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VIA OVERNIGHT MAIL

January 5, 2011

Dr. Tom McLaughlin
U.S. Nuclear Regulatory Commission
Mail Stop T-7-E18
Washington, DC 20555

RE: License No. SUA-1139, Highland Reclamation Project

Dear Dr. McLaughlin:

In accordance with License No. SUA-1139, Condition 33, ExxonMobil has been monitoring a number of wells at the ExxonMobil Highland Mine and Mill Site. In the third quarter (August) of 2010, Point of Compliance (POC) Well No. 175 had a uranium concentration of 0.0325 mg/L, which is greater than the License Condition 33B ground water protection standard of 0.03 mg/L for this well. The sample was re-tested by the analytical laboratory to confirm the results, per ExxonMobil's Highland Mine Site Procedures Manual. The well was sampled again in November, 2010, and the results from the laboratory are still pending. As you are aware, ExxonMobil is preparing a Request for Amendment to the Radioactive Materials License, Application to Amend Existing Alternate Concentration Limits (ACL), to address tailings seepage to the Highland Pit Lake and within the groundwater in the drainage to the southeast of the tailings impoundment. As discussed at previous meetings and teleconferences, this application is projected to be submitted to the NRC within the first quarter of 2011. The proposed ACL application includes detailed technical discussions of the tailing seepage, and proposes ACLs for POC well #175 and others.

During our telephone conference of November 29, 2010, NRC indicated they would like additional information prior to the ACL application regarding this specific well, and the extent to which the increasing trend in uranium concentration at this well is consistent

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with previous discussions. The following summarizes the geochemical and hydrological findings for well #175, with respect to the increasing trend.

Uranium Transport - Conceptual Site Model Summary, with Application to Well 175

The existing Highland Conceptual Site Model (CSM) describes the hydrogeologic and geochemical processes which controlled the historic migration of uranium from the tailings impoundment to the pit lake. Oxidizing tailings seepage characterized as low pH water containing elevated concentrations of chloride, sulfate, uranium, and other metals migrated into the Tailing Dam Sandstone (TDSS) where the tailings pond and tailings material were in direct contact with a surface outcrop of the TDSS. As the tailings seepage migrated downward it reacted with calcite ($CaCO_3$) contained in the underlying TDSS. Reaction with calcite increased the pH to between 7 and 8, and the calcium released from calcite dissolution combined with sulfate to form gypsum ($CaSO_4 \cdot 2H_2O$). The increase in pH under oxidizing conditions also promoted precipitation of $Fe(OH)_3$, resulting in low to non-detectable levels of dissolved iron and most metals that adsorbed to the precipitated iron hydroxide.

Uranium exists primarily as U(VI) under oxidizing conditions which, in the presence of dissolved carbon dioxide and circum-neutral pH, is present mainly as soluble carbonate complexes [$UO_2(CO_3)_2^{-2}$]. Because of the negative charge on the complexes, they are only attenuated weakly by aquifer solids and therefore remain relatively mobile under oxidizing conditions (Eh >200 mV). Supplemental geochemical modeling has shown that the small fraction of adsorbed uranium can be released with the influx of clean groundwater, creating a potential future secondary source.

As the oxidizing, neutralized tailings seepage migrates through the TDSS, it may encounter less-impacted waters with locally-reducing conditions induced by the presence of organic matter and other reducing agents contained within the sandstone. Under reducing conditions uranium exists primarily as uranium (IV), where it can precipitate as insoluble uraninite (UO_2), thereby limiting the mobility of the dissolved uranium. Under the same reducing conditions, the solubility of Fe(III) minerals is increased. As a result, tailings-impacted groundwater in reducing environments is expected to contain low to non-detectable uranium concentrations, but with measurable iron. Regardless of whether groundwater is reducing or oxidizing, the concentrations of chloride and sulfate remain useful as reliable indicators of potential impacts from tailings seepage.

