STATE OF UTAH
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WASTE MANAGEMENT AND RADIATION CONTROL

Technical Evaluation and Environmental Analysis

Silmet Alternate Feed Request

Energy Fuels Resources (USA) Inc.
White Mesa Uranium Mill

Utah Division of Waste Management and Radiation Control

April 2020

An Amendment Request to Radioactive Materials License UT 1900479 and Utah Groundwater Discharge Permit UGW 370004 to approve the Silmet uranium bearing material as an alternate feed material

Contents

Glossary of Terms

Below is a list of words, terms, and acronyms used for this licensing action. These words, terms and acronyms are based on regulatory, technical and industry definitions and are not always the same definition found in dictionaries and other common reference sources. The definitions that come from regulatory sources are the required definitions the Utah Division of Waste Management and Radiation Control Staff (the Division, or Staff) use.

11e.(2) - Refers to the paragraph in the Atomic Energy Act (AEA) of 1954, as amended which defines source material and byproduct material.

11e.(2) Byproduct Material - As stated in the AEA "The term "byproduct material" means…(2) the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content." 11e.(2) byproduct material generated at in-situ leach recovery (ISL or ISR) uranium recovery facilities is sometimes referred to as ISL byproduct material, ISL decommissioning debris or ISR decommissioning debris. NRC does not refer to 11e.(2) material as waste. Therefore, this document will *not* refer to 11e.(2) byproduct material as waste. Such a reference would be inappropriate since 40 CFR (EPA regulations) contains a specific definitions of various classes of waste (e.g., solid waste, hazardous waste, non-hazardous waste) that differ substantially from this definition, and 11e.(2) byproduct material cannot be disposed as any of these classes of waste. Furthermore, the definition of radioactive waste reported below specifically excludes 11e.(2) byproduct material.

ALARA - An acronym that stands for As Low As Reasonably Achievable. In the Utah Administrative Code (UAC) R313-12-3 ALARA is defined as "making every reasonable effort to maintain exposures to radiation as far below the dose limits as is practical, consistent with the purpose for which the licensed or registered activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed or registered sources of radiation in the public interest."

Agreement State - As defined in UAC R313-12-3 "Any State with which the Nuclear Regulatory Commission has entered into an effective agreement under subsection 274b. of the Atomic Energy Act of 1954, as amended." (Also found in 10 CFR 40.4)

Atomic Energy Act of 1954 - Also known by the acronym AEA. The Act requires that civilian uses of nuclear materials and facilities be licensed, and it empowers the NRC to establish by rule or order, and to enforce, such standards to govern these uses as "the Commission may deem necessary or desirable in order to protect health and safety and minimize danger to life or property." Under section 274 of the Act, the NRC may enter into an agreement with a State for

discontinuance of the NRC's regulatory authority over some materials Licensees within the State. The State must first show that its regulatory program is compatible with the NRC's and adequate to protect public health and safety. The NRC retains authority over, among other things, nuclear power plants within the State and exports from the State. (NRC.gov)

Conventional Impoundment - 40 CFR 61.125 defines a conventional impoundment as a permanent structure located at any uranium recovery facility which contains mostly solid uranium byproduct material or tailings from the extraction of uranium from uranium ore. This feature is distinguished from a non-conventional impoundment, which is defined below.

Director - As defined in UAC R313-12-3 "means the Director of the Division of Waste Management and Radiation Control."

Dose - As defined in UAC R313-12-3 "is a generic term that means absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or total effective dose equivalent." For purposes of this document, "radiation dose" is an equivalent term.

DOT - As defined in 49 CFR 171.8, as incorporated by reference in UAC R313-19-100, "means U.S. Department of Transportation"

ER - Acronym for the Environmental Report for the White Mesa Uranium Project written by Dames and Moore for Energy Fuels Nuclear, Inc. in January 1978.

FES - Acronym for the Final Environmental Statement for the White Mesa Uranium project written by the NRC in May 1979. (NUREG-0556)

License - Also known by the acronym RML (Radioactive Materials License). As defined in UAC R313-12-3 "means a license issued by the Director in accordance with the rules adopted by the Board."

Licensee - As defined in UAC R313-12-3 "means a person who is licensed by the Department in accordance with these rules and the Act."

Licensed Material - As defined in UAC R313-12-3 "means radioactive material, received, possessed, used or transferred or disposed of under a general or specific license issued by the Director."

Mill - Means the White Mesa Uranium Mill.

Monitoring - As defined in UAC R313-12-3 "means the measurement of radiation, radioactive material concentrations, surface area activities or quantities of radioactive material, and the use of the results of these measurements to evaluate potential exposures and doses. For purposes of these rules, radiation monitoring and radiation protection monitoring are equivalent terms."

Natural Uranium - As defined in 49 CFR 173.403, as incorporated by reference in UAC R313-19-100, "means uranium (which may be chemically separated) containing the naturally occurring distribution of uranium isotopes (approximately 99.28% uranium-238 and 0.72% uranium-235 by mass)." From the glossary at nrc.gov: "Uranium containing the relative concentrations of isotopes found in nature (0.7 percent uranium-235, 99.3 percent uranium-238, and a trace amount of uranium-234 by mass). In terms of radioactivity, however, the radiation emitted by natural uranium comes approximately 2.2 percent from uranium-235, 48.6 percent from uranium-238, and 49.2 percent from uranium-234. Natural uranium can be used as fuel in nuclear reactors."

NESHAP - An acronym that stands for National Standards for Hazardous Air Pollutants (40 CFR Part 61). Subpart W sets out the National Emission Standards for Radon Emissions from Operating Mill Tailings. These standards are part of the Mill's Air Approval Order issued by the Utah Division of Air Quality.

Non-conventional impoundment - 40 CFR 61.125 defines a non-conventional impoundment as an impoundment used for managing liquids from uranium recovery operations and contains uranium byproduct material or tailings suspended in and/or covered by liquids. These structures are commonly known as holding ponds or evaporation ponds and can be located at any uranium recovery facility. They are typically not permanent structures unless they transition to become used as conventional impoundments. Impoundments constructed for the purpose of managing liquids from closure or remediation activities (e.g., contaminated groundwater), and which are used solely for that purpose, are not subject to the requirements of 40 CFR Part 61 Subpart W. Note that the function of non-conventional impoundments is fluid management, and any tailings introduced therein, if any, will be of a negligible quantity.

Nuclear Regulatory Commission - Also known by the acronym NRC. The NRC was established by the Energy Reorganization Act of 1974. The NRC is assigned the regulatory and licensing responsibilities for the civilian uses of nuclear materials and facilities. (NRC.gov)

Occupational Dose - As defined in UAC R313-12-3 "means the dose received by an individual in the course of employment in which the individual's assigned duties for the Licensee or registrant involve exposure to sources of radiation, whether or not the sources of radiation are in the possession of the Licensee."

Operation - There are two definitions of operation:

1. As defined by 10 CFR 40 Appendix A as is incorporated by reference in UAC R313-24-4 "means that a uranium or thorium mill tailings pile or impoundment is being used for the continued placement of byproduct material or is in standby status for such placement. A pile or impoundment is in operation from the day that byproduct material is first placed in the pile or impoundment until the day final closure begins."

2. As defined by 40 CFR 61 subpart W (NESHAP) "means that an impoundment is being used for the continued placement of uranium byproduct material or tailings or is in standby status for such placement. An impoundment is in operation from the day that uranium byproduct material or tailings are first placed in the impoundment until the day that final closure begins.

Ore - In the September 22, 1995, Federal Register Vol. 60 No. 184 pg. 49296 the NRC defined ore as: **"**Ore is a natural or native matter that may be mined and treated for the extraction of any of its constituents or any other matter from which source material is extracted in a licensed uranium or thorium mill."

OSL Badges - OSL is an acronym for optically stimulated luminescence. These dosimetry badges are made by Landauer. The Mill uses these badges to measure exposure to gamma radiation for occupational dose and environmental/public dose calculations.

Pico - From the glossary at nrc.gov. "A prefix that divides a basic unit by one trillion (10^{-12}). For example picocurie (pCi). 1.00E-12 = 0.000000000001.

Public Dose - As defined by UAC R313-12-3 "means the dose received by a member of the public from exposure to radiation or to radioactive materials released by a Licensee, or to any other source of radiation under the control of a Licensee or registrant. Public dose does not include occupational dose or doses received from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released in accordance with Rule R313-32, or from voluntary participation in medical research programs." As per R313-15-301 a member of the public may not receive more than 0.1 rem or 100 mrem per year from a licensed facility.

Rad - As defined in UAC R313-12-3 "means the special unit of absorbed dose. One rad is equal to an absorbed dose of 100 erg per gram or 0.01 joule per kilogram."

Radiation - As defined in UAC R313-12-3 "means alpha particles, beta particles, gamma rays, x-rays, neutrons, high speed electrons, high speed protons, and other particles capable of producing ions. For purposes of these rules, ionizing radiation is an equivalent term. Radiation, as used in these rules, does not include non-ionizing radiation, like radiowaves or microwaves, visible, infrared, or ultraviolet light."

Radiation Area - As defined in UAC R313-12-3 "means an area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 0.005 rem (5 mrem), in one hour at 30 centimeters from the source of radiation or from a surface that the radiation penetrates.'

Radiation Level - As defined in 49 CFR 173.403, as incorporated by reference in UAC R313-19-100, "means the radiation dose-equivalent rate expressed in millisieverts per hour or mSv/h

(millirems per hour or mrem/h). It consists of the sum of the dose-equivalent rates from all types of ionizing radiation present including alpha, beta, gamma, and neutron radiation."

Radiation Safety Officer - As defined in UAC R313-12-3 "means an individual who has the knowledge and responsibility to apply appropriate radiation protection rules and has been assigned such responsibility by the Licensee."

Radioactive Material - As defined in UAC R313-12-3 "means a solid, liquid, or gas which emits radiation spontaneously." In addition, as defined in 49 CFR 173.403, as incorporated by reference in UAC R313-19-100, "means any material containing radionuclides where both the activity concentration and the total activity in the consignment exceed the values specified in the table in§ 173.436 or values derived according to the instructions in § 173.433."

