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U.S. Nuclear Regulatory Commission  
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Ryan Schierman  
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Lower Level  
Cheyenne, WY 82002

**RE: U.S. Department of Energy Office of Legacy Management July 19, 2018 letter  
Docket No. 40-8102, Radioactive Materials License No. SUA-1139  
Highland Reclamation Project**

Dear Messrs. Orlando and Schierman:

At Mr. Orlando's request, ExxonMobil Environmental Services Company on behalf of Exxon Mobil Corporation has reviewed the July 19, 2018 letter from the Department of Energy (DOE) to the United States Nuclear Regulatory Commission (NRC) regarding the ExxonMobil (Licensee) Highland Uranium Mine and Millsite. We note that much of the letter is premised on DOE's interpretation of the NRC's current position and regulations, and, while NRC is best suited to define and defend their own regulations and positions, we understand that you also requested the Licensee's input. The following remarks do not represent the full extent of our comments; indeed, much of the information and supporting data from additional evaluations have been submitted to NRC in the past, and, as you are aware, have remained under NRC Staff technical review for the last 7 years. Our most recent response to NRC's Request for Additional Information (RAI) document was submitted in July 2017; however, we have received no comments or additional RAIs from NRC with regards to the most recent submittal. We are also aware that the State of Wyoming recently became the country's 38th Agreement State with the Commission discontinuing regulatory authority over uranium milling operations, including the regulation of 11e.(2) byproduct material as defined in the Atomic Energy Act of 1954, as amended by the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA) (collectively the "AEA"). As such, the State of Wyoming now has primary responsibility for completion and approval of the Licensee's request for a comprehensive license amendment associated with alternate concentration limits (ACL), both new and revised, and a revised long-term surveillance boundary (LTSB).

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NMSS

As a preliminary matter, the Licensee's license amendment request entails two separate and distinct issues that require both legal and technical/environmental evaluation by the State of Wyoming and/or final concurrence from NRC. The first matter is legal in nature and is the crux of the aforementioned DOE letter which is a jurisdictional determination that, should there be 11e.(2) byproduct material in the Highland Pit Lake, DOE has a statutory responsibility to take title to the property associated with the safe management and containment of said 11e.(2) byproduct material. This jurisdictional determination is critical to the technical analyses to be performed by the State of Wyoming using any and all technical and environmental findings issued by NRC Staff, because NRC's AEA conferred authority allows it to ultimately determine what property DOE must take for the safe management and containment of 11e.(2) byproduct material as a general licensee of NRC in perpetuity (i.e., closure period of at least two hundred (200) years and, to the maximum extent practicable, one thousand (1,000) years). As will be discussed further in this letter, the Licensee asserts that DOE has ignored fundamental provisions of the AEA/UMTRCA, the authority granted to the Commission therein, and its own past determinations and ongoing closure projects where the agency has concurred with the taking of sites that contain significantly more property than that encompassed by the Highland site.

The second issue that requires evaluation by the State of Wyoming and concurrence by NRC is the technical environmental review resulting in the identification of 11e.(2) byproduct material migrating from the reclaimed tailings impoundment into the Highland Pit Lake and throughout the site. Assuming that the State of Wyoming and NRC concur that DOE is required to take title to all 11e.(2) byproduct material, which is prescribed in the AEA, a finding that the Licensee's technical data show that 11e.(2) byproduct material is indeed in the Highland Pit Lake should result in the requirement that DOE take title to such material and the property on which such material is present. To contravene the express mandate of Congress for the isolation and containment of 11e.(2) byproduct material would be legally unacceptable regardless of the type of property on or in which such material is present.

To be clear, the Licensee is well-aware of its responsibilities under the AEA, NRC's implementing regulations for 11e.(2) byproduct material management under 10 CFR Part 40, Appendix A, and the State of Wyoming's compatible implementing regulations in its Agreement State program regarding closure of a Title II site such as Highland.

The Licensee is also aware that NRC's regulations under 10 CFR Part 40, Appendix A, Criterion 10 prescribe a mandatory contribution to the United States Treasury of \$250,000 in 1978 dollars for long-term surveillance and monitoring. However, the Licensee is also aware that there may be an additional required contribution to cover the costs of any access control installation and maintenance, and other health and safety measures deemed necessary to safely contain site 11e.(2) byproduct material including groundwater monitoring. The Licensee is prepared to negotiate with NRC, DOE, and the State regarding adequate measures to safely control access to the Highland Pit Lake and to surrounding areas if the pit lake is included within the LTSB.

Initially, the aforementioned DOE letter refers to the Licensee's May 2011 ACL license amendment application submittal (AMEC 2011), and does not refer to or evaluate more recent supporting documentation. It is this supporting documentation that further solidifies the Licensees position

that there is indeed 11e.(2) byproduct material in the Highland Pit Lake and that the land area containing the pit lake should be included within the LTSB.

