



Grants Office

Alan D. Cox
Project Manager

29 January 2013

Mr. Kurt Volbrecht
Groundwater Quality Bureau
New Mexico Environment Department
1190 S. Saint Francis Drive
Santa Fe, NM 87505-4173

Re: Response to letter dated December 10, 2012 for TPP pilot testing

Dear Mr. Volbrecht:

Homestake appreciates that the Bureau has granted approval for Phase 1 (tracer testing) of the in-situ triphosphate (TPP) pilot testing in the alluvial aquifer, within the hydraulic barrier (control area) of the Grants reclamation project site. As part of the conditions related to approval of Phase 2 (TPP testing), the Bureau requested additional information, provided herein.

As discussed on January 17, 2013, we request that temporary approval be granted at this time to move forward with Phase 2 (after the results of Phase 1 are shared with the Bureau) so that we can determine whether in-situ TPP will be a viable option for groundwater treatment as part of the overall site strategy moving forward. As discussed, alternatives to the existing land treatment strategy are required for the Grants site, as this program (land treatment) will be limited in the future. The small scale testing that we propose during Phase 2 of the TPP test will provide critical information in determining the suitability of this approach as a potential replacement for existing strategies. Note that in-situ treatment will not generate above ground waste material, and if shown to be effective and permanent, will represent a viable alternate groundwater treatment approach for the project. As described in the work plan, it is critical at this stage that the following be evaluated during the Phase 2 testing:

- Injection of TPP, distribution in groundwater within a specified radius of influence (ROI) around the injection well, and residence time within the ROI;
- Residual treatment capacity for uranium in groundwater flowing into the test area (i.e., at Pilot Test Area S);
- Long-term stability of precipitated uranium phosphate minerals (i.e., at Pilot Test Area X); and
- Potential secondary geochemical and hydrogeological effects (e.g., mobilization or immobilization of other constituents, reduction in aquifer permeability).

Response to NMED Comments

NMED Comment: HMC must submit a contingency plan, which defines the limits of continued test operation that will be protective of human health and the environment as well as possible actions to address unexpected results that are not protective.

HMC Response: Testing completed to date, including bench testing, and pilot testing in the LTP (as described in Appendices A and B to the TPP alluvial pilot testing work plan dated December 3, 2012) indicate that secondary groundwater effects of phosphate injection are not expected to be significant and are expected to attenuate within the pilot test area. Extensive groundwater monitoring will be performed during the pilot tests. Details of groundwater monitoring and contingency actions to be taken, in the event that secondary groundwater effects exceed thresholds during operation of the pilot tests, are provided in Attachment 1 to this letter.

Note that due to the limited quantity of TPP to be injected in the pilot tests (a maximum expected ROI from the injection wells of approximately 15 feet, and maximum volume injected about 20,000 to 40,000 gallons) any potential effects of the pilot test will remain within the hydraulic barrier, and will therefore be captured by the existing extraction well network, which is planned to be operated for seven more years. Calcium is not expected to be a concern relative to secondary groundwater effects (calcium will attenuate through ion exchange with the aquifer soil), however this will be monitored as part of the routine monitoring program for the pilot. Molybdenum and selenium concentrations in the control area have fluctuated over a wide range over the past 15 years, and as such we expect concentrations to continue to fluctuate during the pilot test. Groundwater monitoring prior to the start of the pilot will provide a baseline concentration for each of these elements. Concentrations of selenium have averaged 0.12 mg/L in Pilot Test Area S and 0.35 mg/L in Pilot Test Area X with up to 3x this concentration noted over time. Molybdenum is currently below about 1 mg/L in both the S and X area, with a variation up to 4x this concentration over time. Molybdenum and selenium concentrations will therefore be included in the analytical suite and monitored during the course of the pilot test.

As discussed above, if contingency actions are necessary, these will be implemented immediately upon receipt of analytical data and all injections will stop (select analytes discussed in Attachment 1 will be submitted to lab with for a quick turnaround analysis), and monitoring will be performed until limits are achieved. A report will be provided to NMED if contingency action is needed.

NMED Comment: HMC should obtain an independent analysis of TPP and calcium amendment metals content to be used for injection, which would include arsenic as an analyte.

HMC Response: The TPP and calcium manufacturers provide chemical assays for these reagents. In addition, baseline monitoring will be performed prior to the start of the phosphate injection; as part of this monitoring, the injection solutions will also be sampled and analyzed for parameters shown in Table 6 of the work plan and will include arsenic as shown in the parameter list.

NMED Comment: Please add chloride and arsenic to the list of analytes for ground water monitoring.

HMC Response: Table 6 provides a list of analytes that will be monitored at the frequency shown in Table 9 of the work plan. HMC will add chloride and arsenic to the list of analytes.

Proposed Schedule

In addition to the above information, Homestake provides a schedule of activities planned as part of this pilot test (Attachment 2). As shown, Homestake anticipates starting Phase 1 on March 11, 2013, with completion of the tracer test on April 26, 2013; followed by the start of Phase 2 on May 27, 2013 with the injection period completed by May 31, 2013. Performance monitoring to evaluate uranium treatment efficacy, continued treatment of uranium flux into the test area (for Pilot Test Area S), and potential rebound of precipitated uranium (specifically at Pilot Test Area X) will continue for 6 months, with completion of the pilot test scheduled for late November or early December 2013. Plans for information exchanges with NMED are also provided in Attachment 2. Note that information about the efficacy of the in situ treatment test will be available early on in the performance monitoring phase.