Radioactivity - As defined in UAC R313-12-3 "means the transformation of unstable atomic nuclei by the emission of radiation."

Rem - As defined in UAC R313-12-3 "means the special unit of any of the quantities expressed as dose equivalent. The dose equivalent in rem is equal to the absorbed dose in rad multiplied by the quality factor."

Restricted Area - As defined in UAC R313-12-3 "means an area, access to which is limited by the Licensee for the purpose of protecting individuals against undue risks from exposure to sources of radiation."

SERP Committee - SERP is an Acronym for Safety and Environmental Review Panel. This committee is required by License Condition 9.4. At a minimum the committee is comprised by someone from Mill management, someone from Operations and the Radiation Safety Officer. This committee is to evaluate any changes to the facility or its processes, changes to procedure and/or conduct tests or experiments to determine if these changes meet applicable regulations, do not degrade environmental and safety commitments and are consistent with approved Mill operations.

Site Boundary - As defined in UAC R313-12-3 "means that line beyond which the land or property is not owned, leased, or otherwise controlled by the Licensee or registrant."

Source Material Milling - For this Licensing action this is known as Uranium Milling. As defined in UAC R313-12-3 "means any activity that results in the production of byproduct material as defined by (b) of "byproduct material"."

Source Material - (1)Uranium or thorium, or any combination thereof, in any physical or chemical form or (2) ores which contain by weight one-twentieth of one percent (0.05%) or more of: (i) Uranium, (ii) thorium or (iii) any combination thereof. (10 CFR 40.4)

Source of Radiation - As Defined in UAC R313-12-3 “means any radioactive material, or a device or equipment emitting or capable of producing ionizing radiation.”

Surety - The term used in this licensing action to describe the decommissioning funding plan that is required by UAC R313-22-35 for facilities that possess radioactive materials with half-lives greater than 120 days such as Uranium Mill facilities. R313-22-35(3)(h) requires Licensee’s surety to meet the applicable criteria found in the NRC document NUREG-1757, Volume 3, "*Consolidated NMSS Decommissioning Guidance: Financial Assurance, Recordkeeping, and Timeliness*" (9/2003). The Licensee is also required to follow the requirements found in the RML in License Condition 9.5.

Survey - Also known as Radiological Survey. As defined in UAC R313-12-3 “means an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of sources of radiation. When appropriate, such evaluation includes, but is not limited to, tests, physical examinations and measurements of levels of radiation or concentrations of radioactive material present.”

Total Effective Dose Equivalent- Also known by the acronym TEDE. As defined in UAC R313-12-3 “the sum of the effective dose equivalent for external exposures and the committed effective dose equivalent for internal exposures.” (TEDE=EDE+CEDE)

UAC - An acronym that stands for Utah Administrative Code. The Utah Administrative Code is the body of all effective administrative rules as compiled and organized by the State of Utah’s Office of Administrative Rules. The State of Utah’s Radiation Control Rules are found in Title R313 and the Ground Water Protection Rules are found in Title R317.

Units of Exposure and Dose - As defined by UAC R313-12-20(2)(b)&(c)(2) As used in these rules, the units of dose are:

(b) Rad is the special unit of absorbed dose. One rad is equal to an absorbed dose of 100 erg per gram or 0.01 joule per kilogram. One rad equals 0.01 Gy.

(c) Rem is the special unit of any of the quantities expressed as dose equivalent. The dose equivalent in rem is equal to the absorbed dose in rad multiplied by the quality factor. One rem equals 0.01 Sv.

Units of Radioactivity - As defined by UAC R313-12-40. For purposes of these rules, activity is expressed in the SI unit of becquerel (Bq), or in the special unit of curie (Ci), or their multiples, or disintegrations or transformations per unit of time.

Unrestricted Area - As defined by UAC R313-12-3 “means an area, to which access is neither limited nor controlled by the Licensee or registrant. For purposes of these rules, "uncontrolled area" is an equivalent term.”

Waste - As defined in UAC R313-12-3 "means those low-level radioactive wastes containing radioactive material that are acceptable for disposal in a land disposal facility. For the purposes of this definition, low-level radioactive waste means radioactive waste not classified as high-level radioactive waste, transuranic waste, spent nuclear fuel, or byproduct material as defined in paragraphs (b), (c), and (d) of the definition of byproduct material found in Section R313-12-3."

In addition in the glossary section of nrc.gov, waste, radioactive is defined as "Radioactive materials at the end of their useful life or in a product that is no longer useful and requires proper disposal."

Week - As defined in UAC R313-12-3 "means seven consecutive days starting on Sunday."

Whole Body - As defined in UAC R313-12-3 "means, for purposes of external exposure, head, trunk including male gonads, arms above the elbow, or legs above the knees."

Worker - As defined in UAC R313-12-3 "means an individual engaged in work under a license issued by the Director and controlled by a Licensee or registrant, but does not include the Licensee or registrant."

Year - As defined in UAC R313-12-3 "means the period of time beginning in January used to determine compliance with the provisions of these rules."

Yellowcake - From the glossary at nrc.gov. "The solid form of mixed uranium oxide, which is produced from uranium ore in the uranium recovery (milling) process. The material is a mixture of uranium oxides, which can vary in proportion and color from yellow to orange to dark green (blackish) depending on the temperature at which the material is dried (which affects the level of hydration and impurities), with higher drying temperatures producing a darker and less soluble material. Yellowcake was commonly referred to as U_3O_8, because that chemical compound historically comprised the majority of the yellowcake produced by uranium recovery facilities utilizing conventional milling methods. Most modern uranium recovery facilities utilize in situ recovery methods and produce a yellowish compound comprised mostly of uranyl peroxide dihydrate. This material is then transported to a uranium conversion facility, where it is transformed into uranium hexafluoride (UF_6), in preparation for fabricating fuel for nuclear reactors."

Introduction

Table 1- A Brief History of Alternate Feed

Year	Description
1990	In the Kerr-McGee vs. NRC court decision, which was argued before the United States Court of Appeals, District of Columbia Circuit in 1989, Kerr-Mcgee challenged the NRC's definition of byproduct material. In the Background section the court describes the regulatory framework of this decision and how the AEA and UMTRCA apply to the decision. In the Factual Background section the court describes how Kerr-Mcgee owned a Thorium Mill near West Chicago, Illinois. It also discusses that a portion of the material processed for its thorium content was first processed for its rare earth minerals content. At that time, the NRC determined that this material was not considered byproduct material because it had been previously processed before it was reprocessed for its thorium content and it would be classified as source material. The court also discussed that the material that was processed for the rare earth content as well as the thorium content were identical to the material that was processed for its thorium content in physical composition and in potential health hazards. In the Discussion section the court discusses the definition of ore. It states "The word "ore" is also subject to more than one meaning. In fact, there is ample basis within the AEA for applying the term to the stockpiled material remaining after the rare earth had been extracted from the feedstock ore and before that material had been processed for its thorium content. For example, section 101 of the UMTRCA states that "[a] license for the production of any uranium product from residual radioactive materials shall not be treated as a license for production from ores ... if such production is in accordance with section 7918(b) of this title." 42 U.S.C. Sec. 7911(6) (1982) (emphasis added). The clear implication is that if such production is not in accordance with section 7918(b), then production from residual radioactive materials may be treated as production from ores. Moreover, the NRC's designation of the offsite tailings as "source material" implies that they may be properly categorized as "ore" because the NRC defines source material as "ores which contain by weight ... (0.05%) or more of ... thorium." 10 C.F.R. Sec. 40.4(h) (emphasis added); see also 42 U.S.C. Sec. 2014(z) (statutory definition of source material). The NRC cannot have it both ways. If the offsite tailings may be characterized as ore, so must the stockpiled material from which they were derived. The NRC's construction is not saved by the happenstance that the tailings in this case have a sufficiently high thorium content (0.05% or more by weight) to enable the agency to classify the offsite wastes as "source material" and therefore subject to its licensing authority under another part of the AEA. In the first place, statutory definitions are intended to have general applicability. A construction of section

	11(e)(2) is not acceptable if it will orphan mill tailings having a source material content of less than the 0.05% threshold, as is usually the case. Second, the NRC's interpretation would exclude the offsite wastes from coverage by the regulations promulgated pursuant to Title II that are designed to protect the public health against the hazards created by mill tailings produced in the course of the nuclear fuel cycle." In the Conclusion section the court states "The UMTRCA was intended to bring previously unregulated radioactive end products of the source material extraction process within the scope of NRC regulation and to provide a comprehensive remedial program for the safe stabilization and disposal of uranium and thorium mill tailings. The NRC's interpretation of section 11(e)(2), however, places a portion of the thorium tailings from Kerr-McGee's West Chicago facility outside of the UMTRCA's regulatory regime even though they are in all relevant ways identical to tailings found by the NRC to be byproduct material and thus subject to the UMTRCA's remedial program. The NRC's construction thus frustrates the purposes of the UMTRCA by rendering it inapplicable to waste material that it was clearly intended to reach and recreating a jurisdictional gap it was intended to close. As we find that interpretation impermissible, and as we have considered the other arguments put forth by Illinois and Kerr-McGee and found them without merit, we grant the petitions for review in Nos. 88-1636 and 88-1726, and deny the petition for review in No. 87-1254."
1992	In the May 13, 1992 publication of the Federal Register pgs. 20530 -20533 the NRC published its first discussion of alternate feeds being used as "ores" for the extraction of source material such as uranium. This included a discussion the 11e section of the AEA and examples of NRC licensing actions which allowed the processing of alternate feed materials. The NRC recognizes that the AEA and UMTRCA do not have a definition of "ore" and refers to the court decision of Kerr-McGee vs. NRC and its definition of ore as it applies to the AEA and UMTRCA. The NRC also discusses the definition of 11e.(2) byproduct material and the importance of the word "any" in that definition. The NRC then proposed its own definition as "Ore is a natural or native matter that may be mined and treated for the extraction of any of its constituents or any other matter from which source material is extracted in a licensed uranium or thorium mill." This definition took into account two major considerations: 1. It is broad enough to include a wide variety of feed materials. 2. The definition continues to be tied into the nuclear fuel cycle. The remainder of the discussion revolves around the issues with RCRA, low-level radioactive waste and alternate feeds.
1995	On August 15, 1995 the NRC publishes SECY-95-211 titled *FINAL "REVISED GUIDANCE ON DISPOSAL OF NON-ATOMIC ENERGY ACT OF 1954, SECTION 11e.(2) BYPRODUCT MATERIAL IN TAILINGS IMPOUNDMENTS," AND FINAL*

