture of mine water effluent and natural infiltration.

1b) Estimate the volume of mine effluent discharged to the San Mateo alluvial system upgradient of the Barrick site and the concentrations of Mo, Se and U in the effluent.

1c) Estimate the annual volume of natural precipitation that infiltrates into the San Mateo alluvial system upgradient of the Barrick site.

1d) Perform a mass balance between the upgradient Mo, Se and U concentrations in groundwater and the Mo, Se and U source terms from mine effluent and natural ore outcrops.

Abitz 2009 Issue 2: Upgradient wells placed in the alluvial aquifer have not been located using a valid statistical approach (e.g., systematic grid or random locations on a grid).

NRC Response:

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.

Reply to NRC response:

The NRC letter demonstrates a fundamental misunderstanding of the protocols to obtain representative samples from an area. A homogenous system could be sampled at any point in the system, and the sample point would be representative. It is precisely because of the variation in the physical properties of the system (i.e., heterogeneity) that a standard grid is needed to ensure spatial coverage of the area. There is no basis for the argument that additional upgradient wells would add little to the understanding of the system. In fact, wells on a grid will provide more information on the subsurface

heterogeneity than a cluster of wells located in one small area (i.e. near upgradient wells). Additionally, to state the present number of upgradient monitoring wells corresponds to a 'vast quantity' is overly dramatic when there are only 9 near upgradient wells addressed in the report; and 5 of the 9 wells are within a circle of radius 750 feet (P, P1, P2, P3, P4).

RECOMMENDED ACTIONS

2a) Evaluate the drilling logs of upgradient wells to determine grain size distributions and the depth and length of the screens to assess preferential flow channels and whether groundwater samples are obtained from similar horizons.

2b) Place a uniform grid over Sections 23 and 24 to identify locations for additional monitoring wells (i.e., obtain uniform coverage) across the near upgradient area and sample the new wells for sediment distribution and groundwater quality to gain an understanding of the alluvial heterogeneity.

2c) Construct a fence diagram or develop a 3D-model to illustrate the sediment deposits and preferential flow paths in the alluvial deposits.

2d) Re-evaluate upgradient water quality using the new wells and proper statistical protocols.

Abitz 2009 Issue 3: There is no discussion of laboratory quality control and quality assurance practices to address the significant differences in analytical results between laboratories for samples collected on or near the same date.

NRC Response:

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.

Reply to NRC response:

The first sentence of the NRC response does not address Issue 3. Issue 3 is not about temporal variation of groundwater ions: it is about differences in analytical results between laboratories for samples collected on or near the same date. There are significant differences between the analytical results reported in the ERG report, which covers the period 1976 to 1998. Prior to performing the statistical analysis, samples from

the same date from different laboratories were simply added together and averaged. This violates statistical protocol unless it can be shown that the data sets from the individual laboratories are similar. As noted in the original Abitz critique:

> "Statistical tests were not performed to compare results from independent laboratories prior to grouping the data. Using the duplicate results for Homestake and NMEID for Well DD (14 samples each), the two data sets were found to follow a normal distribution (Shapiro-Wilks Test). Therefore, a t-test group comparison (unequal variances) was performed and the results indicate a significant difference between the two data sets at the 95 percent confidence level. As expected from the analysis in the preceding section on laboratory QA/QC, there is no statistical justification to combine and average the split sample results or different sampling round results from two laboratories."

Based on the NRC statement that HMC agreed to use a 10-year data set from 1994 to 2004, it is apparent that an additional statistical study has been performed, which has not been reviewed by Abitz. However, if such a report exists, it has no bearing on the original issue raised on the 1976 to 1998 data sets in the ERG report.

RECOMMENDED ACTIONS

3a) Reject the statistical results in the 1999 ERG report for lack of data on laboratory QA/QC and invalid data manipulation prior to performing the statistical analysis.

3b) Obtain the statistical study on the 1994-2004 data set that is referenced by NRC and perform an independent analysis of the data and results.

Abitz 2009 Issue 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 combining the labs to obtain an average.

NRC response:

> 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.

Reply to NRC response:

As noted in the response to the NRC response on Issue 3, the 10-year data set referenced by NRC is not the same as the data set in the ERG report (1976 to 1998). Therefore, the NRC response does not address the concern raised in Issue 4.

RECOMMENDED ACTIONS

Same as 3a and 3b.

Abitz 2009 Issue 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 response:

> 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.

Response to NRC response:

Again, the first sentence in the NRC response indicates a fundamental misunderstanding of statistical methods applied to groundwater monitoring. It is precisely because of heterogeneity that the data sets from individual wells must be evaluated to determine if the data from multiple wells can be grouped together. Because it is known that anthropogenic contamination exists in the alluvial aquifer, it is expected that there will be significant differences in the data sets from individual wells, as preferential flow paths are likely to exist in the alluvial deposits.

The use of nonparametric methods should be limited to those data sets that do not follow normal or lognormal distributions. Clearly, parametric methods are applicable to individual wells, but not all wells when the data are grouped. Contrary to the NRC statement that NRC determined that grouping the wells was appropriate (there was no justification for this decision), using nonparametric methods on a grouping of wells to

avoid parametric analysis of individual well data sets is not standard industry practice for groundwater monitoring programs.

NRC states that multiple background values (presumably from individual wells) are used to enable prompt indication of possible groundwater contamination, yet this methodology is not appropriate when setting down-gradient background values. These statements present a confusing and conflicting picture with respect to the heterogeneity of the alluvial deposits and groundwater monitoring objectives. The objective should be to understand the preferential upgradient flow paths via grain-size analysis and monitoring of contamination trends at individual wells.