The Licensee's initial license amendment request proposed a number of licensing actions, including but not limited to, updating existing ACLs, proposing new ACLs, revising the proposed LTSB, and a request for a jurisdictional determination from NRC as discussed above. As is its typical practice and especially with respect to complex license amendment applications, NRC Staff compiled and issued to the Licensee a RAI document subsequent to their review of the 2011 ACL submittal in February 2012. The Licensee's responses to the RAI document were submitted in April 2013, along with a detailed Work Plan to collect additional data needed to complete the RAI response. This included the drilling and installation of 20 groundwater quality monitoring wells with two years of water quality data from those wells, and further geochemical data collection and evaluation. After considerable discussion, NRC Staff approved the Work Plan in February 2014, stating "***with...the additional data acquisition to fill identified data gaps, NRC is convinced that a complete response to the RAIs will be provided by ExxonMobil and determination of 11e.(2) material in the pit lake can be supported***" (NRC 2014). The additional well installations and data were collected over a 2.5-year period, and the final supplemental responses to the RAI document (additional data collection and evaluation based on the approved Work Plan) were submitted to NRC in June 2017. Presently, the NRC has not yet completed its technical review of the 2017 submittal. And, based upon the contents of DOE's letter, it is clear that DOE has not adequately reviewed the Licensee's additional evaluations since 2011, as well as the information presented in the 2011 ACL submittal. Our review of DOE's letter finds its comments to be outdated and premature to any further RAIs or conclusions that NRC Staff will develop based upon a complete evaluation of all supporting information.

#### Licensee's General Comments to DOE's Letter

DOE argues that the size of the LTSB should be a consideration in transfer of the land necessary for long-term containment of byproduct material. We note that there are no size limitations under UMTRCA. DOE's letter points to no statutory or regulatory provisions that assigns a limit to the amount of land allowed within an LTSB; but rather, the AEA and Commission regulations merely mandate that 11e.(2) byproduct material be safely managed and contained. Based on this and absent any other legal/regulatory citation, the amount of the land included in a given LTSB is the amount of land necessary to contain any 11e.(2) byproduct material for 200 years and, to the maximum extent practicable, 1000 years.

Furthermore, as stated above, the Licensee will have to contribute sufficient money to ensure the long-term management and containment of site 11e.(2) byproduct material, including but not limited to access controls, groundwater monitoring, and other management activities. Thus, the amount of land required by the State and NRC to adequately perform such functions will be taken into consideration for the final payment sum, so the amount of land is largely irrelevant. As stated in NRC's Regulatory Issue Summary 2011-11 entitled *Regarding Long-Term Surveillance Charge for Conventional or Heap Leach Uranium Recovery Facilities Licensed Under 10 CFR Part 40*, "[c]onsistent with Criterion 10 to Appendix A of 10 CFR Part 40, any final variances in the LTSC will

be determined solely by the NRC." (September 29, 2011). This further buttresses the conclusion that the Commission can work with DOE or the custodial State on these items, but it retains the sole authority over final determinations including costs.

DOE states that *"For more than twenty years, both during and after termination of the milling operation, the licensee submitted monitoring and other reports indicating that seepage from the tailings basin was limited in extent, and it would not affect the water quality in the pit lake"*. This statement is plainly out of date and, accordingly, no longer relevant. Indeed, DOE's failure to subsequently account for supporting documentation and associated data collected and prepared pursuant to the NRC-approved work plan represents a significant deficiency in its evaluation. In fact, as early as the mid-1990's the Licensee was preparing corrective actions to address the water quality in the pit lake. Subsequently, the Licensee documented and summarized a number of references related to Pit seepage in their 2011 submittal. For example:

- Dames and Moore, 1978
  - Concluded 100 gallons per minute (GPM) seepage into the Pit
- EPRCO, 1982
  - Concluded 120 GPM seepage into the Pit
- WWL, 1988
  - "Likely that most of the active seepage from the tailings impoundment flowed toward the pits during active operations."
  - 45 – 100 GPM Seepage
- SMI, 1998 -
  - **"Current water quality measurements of TDS in the Highland Reservoir demonstrate an effect from historical seepage from the tailings basin, and the effect will likely continue for at least 100 years."**
  - predicted concentration of TDS to increase.
  - predicted concentrations of uranium and radium from tailings fluid to increase.