	"POSITION AND GUIDANCE ON THE USE OF URANIUM MILL FEED MATERIALS OTHER THAN NATURAL ORES". In the Background section of this document the NRC discusses the history of the development of this guidance document. The document discusses what needs to be reviewed and determined to approve an alternate feed to be used as an "ore" for the recovery of source material.
1995	In the September 22, 1995 publication of the Federal Register pgs. 49296 and 49297, The NRC finalizes the Uranium Mill guidance document for the use of Uranium Mill Feed Material Other than Natural Ores. In the discussion three criteria are identified to assist Staff for determining if an alternate feed can be processed as an ore. 1. Determination of whether the feed material is ore. To do this the following definition is to be used "Ore is a natural or native matter that may be mined and treated for the extraction of any of its constituents or any other matter from which source material is extracted in a licensed uranium or thorium mill." 2. Determination of whether the feed material contains hazardous waste. So if the material contains listed waste under subpart D of RCRA, then the material would not be accepted to avoid dual regulation of the material by the NRC/EPA. 3. Determination of whether the ore is being processed primarily for its source material content. This is to be done by the Co-disposal test and the Licensee certification and justification test.
1998	The State of Utah filed a Request for Hearing and Petition for Leave to Intervene in the Ashland 2 alternate feed license amendment request. The State of Utah argued that the NRC staff improperly granted the license amendment because the Mill was not processing the Ashland 2 material "primarily" to recover its relatively minimal uranium content, but rather to obtain the generous handling and disposal fee. The State of Utah also emphasized that the Mill's license amendment application failed to adequately substantiate that the material was to be "processed primarily" for its uranium content. The State of Utah insisted upon "some objective documentation" to show that recovery of the uranium, not payment for disposal, was the Mill's primary interest behind the license amendment.
2000	The NRC issues its decision on the State of Utah's Petition to Intervene in the Ashland 2 alternate feed license amendment request. According to this document the issue in this proceeding is the Atomic Energy Act's definition of 11e.(2) material, defined by the statute 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." The NRC's Presiding Officer explained, "[i]f ... the material were processed primarily to remove some other substances (vanadium, titanium, coal, etc.) and the extraction of uranium was incidental, then the processing would not fall within the statutory test and it would not be byproduct material within the meaning of the Atomic Energy Act. That is, the adverb 'primarily,' applies to what is removed from the material by the process and not to the motivation for undertaking

	the process." The Presiding Officer went on to conclude that the NRC staff appropriately granted the license amendment because IUSA "is milling ore" to extract uranium and therefore is "not involved in a sham." The Presiding Officer also rejected Utah's claim that the Guidance was intended to prevent material from being categorized as 11e.(2) byproduct material if the Licensee's primary economic motive was to receive a fee for waste disposal instead of to recover the uranium. "The Alternate Feed Guidance," the Presiding Officer stated, "is not supportive of the position, taken by the State of Utah, that material is to be considered byproduct only if the primary economic motivation is to remove uranium rather than to dispose of waste." The NRC further described the purposes behind the wording of § 11e.(2)'s definition served: (1) to expand the types of materials that properly could be classified as byproduct material; (2) to make clear that even feedstock containing less than 0.05% source material could qualify as byproduct material; and (3) to assure that the NRC's jurisdiction did not cross over into activities unrelated to the nuclear fuel cycle. The Mill's license amendment was consistent with these statutory intentions, regardless of whether the Mill's bigger interest was payment for taking the material or payment for the recovered uranium. Indeed, even accepting the State of Utah's claim that the four million dollar payment the Mill contracted to receive for processing and disposing of the Ashland 2 FUSRAP site material was the primary motivator for this transaction, the tailings generated from the processing can still properly be classified as § 11e.(2) byproduct material.
2004	State of Utah becomes an Agreement State for Uranium Recovery. In the State of Utah's application to become an Agreement State for Uranium Recovery Facilities, the State of Utah agreed to acknowledge alternate feed as an "ore" and that alternate feeds could be processed within the State.

Since August 2004 the State of Utah has approved of three alternate feeds to be processed at the White Mesa Mill:

- Fansteel approved June 13, 2006;
- Dawn Mining approved July 10, 2014; and
- Sequoyah Fuels approved January 19, 2018.

The table above describes relevant history and judicial and administrative determinations pertaining to alternate feed, which the Division considers to be binding or persuasive legal authority. Based on these authorities and analysis, the Division previously approved these three alternate feeds since Utah was granted Agreement State status for uranium recovery. The case files for the Kerr-McGee case forms the basis of the alternate feed doctrine employed by the

NRC and the subsequent work presented in the table provides the reader a clear idea of what the NRC deems to be ore for the purposes of uranium recovery operations.

A review of the files for the three alternate feed requests the Division has processed since becoming an Agreement State revealed that there were no issues not already resolved in the NRC proceedings and the Kerr-McGee court case. Rather, the challenges made by interested parties have been efforts to re-litigate the NRC's decision to accept the Kerr-McGee material as feed stock for milling. The review criteria imposed in the Kerr-McGee case and the tests prescribed in the Ashland 2 decision discussed in the table provide a robust framework for determining what constitutes acceptable alternate feed material.

Under the Agreement the State of Utah made with the NRC, the Division has a responsibility to use its "best efforts" to maintain compatibility with the federal program. The Division concludes that using its "best efforts" includes following established judicial and administrative precedents, as well as NRC guidance and regulations. Thus, the decision to accept the three alternate feeds listed above had effectively already been made with the Kerr-McGee and Ashland 2 decisions. The technical and legal issues presented in all cases were analogous. The current alternate feed application is also analogous.

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Current Alternate Feed Application

With a cover letter dated April 18, 2019, Energy Fuels Resources (USA) Inc. (EFRI) submitted to the Utah Division of Wasted Management and Radiation Control (DWMRC) an application to amend the White Mesa Uranium Mill's Radioactive Materials License (RML) UT 1900479 to receive and process the Silmet uranium bearing material as an "alternate feed". This amendment request is considered a major amendment according to State of Utah Administrative Code (UAC) R313-17-2(1)(a)(i)(J) and this document serves as the Environmental Analysis required by UAC R313-24-3.

EFRI compares the process that created the Silmet uranium bearing material to the process that created previously approved Fansteel and Cabot alternate feeds. The uranium bearing materials being considered in this review are residuals resulting from the purification of columbite and tantalite mineral ores processed via an acid leach process to recover columbium ("niobium") and tantalum at the NPM Silmet OU's (Silmet) tantalum and niobium production plant in Sillamae, Estonia. According to Section 2.2 of the application:

> *The Uranium Material consists of the residuals from niobium and tantalum recovery from columbite and tantalite ore concentrates. It does not include residuals from oil shale production, from uranium production or enrichment, rare earth recovery, or from other previous operations at the Facility. It does not include materials from the former radioactive materials pond at the Facility.*

Columbite and tantalite-containing mineral ore concentrates were processed via acid-leaching to separate the insoluble impurities, including uranium and some thorium, from niobium and tantalum. The ores were crushed and milled, then dissolved in hydrofluoric and sulfuric acid, and removed in solution phase. The insolubles, containing uranium and thorium, were removed from solution. The precipitate was filtered, and the filter cake was transferred to the calcining unit, in the same building. The filter cake was calcined and dried in electric rotary kilns, cooled in rotary coolers and placed into metal drums lined with triple-walled polyethylene bags.

The process which generated the Uranium Material is isolated from the remainder of site operations. Columbite and tantalite ores are processed in a separate milling area, for which the feed, grinding and discharge steps are controlled by hermetically sealed equipment, primarily for the management of radioactive dusts. Acid leaching, washing, filtration, electric rotary calcining, rotary cooling and packaging are all conducted in automated closed systems. Hence, the Uranium Material is isolated from other materials on site from feed source through drum packaging.

UAC 22-32(5) states: "In the application, the applicant may incorporate by reference information contained in previous applications, statements, or reports filed with the Director, provided the references are clear and specific." EFRI referenced several documents in this application. The DWMRC will acknowledge these references.

1. Technical Evaluation

1.1 Does the Silmet Uranium Material Qualify as an Alternate Feed?

In its application to become an Agreement State for Uranium Recovery [i.e. 11e.(2)] facilities, the State of Utah committed to using RIS 2000-23 ***Interim Position and Guidance on the Use of Uranium Mill Feed Material other than Natural Ores*** as the guidance document for alternate feed amendment requests. To be considered an alternate feed and meet the objectives of the Technical Evaluation, this NRC Guidance document states that the following items must be determined:

1.1.1 Determination of Whether the Feed Material is Ore.

Federal Register, Volume 60, Page 49296, dated September 22, 1995 and later in the ***Interim Position and Guidance on the Use of Uranium Mill Feed Material other than Natural Ores*** **found in RIS 2000-23**, these documents state the following: "For the tailings and wastes from the proposed processing to qualify as 11e.(2) byproduct material, the feed material must qualify as 'ore.' In determining whether the feed material is ore, the following definition of ore must be used:

"Ore" is a natural or native matter that may be mined and treated for the extraction of any of its constituents or any other matter from which source material is extracted in a licensed uranium or thorium mill.

According to EFRI's application dated April 18, 2019, Section 2.6.1, the Silmet uranium bearing material has a range of 0.17 to 0.41 percent U_3O_8. This percentage of uranium is comparable to the native Colorado Plateau ores that the White Mesa Uranium Mill processes. For this reason, and because the material will be processed for the recovery of uranium, DWMRC Staff has concluded that the Silmet uranium bearing material meets the NRC definition of "ore".

