Gallagher, Carol

Subject: FW: Comments on Draft NUREG-2126
Attachments: 2015-06-18 NRC Draft NUREG-2126 EFRI Comments.pdf

12/18/2014

79 FR 75597

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From: Scott Bakken [mailto:SBakken@energyfuels.com]
Sent: Friday, June 19, 2015 10:35 AM
To: Mandeville, Douglas
Cc: Kimberly Morrison, PE, RG
Subject: Comments on Draft NUREG-2126

Doug,

Further to our discussion yesterday, attached please find a copy of Energy Fuels Resources (USA) Inc.'s (Energy Fuels') comments on NUREG-2126: Standard Review Plan (SRP) for Conventional Uranium Mill and Heap Leach Facilities, Draft Report for Comment, which were submitted on June 18, 2015, through the Federal Rulemaking Website. As referenced in the attached, Energy Fuels would be happy to answer any questions the NRC may have or provide additional information to assist the NRC in finalizing the SRP. Thanks again for the opportunity to comment.

Regards,

Scott

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Add= D. T. Mandeville (dtm1)

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June 18, 2015

Cindy Bladey, Chief
Rules, Announcements, and Directives Branch (RADB)
Division of Administrative Services
Office of Administration
Mail Stop: 3WFN-06-A44MP
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

RE: DOCKET ID NRC-2014-0178, COMMENTS ON NUREG-2126: STANDARD REVIEW PLAN FOR CONVENTIONAL URANIUM MILLS AND HEAP LEACH FACILITIES, DRAFT REPORT FOR COMMENT

Dear Sirs/Mesdames:

Energy Fuels Resources (USA) Inc. (Energy Fuels) has reviewed the U.S. Nuclear Regulatory Commission's (NRC's) Draft NUREG-21260, "*Standard Review Plan for Conventional Uranium Mill and Heap Leach Facilities*" (the "Draft SRP"). Energy Fuels operates the White Mesa Uranium Mill in Utah, which is the only operating uranium mill in the United States. Energy Fuels is also in the process of permitting the Sheep Mountain project, which is a proposed uranium mine in Wyoming with the potential for on-site uranium heap leach processing As such, the Draft SRP, which applies to conventional uranium mills and heap leach facilities, is of utmost interest to Energy Fuels. This letter provides Energy Fuels' comments on the Draft SRP.

1.0 INTRODUCTION

In general, Energy Fuels finds the Draft SRP to be a well thought out and beneficial document to assist licensees in preparation of new license applications, and renewals to existing licenses, as they pertain to conventional uranium mills and heap leach facilities. However, we believe that the Draft SRP cannot be finalized by the NRC until the implications of other regulatory actions, such as the U.S. Environmental Protection Agency's (EPA's) proposed revisions to 40 CFR Part 61 – Subpart W (*National Emission Standards for Radon Emissions from Operating Uranium Mill Tailings*), are well understood. The EPA's proposed Subpart W revisions have a direct and potentially serious impact on the design and operation of conventional uranium mills and heap leach facilities in the United States. And, Energy Fuels has provided extensive comments to the EPA in this regard.

2.0 SPECIFIC COMMENTS ON THE DRAFT SRP

The following table provides a listing of specific comments on the Draft SRP, with reference to the location within the document:

Comment #	Section	Page	¶	Comment
EF-1	Executive Summary	xi	2	Most byproduct material from conventional uranium mills is "mill tailings," while most byproduct material from heap leach facilities is "spent ore." We recommend that reference to byproduct material remaining in a heap leach facility after processing is complete be changed to "spent ore," or simply "byproduct material," and that this change be made throughout the document.
EF-2	Executive Summary	xiii	2	This section states "SRP Appendix B provides a correlation between 10 CFR Part 40, Appendix A requirements and the subsection(s) in this SRP..." but does not provide reference to the correlations with 10 CFR Part 2, 10 CFR Part 20 and 10 CFR Part 40, which are also included in Appendix B.
EF-3	2.1.4	2-4	1 & 3	Several places within this discussion refer only to "tailings," but should also include "spent ore" when referring to heap leach facilities.
EF-4	2.3.3(3)	2-8	-	This section states that $PM_{2.5}$ and PM_{10} nonradiological air monitoring data is needed to meet the Acceptance Criteria for site meteorology, with collection of the data for at least 1 full year prior to site construction. NRC regulations and guidance in 10 CFR Part 40, Appendix A, Criterion 7, Regulatory Guide 3.63, and Regulatory Guide 4.14, do not require such data. This could affect pending license applications to the NRC, such as the Sheep Mountain Project in Wyoming, which has several years of air monitoring data, but no $PM_{2.5}$ or PM_{10} monitoring capabilities[1]. The need for $PM_{2.5}$ and PM_{10} nonradiological air monitoring data to meet the Acceptance Criteria for site meteorology should be removed from the Draft SRP.
EF-5	2.6.3(1)(c)	2-19	-	This statement indicates that techniques used as part of the geotechnical site characterization are able of detecting discontinuities, fractures and other zones of high hydraulic conductivity. Through the geotechnical exploration program, detection of discontinuities such as mentioned herein is a goal; however, geotechnical exploration programs do not provide 100% coverage of a site, and such conditions may go undetected.
EF-6	2.6.3(2)	2-19	-	This section indicates that both geological and geophysical techniques should be used to delineate available borrow; however, we recommend that this statement be revised to geological and/or geophysical techniques. If off-site borrow sources are proposed for construction, this information may not be available.
EF-7	2.8.1.3(a) through (h)	2-34 through	-	Comparison of the descriptions of the radiological preoperational monitoring programs in these sections with NRC