DOE then states that *"Around 2006, the licensee changed their conceptual model, indicating that milling-related constituents had probably migrated to the lake..."* Again, this statement is not factual. In 1988, 11e.(2) byproduct material constituents from the mill site's uranium mill tailings impoundment were found to be seeping into site groundwater and, pursuant to NRC direction and its regulations at 10 CFR Part 40, Criterion 5, ExxonMobil immediately began preparation of a groundwater corrective action plan (CAP). As further water quality data became available (as opposed to model predictions prior to milling cessation) the licensee was reevaluating the pit lake water quality with the Wyoming Department of Environmental Quality (WDEQ) (1996-2000, numerous reports and letters), and concluded in 1998 that there were milling-related constituents in the lake, which prompted further pit lake evaluations. In August 2003, the Licensee submitted the *"Long-Term Pit Lake and Groundwater Hydrology at the Highland Mine Site"* report, which was updated and revised in 2007. Further geochemical and ecological risk evaluations were initiated in 2003 -2006. In March 21, 2006 the NRC provided a review of a public meeting held March 15, 2006 regarding the Highland site. As summarized by the NRC (2006), notable information shared at the public meeting included:

- Three new wells (Wells MFG-1, MFG-2, and MFG-3) had been drilled near the southeast site boundary because an existing well (Well 148) had become dry. Elevated levels of sulfate and uranium were seen in two of the new wells. As a result, ExxonMobil proposed to drill three wells along a buried alluvial channel outside the site boundary to determine if contamination had migrated there.
- A lake exists in the Pit with water levels continuing to rise, although the Licensee's calculations show that the long-term water level will be below any potential outlet. However, *"the water in the lake is contaminated with some of the contamination derived from the tailings"*. As a result, ExxonMobil stated that it would revise the proposed DOE site-transfer boundary at license termination to include the area around the pit lake.

Over 30 years of supporting hydrological and geochemical data have been collected from the site since milling was terminated, during which time there has been an informed progression in the evolution of our understanding of the site hydrology and geochemistry. Clearly, site-specific data collected over a 30-year period are going to provide better evidence of byproduct migration at the site compared to the antiquated models and theories which were prepared prior to the end of milling and mining (e.g. 1982). Incidentally, this is also the same time period during which additional data evaluation prompted the Licensee to inform the NRC that there was also likely by-product migration in the southeast drainage, which prompted additional groundwater monitoring studies to address such potential drainage. While DOE accepts and concurs with factual transport of mill constituents to the southeast drainage, they continue to assert that the same evaluations are inaccurate with regard to the migration of byproduct material through unconsolidated backfill into the Pit to the west, without providing any data to support their theory.

The Licensee has been working continuously since closure to refine its understanding of the tailings seepage migration, and while DOE was not always a party to those earlier investigations, all work has occurred under the NRC and/or State of Wyoming's oversight. That is appropriate, given that in 2000, NRC Commissioners concluded in CVR-SECY-99-027 that NRC has exclusive, preemptive federal jurisdiction over all components (radiological and non-radiological) of 11e.(2) byproduct material.

DOE also incorrectly states *"The licensee provided no new data to invalidate the previous [1982] conceptual model that attributed pit lake contamination to mining rather than milling activities"*, as it is evident that DOE has not adequately reviewed all pertinent evaluations and supporting data provided to the NRC in the last 10+ years. Specifically, a geochemical and hydrological evaluation later provided (Tetra Tech 2007) demonstrated that the uranium and radium in the pit lake had reached concentrations which were higher than could be possible based upon mining alone. DOE concurs with this conclusion in their 2018 letter's supporting information. All relevant post-1982 evaluations were revised and re-submitted in the 2011 ACL submittal, along with additional supporting data and evaluations. In response to the RAI document received from NRC in 2012, new data were collected and subsequently provided in additional submittals which were provided in 2013 (EMES 2013) and 2017 (WME 2017). The Licensee's improving understanding of site dynamics resulted in the need for more practical knowledge and data gathering versus conceptual

modeling, the former of which is a much better indicator that there is 11e.(2) byproduct material in the pit lake.

Finally, in the conclusion of the letter, DOE states they have three reasons for disagreeing with the proposed LTSB, and refer to the supporting information attached to the letter. These three reasons and their supporting information are listed below, along with our comments:

**1. "The possible presence of milling-related constituents in the pit lake does not by itself compel DOE ownership for long-term care"**

DOE's supporting information misquotes the regulations. Title 10 CFR Part 40 Appendix A, Criterion 11(C) states: "Title to the byproduct material licensed under this Part AND land, including any interests therein (other than land owned by the United States or by a State) which is used for the disposal of any such byproduct material, or is essential to ensure the long term stability of such disposal site, must be transferred to the United States or the State in which such land is located, at the option of such State"(emphasis added). Congress' primary intent in UMTRCA was to ensure isolation of 11e.(2) byproduct material and to restrict public access to such material. This Congressional intent manifests itself in many forms such as the armoring and covering of mill tailings impoundments, the construction of fencing where appropriate to restrict access to uncontrolled areas, and the use of institutional controls to restrict access to and/or use of site groundwater containing 11e.(2) byproduct material. The use of institutional controls has been endorsed by both NRC and DOE for purposes of long-term surveillance and monitoring and is currently being used to restrict access to site groundwater at the Western Nuclear, Inc. Split Rock site.

