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By Electronic Mail

Mr. Thomas Lancaster
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Subject: **Western Nuclear, Inc. Split Rock Site, NRC Radioactive Materials License No. SUA-0056; Responses to NRC Questions and Requests for Clarification**

References: **(1) January 25, 2022 Letter from Western Nuclear, Inc. to NRC Regarding the Western Nuclear, Inc. Split Rock Site Long-Term Care Fee (Accession No. ML22026A092)**

(2) April 1, 2022 Letter from Western Nuclear, Inc. to NRC Regarding the Western Nuclear, Inc. Split Rock Site Long-Term Care Fee (Accession No. ML22095A156)

(3) September 2021 Department of Energy Office of Legacy Management Annual Cost Estimate for Long-Term Surveillance and Maintenance at the Split Rock Site (Accession No. ML21277A128)

(4) November 2021 Preliminary Final Long-Term Surveillance Plan for the Split Rock, Wyoming UMTRCA Title II Disposal Site, Jeffrey City, Wyoming (Accession No. ML21323A184)

(5) June 17, 2010 Letter from NRC (K. McConnell, Decommissioning and Uranium Recovery Licensing Directorate) to Department of Energy Office of Legacy Management, Office of Site Operations (R. Plieness), Determination of Long Term Care Fee for Uranium Mill Tailings Radiation Control Act Title II Sites (Accession No. ML100670337)

(6) September 8, 2004 Letter from NRC (G. Janosko) to Kennecott Energy Company (J. Trummel), Determination of Long Term Surveillance Charge for the L-Bar Uranium Mill Tailings Site (Accession No. ML042580457).

(7) Long-Term Surveillance Plan for the U.S. Department of Energy L-Bar, New Mexico, (UMTRCA Title II) Disposal Site, Seboyeta, New Mexico (Accession No. ML043450085)

(8) August 29, 1997 Letter from NRC (J. Holonich) to DOE (J. Virgona), Long-Term Care Fund for the Bluewater Mill Site (Accession No. ML103410026).

(9) July 1997 Long-Term Surveillance Plan for the DOE Bluewater (UMTRCA Title II) Disposal Site Near Grants, New Mexico (Accession No. ML12263A274)

(10) October 14, 2021 Letter from U.S. Department of Energy, Office of Legacy Management (P. O'Konski) to NRC (P. Holahan) (Accession No. ML21300A005)

(11) March 2022 Evaluation of In-Service Radon Barriers Over Uranium Mill Tailings Disposal Facilities (NUREG/CR 7288, Vols. 1 & 2) (Accession Nos. ML22089A080 and ML22089A153, respectively)

(12) February 1994 Western Nuclear, Inc. Split Rock Mill, Addendum A to Revision No. 5 To the June 30, 1987 Uranium Tailings Reclamation Plan, Vols. 1, 2 & 3 (Accession Nos. ML083120478, ML083120479, and ML083120480, respectively)

(13) April 1999, Split Rock Tailing Reclamation Construction Completion Report Vol. 1 of 2 (Accession No. ML11209C525)

(14) November 13, 1998 Letter from Western Nuclear, Inc. (S. Baker) to NRC (J. Holonich) Re: DOCKET NO. 40-1162, LICENSE NO. SUA-56, RADON FLUX SAMPLING DATA (Accession No. ML11209B926)

Dear Mr. Lancaster:

On behalf of Western Nuclear Inc. (WNI), I am writing to provide you with additional information that is pertinent to the NRC staff's determination of the Long-Term Care Fee (LTCF) for the WNI Split Rock Site. During an April 11, 2022 telephone conversation, you requested that WNI clarify information that WNI provided to the NRC in a letter dated April 1, 2022 (**Reference No. 2**). WNI

greatly appreciates the opportunity to provide this additional information to the NRC, and thanks you and the NRC staff for the open communications we have experienced during this process.