[1] An Air Permit Application for the project was recently approved by the Air Quality Division (AQD) of the Wyoming Department of Environmental Quality (WDEQ) for Public Notice without on-site PM_x monitoring. Instead, background PM_x values were taken from AQD's State and Local Air Monitoring Station (SLAMS) network's Lander site.

Comment #	Section	Page	¶	Comment
		2-36		Regulatory Guide 4.14 indicates inconsistencies in the sample number, sample frequency and/or type of analyses to be conducted. It is recommended that these sections be reviewed and revised to ensure consistency with NRC Regulatory Guide 4.14 and avoid conflicting requirements. Examples of some of these inconsistencies are provided in the comments that follow.
EF-8	2.8.1.3(1)(c)	2-34		Preoperational surface water sampling described in lines 43 to 45 should be revised to note that both suspended and dissolved constituents are required per NRC Regulatory Guide 4.14.
EF-9	2.8.1.3(1)(e)	2.35	-	The statement in lines13 and 14 "Preoperational samples are collected for 12 consecutive months." is incorrect as it applies to vegetation and food samples. Per Table 1 of NRC Regulatory Guide 4.14, vegetation and food samples are collected at a frequency of three times during the grazing season and once at the time of harvest or slaughter, respectively.
EF-10	2.8.1.3(1)(h)	2-36	-	The statement in lines 25 through 27 "When radon flux data are required, at least 12 consecutive months of radon flux data are provided prior to major site construction" is incorrect. Per Table 1 of NRC Regulatory Guide 4.14, radon flux data are required for a frequency of "One sample during each of three months."
EF-11	2.8.2.3	Table 2.8.2-1	-	Section C. Physical Indicators requires that pH be determined both in the field and in the laboratory. The laboratory determination of pH should be deleted from the requirements. The holding time for pH measurement is 15 minutes from collection. Sending samples for laboratory determination of pH will result in all data being flagged "H" for exceeded holding time. Further, field samples may undergo evolution (degassing) of naturally-present CO_2 during packaging, shipment, and re-opening of sample containers at the laboratory. In the case of pH, the sample measured by the laboratory will tend to have generally lower CO_2 levels and generally higher pH than the corresponding measurement made in the field. Hence, field pH measurements are therefore more correctly representative of electrochemical conditions at the point and time of sampling.
EF-12	3.2	3-3 through 3-6	-	Section 3.2 Heap Leach Facilities appears to apply only to conventional in-place heap leach facilities. Other similar types of uranium recovery facilities that have been discussed by uranium companies in recent years include on-off heap leach facilities with a separate disposal cell for "spent ore", and use of a continuous vat leaching process (e.g., Innovat) with a separate disposal cell. Please consider expansion of this section to include other types of heap leaching operations.
EF-13	3.2.3(2)(a)	3-4	-	This section states "The size distribution of ore particles needs to be commensurate with the specifications of the geomembrane to avoid puncture...". However, in the case of a conventional heap leach facility, a drainage system comprised of crushed gravel and piping is typically placed adjacent to the geomembrane prior