1.1.2 Determination of Whether the Feed Material Contains Hazardous Waste.

In the *Interim Position and Guidance on the Use of Uranium Mill Feed Material other than Natural Ores* found in RIS 2000-23 the NRC states:

> "*If the proposed feed material contains hazardous waste, listed under subpart D Sections 261.30-33 of 40 CFR (or comparable Resource Conservation and Recovery Act (RCRA) authorized State regulations), it would be subject to the U.S. Environmental Protection Agency (EPA) or State regulation under RCRA. If the licensee can show that the proposed feed material does not contain a listed hazardous waste, this issue is resolved*."

According to EFRI's application Section 3.3.3 and the laboratory results found in the appendices of the alternate feed application, the Silment uranium bearing material does not have:

- Volatile or Semi-Volatile Compounds;
- Does not exhibit RCRA Characteristics of ignitability, corrosivity, reactivity or toxicity for any constituents; and
- The generator of the material has provided an affidavit declaring the Uranium Material does not contain RCRA listed hazardous waste.

Public commenters in the past for similar licensing actions have called alternate feed material as "waste". However, the NRC in the 1995 Policy (SECY-95-211) (pgs. 24 and 25 of the *Final Guidance Document*) on alternate feed addressed this issue with the following statement;

> "Use of the term "waste": We agree that the term "waste" should not be used to describe alternate feed materials. If material can be used in accordance with the proposed guidance to recover source material, it is not waste. However, some material, from which source material could be recovered, would nevertheless meet the definition of hazardous or mixed waste, under EPA regulations. The proposed guidance would not allow such material to be processed in a licensed mill."

Therefore, the term "waste" is not applicable to the Silmet uranium bearing material because the material does not contain material that could be regulated under EPA regulation and is in accordance with the NRC alternate feed guidance.

DWMRC Staff has concluded that the Silmet uranium bearing material does not contain hazardous waste.

1.1.3 Determination of Whether the Ore is Being Processed Primarily for its Source-Material Content.

In the *Interim Position and Guidance on the Use of Uranium Mill Feed Material other than Natural Ores* found in RIS 2000-23 the NRC states:

> "*For the tailings and waste from the proposed processing to qualify as 11e.(2) byproduct material, the ore must be processed primarily for its source-material content. If the only product produced in the processing of the alternate feed is uranium product, this determination is satisfied*."

In addition, In its Memorandum and Order, February 14, 2000, In the Matter of International Uranium (USA) Corp. (Request for Materials License Amendment), Docket No. 40-8681-MLA-4, the NRC concluded that an alternate feed material will be considered to be processed primarily for its source material content if it is reasonable to conclude that uranium can be recovered from the Uranium Material and that the processing will indeed occur.

According to EFRI's application Section 3.4 the Silmet uranium bearing material will be processed for its source material. Also in Section 2.2, the Silmet uranium bearing material is similar to the Cabot and Fansteel alternate feed materials that the Mill has processed and recovered uranium. As discussed above, the Silmet uranium bearing material meets the

definition of ore. Therefore, it is reasonable to conclude that uranium (source material) can be recovered from the Silmet uranium bearing material.

1.2 Engineering Review

10 CFR 40 Appendix A (as incorporated by reference in UAC R313-24-4) requires a reclamation and decommissioning plan for uranium recovery facilities. The White Mesa Mill currently operates under Amendment 8 to its Radioactive Material License Number UT 1900479, which recognizes Reclamation Plan Revision 5.1B. The current surety is based upon that reclamation plan, and includes provisions for handling and disposal of all feed material currently on site and anticipated to be brought to the site during the year. The surety is adjusted annually to account for changes in many quantities, including the amount of feedstock to be stockpiled onsite during the year. The proposed licensing action would affect the Mill's reclamation plan by limiting the quantity of material the Mill may possess in stockpile prior to processing. Inasmuch as the material is similar to the Fansteel Alternate Feed, all provisions specific to the type and chemical makeup of the material have already been implemented, and only the quantity would be affected. The adjustment to the surety would occur following approval of the product as an alternate feed for the site, and prior to receiving the first shipment.

UAC R313-22-35 requires financial assurance (Surety) for certain types of facilities. The Mill is one of these facilities. The proposed licensing action would affect the Surety by placing a requirement on EFRI to provide sufficient surety funding to transport and dispose of the maximum quantity of unprocessed Silmet alternate feed material that may be present onsite awaiting processing at any time. This requirement will also set the maximum quantity of material the Mill may stockpile prior to processing mentioned above (e.g. available volume in the tailings impoundments). As stated above, the adjustment to the surety would occur following approval of the product as an alternate feed for the site, and prior to receiving the first shipment.

RML License Condition 10.1 paragraph D requires provision of surety funding for the maximum amount of feed material stored onsite. This requirement is addressed in the preceding two paragraphs.

RML License Condition 10.1 paragraph E requires EFRI to provide sufficient tailings capacity for all materials to be processed and for decommissioning of the mill. This licensing action affects this requirement by requiring that provision for the tailings to be produced from the Silmet material be included in the tailings capacity analysis, and that no more material be transported to the site than can be processed and the tailings therefrom disposed in the provided disposal volume.

The material is calcined, so it will arrive at the site dry and will be stored on site in sealed containers. No danger of dust or fluid leaks from the transport containers is possible. Being in a dry state, dust production is a possibility as the material is introduced into process. Dry materials have been processed in the Alternate Feed Circuit in the past, so no change in written procedures will be necessary; however, the provisions in those procedures for dust control as the material is introduced into process will need to be implemented.

1.3 Groundwater Review

10 CFR 40 Appendix A Criterion 7A states: "*The licensee shall establish a detection monitoring program needed for the Commission to set the site-specific groundwater protection standards in paragraph 5B(1) of this appendix. For all monitoring under this paragraph the licensee or applicant will propose for Commission approval as license conditions which constituents are to be monitored on a site specific basis. A detection monitoring program has two purposes. The initial purpose of the program is to detect leakage of hazardous constituents from the disposal area so that the need to set groundwater protection standards is monitored. If leakage is detected, the second purpose of the program is to generate data and information needed for the Commission to establish the standards under Criterion 5B…*"

When the State of Utah became an Agreement State for Uranium Recovery Facilities it was agreed that the State would use its groundwater protection rules and issue a State of Utah Groundwater Quality Discharge Permit for the White Mesa Uranium Mill which was determined compatible with the groundwater requirements found in 10 CFR 40 Appendix A. These agreements were formalized and issued for public comment in the Federal Register (See Applicable Federal Register Publication Date August 27, 2003). Additionally, the current license for the White Mesa Mill recognizes the groundwater permit as functionally equivalent, the State Radioactive Material License No. UT1900479 (License), Amendment # 8, Condition 9.12 states: "*The Licensee shall at all times have a valid groundwater discharge permit issued by the Co-Director. No transfer of this License will be approved unless the Ground Water Quality Discharge Permit is also transferred*."

On August 15, 2004, the NRC delegated the Utah uranium mill regulatory program to the State of Utah by approving Agreement State status. The Division became the primary regulatory authority for the Mill, and subsequently issued the License and a separate State of Utah Ground Water Quality Discharge Permit No. UGW370004 (Permit), which includes requirements to detect potential leakage from the White Mesa Uranium Mill in the groundwater and requirements for corrective action in the event that such contamination is detected.

The groundwater monitoring well network at the White Mesa Uranium Mill includes 104 monitoring wells and piezometers. These are actively monitored for multiple purposes, including; 1. Characterizing groundwater flow directions and velocities; 2. Groundwater sample collection and analysis to determine compliance with the Permit requirements; 3. Meet conditions of current Groundwater Corrective Action Plans (CAPs) for nitrate and chloroform, and; 4. Other study and characterization objectives. Monitoring requirements and quality control are specified in the Permit and the required Groundwater Monitoring Quality Assurance Plan. The Permit requires that EFR submit quarterly groundwater monitoring reports to the Division for review and approval. The Division ensures that all collected data meet the prescribed data quality objectives and that all collected data is in compliance with Permit requirements through

review of the groundwater monitoring reports and through onsite inspection of groundwater activities (e.g. groundwater monitoring, groundwater monitoring well installation, etc.).

The Permit includes a distinct groundwater monitoring well network to gather compliance based groundwater samples for detection of potential pollutants from the White Mesa Mill operations, including nonconventional impoundments (evaporation impoundments and conventional impoundments (tailings impoundments). Compliance wells are sampled on a routine frequency and tested for 38 constituents of concern. The constituents are based on measurements and evaluations of potential sources of groundwater contamination from the White Mesa Uranium Mill. Monitoring wells have also been installed to monitor and pump groundwater contaminant plumes (chloroform and nitrate) for compliance with CAPs, as well as other upgradient and downgradient areas. Additionally, annual samples are collected from seeps and springs on the margins of White Mesa. All data results are reviewed by the Division in the Permit-required EFR monitoring reports. In addition, the Division performs onsite split sampling inspections during EFR monitoring activities, including split samples for compliance monitoring wells, nitrate and chloroform monitoring wells, seeps and springs, and tailings wastewater.

An important element of the Silmet Uranium Material review is to determine if the incoming material will change the potential contaminant source in the conventional impoundments and create need to provide additional new monitoring locations and/or monitoring constituents in the Permit. Section 2.2 below provides a summary of the Division review regarding the EFRI License Amendment Request, final Silmet Uranium Material disposition, and material (waste) characterization.

Based on the information provided and Division review (See section 2.2 below), Division Staff have determined that no additional/new monitoring wells, constituent sampling or other new requirements will be required or incorporated into the Permit for the Silmet Alternate Feed Material. Current Permit requirements and Division data review and inspections are comprehensive and will provide for early detection in the event of a discharge from the Mill processing areas and/or impoundments to groundwater.