In our January 25, 2022 letter (**Reference No. 1**), WNI stated its position that the LTCF for the Split Rock Site should be calculated in the same manner as the fee for the six uranium mill sites regulated under Title II of the Atomic Energy Act (AEA) of 1954, as amended by Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978, that have previously been assessed such fee (i.e., roughly equivalent to the minimum charge of $250,000 (1978) identified in 10 C.F.R. Part 40, Appendix A, Criterion 10). In our April 1, 2022 letter (**Reference No. 2**), WNI reiterated its position that the Split Rock site should be assessed an LTCF roughly equivalent to the minimum charge of $250,000 (1978 dollars), or approximately $1.1 million (2022 dollars).

WNI also expressed in **Reference No. 2** that, if the NRC staff chooses to take approach different from the one set forth in Criterion 10 to determine the LTCF, such as by using the DOE annual cost estimate contained in **Reference No. 3** as the basis for developing the LTCF, then the NRC staff should consider information provided by WNI in **Reference No. 2** on DOE's annual cost estimate. Among other things, WNI explained that the DOE Annual Cost Estimate Summary (**Reference No. 3**) inappropriately includes costs for activities (1) that have no nexus to radiological health and safety, or are part of DOE's internal management processes, and thus should not be used as a basis for calculating the LTCF, including annual noxious weed control and rangeland health assessments; and (2) that would not occur annually, resulting in an annual cost estimate that is inappropriately inflated, and that a more accurate cost accounting approach would be to use a time-phased estimate of costs.

During our April 11, 2022 phone conversation, you requested clarification on some of the information provided by WNI in **Reference No. 2**. In response, WNI provides the following information.

<u>Applicability of 10 C.F.R. § 40.28 (General license for custody and long-term care of uranium or thorium byproduct materials disposal sites) and Regulatory Issue Summary (RIS) 2011-11 (Regarding Long-Term Surveillance Charge for Conventional or Heap Leach Uranium Recovery Facilities Licensed Under 10 CFR Part 40</u>

You asked for clarification on the applicability of 10 C.F.R. § 40.28 to the costs that are to be considered as part of the LTCF. In particular, you noted that language in 10 C.F.R. § 40.28 suggests that regular, active maintenance of a disposal site (such as noxious weed control and rangeland health assessments) may be required. For example, 10 C.F.R. § 40.28(b)(2) provides in part that that the Long Term Surveillance Plan (LTSP) the Department of Energy (DOE) prepares for a particular site must contain a description of the site sufficiently detailed "*so that future inspectors will have a baseline to determine changes to the site and when these changes are serious enough to require maintenance or repairs.*" And, in accordance with 10 C.F.R. § 40.28(b)(5), the LTSP must contain "*criteria for instituting maintenance or emergency measures*."

You also asked for clarification on the applicability of RIS 2011-11 to the costs that are to be considered as part of the LTCF. In particular, you noted that RIS 2011-11 states in part that the NRC may consider increasing the LTCF above the minimum amount, adjusted to current year

dollars, to cover any "*additional expected long-term surveillance and control activities relied on for the performance of tailings impoundment,*" and that the NRC "*may consider increasing the [LTCF] for long-term maintenance and control activities undertaken to ensure maintenance of radiological health and safety, such as, but not limited to (1) groundwater monitoring; (2) rip-rap, erosion or other cover repair; (3) fencing; and (4) vegetation control.*"

WNI Clarification: The DOE Annual Cost Estimate Summary (**Reference No. 3**) includes costs for activities that are not identified in the Preliminary Final Draft LTSP DOE prepared for the WNI Split Rock site (**Reference No. 4**) as routine maintenance activities and therefore should not be accounted for in the LTCF. This is consistent with the guidance provided in RIS 2011-11, which requires in relevant part that DOE, as the custodial agency, include commitments in the LTSP that would increase the LTCF above the minimum.

To be clear: any additional charges included in the LTCF above the minimum charge specified in Criterion 10 must have a specific basis provided in the LTSP, i.e., a specific action with a nexus to radiological safety. Absent such specific basis, the charge(s) should not be included in the LTCF.