Oxidation–Reduction Conditions in Groundwater

Analysis of TDSS groundwater samples for iron and uranium was conducted during first Quarter 2010 to evaluate the potential for contrasting oxidation-reduction (redox) conditions in the TDSS. The resulting relationship between iron and uranium is consistent with variable redox control of uranium in the TDSS (Figure 1). Oxidizing conditions are signified by groundwater containing non-detectable iron concentrations (<0.052 mg/L) but with measureable uranium. Conversely, reducing conditions are represented by groundwater containing measureable iron but with non-detectable concentrations of uranium (<0.0003 mg/L). Two of the wells located at the margin of tailings impoundment (Wells 120 and 175) produced anomalous chemical results, with detectable concentrations of both iron and uranium (Figure 1). The groundwater in Wells 120 and 175 is characterized as transitional and may indicate the presence of a redox boundary in the vicinity of the wells.

Geochemical and Hydrologic Conditions at Well 175

Well 175 is located on the western edge of the tailings impoundment. It has demonstrated historic tailings seepage impacts based on the elevated chloride and sulfate concentrations, both of which have been slowly decreasing since the mid-1990s (Figure 2). Moreover, uranium concentrations were consistently low to non-detectable in Well 175 from the time of installation in 1988 until about 2002 (Figure 3). The low uranium concentrations during this period suggest the presence of locally-reducing groundwater as described above and in the CSM. Recently, iron data have become available to better understand groundwater redox conditions. Since 2003, uranium has been increasing in Well 175, and the August 2010 concentration (0.0325 mg/L) exceeds the MCL of 0.03 mg/L.

The increasing trend in uranium at Well 175 has been interpreted previously as oxidation of precipitated U(IV) minerals, such as uraninite, solely promoted by a shift toward oxidizing conditions caused by desaturation of the TDSS. However, the occurrence of elevated iron in conjunction with detectable uranium is inconsistent with a shift toward oxidizing conditions. For this reason, groundwater at Well 175 is now classified as transitional (Figure 1) because it contains chemical characteristics of both oxidizing and reducing groundwater.

Hydrologically, the aquifer in the vicinity of Well 175 has demonstrated generally high permeability based on significant well yields during groundwater extraction. The high

permeability predisposes this location to potentially rapid responses to changing hydrologic conditions. For example, during Exxon's Highland corrective action program (CAP), over 9 million gallons of water were removed from Well 175, with a reported recovery rate of 4,050 gallons per day in June 1998, which is many times greater than the production from any of the other CAP wells. The recovery of groundwater levels at Well 175 after cessation of the CAP was followed by a continual decrease in elevations as the TDSS continued to desaturate. Based on the increasing uranium and elevated iron concentrations, the high permeability zone appears to be responding to aquifer desaturation, providing a conduit for transport of oxidizing and reducing groundwater into Well 175.

Summary of Reasons for Increasing Uranium Concentrations in Well 175

Prior to 2003, the redox state of groundwater at Well 175 was predominantly reducing, based on the low uranium concentrations. The elevated concentrations of chloride and sulfate indicated that the groundwater in Well 175 was impacted by seepage from the tailings impoundment. However, continued desaturation of the TDSS has resulted in transient flow conditions in the vicinity of Well 175 which appear to be bringing groundwater from different zones within the aquifer, resulting in the mixing of oxidizing and reducing waters. The trend in increasing uranium concentration indicates that the relative proportion of oxidized water to reduced water being intercepted at Well 175 has been increasing since 2003. Accordingly, the ACL Application will further address tailings seepage at Well 175 in order to provide a complete resolution of site groundwater control issues with respect to long-term surveillance and monitoring and, ultimately, license termination. Please let me know if you have any further questions.