1.4 Legal Review

Ore vs. Waste

Based on previous alternate feed requests, the Division anticipates that it may receive public comments claiming that the Silmet Alternate Feed Material is not "ore" within the meaning of the AEA and that the material is waste (*e.g.*, sham disposal). Similar comments were addressed in detail in connection with the EFR renewal (Amendment 8). The Division refers to the discussion on pages 28 to 35 in the Division's Public Participation Summary in the Amendment 8 matter, available online at: https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2018-000762.pdf

For the reasons discussed in the Public Participation Summary, the Division is bound to follow federal law on these questions, which have long been resolved beyond legal dispute. The NRC discussed its determination in the NRC document, SECY-02-0095, "Applicability of Section 11e.(2) of the Atomic Energy Act to Material at the Sequoyah Fuels Corporation Uranium Conversion Facility." Moreover, the full five member NRC Commission ruled, in a "sham disposal" case previously brought by the State of Utah prior to the time that it was an agreement state, relating to the White Mesa Mill, that so long as more than a minute or negligible recovery of uranium were possible from the material, there was no issue of sham disposal of byproduct material at the White Mesa Mill. *In the matter of International Uranium (USA) Corporation (Receipt of Material from Tonawanda, New York)*, Docket No. 40-8681-MLA-4 (February 10, 2000), at 21. The Division is now legally bound to follow these federal requirements as applied to the Silmet Alternate Feed Materials.

Import License

In addition to the other legal issues relating to alternate feed requests, this request includes the issue that the Silmet Alternate Feed originates in a foreign nation, specifically Estonia. In its application, EFRI contends that because the import of the Silmet Alternate Feed into the United States is covered by the general license in 10 CFR Part 110.27(a), a specific import license is not required.

There is every reason to believe that the NRC would agree with this position if this licensing matter were before the NRC. The NRC's November 1998 approval of Amendment 9 to the Mill's Source Material License SUA-1358, White Mesa Uranium Mill - Approval to Process Materials involved materials originating from Cameco Corporation's Facilities in Ontario, Canada. In that matter, the NRC concluded that an import license was not required, based on the following rationale:

> Finally, import of radioactive materials from Canada required a license from NRC. As discussed above, the staff has determined that these uranium-bearing materials from Cameco's Blind River and Port Hope facilities will be processed for their source-material content. Therefore, with the staff's approval of IUC's request to process these materials, IUC also is authorized to import them under the general license at 10 CFR 110.27.

Based on the foregoing, the Assistant Attorney General with responsibility for this licensing action has concluded that there is adequate legal basis to support the requested licensing action as to an NRC import license not being required under 10 CFR 110.27(a).

1.5 Technical Conclusion

Based on the foregoing, the Silmet uranium bearing material meets the three criteria that the NRC set forth in the ***Interim Position and Guidance on the Use of Uranium Mill Feed Material other than Natural Ores*** **found in RIS 2000-23** of:

1. Is the feed ore;
2. Is it, or does it contain, RCRA listed hazardous waste or characteristic hazardous waste from water treatment residues; and

3. Will it be processed for its source material?

Per review, several previously accepted and Licensed uranium mill feed materials (considered Ores) were from the same process of previous niobium and tantalite mineral extraction, but were noted to contain much higher concentrations of the same chemical constituents (potential contaminants) than were measured in the Silmet uranium material. These other alternate feeds as described in the review above as well as in the EFRI License Amendment Request were approved at much higher volumes than the current EFRI License Amendment Request for the Silmet uranium material. The previous EFRI amendment requests were similarly reviewed by the NRC/Division to ensure compatibility with the White Mesa Uranium Mill process and tailings disposal and underwent rigorous public notice and public hearing protocols.

The EFRI License Amendment Request adequately identifies and evaluates potential chemical hazards regarding processing and disposal locations of the Silmet uranium material. This review consisted of a comprehensive evaluation of the chemical compatibility of the Silmet uranium material with the existing process and tailings impoundment design. The EFRI review found that the material was fully compatible with the existing process and tailings impoundments materials.

No new disposal locations or process structures will be required to process the Silmet uranium material, and per DWMRC evaluation, the current impoundments and monitoring networks at the White Mesa Uranium Mill (Groundwater, Surface Water, Engineering and Air) are adequate to provide for environmental protection and protection of public health for disposal of the Silmet uranium material. Additionally, the current Division inspections at the facility and reporting requirements are currently adequate to address the Silmet uranium material.

In addition, the DWMRC staff evaluated the material with respect to compliance to:

1. The White Mesa Uranium Mill's Radioactive Material License. Specifically License Conditions 10.1 D. & E.;
2. The White Mesa Uranium Mill's Groundwater Discharge Permit; and
3. A Legal analysis from the Utah Attorney General's office to determine if the Silmet uranium bearing material can be legally imported to the United States.

The DWMRC Staff has concluded that the Silmet uranium bearing material meets the technical requirements to be an alternate feed material. No new monitoring equipment, monitoring, or construction permits will be required for acceptance of the Silmet uranium material. Therefore, it is consistent to amend the License to allow acceptance of the Silmet uranium material with conditions of acceptance outlined therein.

2. Environmental Analysis (R313-24-3)

UAC R313-24-3 Environmental analysis: states:
"(1) Each new license application, renewal, or major amendment shall contain an environmental report describing the proposed action, a statement of its purposes, and the environment affected. The environmental report shall present a discussion of the following:

(a) An assessment of the radiological and nonradiological impacts to the public health from the activities to be conducted pursuant to the license or amendment;
(b) An assessment of any impact on waterways and groundwater resulting from the activities conducted pursuant to the license or amendment;
(c) Consideration of alternatives, including alternative sites and engineering methods, to the activities to be conducted pursuant to the license or amendment; and
(d) Consideration of the long-term impacts including decommissioning, decontamination, and reclamation impacts, associated with activities to be conducted pursuant to the license or amendment.
(2) Commencement of construction prior to issuance of the license or amendment shall be grounds for denial of the license or amendment.
(3) The Director shall provide a written analysis of the environmental report which shall be available for public notice and comment pursuant to R313-17-2."

EFRI stated in Section 4.1 "*Processing of the Uranium Material involves no new construction, no additional use of land, no modification of the Mill, main circuit, alternate feed circuit, or tailings management system of any significance. The Uranium Material contains no new chemical or radiological constituents beyond those already processed in ores and approved alternate feed materials, or already known or expected to be present in the tailings management system. As a result, there are no anticipated impacts to the environment via any of the above pathways, above those already anticipated in the existing environmental statements and environmental assessments associated with the Mill's approved license*".

DWMRC Staff concurs that processing the Silmet Uranium Material will not involve any changes to the Mill. Therefore in the table below the DWMRC references the following from other reviews.

Table 2-Referenced Topics for the Environmental Analysis

Topic	Reference	DWMRC Response
Site Location and Layout	White Mesa Reclamation Plan Section 3.1	Maps and description fulfill the requirement
Use of Adjacent Lands and Waters	2018 White Mesa Mill's Land Use Survey (DRC-2018-006354)	Maps and description fulfill the requirement
Population Distribution	Tailing Impoundment 5A/5B Application, Attachment B: Environmental Report, Table 2.3-1	This table uses the most current 2010 U.S. Census data.
Historic, Scenic, Archeological and Cultural Resources	White Mesa Reclamation Plan Section 1.3	The description and the data provided in this section fulfill the requirement.
Meteorology and Climatology	White Mesa Reclamation Plan Section 1.1	The description and the data provided in this section fulfill the requirement.
Geology and Seismology	White Mesa Reclamation Plan Section 1.6	The description, data and maps provided in this section fulfill the

		requirement.
Hydrology and Hydrogeology	White Mesa Reclamation Plan Section 1.5	The description, data and maps provided in this section fulfill the requirement.
Surface Water	White Mesa Reclamation Plan Section 1.4	The description, data and maps provided in this section fulfill the requirement.
Ecology (Including Endangered Species)	White Mesa Reclamation Plan Section 1.7	The description, data and maps provided in this section fulfill the requirement.
Background of Radiological and Non-radiological characteristics	White Mesa Reclamation Plan Section 1.7.3 and 1.7.4;	The description and the data provided in this section fulfill the requirement.
Mill Circuit	White Mesa Reclamation Plan Section 2.1 and 2.2.2	The description provided in these sections fulfills the requirement.
Tailing Management Facilities	White Mesa Reclamation Plan Section 2.2.3	The description provided in these sections fulfills the requirement.
Embankment Design, Construction and Performance	White Mesa Reclamation Plan Section 2.2.3	The description provided in this section fulfills the requirement.
Corporate Organization and Administrative Procedures	2007 White Mesa Uranium Mill. Radioactive Material License Renewal Application Volume 1, Section 6.3	The description provided in this section fulfills the requirement.
Management Control Program	See ALARA Program	The description provided in this section fulfills the requirement.
Management Audit, Inspection and Recordkeeping Program	See ALARA Program	The description provided in this section fulfills the requirement.
Qualifications for Personnel	See ALARA Program	The description provided in this section fulfills the requirement.
Radiation Safety Training	2007 White Mesa Uranium Mill. Radioactive Material License Renewal Application Volume 3/or most current version	The description provided in this section fulfills the requirement.
Security Program (Administrative Procedures and Physical Barriers)	2007 White Mesa Uranium Mill. Radioactive Material License Renewal Application Volume 3/or most current version	The description provided in this section fulfills the requirement.