In addition, the DOE Annual Cost Estimate Summary purportedly includes costs for routine maintenance activities identified in Section 3.6.1 of the LTSP (**Reference No. 4**) but provides no description or basis for the activity's nexus to radiological safety, or any appropriate criteria for instituting maintenance or emergency measures. Indeed, the DOE has previously admitted in **Reference No. 10** that the DOE Cost Estimate "includes items [the NRC] may not consider directly necessary for radiological safety," and that DOE does not expect that the LTCF will cover all of DOE's long-term surveillance and maintenance costs for this reason. The specific issues addressed in more detail below include noxious weed control, rangeland health assessment, fencing, and indirect charges related to overhead. The LTCF should not include charges for these costs.

Noxious Weed Control. The sole description of the noxious weed control activity in the Preliminary Final Draft LTSP (**Reference No. 4**) is provided in Section 3.6.1, which states "*DOE will conduct vegetation control **as needed** to control noxious and invasive weed species.*" [emphasis added]. The Initial Site Inspection Checklist included as Appendix C to the Draft Final LTSP indicates "*Note occurrence of listed noxious or invasive weeds; control **as needed**.*" [emphasis added].

Notwithstanding the clear language in the LTSP on the speculative potential to control "as needed" any noxious weeds, the DOE Annual Cost Estimate Summary (**Reference No. 3**) assumes such activity will be annual. That annual cost estimate summary estimates annual "Maintenance" costs of $30,869.03. The description of these costs includes the following statement:

> "*Noxious weed control is DOE contractor-performed annually, including lodging and per diem for three staff, and GSA vehicle; Rangeland health assessment is DOE contractor-performed once every three years in conjunction with noxious weed control.*"

DOE's bid to include costs for noxious weed control fails for at least three reasons discussed below: (1) the Split Rock Preliminary Final Draft LTSP contains no information justifying the

need for such costs to protect the Split Rock radon barrier; (2) existing NRC studies on the performance of in-service radon barriers do not support the need for noxious weed control to assure compliance with applicable performance criteria; and (3) the Split Rock radon barrier was approved in both its design and as constructed, and it also includes additional conservatisms not modeled in the barrier design, which further assure its long-term performance.

The purported need for annual noxious weed control is not evident from or suggested by the Preliminary Final Draft LTSP (**Reference No. 4**). Section 3.6.1 of the LTSP states that UMTRCA disposal sites are designed and constructed so that ongoing active maintenance is not needed to preserve isolation of radioactive materials, and that the Split Rock tailings impoundment was designed and constructed to minimize the need for routine maintenance. Further, although Section 3.6.1 states that DOE will conduct vegetation control only "*as needed*" to control noxious and invasive weed species, it provides no criteria for when such control would be needed, as required by 10 C.F.R. § 40.28(b)(5). The LTSP provides no information on why any noxious weeds present a threat to the Split Rock tailings impoundment. Also, the term "*noxious weeds*" is undefined,[1] and no information is presented suggesting that the vegetation at issue has the potential to penetrate into the radon barrier. Further, while WNI is aware of data that indicate root penetration can affect overall barrier radon flux rates, WNI is not aware of any data that demonstrate that *noxious weed* root penetration results in radon barriers failing to meet the specified flux criteria of 20 pCi/m^2/second. Stated differently, it seems that DOE has assumed that any noxious weeds might be penetrating and unacceptably deleterious to the radon cover performance without justification. DOE has presumed that changes to cover performance are unacceptable and that routine noxious weed control maintenance activity must be conducted annually without compelling evidence or criteria.

NRC's own research on the performance of in-service radon barriers recently published in NUREG/CR-7288 (**Reference No. 11**) confirms that the conservatism built into the design of the barriers has allowed the conventional clay radon barriers to continue to meet the average cover radon flux requirement of 20 pCi/m^2/second (0.74 Bq/m^2/second) identified in Criterion 6(1) of Appendix A to 10 CFR 40. These conservatisms include assuming extremely dry conditions equivalent to a worst-case moisture content under 15 bars of suction (or approximately the soil wilting point), and using clays that tend to self-heal and fill voids due to the plasticity of the material.