If the milling-related contamination was generated from extraction of uranium ore primarily for its source material content, then it is classified as 11e.(2) byproduct material. Section 11e.(2) defines byproduct as "*the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content.*" An 11e.(2) constituent becomes a hazardous constituent when it meets the criteria under 5B(2). Non-radiological hazardous constituents are byproduct material under Title 10 CFR 40 Appendix A Criterion 5 - however not all non-radiological byproduct material is hazardous. Also, NRC can, under defined circumstances, exempt certain hazardous constituents from point of compliance regulations. The critical concept is that hazardous non-radiological, non-hazardous non-radiological constituents, and radiological constituents all can be classified as 11e.(2) byproduct material by NRC, so long as the material result from the processing of any ore primarily for its source material content. The Atomic Energy Act (AEA), Section 83, requires that the "*ownership of any byproduct material, as defined in section 11e.(2), which resulted from such licensed activity shall be transferred to (A) the United States....*" Clearly the regulations indicate that byproduct material ownership and the land required for long term containment must be transferred to the Federal Government, or the State, at the State's option.

DOE indicates that 75% of the uranium in the pit lake may not be byproduct, and therefore the NRC could declare that the constituents are not hazardous. If the NRC so concludes, given the data and information that has been provided, they can state that the byproduct is not hazardous and exempt

it from meeting compliance criteria under Title 10 CFR Part 40 Appendix A Criterion 5B(1) and 5B(2). However, we note that anywhere from 4% to 25% of the uranium concentrations in the pit lake water would still exceed drinking water standards, so it would be inappropriate and not protective for the NRC to declare the constituents exempt under Title 10 CFR Part 40 Appendix A Criterion 5B(3). Further, even if the Commission were to determine that a given constituent in 11e.(2) byproduct material is hazardous, it is not a *de facto* determination that such constituent(s) is not part of 11e.(2) byproduct material. A declaration that a given constituent is not hazardous merely applies to determination under 10 CFR Part 40, Criterion 13 and not to a statutory determination that material is 11e.(2) byproduct material. Congress defined 11e.(2) byproduct material on an intent basis and not a radiological or hazardous basis and, thus, DOE's statements here are erroneous and without legal foundation.

DOE claims "*It is beyond DOE's responsibilities under the Uranium Mill Tailings Radiation Control Act (UMTRCA) to assume responsibility for what is primarily a mine waste problem.*" There is always a component of naturally-occurring uranium associated with milling contamination when the mill and affected groundwater are located in a mineralized (mined) area. This is irrelevant to the fact that 11(e).2 byproduct material was created and is present. The presence of some natural uranium in mill-affected water in a surface water body (pit lake), as opposed to subsurface groundwater, is not relevant. Furthermore, the current or previous land use is not a criterion for defining byproduct material, and the existence of a former mine is also not relevant. Moreover, the difference between *mine waste* and 11e.(2) byproduct material has nothing to do with constituents present or the nature of such constituents. It merely deals with the intent of the process that created the waste material. The Licensee has sufficiently shown that there is 11e.(2) byproduct material in the pit lake, which DOE appears to have conceded. Such 11e.(2) material is commingled with other types of materials in the pit lake's water source term and cannot be readily distinguished from what potentially could be termed mine waste. So, if the legal premise that UMTRCA mandates that DOE take title to all 11e.(2) byproduct material, realistically how is the Licensee to separate that material from other uranium material in the pit lake. Thus, DOE should be mandated to take the pit lake because of the presence of 11e.(2) byproduct material in the pit lake.

In addition, DOE ignores the express determination by NRC Staff several years ago that there is no *de minimis* quantity of 11e.(2) byproduct material. When NRC's Uranium Recovery Field Office (URFO) was in operation, its Director Ramon Hall issued a letter explicitly stating that there is no quantity of 11e.(2) byproduct material that is not regulated by NRC under the AEA. This makes logical sense because there are no concentration or weight limits under NRC for 11e.(2) byproduct material and no distinction between what 11e.(2) byproduct material may require a general versus a specific license (as compared to source material that has both). The only statutory mandate for regulatory authority of 11e.(2) byproduct material during operations, decommissioning, and post-site closure is that an entity requires a specific license to possess and use 11e.(2) byproduct material and DOE requires a general license from NRC for long-term surveillance and monitoring pursuant to a Commission-approved Long Term Surveillance and Monitoring Plan (LTSP). Indeed, this fact is further supported by the fact that laboratories performing analyses of very small quantities of 11e.(2) byproduct material in samples require AEA licenses.