Radiation Safety Controls and Monitoring	See Radiation Protection Program	The description provided in this section fulfills the requirement.
ALARA Program	2007 White Mesa Uranium Mill. Radioactive Material License Renewal Application Volume 2/or most current version	This program discusses the policies used to reduce exposure to radiation for both occupational workers and members of the public. The DWMRC conducts annual inspections of this program and have found the Mill compliant.
Radiation Protection Program	2007 White Mesa Uranium Mill. Radioactive Material License Renewal Application Volume 2/or most current version	This program discusses the procedures used to reduce exposure to radiation for both occupational workers and members of the public. The DWMRC conducts annual inspections of this program and have found the Mill compliant.
Respiratory Protection Program	2007 White Mesa Uranium Mill. Radioactive Material License Renewal Application, Response to Round 2 Health Physics Interrogatories/or most current version	This program discusses the procedures used to reduce exposure to radiation for occupational workers through using respiratory protection (i.e. respirators). The DWMRC conducts an annual inspection of this program and have found the Mill compliant.
Dosimetry	See Radiation Protection Program	The description provided in this section fulfills the requirement.
Surface and Groundwater Monitoring	White Mesa Reclamation Plan Section 2.3.1	The description, data and maps provided in this section fulfill the requirement.
Environmental Monitoring	White Mesa Reclamation Plan Section 2.3.2	The description, data and maps provided in this section fulfill the requirement.
Exposure Calculations	See Radiation Protection Program	The description provided in this section fulfills the requirement.
Dose to an Embroyo/Fetus	See Radiation Protection Program	The description provided in this section fulfills the requirement.
Dose Limits to the Individual of the Public	See Radiation Protection Program	The description provided in this section fulfills the requirement.
Compliance to dose limits to Individual of the Public	See Radiation Protection Program	The description provided in this section fulfills the requirement.
Bioassay Program (i.e Urinalysis, Body Counts and etc.	See Radiation Protection Program	The description provided in this section fulfills the requirement.
Contamination Control Program	See Radiation Protection Program	The description provided in this section fulfills the requirement.

Reclamation and Decommissioning Plan	White Mesa Reclamation Plan Section 3 and 4	The description provided in this section fulfills the requirement.

The following is a specific to the Silmet Uranium Material request.

2.1 Engineering

10 CFR 40 Appendix A Criterion 5A(1) states "surface impoundments must have a liner that is designed, constructed, and installed to prevent any migration of wastes out of the impoundment to the adjacent subsurface soil, groundwater, or surface water at any time during the active life (including the closure period) of the impoundment."

Prior to constructing impoundments, the proposed liner system is reviewed for compatibility with the chemical environment to which it will be subjected. On June 17, 2010 the Division issued License Amendment 4 authorizing construction of Impoundments 4A and 4B. Liner compatibility was assessed at that time, and the materials proposed were found to be satisfactory. Similar processes were undertaken at the time of design approval for each of the other impoundments. To date, no chemical-related failures have been noted, and the chemical makeup of the proposed feed does not differ materially from materials already approved. The existing liners appear to be functioning as expected.

The proposed feed is mostly quartz (SiO_2), feldspars (aluminosilicates with the general formula AT_4O_8 in which A = potassium, sodium, or calcium (Ca); and T = silicon (Si) and aluminum (Al)), and plagioclase (a group of feldspar minerals that form a solid solution series ranging from pure albite, $Na(AlSi_3O_8)$, to pure anorthite, $Ca(Al_2Si_2O_8)$) with trace amounts of other minerals, including uranium. More data on the chemical makeup of the proposed feed material is provided in the documentation supplied by Energy Fuels. The material is calcined (dried at high temperature), so organic and volatile chemicals Silmet used in its extraction process have been removed (burned off). Additional discussion of the chemical makeup of the material is presented in the next section of this document.

Impoundments 1 through 3 use a 30-mil PVC liner system. Impoundments 4A and 4B use a 60-mil HDPE liner system. Published data for chemical compatibility of PVC and HDPE liner materials was consulted and compared to the feedstock chemistry. Both materials perform favorably in the presence of the proposed feedstock. In reviewing the documentation provided during the review of Impoundments 4A and 4B, the driving considerations toward material selection were the chemicals added to the feedstock to extract the uranium (sulfuric acid and kerosene, primarily) and resistance to ultraviolet light.

The above findings agree with the work EFRI presented on liner compatibility in Attachment 5 of its License Amendment Request to consider the Silmet material as feedstock for the mill.

This Licensing Action will not result in significant change to the chemical makeup of the tailings. Since the chemical makeup of the tailings will not change, the liner performance will not be affected by the proposed action.

For a description of the tailing impoundments see the White Mesa Uranium Mill Reclamation Plan Rev. 5.1B, Section 2.2.3 as referenced in Table 2 above.

2.2 Groundwater and Surface Water Assessment (R313-24-3(1)(b))

Under the Permit, the Permittee (EFRI) is required to conduct and report on environmental monitoring at the Mill, including compliance with the Permit. Current groundwater and surface sampling at the Mill includes; tailings wastewater sampling to evaluate constituents and concentrations in a potential tailings wastewater source, groundwater monitoring well sampling, spring and seeps sampling, groundwater elevation data, chloroform monitoring, and nitrate monitoring. The groundwater monitoring network at the Mill includes 104 monitoring wells for compliance purposes. Wells installed to monitor the tailings cells (MW Wells) include 21 monitoring wells which are required to be sampled and analyzed for 38 different constituents with associated groundwater compliance limits (GWCL's). The Permit GWCL's are based on measured constituents in the tailings wastewater and discussed in the Permit 2005 Statement of Basis. The monitoring wells are designed and located for timely detection of tailings wastewater discharge to the groundwater as determined by well spacing analysis and detection monitoring efficiency.

Per the EFRI License Amendment Request which includes a Safety and Compatibility Technical Memorandum (Attachment 5) it was noted that "*all of the constituents found in the Uranium Material have previously been processed in the Mill's circuits and managed in the Mill's tailings management system*." (p. 22 and Attachment 5). Therefore the constituents in the tailings wastewater will not change based on discharge of the Silmet Uranium Material to an active tailings cell. EFRI monitors the tailings wastewater in all tailings cells (and Evaporation Cell 1) annually to evaluate the concentrations of all constituents. Any changes in constituent concentrations due to the Silmet Uranium Material would be timely detected. EFRI submits the monitoring information to the Division, and the Division conducts a split sampling evaluation of the tailings wastewater annually.

Per the EFRI License Amendment Request it was noted that after milling and processing, the Silmet Uranium Material will be disposed of in the tailings management system, either active Cell 3 or Cell 4A and will most likely be disposed in Cell 4A since Cell 3 is nearing completion.

Fifteen composited samples of the Silmet Uranium Material were collected by Sillamae Estonia during April 2018 and analyzed by ALS Laboratory Fort Collins Co. (samples received by ALS on 6/4/2018) for ignitibility, inorganics (ammonia, nitrate/nitrite, pH, chloride, fluoride, and

sulfate) isotopic thorium, isotopic uranium, lead-210 and metals. The data results are included with the EFRI License Amendment Request as attachment C.1. The results of this data were used by EFRI during review to evaluate whether the Silmet Uranium Material is a hazardous waste (Attachment 4 of the EFRI License Amendment Request) and for evaluation of the effects of storage in the tailings cells, including increases in detected constituents and volumes (Attachment 5 of the EFRI License Amendment Request). Although not evaluated as part of the groundwater/surface water review, Attachment 5 also includes an evaluation of chemical compatibility of the Silment Uranium Material in the White Mesa Mill Processing (potential for chemical reactions) and compatibility of the Silmet Uranium Material with the tailings cell liner material.

Overall, per Attachment 4 of the EFRI License Amendment Request it was noted that the Silmet Uranium Material is considered a uranium ore and not a hazardous waste since the uranium content of the material is greater than 0.05 weight percent and is therefore exempt from regulation under RCRA as a hazardous waste. Attachment 4 notes that even without the uranium ore criteria the Silmet Uranium Material would not be a hazardous waste since; 1. The material does not contain RCRA listed hazardous waste under affidavit of the waste generator: 2. Does not exhibit RCRA characteristics of ignitability, corrosivity, reactivity or toxicity: 3. Does not contain volatile organic or semi-volatile organic compounds, and: 4. Does not contain metals from RCRA listed hazardous waste sources. Constituents in the material are consistent with previously accepted alternate feeds and no new constituents were noted by the Division which have not previously been accepted to be discharged into the Mill tailings cells.

Per review of the constituents in the Silmet Uranium Material it was noted that:

Organic Constituents:

The Silmet Uranium Material will not contain organic constituents (Volatile or Semi-Volatile Organic Constituents) as discussed in Attachment 5 of the EFRI License Amendment Request, this is because the Material "*consists of acid digestion residuals from inorganic mineral ores, which have subsequently been oxidized in a calcining rotary kiln at temperatures above 1000ºF. The only constituents remaining in the material following calcining are metals and inorganic ionic species in their highest oxidation states. No semi-volatile organic constituents can reasonably be expected to be present in the Uranium Material*." The absence of organic constituents is also noted per the material information safety sheet (Attachment B.6 of the EFR Application).

Inorganic Constituents:

Ammonia as N, Nitrate/Nitrite as N, Chloride, Fluoride and Phosphorous will be present at low concentrations in the Silmet Uranium Material especially in relation other currently approved alternate feeds for the White Mesa Mill. The Permit currently requires routine groundwater

monitoring for all of these inorganic constituents since the White Mesa Tailings Cells contain significant amounts of these constituents.

Metals Constituents:

Table 2 of Attachment 5 of the EFRI License Amendment Request provides a summary of all metal classes and specific metals expected to be present in the Silmet Uranium Material. It is noted that these are natural constituents in tantalum and niobium ores. The mineral forms of the metals were analyzed inhouse by Silmet and the EFRI License Amendment Request provides a review to ensure that excessive chemical reactivity should not occur during the acid leach process or create other incompatibility hazards during the process.

Per the EFR Application, Attachment 5, Section 9.1.1 (p. 14) "*every metal and non-metal cation and anion component in the Uranium Material already exists in the Mill's tailings management system and/or is analyzed under the GW monitoring program.*

Attachment 5 of the EFRI License Amendment Request includes tables indicating expected percent increases in constituents in mill tailings due to the disposal of the Silmet Uranium Material after Mill processing (Tables 4-1 and 4-2). Most constituents show minimal increases (or decreases), however, per the EFRI Attachment 5 calculations it was noted that the Material contains a relatively high concentrations of Lead and Barium, and that Tin and Zirconium will increase significantly after processing. However, it is noted that these increases appear significantly high due to low current concentrations in Cell 4A. The table below summarizes the EFRI calculated increases in cells 3 and 4A after processing.