Comment #	Section	Page	¶	Comment
				to stacking the ore above. Though the gravel in the drainage system may be comprised of crushed/screened ore, it is not often the case. Also, in the case of an on-off heap leach facility, a liner system that allows frequent traffic is typically required, and often includes asphalt or concrete as the upper surface to allow frequent trafficability. As such, we recommend revision of this statement to read: "*The size distribution of the drainage material (e.g., gravel or crushed ore) to be placed in contact with the geomembrane, if employed, will be commensurate with the specifications of the geomembrane to avoid puncture and associated leachate leakage.*" Liner load testing is a common test to evaluate this consideration.
EF-14	3.2.3(2)(c)	3-4	-	This sectiont discusses ore compaction under equipment loading, and indicates that the decrease in heap permeability at the top of the heap is especially critical. However, the ore consolidates and compresses much more under its own weight via placement of subsequent lifts of ore than would occur via equipment loading alone. As such, the consolidation of the ore near the base of the heap (and hence loss of permeability) is significantly greatly than near the surface. Consolidation/percolation and/or consolidation/permeability tests are common tests to show that ore will maintain permeability under load. If permeability is not maintained under the full heap height, operational considerations such as inter-lift drainage layers or inter-lift liners may be employed to facilitate flow of leachate. If local compaction of the ore occurs near the surface of the heap from equipment loading that limits the ability of leach solutions to percolate, the surface should be ripped to facilitate drainage; however, this is an operational consideration.
EF-15	3.2.3(3)	3-5	5	The last statement in this section indicates that the leach pad(s) are required to have sufficient storage to accommodate the entire quantity of ore to be leached. This statement is not applicable for on-off heap leach facilities, where ore is only temporarily placed on the leach pad, and then removed to a waste facility for long-term disposal. Also, given the potential regulatory requirement to only have two (2) up to 40-acre facilities operational at any given time[2], future leach pads may need to be considered in order to facilitate additional reserves or future expansion.
EF-16	3.3.2(11)	3-8	-	Criteria 5A(2) and 5G(2) of 10 CFR Part 40, Appendix A, as referenced, do not indicate that the top of the foundation beneath the surface impoundment (e.g., tailings impoundment, heap leach pad, pond) needs to "exhibit a low permeability." Instead, these criteria discuss the liner system design, and that characterization of the underlying soil and geologic formations should be sufficient to demonstrate the ability of the foundation

[2] Per EPA's proposed NESHAPs Subpart W rulemaking.

Comment #	Section	Page	¶	Comment
				to effectively "work with" the proposed liner system. The foundation soils do not necessarily need to demonstrate low permeability in order to achieve these requirements, and the term "low permeability" is somewhat subjective. We recommend that the first sentence in this section be rewritten to more closely follow the regulation in consideration, for example: "*Verify that the foundation of the impoundment is capable of providing resistance to pressure gradients above and below the liner to prevent failure of the liner due to uplift.*"
EF-17	3.3.2(12)	3-8	-	This section mentions verifying that the proposed liner is capable of withstanding stresses, with specific reference to installation stresses and daily operations. However, the liner system design should also demonstrate ability to withstand the stresses of ultimate "future" loading conditions, which typically equate to loads/stresses in excess of those from construction and daily operations.
EF-18	3.3.2(16), 3.3.2(17), 3.3.2(18)	3-9	-	These sections discuss the design requirements associated with ponds associated with heap leach facilities (paragraphs 16, 17 and 18) and conventional uranium mills (paragraph 18). The regulatory requirements for the various types of ponds are effectively the same, and we recommend that these sections be combined into a single section titled "Process Ponds and Evaporation Ponds."
EF-19	3.3.3(11)	3-15	-	This statement indicates that the "top part of the foundation acts as a barrier to vertical fluid flow, and consequently has a very low hydraulic conductivity." In reality, it is the liner system, and not necessarily "the foundation," that should act as a barrier to vertical fluid flow. JBR (1998) is referenced, indicating that the top 0.3 m of the "foundation" should have a hydraulic conductivity of 1E-6 cm/sec or less. However, in practice (such as for cyanide gold heap leach facilities), when heap leach facilities are designed using a single composite liner system (where solution heads are low) or a double composite liner system (where solution heads are high), a low permeability liner bedding soil, as described by JBR (1998), is often constructed in conjunction with the liner, when the *in situ* foundation materials do not demonstrate sufficiently low permeability (refer to Lupo & Morrison, 2007). Instead of prescribing that the foundation materials have a low permeability, a performance standard for the liner system is recommended. However, the NRC regulations in Criterion 5 of Appendix A to 10 CFR Part 40 refer to the EPA's regulations in 40 CFR Part 192, Subpart D, which then refers to 40 CFR 264.221, providing for a prescriptive liner system. EPA's prescriptive liner system includes 3 feet (91 cm) of compacted soil material beneath the bottom liner with a hydraulic conductivity of no more than 1E-7 cm/sec, which is significantly more stringent than the indicated one foot (0.3 m)