Thank you for your time and attention on this matter. We look forward to your review, and as described above, our goal is to initiate the pilot tests during the first quarter of 2013 and complete this testing in 2013. Please let us know if you have any questions with respect to this letter; I can be reached by phone at (505) 287-4456 or via cell at (505) 400-2794.

Sincerely yours,



HOMESTAKE MINING COMPANY
OF CALIFORNIA

Alan D. Cox – Project Manager

CC: J. Buckley – NRC (via e-mail)
S. Appaji – Region VI Dallas (via e-mail)

B. Ferdinand - SLC (via e-mail)
J. Giraud - SLC (via e-mail)
P. Malone - SLC (via e-mail)

P. DeDycker – ARCADIS (via e-mail)
G. Hoffman – Hydro Engineering (via e-mail)
J. Indall - CMTI (via e-mail)

Attachment 1. Summary of contingency actions for Phase 2 of the in-situ TPP pilot.

Observation	Contingency Action
<p>Baseline <u>phosphate concentrations</u> will be established prior to the start of the phosphate injection. Phosphate concentrations measured at the “dose response well” (5 and 7.5-ft from injection well) and downgradient performance monitoring wells (a total of 15-ft from injection well) not to exceed specified concentration limits as follows:</p> <ul style="list-style-type: none"> • Dose response – 1,500 mg/L above baseline. • Furthest downgradient performance monitoring well – 150 mg/L above baseline. <p>If concentrations exceed these limits then contingency actions will be taken.</p> <p>The monitoring frequency during the pilot tests are provided in Table 9 of the work plan.</p> <p>Phosphate analyses and analyses of other analytes (calcium, arsenic, molybdenum, and selenium) will be performed after injection of 15,000 gallons, every subsequent 5,000 gallons, and at the conclusion of injections. Additionally, the analyses will be performed 1x/week for the first month, 2x/month for the second month, followed by monthly analyses for the next 3 to 6 months. This frequency will be increased if contingency actions are required.</p>	<p>If concentrations exceed specified limits, then injections will be stopped and concentrations of phosphate will continue to be monitored weekly at dose response and performance monitoring wells. In addition, the next closest downgradient well (S0 or S1 in the case of Pilot Test Area S; X18 in the case of Pilot Test Area X [exact well locations will be determined after Phase 1 tracer testing]) will be monitored for phosphate. Monitoring will continue until concentrations drop to specified concentration limits at which point the data will be reported to NMED and a review of injectate concentrations will be performed. Adjustments to injectate concentration will be proposed to prevent exceedances of the phosphate concentration limit, and this will be reviewed with NMED prior to additional work.</p> <p>Phosphate concentrations in excess of the established limits that travel downgradient will be recovered by the extraction well network within the hydraulic barrier. As discussed above, monitoring will continue until concentrations return to limits within the pilot test areas, and if additional injections are not performed, monitoring will continue until concentrations return to within 20% of baseline.</p>

Observation	Contingency Action
<p>Baseline <u>arsenic concentrations</u> will be established through monitoring prior to the start of phosphate injection. Arsenic concentrations at the dose response wells will not exceed 200 µg/L or 10x the baseline concentration (whichever is a higher concentration), and will attenuate by 50% of the concentration observed at the dose response well at the furthest downgradient performance monitoring wells. Monitoring will be performed to evaluate the degree of attenuation that occurs over a short distance downgradient to demonstrate that sufficient attenuation is achieved.</p> <p>If concentrations exceed these limits, or if attenuation does not occur within the pilot test area, then contingency actions will be taken.</p>	<p>If concentrations exceed specified limits, and if attenuation is not occurring, then injections will be stopped and concentrations of arsenic will continue to be monitored weekly at dose response and performance monitoring wells. In addition, the next closest downgradient well (SO or S1 in the case of Pilot Test Area S, X18 in the case of Pilot Test Area X [exact well locations will be determined after Phase 1 tracer testing]) will be monitored for arsenic. Monitoring will continue until concentrations drop to specified concentration limits at which point the data will be reported to NMED and a review of pilot test parameters will be performed. Adjustments to injectate concentration will be proposed to prevent exceedances of the arsenic concentration limit, and this will be reviewed with NMED prior to additional work.</p> <p>Arsenic concentrations above the established limits that travel downgradient will be recovered by the extraction well network within the hydraulic barrier. As discussed above, monitoring will continue until concentrations return to limits within the pilot test area, and if additional injections are not performed, monitoring will continue until concentrations return to within 20% of baseline.</p>

Attachment 2. Schedule of planned activities for the TPP alluvial pilot test (dates are approximate and will be adjusted depending upon progress of field activities).

Activity	Start Date (2013)	End Date (2013)	Data Provided to NMED at Completion of Activity
Phase 1 – Hydraulic Evaluation			
Install injection wells (one each in location S and X) and monitoring wells (5 or 6 each in locations S and X).	March 11	March 15	
Perform tracer test using fluorescent dye tracer	March 25	April 26	x
Install performance monitoring wells (4-5 each in areas S and X)	May 6	May 10	
Perform baseline monitoring for all parameters shown in Table 6 of work plan	May 13	May 17	
Phase 2 – Alluvial Pilot Test			
Prepare phosphate solution and complete injections, and perform frequent monitoring of dose response wells and weekly monitoring of performance monitoring wells	May 27	May 31	
Complete 1 month monitoring with weekly samples recovered	June 3	July 1	x
Complete 6 month monitoring with samples recovered 2x month (up to month 2) and monthly thereafter	July 8	December 6	x