Constituent	Concentration in Silmet Material (ppm)	% Increase in Cell 3 after Processing	% Increase in Cell 4A after Processing
Barium	435	761.5	1588.8
Lead	4,093	35.7	127.4
Tin	89	1.4	466.8
Zirconium	1,885	12.9	271.8

Additional discussion regarding these four parameters is below:

> *Lead* – DWMRC notes that the groundwater monitoring network for Cells 3 and 4A include specific GWCL's for lead and that the increase in lead concentrations will not create a need to include additional monitoring parameters or compliance limits. The EFRI License Amendment Request also notes that previously approved alternate feed materials have had significantly higher concentration of lead than the Silmet Uranium Material. The EFRI License Amendment Request specifically cites the Cabot, Fansteel, and Molycorp material, all derived from tantalum, niobium and rare earth recovery operations similar to the Silmet material, which have been approved to be received at the

White Mesa Mill, and which have lead concentrations ranging up to 236,000 mg/kg. The Silmet material is reported to have maximum concentrations of lead of 4,100 mg/kg. It is also noted that the volume of Silmet material that will be received by the White Mesa Mill is "*far lower than the quantities of*" those other alternate feeds (p 21).

Barium – Regarding barium, the EFRI License Amendment Request summarizes that the solubility of barium would be limited in the tailings cell due to an abundance of sulfate in the cell. Per the EFRI License Amendment Request Attachment 5 (p. 14) "*the insolubility of barium in the presence of sulfate is generally consistent regardless of the liquid medium. That is, the solubility of barium sulfate in cold water is 0.022 mg/L and in concentrated sulfuric acid is 0.025 mg/L (Handbook of Chemistry and Physics, 68th Edition). At the listed concentrations of sulfate in the tailings solutions (67,600 mg/L to 87,100 mg/L in Cell 4A), a change in the ambient barium concentration in the tailings solutions 0.4 mg/L, or even 1.6 mg/L would be negligible.*" The Division finds that the addition of barium as a monitoring constituent in the Permit is not warranted based on the insolubility in the tailings wastewater and low mobility and high retardation in the event of a release of tailings wastewater. Per the 2005 Statement of Basis for the Permit, Barium was not included in the Permit based on a high Partition Coefficient (K_d) of 530 indicating low mobility in ground water. The low mobility of barium would not provide a reliable indicator of tailings wastewater discharge.

Tin – The groundwater monitoring network for Cell 4A includes specific GWCL's for tin and the increase in tin concentrations from the Silmet Uranium Material will not create a need to include additional monitoring parameters or compliance limits in the Permit. It is noted that Tin was added as part of the groundwater review for the Fansteel alternate feed material in 2005. The tin concentration in the Silmet Uranium Material is low when compared to previous alternate feed material. Maximum values of tin in the Silmet Uranium Material were measured at values of 89 ppm. Per the table above, if the Silmet uranium material were added to Cell 3 the increase in inventory of tin would be minimal, but since current inventory concentration of tin in Cell 4A are low, a large increase will occur, but the concentrations in Cell 4A will still remain low compared to other disposal cells.

Zirconium – The partition coefficient (K_d) for zirconium is 600 per the 2005 Statement of Basis for the Permit (Attachment 7). Therefore, zirconium is not mobile in groundwater at the White Mesa Mill. Additionally, zirconium was reviewed by the Division during the Fan Steel Alternate Feed Application review, and per the 2005 Safety Evaluation Report zirconium was eliminated from inclusion in the Permit due to high K_d. Based on past precedence and the high K_d of zirconium, it will not be added as a parameter in the Permit to address the inclusion of Silmet uranium material.

The addition of the Silmet uranium material to the License as an alternate feed will not require additional monitoring wells, monitoring constituents, or other new Permit conditions for the protection of groundwater. Analytical results from sampling the Silmet uranium material indicate that the current Permit monitoring network and monitoring constituent list is appropriate to identify releases of Silmet uranium material to groundwater. The Permit additionally requires appropriate follow up actions in the event that Permit listed GWCL's are exceeded at any monitoring well.

For a description of the surface water and groundwater conditions at the Mill site and the monitoring program for surface and groundwater see the White Mesa Uranium Mill Reclamation Plan Rev. 5.1B, Sections 1.4, 1.5 and 2.3 as referenced in Table 2 above.

2.3 Radiological and Non-radiological Assessment (R313-24-3(1)(a))

2.3.1 Radiological Analysis

In the Final Environmental Statement for the White Mesa Uranium Project (NUREG-0556) that the NRC prepared in 1979, the NRC prepared a Summary of Conclusion section that it based its decision on. All these conclusions still apply except for the Mill operating for 15 years.

Processing the Silmet uranium bearing material falls within the envelope of the original purpose of the White Mesa Uranium Mill. This purpose is processing materials for its uranium content. This includes the NRC's conclusions of processing alternate feed material as documented in guidance documents and in addition through subsequent environmental assessments done by the NRC and the DWMRC throughout the years for License renewal and alternate feed amendment requests.

As stated in the Technical Review section, this uranium bearing material has similar uranium and thorium (including progeny) content as the Colorado Plateau ores that the Mill already processes. Therefore, the radiological impacts from processing this uranium bearing material would also be the same as current radiological conditions found at the Mill.

Compliance with the public dose requirement is measured using the White Mesa Mill's effluent monitoring program. EFRI submits the results from effluent monitoring twice a year and the Division staff reviews the results. The Division review of these monitoring results indicates that the Mill is compliant with the 100 mrem public limit found in UAC R313-15-301.

In addition, computer modeling is typically used at license renewal to confirm the Division staff reviews. For uranium milling, the computer model that is used is called MILDOS-AREA. The MILDOS-AREA computer model was created and has been revised by Argonne National

Laboratory. Modeling can be done by EFRI, the Division or a contractor to either EFRI or the Division to show compliance. A contractor ran a MILDOS-AREA model for EFRI which was submitted as part of the 2007 RML renewal application. The Division did a separate MILDOSAREA model after the 2011 public comment period. Both models indicate that the Mill is compliant with the 100 mrem public limit. A detailed description of the Division's MILDOS-AREA modeling can be found in Attachment A of the 2017 Technical Evaluation and Environmental Assessment (TEEA) for the White Mesa Uranium Mill renewal application.

In previous licensing actions, there have been several comments and concerns from the public about radon emanating from the White Mesa Uranium Mill. In a recent NRC guidance document, *DIVISION OF DECOMMISSIONING, URANIUM RECOVERY, AND WASTE PROGRAMS INTERIM STAFF GUIDANCE DUWP-ISG-01 EVALUATIONS OF URANIUM RECOVERY FACILITY SURVEYS OF RADON AND RADON PROGENY IN AIR AND DEMONSTRATIONS OF COMPLIANCE WITH 10 CFR 20.130,1* published in June of 2019 the NRC references a study that indicates that radon emissions from a uranium recovery facility would be statistically no different, or indistinguishable, from natural background radon levels at a distance of one mile from the source of the radon. This is due to air dispersion. The closest residences to the White Mesa Uranium Mill in any direction are more than one mile away. This means radon emission from the White Mesa Uranium Mill is not a significant contributor to Public dose outside the mill fence line. Radon measurements collected from the Mill's environmental monitoring stations and reported to the Division in the semi-annual environmental reports confirm this study's conclusions. Therefore, processing the Silmet uranium bearing material will not increase the public dose from radon.

The Division also performs onsite inspections every year at the Mill. Division staff has been able to confirm in those inspections that EFRI personnel working at the Mill receive occupational doses less than the 5,000 mrem limit found in R313-15-201.

The Silmet uranium bearing material will not increase the public and occupational dose because:

1. The uranium content of the Silmet uranium bearing material has an equivalent uranium content as the Colorado Plateau ores which are currently processed at the Mill. The Colorado Plateau ores were an analyzed feed in the two MILDOS-AREA models that were done as part of the RML renewal; and

2. The total tonnage of Silmet uranium bearing material is very small (660 tons initially and 80 tons per year after the first year) compared to the amount of ore and alternate feeds processed that was analyzed in the Division's MILDOS-AREA modeling. (See Table 2 of Attachment A of the TEEA for the total amount of ores processed.)

No changes are required to the Mill's Environmental and Occupational monitoring programs to process the Silmet uranium bearing material. For example:

- The Mill's Meteorological Data Monitoring plan found in Section 1.1 of the White Mesa Uranium Mill Reclamation Plan Rev. 5.1B documents all of the meteorological data collected at the Mill. This data indicates that the primary wind rose direction is to the North-northeast, meaning that the wind blows from the South-southwest towards the North-northeast. This also means that all of the environmental monitoring stations and soil and vegetation sampling locations around the White Mesa Uranium Mill are appropriately placed;
- Collection and monitoring methods described in the Mill's White Mesa Uranium Mill Reclamation Plan Rev. 5.1B Section 1.7.5 and 2.3 follow NRC guidance documents;
- Radiological detection instruments used at the Mill as described in the Mill's Radiation Protection Program are appropriate to the types of radiation found at the Mill;
- Based on the analytical results found in the appendices of the alternate feed application, no additional radionuclides will need to be added to the Mill's air particulate monitoring. The air particulate monitoring already accounts for the Uranium and Thorium decay chains;
- The current soil monitoring plan that is found in Section 4.1 and vegetation sampling found in Section 4.2 of the Environmental Protection Manual are adequate and follow NRC guidance document NRC Regulatory Guide 4.14;
- The gamma radiation monitoring using OSL badges and using the Radonova Rapidos High Sensitivity Outdoor Environmental detectors for radon monitoring are adequate for occupational and environmental monitoring; and
- The current occupational and environmental monitoring locations throughout and around the Mill are appropriately placed.

2.3.1.1 Transportation

All transport packages shall meet U.S. DOT criteria for transporting Radioactive 7 material to the White Mesa Uranium Mill. As per 49 CFR 173.411 *Industrial Packages* (IP), the drums being used to transport the Silmet uranium bearing material shall be IP-1 and IP-2 type packages. According to the application, the inside of each drum is tripled lined with plastic liners, and shall be transported to the Mill inside another shipping containers such as an intermodal or sea land container that will act as a secondary containment for each shipment.