The NRC closing statement on Issue 5 notes that distribution analyses were performed on individual data sets. This is not the case in the ERG report. Data from all laboratories were grouped together for near upgradient wells, far upgradient wells and both groups prior to the statistical analysis. This is an invalid approach, as described in the Abitz critique:

> "Statistical tests to compare the near upgradient and far upgradient well sets were performed (page 2, paragraph 5 of the ERG report), but the authors should have performed a comparison of individual wells within each set to determine if the individual wells could be grouped together for statistical analysis. A preliminary nonparametric analysis of uranium concentrations for the near upgradient wells (DD, ND, P, P1, P2, Q and R) indicates that all wells cannot be grouped into a single population. The Kruskal-Wallis Rank Test (EPA, 1992) indicates 4 distinct groups of wells (R&P2, P1&Q, P&ND, and DD). Therefore, the conclusions in Section 5 of the report are invalid, and uranium levels in individual wells must be assessed to determine if they represent pre-mining background.
>
> The statistical demonstration of distinct populations for the uranium concentration measured in near upgradient wells implies that the contamination from upstream discharges is following preferential flow paths, and the uranium concentration in the wells is dependent on the location of the well with respect to plume migration. Well R is the least impacted by the contamination, and a comparison of all water-quality data from this well should be made to earlier water-quality studies that investigated wells in the subdivisions SW of the HMC tailing piles. For example, the USEPA Office of Radiation Programs evaluated pre-mining data to determine a value of 7.7 pCi/L for uranium-238 (see Table 5 in EPA, 1975), which is equivalent to 0.023 mg/L natural uranium, in the alluvial aquifer below the subdivisions. This compares well with a uranium median value of 0.018 mg/L (Energy Laboratory, Table 1) for Well R."

RECOMMENDED ACTIONS

Same as 3a and 3b.

Barrick bids $7.68 billion for Equinox, tops Minmetals

NEW YORK/TORONTO | Mon Apr 25, 2011 11:35am EDT
(Reuters) - Barrick Gold Corp (ABX.TO) (ABX.N) has agreed to buy Equinox Minerals (EQN.TO) (EQN.AX) for about C$7.3 billion ($7.68 billion), topping a bid from China's Minmetals Resources (1208.HK) in a big bet on soaring copper demand.

Already the world's largest gold miner, Barrick will double its position in copper with the acquisition. Prices for the industrial metal have risen more than sevenfold in the past eight years as supplies lag the growing needs of China and other developing economies.

Equinox, an Australian company listed in Toronto and Sydney, owns the Lumwana copper mine in the rich Zambian copper belt. It also owns most of the Jabal Sayid project in Saudi Arabia.

Toronto-based Barrick said on Monday it offered to buy Equinox for C$8.15 a share, an 8.7 percent premium over the company's Thursday closing price. Barrick said the deal was worth about C$7.3 billion, including warrants and options.

The all-cash bid is 16 percent higher than one from Minmetals, the Chinese metals powerhouse that made a bold, C$6.3 billion offer on April 3, underscoring the global race for resources.

Equinox called the C$7-a-share offer from Minmetals a low-ball bid and said on Monday it believes the Barrick bid is superior in terms of price and likelihood of completion.

Equinox shares jumped nearly 12 percent in Toronto,

suggesting
investors are expecting a counter-bid from the Chinese company.

"I suspect that there is room on the upside for this, and the stock is
trading at a premium to the bid," said John Ing, analyst at Maison
Placements in Toronto.

"In a world where commodities are trading at ever new highs, and
you're looking at this project and the cash flow generated, the
reality is today's prices may well be cheap in tomorrow's world," Ing
said, referring to Equinox's Zambian project.

Barrick said its agreement for Equinox prevents the Australian miner
from soliciting superior bids and gives Barrick the right to match any
higher offers. Equinox would have to pay Barrick C$250 million to walk
away from the deal, even if it accepts a higher bid.

Barrick Chief Executive Aaron Regent described the takeover bid as an
opportunity to gain access to the rich Zambian copper belt at a time
when copper prices are seen continuing their upward trajectory from
already record levels.

Equinox's Lumwana copper and uranium mine is Africa's third-largest
copper mine by production and the Jabal Sayid copper development is
due to start production next year.

"The acquisition of Equinox is expected to double our current
production to around 600 million pounds, which would increase to over
700 million pounds with the expected completion of Jabal Sayid in late
2012," Regent told analysts on a conference call.

Barrick already owns the Zaldivar copper mine in northern Chile, the No. 1 copper producing country, so the acquisition of Equinox would provide it with access to two of the most prolific copper-producing regions of the world.

"Directionally, I would say that most of the long-term copper price assumptions that are being used right now are understating what's going to happen," Regent said, declining to reveal his company's copper price forecast.

As part of the Barrick agreement, Equinox will pull its unsolicited bid for Lundin Mining (LUN.TO). Equinox had been trying to take over the rival copper miner since February but conceded on Monday that its own shareholders would not likely have supported the deal.

U.S.-listed shares of Barrick slid 5.4 percent to $50.28 after the announcement.

Barrick said it has committed cash and financing in place for the transaction. It expects the deal to add to earnings per share and cash flow immediately.

Morgan Stanley and RBC Capital Markets advised Barrick on the deal, while CIBC World Markets, Goldman Sachs and TD Securities acted as financial advisers to Equinox.

(Additional reporting by Michael Erman and Julie Gordon; Editing by Frank McGurty)