Sincerely,

Mahesh Vidyasagar
Project Manager
ExxonMobil Environmental Services Company

CC: Rebecca Bilodeau, AES, Inc.
Bruce Wielinga, AMEC, Inc.
NRC Document Control Desk

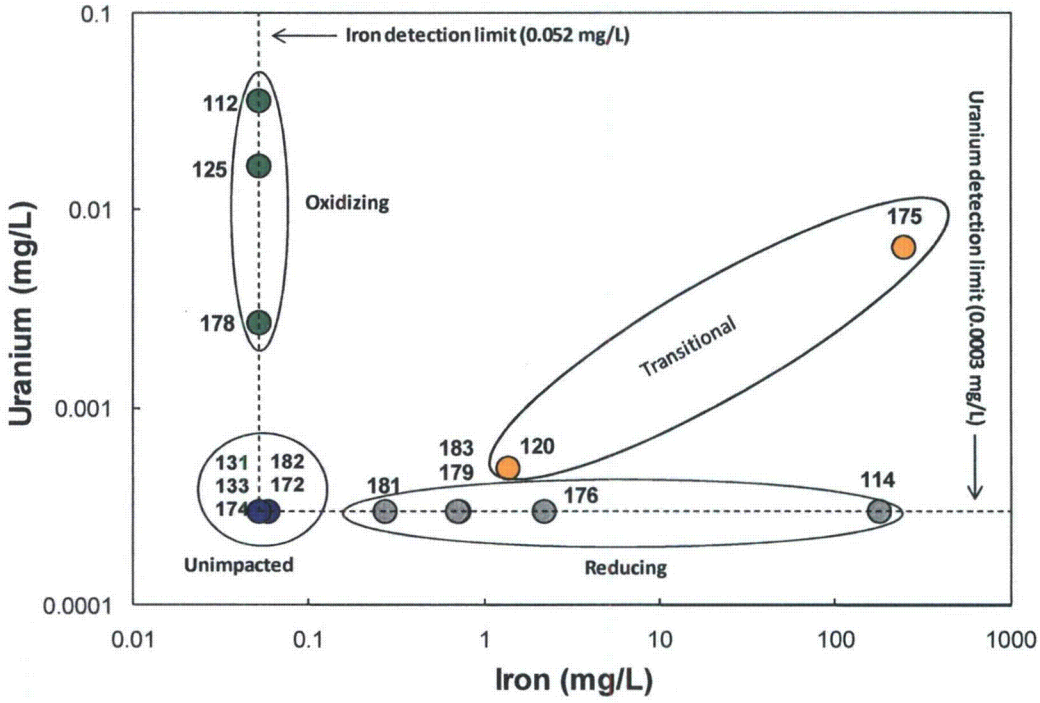

Figure 1. Iron and uranium concentrations in selected TDSS monitoring wells.

