UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
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DALLAS, TX 75202-2733

Via Electronic Mail

April 2, 2019

Daniel Lattin, P.E.
Project Evaluation Manager
Barrick Gold of North America, Inc.
www.barrick.com

Re: 2019 Draft Work Plan for Groundwater Background Investigation,
Homestake Mining Company Grants Reclamation Project

Dear Mr. Lattin:

The U.S. Environmental Protection Agency (EPA) has completed its review of the document entitled "Draft Work Plan: 2019 Background Investigation, Grants Reclamation Project, Grants, New Mexico, February 13, 2019" (Work Plan). This Work Plan was submitted to EPA and other regulatory stakeholders as a proposed supplemental investigation to address technical concerns and inquiries from EPA and the New Mexico Environment Department (NMED) related to the Homestake Mining Company (Homestake) conceptual site model (CSM) that ground water uranium concentrations in near upgradient alluvial wells to the Homestake NPL site are attributed to naturally occurring uranium released from sediments. The CSM is presented in a 2018 Homestake white paper and is based on a previous investigation by Arcadis U.S., Inc. (Arcadis) and split-sampling data from a U.S. Geological Survey (USGS) background study performed on behalf of EPA. The CSM is also summarized in the Work Plan.

Based on the review of the Work Plan and the follow-up technical meeting held in Santa Fe, New Mexico, on March 13, 2019, EPA finds the Work Plan to be acceptable contingent upon the following:

1. The location of paired alluvial monitoring wells to be constructed along the electrical resistivity tomography (ERT) transects should be agreed upon by Homestake, EPA, and NMED after reviewing the ERT cross sections.

2. The total number of paired alluvial monitoring wells to be constructed should be agreed upon by Homestake, EPA, and NMED after the ERT cross-sections are reviewed. Homestake has proposed two well pairs in the Work Plan. However, EPA and NMED believe that 2-3 additional well pairs may be needed for the investigation once the geometry of the San Mateo Creek (SMC) paleo-channel is delineated by the ERTs. Based on previous detailed mapping by Homestake and EPA of the base of alluvium structure, there may be multiple troughs and ridges that define the paleo-channel, including a central deep trough or channel at a depth of over 30 meters below ground surface. There may be significant variations in the mineralogy and hydraulic properties of the sediments and water quality across such a channel geometry.

3. The lengths of the two planned ERT transects that span the alluvial channel should be extended outward from that shown on Figure 4 of the Work Plan so that the imaging depths are great enough to clearly delineate the alluvium/bedrock contact at the edges of the paleo-channel where there is known saturation. In the ERT cross-section example provided in the Work Plan (Exhibit 1), the transect is extended approximately 60 meters beyond the point where the maximum imaging depth is shown (both to the south and north) to allow clear delineation of the top of bedrock. For the northern most ERT transect shown on Figure 4, such an extension is needed to clearly image the top of bedrock at monitoring wells DD and ND (located at the western and eastern edges of the transect). For the southern ERT transect, an extension is needed on the western end to delineate top of bedrock as well as verify or refute the paleo-channel trough mapped by EPA (*see* Figure A4-7, Phase 2 San Mateo Creek basin ground water study).

4. Work Plan: Section 3 Lithological Assessment and Installation of Monitoring Wells, page 13, paragraphs two and three:

   The CSM for sources of uranium, local and regional scales, needs to provide more technical detail regarding the association of uranium with fluvial fine-grained sediments versus regionally-derived uranium associated with coarse-grain sediments. Uranium concentrations in sediments will be higher with fine-grained particles due to adsorption onto larger surface areas and mineralogy (clay minerals and Fe-Mn (oxy)hydroxides coatings). Dissolved uranium present in mine discharge water upstream of the Homestake NPL site may contribute to dissolved uranium present in alluvial ground water upgradient from the site.

5. Work Plan Appendix A: Sampling and Analysis Plan - Section 3.2 Lithological Assessment and Installation of Additional Wells:

   a) Page 10: Consider adding paste pH and oxidation and reduction potential (ORP), sulfate, carbonate, and phosphate to leachate analyses using soil/sediment.

   b) Page 12: Consider determining effective distribution coefficients (Kd) using leachate results from selective sequential extraction tests. This information along with the leachate results can be used to quantify adsorption capacity of sediments. Different Kd values for uranium are associated with various extraction steps.

c) It would be useful to include non-contaminated sediments with the selective sequential extraction tests to represent sample controls.

d) Mass flux of uranium and other solutes needs to be evaluated using solute concentrations multiplied by ground water flow rates. This will help quantify areas where most of uranium and solute transport occurs versus secondary transport zones associated with less permeable sediments in the alluvial groundwater.

e) Replace magnesium exchange capacity with calcium exchange capacity to quantify exchangeable uranium and calcium. Calcium concentrations exceed magnesium concentrations in ground water and are most likely associated with sediments.

f) Measure concentrations of total organic carbon/dissolved organic carbon in leachates associated with extraction step 5 (organic bound).

6. Section 3.3 – Ground Water Sampling, page 14:

   Provide information on the type of ORP electrode used to allow conversion of ORP to Eh (mV of V) in ground water samples.

7. Section 3.4 – Ground Water Analyses, page 15:

   Add TOC/DOC, dissolved Fe(II)/Fe(III), and total phosphate-P to ground water to the analyte list.

These technical comments were discussed at the March 13, 2019 meeting and during a conversation between us the following day. The comments made at the meeting include those made by Dr. Patrick Longmire of NMED related to the mineralogical and geochemical analyses described in the Work Plan.

Lastly, it should be noted that in addition to understanding the source(s) of the uranium in alluvial ground water at the near upgradient wells, EPA believes it is important to understand the ground water flow path(s) and mass flux of uranium, selenium, and other solutes in the reassessment of background. The supplemental background investigation planned by Homestake should improve our understanding significantly.

The EPA is continuing to review the work performed to date by Homestake and Arcadis as well as the work performed by the USGS. As you are aware, EPA is awaiting the publication of the second USGS journal paper on the background study. These studies, along with this supplemental investigation, will be assessed collectively as part of EPA's ongoing reassessment of background. The EPA will continue to coordinate this reassessment with NMED and the U.S. Nuclear Regulatory Commission and Department of Energy.

If you have any questions, please contact me at (214) 665-6707 or via e-mail at purcell.mark@epa.gov.

Sincerely,

Mark Purcell, Remedial Project Manager
Superfund Division

Cc: Kurt Vollbrecht, New Mexico Environment Department
Ron Linton, U.S. Nuclear Regulatory Commission
Deborah Barr, U.S. Department of Energy Legacy Management Program