As presented in NUREG/CR-7288 (**Reference No. 11**), Volume 1, Section 4, for all four sites on which in-service radon barriers were tested for radon flux, ***none of the individual test pits at any site*** had a geometric mean radon flux greater than the performance criteria (20 pCi/m^2/second or 0.74 Bq/m^2/second) and ***the average of all the test pit data were well below the average radon flux performance criteria***.[2] These test pits were specifically focused on areas affected by deep

[1] USDA identifies "noxious weeds" as nonindigenous plants that are ecologically undesirable.

[2] More specifically, NUREG/CR 7288 Table 4-8 provides that (a) the Fall City, Texas, cover had an average measured radon flux of 0.22 Bq/m^2/second or roughly 31% of the performance standard; (b) the Bluewater Site cover had an average measured radon flux of 0.12 Bq/m^2/second or roughly 17% of the performance standard; (c) the Shirly Basin South, Wyoming Site cover had an average measured radon flux of 0.057 Bq/m^2/second or roughly 8% of the performance standard; and (d) the Lake View, Oregon, Site cover had an average measured radon flux of 0.009 Bq/m^2/second or roughly 1% of the performance standard.

rooted plants and were not designed to analyze representative average conditions on the cover. These data demonstrate that the conservatism incorporated in the tailings reclamation design requirements are prudently sufficient to ensure that anticipated changes to the cover materials (be they be rip rap weathering or pedogenic soil forming processes that affect the engineered properties of the radon barrier) are sufficient to ensure long-term barrier performance. Therefore, although root penetration is confirmed to increase radon flux from the as-built conditions (as-built conditions are intended to be substantially below the performance standard), the intended resilience of the cover design to accommodate the impacts of 1,000 years of environmental weathering and waste isolation is confirmed by these studies. NUREG/CR-7288 does not conclude that the barriers have failed or are at risk of failing the performance criteria, or that the presence of roots, now or in the future, will cause them to fail the performance criteria.

Although there is no evidence that deep rooting plants will cause or have caused radon barriers to fail in retarding radon flux to below 20 pCi/m^2/second averaged of the entire tailings surface, the Split Rock Site tailings cover was designed and constructed with additional conservatism not modeled in the barrier design, which further decreases the likelihood that the radon barrier will fail to meet the performance criteria in Criterion 6(1) of 10 CFR Part 40 Appendix A.

The Split Rock tailings cover was constructed with weathered Cody Shale, quarried from the Crooks Gap area to the south of the Split Rock site.[3] The characterization of the Cody Shale materials is presented in **Reference No. 12** at Volume 2, Appendix A.7 and A.8. The materials were tested for the following physical properties: Specific Gravity, Proctor Dry Density, Permeability (Falling Head), Dispersion, and 15-Bar Moisture content. As identified in Appendix A.8 (Cody Shale Geotechnical Testing Results), the clay barrier materials were predominantly highly plastic clays, classified as CH by the unified soil classification system (Ingberg-Miller Engineers 12/21/1992 test results in Appendix A.8). These highly plastic materials will tend to have high moisture retention characteristics and will tend to swell and flow to fill voids left by roots that slowly decay after plant death.

The Split Rock radon barrier incorporates multiple conservatisms that further demonstrate the unlikelihood that the radon barrier will fail to meet the performance criteria:

- First, the radon attenuation properties of the interim soil cover layer were not included in the design of the radon barrier layer. This additional material layer will decrease the reliance on the clay barrier to be the primary mechanism for radon attenuation.

- Second, an additional "sacrificial clay" layer was placed in the cover. As documented in the final Construction Completion Report (**Reference No. 13**) at Section 1.3.1.3.4, Addition of Sacrificial Clay Layer: "*The required reclamation cover consisted of a radon barrier (Cody Shale clay) layer with a minimum thickness varying from 6 inches to 44 inches, and a layer of borrow soil 8 to 12 inches thick. In 1994 during the initial stages of construction of Areas 3A and 3B, it was found that the subgrade surface did not provide*

[3] The Cody Shale materials were placed in accordance with the technical specification provided in 1994 Addendum to the 1987 Split Rock Uranium Mill Tailings Reclamation Plan (**Reference No. 12**) at Volume 1. The radon barrier design was included in Volume 3 of the Addendum (**Reference No. 12**). The Split Rock Tailing Reclamation Construction Completion Report (Reference No. 13) was provided to the NRC in April of 1999.

an adequately firm base for placement of the first 6-inch thick lift of the radon barrier. As a result, ***an extra 4-inch thick layer of Cody Shale clay, was placed over the subgrade****. This clay layer provided a firm surface with the dry strength needed to assure that the first radon barrier lift was a full 6 inches thick and was not mixed with tailing subgrade. This additional clay was referred to as "sacrificial clay" because it was not included in the RADON model.*" [emphasis added].