Upon arrival at the Mill, the Mill's Radiation Safety Technicians shall perform a radiological survey of the interior and exterior of the shipping containers to verify that the containers met the U.S. DOT criteria for Exclusive Use Shipments for Radioactive 7 material found in 49 CFR 173.441.

After the drums containing the Silmet uranium bearing material are unloaded, all transport containers and trucks shall be decontaminated and Radiation Safety Technicians shall perform

radiological surveys to verify unrestricted release criteria prior to being released from the White Mesa Uranium Mill as per Table 2 in NRC Regulatory Guide 8.30 *Health Physics Surveys in Uranium Recovery Facilities*.

Transportation accidents shall follow U.S DOT requirements found in 49 CFR 171.15 for notification of incidents and the Mill's Emergency Response Plan. U.S. DOT regulations are incorporated by reference in UAC R313-19-100.

2.3.1.2 Receiving and Storage of the Silmet Uranium Material

The Silmet uranium material will be stored in drums that are triple lined with plastic liners. As per License Condition 9.6 of the Mill's RML, receiving and storage of the Silmet uranium bearing material shall follow existing and previously reviewed SOP's. These procedures include but not limited to the following:

- PBL-2 Rev.8- Intermodal Container Acceptance, Handling & Release;
- PBL-9 Rev. 4- End Dump Trailer Acceptance, Handling & Release; and
- PBL-19 Rev. 3-Containerized Alternate Feedstock Material Storage Procedure.

The use of Radiation Work Permits (RWPs) and Safe Work Permits (SWPs) for receiving and storage activities shall be evaluated by the Mill's RSO and Safety Manager as per Section 5 of the Mill's Radiation Protection Manual. That evaluation shall be documented. Documentation of these activities shall be made available to DWMRC Staff upon request during onsite inspections.

2.3.1.3 Mill Processing the Silmet Uranium Material

As per License Condition 9.6 of the Mill's RML, processing the Silmet uranium material shall also follow existing and previously reviewed SOP's, unless a specific SOP for the Silmet Uranium Material is developed. If a specific SOP is developed it shall be approved by the Mill's SERP process and be available for onsite inspection by DWMRC. The use of RWPs and SWPs for processing activities shall be evaluated by the Mill's RSO and Safety Manager. That evaluation shall be documented. Documentation of these activities shall be made available to DWMRC Staff upon request during onsite inspections.

2.3.1.4 Accidents at the Mill while processing the Silmet Uranium Bearing Material

UAC R313-22-32(8)(a) requires an Emergency Response Plan for certain types of facilities. A uranium recovery facility is one type of facility that requires one. The current White Mesa Mill

Emergency Response Plan states that it follows the format and content outlined in NRC Regulatory Guide 3.67 and NUREG-1140.

The plan includes the following:

- evaluation of the potential risks for accidents, including fire, explosions, gas releases, chemical spills and floods (including tailings dam failure), that could occur at the Mill;
- specific emergency programs for each potential event;
- administrative response actions; and
- emergency response contacts - both internal and external.

If an emergency were to happen while processing the Silmet uranium bearing material, then EFRI and its employees shall follow the most current version of the White Mesa Mill Emergency Response Plan. Processing the Silmet uranium bearing material will not require changes to the White Mesa Mill Emergency Response Plan.

2.3.2 Non-Radiological Analysis

As discussed in the Technical Assessment of this document, the Silmet uranium bearing material does not contain any EPA regulated constituents. Therefore, there are no additional non-radiological concerns than what has already been evaluated in previous environmental assessments.

2.3.2.1 Transportation

The transportation of the Silmet uranium material will not significantly increase the truck volume to the White Mesa Uranium Mill. The largest impact will occur the first year when approximately 50 intermodal containers will be shipped to the Mill. After that it is expected that six intermodal containers per year will be shipped to the Mill. According to the alternate feed application, Utah Department of Transportation 2017 data recorded 319 truck shipments per day along the U.S. Highway 191 segment that the Silmet uranium material would be transported on. Assuming one intermodal container per truck shipment would increase the truck traffic 8 to 16% for one to two days the first year and 2% for one day per year after that.

2.3.2.2 Receiving and Storage of the Silmet Uranium Material

See Section 2.3.1.2 above.

2.3.2.3 Mill Processing the Silmet Uranium Material

Processing the Silmet uranium bearing material will use the same process as described in the White Mesa Mill Reclamation Plan Rev. Section 2.2 Facility Operations which is referenced in Table 2 above. Therefore, the same mechanical and chemical processes will be used to extract the uranium that are currently being used to extract uranium from native and alternate feed ores.

Therefore, no expansion of the Mill facilities to process the Silmet uranium bearing material is necessary.

2.3.2.4 Accidents at the Mill while processing the Silmet Uranium Bearing Material

See Section 2.3.1.4 above.

2.3.3 Consideration of Long-term Impacts (R313-24-3(1)(d))

In the May 1979 NRC's Final Environmental Statement related to operation of the White Mesa Uranium Project (NUREG-0556) Section 8, *Relationship Between Short-Term uses of the Environment and Long-Term Productivity*, the NRC stated the following

> 8.1.1 Air quality
>
> The short-term increases in suspended particulates during plant construction and the increases in suspended particulates and chemical emissions associated with mill operation are expected to have no impact on the long-term quality of the atmosphere in the region.
>
> 8.1.2 Land use
>
> The land on which the mill is located could be returned to its present state and capacity by reclamation activities. The tailings area, however, under present regulations may be unavailable for further productive use. While uranium milling is a short-term activity, a mill tailings disposal site will constitute a permanent disturbance of the land surface, rendering it unsuitable for future archaeological investigation. Therefore, any such investigation must be conducted prior to the initial surface disturbance.
>
> 8.1.3. Water
>
> Because water for milling operations will be drawn from a deep and lightly used aquifer, no changes in the water-use patterns of the area are expected to occur as a result of mill operation.
>
> 8.1.4 Mineral resources
>
> No mineral resources are known to exist on the site. Reworking of tailings for extraction of other minerals could occur if economics warrant.
>
> 8.1.5 Soils
>
> The applicant's reclamation program is designed to return the soils to a condition of productivity that is consistent with their present and historic usage -that is, the production of forage and habitat for livestock and wildlife. The program will begin as soon as

practicable and will continue throughout the life of the project. As a result, about half the disturbed soils should be back in production by the time mill operation ceases.

8.1.6 Biota

8.1.6.1 Vegetation

Revegetation of disturbed areas will begin as soon as practicable and will continue throughout the life of the project. A satisfactory vegetative cover is expected to be established in two or three years. About half the disturbed area will be revegetated by the time mill operations cease, and the remainder will be revegetated shortly thereafter.

8.1.6.2 Wildlife

Terrestrial vertebrates now inhabiting the project site will either perish or will escape to undisturbed areas surrounding the mill, where populations will be controlled by natural means. After reclamation, the more adaptable individuals and species will repopulate the area as favorable stages in the vegetative succession are reached.

8.1.7 Radiological

The tailings will be impounded in lined cells. Such enclosures would be overlain with cover material to meet radon release standards, and then reclaimed. The reclaimed tailings area will constitute a source of radon emission of about twice the natural background flux.

DWMRC Staff conclude that the NRC's findings from a 1979 Final Environmental Statement are still valid, and; the addition of processing the Silmet uranium bearing material as an alternate feed does not change the long term impacts of the Mill. This conclusion is based on the similarity of the percent of uranium being recovered in the Silmet uranium material with Colorado Plateau grade ore that was originally considered and approved by the NRC. Also because there are no EPA listed constituents in the Silmet uranium material there are no additional chemical impacts for processing the Silmet uranium bearing material.

2.3.4 Consideration of Alternates (R313-24-3(1)(c))

There are only two alternates for DWMRC staff to consider for this licensing request. They are, to approve the request or to deny the request. There are no other options for this request.

Both the Technical Evaluation and the Environmental Analysis above demonstrate that:

- Processing the Silmet uranium bearing material does not change the Mill process for alternate feeds and ores;

- Processing the Silmet uranium bearing material will not require expansion of the White Mesa Uranium Mill facility;
- Addition of the Silmet uranium bearing material will not require changes to the Mill's Environmental Monitoring or Surface/Groundwater Monitoring;
- Processing the Silmet uranium bearing material will not cause any exceedances of occupational or public dose; and
- Addition of the Silmet uranium bearing material will not change the long term impacts of the Mill.

The radiological and non-radiological impacts are the same for both alternatives.

2.4 Environmental Analysis Conclusion

The Environmental Analysis for the Silmet uranium bearing material demonstrated compliance with UAC R313-24-3:

1. Radiological and non-radiological impacts to the public health will not be increased (R313-24-3(1)(a));
2. The impacts on waterway and groundwater will not increase (R313-24-3(1)(b));
3. There is no difference in environmental impacts associated with the alternatives (R313-24-3(1)(c)) ; and
4. Long term impacts will not change (R313-24-3(1)(d)).

Therefore, DWMRC Staff have concluded that the Silmet uranium bearing material will not increase the environmental impacts from the Mill. Additionally, similar material has previously been assessed and approved

3. DWMRC Staff Recommendation to the Director

After consideration of the technical and environmental review, the DWMRC Staff recommends that the Director approve adding the Silmet uranium bearing material to the list of approved alternate feed materials in the License.

4. Proposed Language for the New Alternate Feed License Conditions

License Condition 10.10:

The Licensee is authorized to receive source material (the Silmet uranium bearing material) from the NPM Silmet OÜ Facility located near Sillamae, Estonia, in accordance with statements,

representations, and commitments contained in the License Amendment Request submitted to the Director dated April 18, 2019.

5. Explanation for the Proposed Language for the New Alternate Feed License Conditions

License Condition 10.10 indicates that EFRI's application provided all of the required information for the amendment application to be approved.

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