DOE states "NRC's current Alternate Concentration Limits guidance says that DOE would have to agree to take custody of "excess land" beyond that actually being used for byproduct material disposal when a "distant POE" is being used to encompass hazardous constituents in groundwater (and presumably surface water) (NRC 1996). DOE, therefore, can decline to accept the excess land that includes the pit lake." We are not able to locate these quotes or information in the cited reference, and it is difficult to comment without an accurate citation. However, the 1996 NRC document does not give DOE the ability to refuse or decline land included in the LTSB if the Commission approves the boundary as part of an LTSP. More specifically, under the AEA, if the Commission mandates that land be included in the LTSB, DOE *must* take that land. The document also makes no reference to "excess land" or "distant POE". Title 10 CFR Part 40 does not give DOE any rights of refusal. Regardless, the pit lake and backfilled pits area are located directly adjacent to the tailings impoundment, rather than at a "distant" location. DOE's statement is also inconsistent with NUREG 1620, which is the current ACL guidance document.

DOE's statement is also contravened by its own actions, as well as those of NRC, at sites which have been granted ACLs where institutional controls are required to control access to groundwater. In these cases, DOE has taken land within the LTSB necessary to implement institutional controls to prohibit use of groundwater for instance. Thus, DOE's characterization of lands associated with the disposal of 11e.(2) byproduct material omits the lands associated with containing such material. In the case of the Highland Pit, institutional control to limit the use of the water in the pit would be consistent with the institutional controls that are provided to limit use of groundwater at this and other uranium mill tailings facilities upon closure and transfer to the long-term custodian.

DOE suggests "Where mine- and mill-related materials were present at the Church Rock, New Mexico, UMTRCA Title II site, cleanup under the NRC license was only required when the mill component exceeded 50% of the material... and the pit lake [presumably any area outside of the tailings impoundment] should not be regulated under the existing or general [Radioactive Materials] license, but should be subject to the state regulation under the mining permit (avoiding dual regulation)". This assertion is again misinformed, or using the wrong citation. First, the document cited (UNC 1989) describes the site's cleanup process of using radium to uranium concentration ratios to determine where soil had been contaminated by windblown tailings or spills from a mill as a guide for excavation and cleanup to satisfy the equivalent of the 5/15 pCi/g standard in 10 CFR Part 40, Appendix A for radium in soil at uranium mill tailings sites. It absolutely DOES NOT indicate that the licensee was not regulated under UMTRCA in areas where contaminated soil/tailings were less than 50% tailings. The soils were excavated using the NRC regulatory criteria of 5/15 pCi/g, rather than a criteria based on achieving less than 50% tailings related contamination. Second, in 2000 the NRC concluded all radiological and non-radiological components of 11e.(2) byproduct material are under the NRC's exclusive, preemptive AEA jurisdiction, which defines the AEA and UMTRCA as the governing regulations of ALL byproduct material, not a predefined volume or percentage by area (CVR-SECY-99-027 2000). DOE also incorrectly asserts without evidence that CVR-SECY-99-027 is no longer NRC's official position.

Moreover, it is impractical to assert that, generally, only a tailings impoundment should be within the LTSB. This is inconsistent with past DOE determinations at many other sites where the LTSB

includes lands between the tailings impoundment and the point of exposure that are necessary to control access to groundwater. Therefore, we are requesting that the NRC clarify this position or that DOE provide a citation or regulation to demonstrate that CVR-SECY-99-027 is no longer NRC's position.

DOE states that *"The pit lake is regulated under a Wyoming Land Quality Division mining permit. DOE expects that the water in the pit lake must meet State of Wyoming surface water-quality standards, as well. If the water does not meet these standards, DOE cannot assume responsibility for a site that has not achieved compliance with applicable regulations."* The WDEQ Land Quality Division (LQD) has agreed that given the presence of byproduct, under UMTRCA, the mine permit is to be closed, pending the NRC's final determination on the 2011 submittal (August 3, 2010 meeting in Casper Wyoming and 2017 Site meeting). The water quality in the pit lake likely meets WDEQ Class 4c standards. However, the water quality does not meet NRC requirements, which is why the Licensee requested ACLs. DOE's statement also ignores the new technical information obtained by the Licensee that reveals that there is 11e.(2) byproduct material in the pit lake, a fact that was not known while the current mine permit was actively in effect. For this reason, the Licensee had requested a jurisdictional determination from NRC and, now the State. In the latter case, the State's determination will have to be consistent with NRC's.

**2. "The licensee's calculations and conceptual model for tailings seepage contribution to the pit lake are not definitive, and there are many inconsistencies with site observations."**

DOE's first supporting information for Comment No. 2 defers to a WDEQ letter, stating *"The State of Wyoming has stated that the evidence provided for including the pit lake in the license boundary is questionable and may not be sufficient (WDEQ 2011)"*. The evidence is subject to UMTRCA requirements. In the letter, WDEQ does not provide further details as to why they think it MAY not be sufficient, but rather the letter indicates that if the NRC accepts the proposed LTSB and ACLs, then long-term groundwater monitoring should "be robust." Therefore, in the letter, WDEQ is more interested in the LTSP. In addition, this reference is outdated as it predates the NRC's 2012 RAI document and the Licensee's follow-up responses that have been submitted. The additional data collection and evaluations presented to NRC have provided sufficient supporting information and we believe have satisfied the concern.