- Third, radon barrier layer thicknesses were determined assuming that all subsequent layers would be compacted to 95 percent of Standard Proctor Density. However, the as-built average density was 98.9 percent of Standard Proctor Density. The additional density decreases the as-built porosity and permeability of the barrier and, as a result, increases the radon attenuation beyond that modeled. Radon Flux Measurements from the as-built barrier were presented to the NRC in November 1998 in **Reference No. 14**, which showed almost all fluxes as less than 0.5 pCi/m2/second (0.0185 Bq/m2/second), or roughly 2.5% of the performance criteria.

In addition, it is also noted that none of the other Title II sites previously transferred to the DOE (Edgemont, Shirley Basin South, Bluewater, L-Bar, Maybell West[4]) have noxious weed control as a routine maintenance activity. All of these sites were designed and constructed with engineered clay radon flux barriers similar to that of the Split Rock Site.

In summary, DOE's LTSP states that noxious weed control is to be performed "as needed" but the cost estimate incompatibly assumes a large team to perform this activity annually. But this activity has no demonstrated necessity for radiological safety and should not be included in the LTCF. The fundamental issue here is not that plants can have an impact on radon barrier performance. Rather, the issue is that the nexus of weed control to long-term cover compliance and radiological safety is not established. Further, 10 CFR 40.28(b)(5) requires that there be "*criteria for instituting maintenance or emergency measures*," but the potential presence of vegetation alone is clearly not sufficient. This is particularly so in light of the numerous built-in conservatisms in the Split Rock cover, and the recent studies of in-service barriers discussed above that demonstrate continued performance of covers with deep rooted plants, maintaining radon flux below the performance criteria. Therefore, the inclusion of noxious weed control in the LTSP (a) appears arbitrary and is inconsistent with the previous Title II site LSTPs, (b) is not supported by a description of its nexus to radiological safety, and (c) does not include any criteria for when maintenance (weed control) is needed to ensure the tailings impoundment cover performance.

Rangeland Health Assessment. With respect to any costs associated with the "*rangeland health assessment,*" the Preliminary Draft Final LTSP (**Reference No. 4**) nowhere mentions any "*rangeland health assessment*" or what that would entail, what nexus it has to the tailings isolation, stability, or radiological safety, or what activities would be associated with such assessment. Indeed, in a letter dated October 14, 2021 (and signed on October 26, 2021) (**Reference No. 10**), the DOE Office of Legacy Management wrote to the NRC stating that the costs for the rangeland health assessment would not be directly necessary for radiological safety. Thus, no adequate basis exists to include these costs in the Split Rock LTCF.

[4] The Sherwood Site has a thick soil vegetated cover that does not rely on an engineered radon barrier to control radon flux

Fencing. The estimated Maintenance costs in DOE's Annual Cost Estimate Summary (**Reference No. 3**) also includes costs for replacing "*12,500 linear foot of fencing. once every 50 years by a subcontractor managed and procured by DOE contractor staff, including logding [sic] and per diem for two construction oversight visits, and a GSA vehicle.*" These costs, however, are also inappropriately included in the annual cost estimate.

Although grazing historically was permitted in areas directly adjacent to the tailings disposal area in previous years, WNI is not transferring to DOE any grazing leases for any lands associated with the Split Rock Site. Any future grazing will be solely at DOE's discretion and the existing fencing noted in the LTSP is not necessary for stabilization of the tailings.