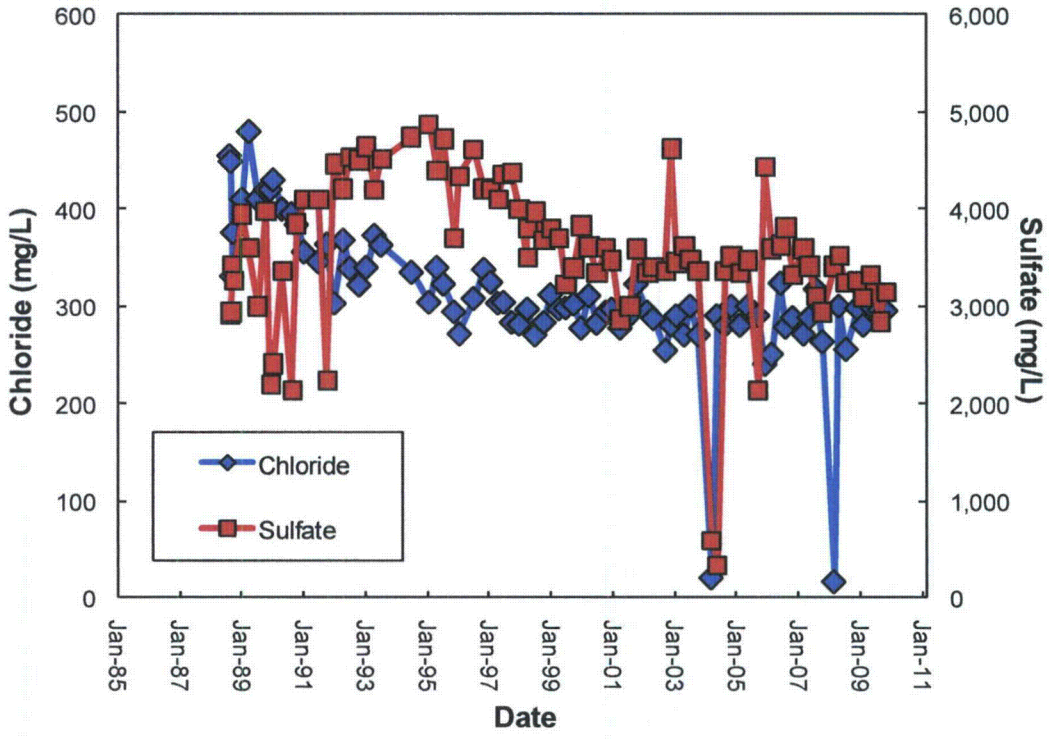

Figure 2. Chloride and sulfate concentrations trends in Well 175.

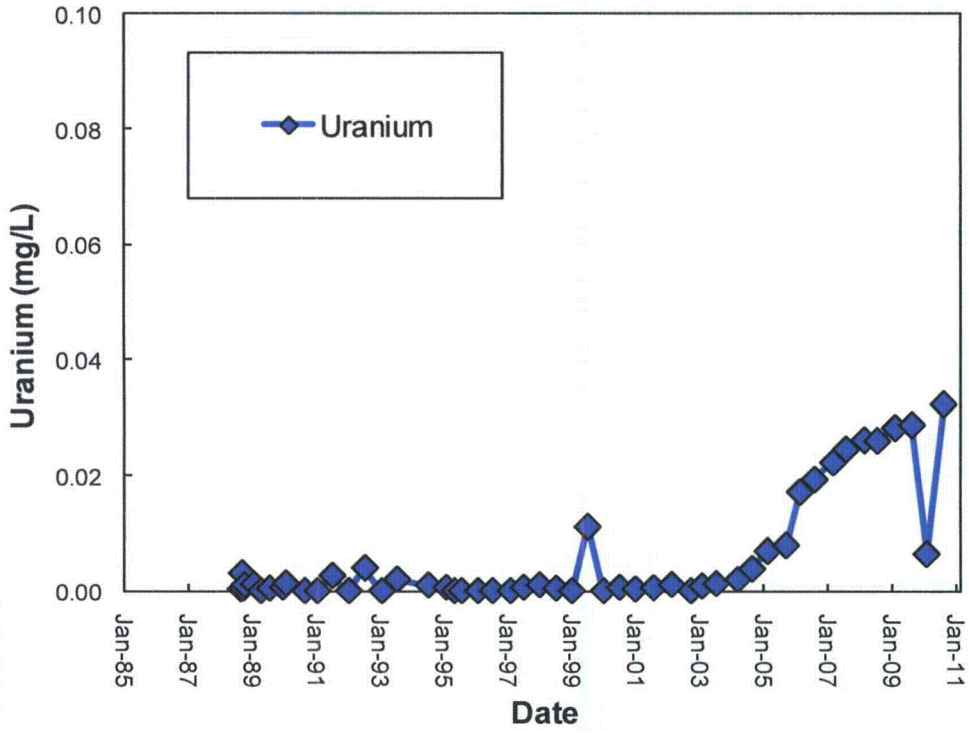

Figure 3. Uranium concentrations in Well 175.