DOE continues by saying *"The licensee's geochemical argument is conceptual in nature-there are no actual modeling or monitoring data to support conservative transport of uranium under conditions that exist(ed) at the Highland site."* This statement is false and demonstrates DOE staff have not adequately reviewed the original 2011 ACL submittal or 2017 Supplemental Report. For example, rigorous conceptual and geochemical models have been developed. Section 2.1.2.6 of the 2011 submittal discusses the modeled reaction of tailings with bedrock, and subsequent mobility of uranium, followed by a period of additional uranium desorption that was also modeled. These modeling results are used to support the conceptual model, and should be a key focus of any geochemical review. Section 2.1.2.5 discussed influx of seepage to

the pit, and water quality data were presented for wells between tailings and pit which have elevated uranium.

DOE states "*The licensee's monitoring data do not support the current conceptual model*". Contrary, the current conceptual model was developed using site-specific monitoring data. DOE's comment is merely conclusory and, as such, provides no specific information or assessment to support the contention. Please refer to Section 1.2.2.7 of the 2011 ACL submittal. Also, further data collection and evaluation were the intent of the responses to NRC's RAI document as presented in the 2017 Supplemental Report. Again, it is increasingly apparent that DOE has not adequately reviewed all pertinent Licensee submittals.

Regarding the Highland tailings water composition, DOE states "*The composition used was from a single sample collected from the discharge pipe that went from the mill to the tailings pond and not from the tailings pond itself*." This is an inaccurate description of the tailings water samples composition used in the Licensee's assessment. Three (rather than one) historic tailings water sample compositions were presented. The tailings water chemistry represented samples collected from the tailings pond, with the exception of the EPRCO 1982 sample, which was collected from the effluent pipe (see Table 2-1 of the 2011 ACL submittal). It is not clear why DOE would assert otherwise. In addition, DOE declares that the pipe sample is not an accurate representation of the tailings pond water quality, due to dilution in the pond from other water sources. We note that the chemistry of the tailings pond water samples was *more* concentrated, due to the effects of evapo-concentration in the pond since milling ceased.

DOE draws generalized conclusions about "*nearly every site*" with regards to uranium transport, and states "*At the Highland site, there is no evidence that fluids with high uranium concentrations migrated any distance away from the disposal cell*." However, in this same letter, DOE concurs that the seepage migrated a distance of one mile down the Southeast Drainage, but neglects all of the hydrologic data supporting seepage migration to the pit as well. This reference also ignores that uranium need not be the primary constituent to be identified when making an 11e.(2) byproduct material determination. Criterion 13 referenced above contains a list of identified hazardous constituents that may be part of 11e.(2) byproduct material and that have formally been deemed to be *hazardous* by the Commission. There are also many constituents consistent with the presence of 11e.(2) byproduct material that are not hazardous. This, indeed, is the case with constituents such as nitrates and calcium which are commonly present in uranium recovery materials. The specific reference to uranium merely indicates that *source material* uranium is present in the pit lake but has no bearing on whether the material is indeed 11e.(2) byproduct material.

DOE states "*any tailings pond seepage into the TDSS would need to migrate nearly a mile before discharging to the pit lake. In addition, backfilled former open pit uranium mines lie between the tailings impoundment and the pit lake, so seepage would need to migrate through this backfill material before entering the lake. A review of the 1982 pit lake hydrology report done on behalf of NRC indicated that the backfill material likely acted as a barrier for migration of groundwater from the TDSS to the pit lake (WRA 1982)*." This statement is somewhat misleading, and again, DOE is apparently unfamiliar with information that has been presented in more recent Licensee's

submittals. In February 1982, 36 years ago, Exxon prepared a Uranium Tailings Impoundment Seepage Study (EPRCO 1982) for the Highland Site predicting that tailings impoundment seepage would migrate to the Southeast Drainage and west to the mined out areas (mine pits), but that there would be attenuation (not a barrier) of the hazardous solutes. In the model results presented in the 1982 report, the attenuation of hazardous 11 e.(2) byproduct constituents was based on a laboratory program that consisted of batch tests. There was some concern over the ability of the study to predict what might happen over the long-term. In fact, in May 1982 Dr. Roy Williams (Williams-Robinette & Associates, Inc.) commented to the NRC (WRA 1982 - this is the same citation DOE is using here) that he disagreed with this study. Dr. Williams expected the seepage to move more rapidly than the model predicted and said that chloride should be used as a tracer for the seepage plume. Chloride is now used as a tracer for the 11 e.(2) byproduct material seepage at the site. We also have demonstrated with supporting data that there has not been significant attenuation in the backfill. It is clear that unconsolidated end-dumped rock sitting on a sandstone unit would be more permeable than surrounding consolidated native sandstone or shale rock formations. The Licensee has presented hydraulic conductivity data showing the backfilled pit area is 10x more transmissive than the bedrock. The distance from the western most exposure of the TDSS Outcrop to the eastern tip of Pit 1 is one-quarter (0.25) of a mile.