Although Preliminary Final Draft LTSP (**Reference No. 4**) Section 3.6.1 states in part that, "*The tailings impoundment area is also isolated by fencing and granite outcrops to prevent damage from livestock grazing,"* fencing of the rangeland within the LTSP has no technical or regulatory nexus with applicable means to ensure tailings stabilization or radiological safety. The sole rationale for inclusion of fencing by the DOE in the LTSP cost determination apparently is based on the DOE's unilateral and discretionary preference to grant grazing leases within the LTSP *post transfer*. The DOE may, post transfer, unilaterally elect to manage the land within the LTSP through other means, such as to revert the land use to wildlife habitat or otherwise allow the land to remain undeveloped to improve natural resource and environmental outcomes, as well as numerous other land use choices, none of which requires the fencing currently in place, its maintenance, or requires subsequent fencing replacement currently reflected in the costs imbedded LTCF calculations.

Moreover, the Section 3.6.1 of the LTSP explicitly states that other individuals (neither WNI nor DOE) will be responsible for any costs associated with future fencing: "*On the portions of the site where livestock grazing is permitted, the grazing leasee(s) will be required to maintain all fencing used for livestock management onsite.*" Further, the LTSP does not specify criteria for when fencing maintenance is required but simply states "*DOE will perform routine site maintenance, where and when needed, to maintain protectiveness.*"

Therefore, the costs for fencing and any requirement for fencing should be removed because (a) livestock grazing is not a land use permitted on any lands to be transferred to DOE at the time of transfer; (b) any grazing to be allowed (and any fencing required) is at the sole discretion of the DOE, (c) the LTSP states that any costs for such fencing are to be the financial responsibility of any leasee(s) DOE permits to use the lands and not the burden of the DOE (or WNI), and (d) whatever maintenance might be required has not been sufficiently defined to comply with the requirements of 10 C.F.R. § 40.28(b)(5).

Overhead: The DOE Annual Cost Estimate Summary (**Reference No. 3**) includes overhead-related charges for DOE to "perform project management activities as a DOE operated and managed site." There is no nexus to radiological safety for these indirect charges for overhead.

WNI notes that, in **Reference No. 5**, the NRC staff told DOE that "*only those measures relied on for the performance of the tailings impoundment (i.e., those measures having a nexus with the*

radiological safety of the facility) would be considered longterm care activities that would merit an increase in the fee," and "*increased fees may be warranted to ensure that the protection of public health and safety and the environment is confirmed.*" But the NRC also stated that, if a custodial agency desires to have commitments in the Long-Term Surveillance Plan that go beyond the requirements set forth in 10 CFR Part 40, Appendix A, "*the custodial agency will need to identify a funding mechanism to meet such commitments*".

This is the case with respect to the noxious weed control, the rangeland health assessment, the fencing, and the overhead/project management charges identified in the DOE Annual Cost Estimate (**Reference No. 3**). There is no showing that these measures are needed to show compliance with 10 CFR Part 40, Appendix A, thus the LTCF should not be adjusted to account for such costs.

The point is further illustrated by examples at other UMTRCA sites where DOE has specifically identified measures relied on for the performance of the tailings impoundment (i.e., measures having a nexus with radiological safety) that have justified an increase in the LTCF assessed by the NRC for those sites:

- In **Reference No. 6**, the NRC assessed a "*A basic long-term surveillance charge of $697,194 derived from the escalation of $250,000 in 1978 dollars through September 2004, as specified in 10 CFR Part 40, Appendix A, Criterion 10, to account for the effects of inflation*" for the L-Bar site. The NRC also assessed a "*maintenance bond of $1,000 for mitigation of potential sedimentation in the L-Bar flow diversion channels in an estimated 450 to 500 years*" in the future. The NRC's addition of the $1,000 maintenance bond directly corresponded to the finding in Section 3.6.1 of the L-Bar LTSP (**Reference No. 7**) that it is "*anticipated that it will be necessary to clean out the sediment trap after 600 years to maintain the as-built run on/run off control design conditions.*"