Comment #	Section	Page	¶	Comment
				of compacted soil with a hydraulic conductivity of no more than 1E-6 cm/sec. Fortunately, the NRC regulations provide for flexibility that allows the operator to demonstrate that the proposed liner system meets or exceeds EPA's prescriptive requirements.
EF-20	3.3.3(13)	3-17	4	This paragraph discusses the geomembrane "overliner" design, and refers to JBR (1998) indicating that the overliner should be thicker than 2 feet (0.6 m) with a maximum hydraulic conductivity of 1E-7 cm/sec. The referenced hydraulic conductivity is too low and not practical. Typically, the overliner is provided as both a protection layer as well as a "drainage or collection" layer. As such, a considerably higher permeability is typically desired for this layer. We recommend that the NRC remove reference to JBR (1998), and instead refer to Lupo & Morrison (2007), which discusses such characteristics of the overliner material as providing sufficient hydraulic conductivity under load, and the need to characterize overliner material for each project site and for compatibility with the proposed geomembrane liner.
EF-21	3.3.3(14)(b)	3-18	-	This paragraph refers to JBR (1998), suggesting a specific minimum permeability for the seepage detection layer, if aggregate materials are used. A minimum hydraulic conductivity of 1E-2 cm/sec is suggested. However, this recommendation is counter to the EPA's regulations in 40 CFR 264.221, by reference from Criterion 5 of Appendix A to 10 CFR Part 40 and subsequently 40 CFR Part 192, Subpart D. The EPA's regulation indicates that if granular materials are used for the leachate collection and removal system between liners, that the granular drainage materials should have a hydraulic conductivity of 1E-1 cm/sec or greater, and a thickness of 12 inches (30.5 cm) or more. In practice, it is often difficult to obtain a granular soil with a hydraulic conductivity of 1E-1 cm/sec or greater that would also be protective of the liner system (i.e., resist puncture), and hence synthetic materials are typically employed.
EF-22	3.3.3(16), 3.3.3(17), 3.3.3(18)	3-18 to 3-19	-	Refer to Comment EF-18 above, as the regulatory requirements for the various types of ponds are effectively the same, and we recommend that these sections be combined into a single section titled "Process Ponds and Evaporation Ponds."
EF-23	3.3.3(26)(h)	3-23 to 3-24	-	This paragraph indicates that seismic displacements of 15 cm to 30 cm may be acceptable. However, the actual acceptable displacement is a function of such things as strain on the proposed liner system resulting from differential displacements. We recommend removing reference to these actual displacement values, while maintaining the last statement in this section that "*the applicant has justified the acceptable permanent displacement value, which would not produce adverse*

Comment #	Section	Page	¶	Comment
				consequences..."
EF-24	3.3.3(32)	3-26 to 3-27	1	With regard to radon barrier cover design, consolidation testing of the embankment materials, foundation, and tailings is mentioned. Though consolidation of the ore on a heap leach facility is not typically significant, similar consideration should also be provided for the ore to be stacked on a heap leach facility.
EF-25	3.3.3(32)(a)(ii)	3-27	-	The increase in overburden pressure could also refer to pressures from placement of ore for a heap leach facility.
EF-26	3.3.3(39)	3-29	-	This paragraph indicates that seams of a synthetic liner will not run across a slope unless the applicant has provided a technical justification. Due to length limitations of geomembrane liner rolls, horizontal seaming across a slope is often required; however, the use of "continuous horizontal seams" is discouraged and can typically be avoided. We recommend that the NRC revise the first sentence in this paragraph to read: "*Continuous horizontal seaming of a synthetic liner across a slope will not be performed unless the applicant has provided technical justification.*"
EF-27	5.4.1 through 5.4.3	5-14 through 5-16	-	Within these sections, there are numerous references to the sampling of "animals" during the operational monitoring program. For consistency with NRC Regulatory Guide 4.14, it is recommended that references to "animals" be replaced with "food" or "livestock" as appropriate.
EF-28	6.4.3(2)	6-15		The determination of workers who will be monitored in a bioassay program references NRC Regulatory Guide 8.22, Revision 1(NRC, 1988, Section 2). The reference should be updated to reflect the most recent revision of the document, which is Revision 2 (NRC, 2014).

3.0 REFERENCES

Lupo, J.F. and K.F. Morrison (2007) "Geosynthetic Design and Construction Approaches in the Mining Industry." *Geotextiles and Geomembranes*. Vol. 25, No. 2.

Thank you for the opportunity to comment on the Draft SRP. Energy Fuels would be happy to answer any questions you might have and to provide additional information to assist the NRC in finalizing the SRP.

Respectfully Submitted,

Kimberly Morrison
Environmental Manager

Scott Bakken
Director, Permitting & Environmental Affairs

cc: Douglas Mandeville, NRC (douglas.mandeville@nrc.gov)