DOE further states *"The only new data that are provided to support the presence of potential mill waste in the pit lake are based on uranium isotopes."* This is not true and once again it is apparent that DOE is unfamiliar with the Licensee's submittals; DOE is not presenting an accurate representation of the 2011-2017 data and reports. There were numerous lines of evidence and numerous new data, as well as an entire program to collect additional data in response to the NRCs RAI document which included new wells installed (and additional geologic data from well installation as well as additional water quality data), additional data reviewed from surrounding Cameco Corporation wells, and geochemical evaluation of subsurface aquifer solids and groundwater. To assert that the only new data is the isotopic evaluation indicates that DOE has not adequately reviewed the 2011 ACL report and all subsequent hydrological and geochemical evaluations. However, isotopic evidence should not be ignored but rather considered with the other above-mentioned information.

**3. "The pit lake in its current state is not protective, likely does not meet end-use requirements under the state mine permit, and does not meet NRC closure requirements for a uranium recovery operation."**

This statement is false, all licensed sites must be secure and protective and meet ALARA; NRC regularly inspects the site and the licensee and has had no significant adverse findings as a result of the Inspections. DOE states in supporting comments *"The license amendment request does not mention the originally intended 'end use of the pit lake. It is not clear if alternatives were considered to leaving the pit lake unreclaimed."* There are no requirements for *"originally intended land use"* to be considered in defining the extent of UMTRCA regulations. Indeed, a determination of use for the pit lake would rest on a formal LTSP and subsequent approval by the Commission and has no bearing on whether it should be included in the LTSB. The licensee owns the property in question and has no intended end-use outside of the requirements of

transfer to the Federal Government or State as provided for under UMTRCA. The mine permit, while not relevant due to the presence of 11e.(2) byproduct material, states that the final land use of the site would be consistent with the original land use, which was livestock grazing. The State required that one-half (50%) of the highwalls be regraded to 3:1 slopes and then be revegetated, which has been completed. All the required reclamation requirements have been met. The mine permit was issued prior to mining, and therefore no pit lake existed at the time. There was no expectation or understanding that the lake would be contaminated by tailings seepage; indeed, this was before UMTRCA and the subsequent regulatory requirement to line tailings impoundments nearly 50 years ago. Furthermore, detailed analysis of corrective Action Alternatives is provided in the 2011 report (Appendix E) as required, and specifically addresses alternatives for the pit lake. Yet again it appears DOE has not thoroughly reviewed the 2011 ACL submittal. If there are other items such as access controls that need to be implemented, such items can be included in an LTSP and subject to a Criterion 10 financial contribution.

DOE States *"If there are hazardous constituents present in the pit lake that require it to be included in the LTSP for the disposal site, it should first be reclaimed to meet the 10 CFR 40 Appendix A Criterion 1 requirement of "permanent isolation of tailings and associated contaminants." In its current state, contaminants in the lake are not isolated from contact with humans or ecological receptors, nor does the pit lake meet the definition of a disposal area under UMTRCA. The licensee indicates that the lake will continue to act as a sink over time; if so, contaminant concentrations should continue to increase".* This statement is also misleading. Criterion 1 states *"The general goal or broad objective in siting and design decisions is permanent isolation of tailings and associated contaminants by minimizing disturbance and dispersion by natural forces, and to do so without ongoing maintenance."* Title 10 CFR Part 40 Appendix A provides for alternatives to the criteria where it is stated, *"Licensees or applicants may propose alternatives to the specific requirements in this appendix. The alternative proposals may take into account local or regional conditions, including geology, topography, hydrology, and meteorology. The Commission may find that the proposed alternatives meet the Commission's requirements if the alternatives will achieve a level of stabilization and containment of the sites concerned, and a level of protection for public health, safety, and the environment from radiological and nonradiological hazards associated with the sites, which is equivalent to, to the extent practicable, or more stringent than the level which would be achieved by the requirements of this Appendix and the standards promulgated by the Environmental Protection Agency in Title 40 CFR Part 192, Subparts D and E."* The licensee has proposed alternatives based on guidance provided, a mutual understanding with NRC that 11e.(2) byproduct material is in the pit lake, and the local and regional conditions that exist at the Site. The licensee has provided significant amount of data demonstrating that pit lake water will not migrate offsite (see responses to the NRC's RAI document in 2013 and 2017 Supplemental Responses). There will be no long-term maintenance requirements other than occasional fence repair, and the funds for this will be included in the transfer fee. Ecological receptors are not at risk (see 2011 ACL submittal and recent pit lake water quality data) and institutional controls to prevent human access ensure protection of human health.