- In **Reference No. 8**, the NRC assessed a "*Basic licensee long-term care funding equal to $594,165 per 10 CFR Part 40, Appendix A, Criterion 10 ($250,000 in 1978 dollars escalated to September 1997)*" for the Bluewater site. The NRC also assessed *"[a]dditional licensee funding equal to $41,000 for sampling of groundwater for [polychlorinated biphenyls (PCBs)]*" for four wells yearly for 20 years, and three wells yearly for 6 years. This additional cost directly corresponded to the measure identified in Section 3.7.1 (Groundwater Monitoring) of the Bluewater LTSP (**Reference No. 9**) for "*groundwater monitoring for PCB detection [] as described in the EPA-approved monitoring plan for the PCB-byproduct disposal facility.*"

- Also in **Reference No. 8**, the NRC stated that it did not assess any additional cost associated with fence maintenance, *"[s]ince fencing is not required to ensure compliance with the regulations in 10 CFR Part 40 Appendix A.*" This is consistent with the Bluewater LTSP, which did not identify any nexus between fencing and radiological safety. The Bluewater LTSP (**Reference No. 9**) states in Section 3.6.1 only that that the "*long perimeter of the site property and the utility right-of-ways inside the site property are fenced with a 4-strand barbed-wire fence to prevent livestock grazing. Some livestock and wildlife entry to the site*

will occur and fence repair and maintenance will be conducted as necessary to maintain the integrity of the fences."

In summary, the circumstances for the L-Bar and the Bluewater sites are different from the Split Rock site because the LTSPs for those sites identified specific, additional measures with a nexus to radiological safety to be taken for which the NRC assessed a fee. The Split Rock LTSP does not identify any such additional measures and there is no basis for including noxious weed control or rangeland health assessment as necessary routine maintenance activities where it is not a required activity for any other previously transferred UMTRCA Title II Site with similar cover design.

And importantly, as made clear from the L-Bar and Bluewater examples, when the NRC staff does escalate the long-term care fee from the minimum charge in Criterion 10, its past practice has been to do so only by the increment of cost needed to pay for only those activities specifically identified as having a nexus to radiological safety. In other words, the starting point is $250,000 (1978 dollars) escalated to 2022 dollars, which amount might be increased by the net present value of time-phased costs for only those additional activities that have a nexus to radiological safety.

Calculating Long-Term Surveillance Costs Using Average Annual Costs Versus Discounted Cash Flow of Costs

You also asked for information on WNI's suggestion that more accurate cost accounting approach would be to use a time-phased estimate of costs (in other words, a discounted cash flow of costs) for the long-term surveillance activities.

WNI Clarification: Criterion to 10 CFR 40 Appendix A states in part "*In any case, the total charge to cover the costs of long-term surveillance must be such that, with an assumed 1 percent annual real interest rate, the collected funds will yield interest in an amount sufficient to cover the annual costs of site surveillance*." This indicates that the amount to be provided at the time of license transfer is understood to increase in value over time at an annual rate growth of 1 percent, and that the available funds must cover the projected future costs in the year those costs are to occur. The annual costs of site surveillance are not uniform in any given year as the scope, and therefore the costs, of some activities vary year to year and different costs are incurred in different years. In order to ensure that the amount provided by the Licensee in current dollars meets the future annual costs of site surveillance, the present value of those future costs must be appropriately determined.

Specific guidance on how to calculate that present value for this financial assurance has not been identified in review of relevant NRC guidance for uranium mills and byproduct material disposal. However, it is noted that present worth calculations considering the time value of money is addressed in an analog manner in Appendix N to NUREG-1757 Volume 2, Rev. 1 (NRC, 2006), which addresses ALARA analyses and calculation of the benefit of averted dose (B_{AD}).

In the referenced volume of NUREG-1757, the present value in US dollars for B_{AD} is taken as product of the present worth in US dollars of the collective averted dose ($PW[AD_{collective}]$) and the value of averted dose (V_{AD}), as shown below.

(Equation 1): $B_{AD} = V_{AD} \times PW(AD_{Collective})$

Where

B_{AD} = benefit from an averted dose for a remediation action, in current U.S. dollars

V_{AD} = value in dollars of a person-rem averted (see NUREG/BR–0058; NRC, 2017)

$PW(AD_{Collective})$ = present worth of a future collective averted dose

Equation 2 identifies the equation for calculating the present worth of future collective averted doses.

(Equation 2): $PW(AD_{Collective}) = P_D \, x \, A \, x \, 0.025 \, x \, F \, x \, \frac{Conc}{DCGL_W} \, x \, \frac{1 - e^{-(r+\lambda)N}}{(r+\lambda)}$

Where

P_D = population density for the critical group scenario in people/m^2;

A = area being evaluated in square meters (m^2), this is the area inside the proposed control boundary where groundwater concentrations may be accessed.

0.025 = annual dose to an average member of the critical group from residual radioactivity at the Derived Concentration Guideline Level ($DCGL_W$) concentration in rem/y;

F = effectiveness, or fraction of the residual radioactivity removed by the remediation action;

Conc = average concentration of residual radioactivity in the area resulting from implementation of an alternative, activity per unit volume for groundwater; (pCi/L)

$DCGL_W$ = derived concentration guideline equivalent to the average concentration of residual radioactivity that would give a dose of 0.25 mSv/y (25 mrem/y) to the average member of the critical group, (pCi/L)

r = monetary discount rate in units per year;

λ = radiological decay constant for the radionuclide in units per year; λ = 0.693/T, where T is 1/2 life of isotope.

N = number of years over which the collective dose will be calculated.

This equation accounts for radiological decay via the term lambda (λ) of the relevant radioisotopes being considered. At the core of this calculation is the term $\frac{1 - e^{-(r+\lambda)N}}{(r+\lambda)}$. Disregarding the radiological decay term λ in this equation yields the term $\frac{1 - e^{-rN}}{(r)}$ in which the term $1 - e^{-rN}$ is the discount factor for each year (N=1, 2, 3, etc.) with the discount rate of r.

While the information above is not presented as the applicable equation for calculation of present worth for future long-term maintenance and surveillance costs at a uranium tailings disposal site, it illustrates that NRC has a clear precedent and basis for considering generally accepted accounting practices for discounting future costs.

As illustrated in the attached Excel spreadsheet hypothetical example calculation, discounting the future costs based on the years in which they are projected to occur has significant implications for calculated present worth.[5] The net present value calculation used in the attached example is as follows:

$$\text{Net Present Value (NPV)} = \frac{cost\ year\ N}{(1+r)^N} + \frac{costs\ year\ N+1}{1+r^{N+1}} + \frac{costs\ year\ N+2}{(1+r)^{N+2}} + etc.$$

This equation is a commonly accepted accounting practice.

As stated in our previous communications including **Reference No. 2**, if the NRC staff elects to escalate the long-term surveillance charge based on additional maintenance activities, the DOE cost basis should be more detailed so as to be transparent to the Licensee while still protecting proprietary contractor rate information. The attached spreadsheet hypothetical example provides an example of the basis for more detailed (task-specific) non-proprietary cost information that can be provided that allows the Licensee to understand the costs basis for activities it is being required to fund.

The NPV calculations are often used as a proxy for the fair value of an asset or liability in the absence of a readily available market price and reflects economic reality: a dollar today is worth more than a dollar tomorrow since a dollar received today can be invested and earn a return; therefore, valuing an asset or liability by its future (or nominal) value can be misleading. The calculation of present worth is consistent with U.S. Generally Accepted Accounting Practices (GAAP), which is the standard for reporting financial statements for a wide variety of entities, including public/private companies, non-profit organizations, and governments.

WNI appreciates the opportunity to provide this input into your ongoing LTCF evaluation and review processes. Should you have any questions for WNI, please do not hesitate to contact me at lcorte@fmi.com.

Sincerely,

Lawrence J. Corte

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[5] The attached spreadsheet includes a cost for fencing maintenance. As explained earlier in this letter, WNI does not believe such costs should be included in the Split Rock LTCF. Nonetheless, these hypothetical costs are included in the attached spreadsheet to illustrate another example of how NPV can account for an activity that is scheduled to occur infrequently over the compliance period.