DOE asserts *"The U.S. Fish and Wildlife Service (USFWS) did not agree with the licensee's conclusion that the pit lake would result in "insignificant effects" to migratory birds (DOI 2004). Several approaches to achieve water-quality improvements were suggested but were not acted upon. Therefore, the pit lake water quality cannot be demonstrated to be as low as reasonably achievable. There is a possibility that USFWS could request improvements to pit lake water quality in the future for the protection of migratory birds."* This statement is very misleading. The DOI 2004 letter came from USFWS PRIOR to conducting a detailed Ecological Risk Assessment which supports the 2011 ACL submittal and subsequent follow-up reports. This is a letter that is over 14 years old and the information is taken out of context. In the letter, Mr. Brian Kelly of the USFWS states *"Wildlife use and the risk presented by inorganic contaminants in pit lakes is unknown. Riparian and aquatic communities may become established in some pit lakes; however, the nature of these communities is unknown. Pit lakes are typically deep with steep sides, thereby limiting riparian and shallow lentic habitat"* (emphasis added). Mr. Kelly continues to describe situations where exposure to upper trophic level receptors *"may occur"* through consumption of food or submerged aquatic vegetation from the pit lake. Mr. Kelly also suggests that the unknown risk from constituents at the lake could be determined through monitoring and assessment of the site specifically for *"occurrence or absence of submerged aquatic vegetation and aquatic invertebrates in the pit lake which could serve as direct pathways"*. As Mr. Kelly indicated, there clearly was a need to conduct an ecological field evaluation risk assessment, which was subsequently completed. This study answered the "unknowns" at the site posited by Mr. Kelly and concludes that the level of risk to ecological receptors is very low. The results from the investigation are very clear; there is no habitat to support a complex ecosystem, much as Mr. Kelly suggested is common of mine pit lakes. Furthermore, the selenium concentrations have been steadily decreasing in the pit lake to levels below MCLs, and are expected to continue to decline. In addition, the pit lake likely meets WDEQ Class 4c water quality standards.

DOE does not provide any citation for *"several approaches ... were not acted upon"*, however, various alternatives for the pit lake were addressed in the 2011 submittal, and treatment options have been discussed previously as well.

DOE states *"Although leaving some highwalls along the pit lake may have met state reclamation requirements, DOE believes that they pose a significant safety risk because of potential mass wasting. Therefore, the pit lake in its current condition is not protective"*. DOE does not provide any evidence that there is a potential for mass wasting. The site receives only 11 inches of precipitation per year and the capacity for mass wasting on this site is miniscule. In addition, the 2011 ACL submittal complies with the NRC requirements under Title 10 CFR Part 40 Appendix A and the factors listed in Criterion 5B6(a-b). ExxonMobil's 2011 ACL submittal and supporting responses to the NRC's 2012 RAI document present evaluation results necessary for the NRC Staff to conduct a detailed technical and environmental review of an ACL application, as well as a proposed "alternative" pursuant to the Preamble of Appendix A for the pit lake. The stability requirements in Title 10 CFR Part 40 Appendix A govern the long-term stability of the tailings materials. The tailings impoundment was closed in accordance with the reclamation plan. The closure was approved by NRC and there are no outstanding stability requirements for the tailings impoundment within the license. In addition, long-term geotechnical studies have been conducted

on the area surrounding the pit lake, and those areas that were deemed less stable were sloped to 3:1 angle. Continued studies have demonstrated the geotechnical stability of the pit lake slopes and highwalls. Regardless, nothing associated with stability in the pit lake area will impact the stability of the reclaimed uranium mill tailings impoundment; indeed, the pit lake represents a self-maintaining (i.e., passive) control mechanism for tailings seepage to the west of the reclaimed uranium mill tailings impoundment.

We would be pleased to meet with WDEQ and NRC to discuss the *2011 Highland Uranium Mine and Millsite Request for Amendment to Radioactive Materials License SUA-1139* and the subsequent *2017 Supplemental Response to Request for Additional Information and Assessment of Additional Hydrogeologic Data and Modeling*, as well as the information provided in this letter. Please contact me at your convenience to discuss possible dates in the near future that you would be available to discuss these matters.

Sincerely,



Marla Madden  
Project Manager

Cc: NRC Document Control Desk  
Ramon L. Echevarria II, Exxon Mobil Corporation  
Rebecca Bilodeau, Worthington Miller Environmental  
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#### Pertinent References

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