

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

Technical Evaluation and Environmental Analysis

Moffat Tunnel 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 Moffat Tunnel uranium bearing material as an alternate feed material

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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.

Equivalent Feed – According to NRC REGULATORY ISSUE SUMMARY 2012-06 NRC POLICY REGARDING SUBMITTAL OF AMENDMENTS FOR PROCESSING OF EQUIVALENT FEED AT LICENSED URANIUM RECOVERY FACILITIES, equivalent feeds are a type of alternate feed materials that can be processed at a licensed uranium recovery facility (i.e. conventional mill, ISR, or heap leach) which does not require a license amendment to process.

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 is the National Emission Standard 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.”

UPRR – An acronym for Union Pacific Railroad

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	<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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</p>

	<p>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.”</p> <p>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.”</p>
1992	<p>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:</p> <ol style="list-style-type: none"> 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. <p>The remainder of the discussion revolves around the issues with RCRA, low-level radioactive waste and alternate feeds.</p>
1995	<p>On August 15, 1995 the NRC publishes SECY-95-211 titled <i>FINAL "REVISED GUIDANCE ON DISPOSAL OF NON-ATOMIC ENERGY ACT OF 1954, SECTION 11e.(2) BYPRODUCT MATERIAL IN TAILINGS IMPOUNDMENTS," AND FINAL</i></p>

	<p><i>"POSITION AND GUIDANCE ON THE USE OF URANIUM MILL FEED MATERIALS OTHER THAN NATURAL ORES"</i>. 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.</p>
1995	<p>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.</p> <ol style="list-style-type: none"> 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	<p>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.</p>
2000	<p>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</p>

	<p>the process."</p> <p>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."</p> <p>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.</p>
2004	<p>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.</p>

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.

Current Alternate Feed Application

With a cover letter dated December 13, 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 Moffat Tunnel 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.

The uranium bearing materials being considered in this review are the centrifuge cake resulting from mechanical and inorganic treatment of native groundwater pumped for dewatering of the Moffat Railroad Tunnel, conducted in Union Pacific Railroad's ("UPRR") water treatment plant (the "WTP") in Winter Park, Colorado.

The WTP treats pumped groundwater to remove metals and radionuclides prior to discharge of the treated water to the Fraser River. The WTP produces filtered solids which are then dewatered in a centrifuge to produce a centrifuge cake that is packaged in closed drums for off-site recovery or disposal. The Uranium Material consists of the centrifuge cake only. This material is similar to the filter cake received from the currently-approved Dawn Mining alternate feed, in that it results from the treatment of native groundwater for the removal of metals and radionuclides.

Prior to 2019, UPRR periodically disposed of the Uranium Material at various off-site waste disposal facilities. Because the Uranium Material contains elevated levels of naturally-occurring

radionuclides, the Colorado Department of Public Health and the Environment ("CDPHE") required in 2018 that UPRR apply for a Radioactive Materials License, and demonstrate that UPRR has identified an off-site location suitable for disposal or recovery of naturally occurring radioactive material.

UPRR requested that EFRI make this application to process the Uranium Material as an alternate feed material at the Mill and to dispose of the resulting tailings in the Mill's tailings management system as 11e.(2) byproduct material. The Division will compare the process that created the Moffat uranium bearing material to the process that created the previously approved Dawn Mining alternate feed because the materials are similar from technical, regulatory, and legal perspectives.

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

This Technical Evaluation concludes that the Moffat Tunnel material qualifies as both alternate feed as well as equivalent feed pursuant to applicable NRC guidance, laws, and regulations. These determinations are independent. Qualification of the material as either alternate feed or equivalent feed alone would be adequate to result in the approval for EFRI to possess and process the material.

1.1 Does the Moffat Tunnel 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 December 23, 2019, Section 2.4, UPRR has estimated that the Moffat Tunnel uranium bearing material has a uranium content ranging from 0.45 to 0.49 dry weight % natural uranium or 0.53 to 0.58 dry weight % U_3O_8 . This percentage range of uranium is comparable to the native Arizona Strip 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 Moffat Tunnel 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.”

In the application EFRI claims that the Moffat Tunnel uranium bearing material is excluded from RCRA based on 40 CFR 261.4(a)(4). 40 CFR 261.4(a)(4) is as follows:

40 CFR 261.4 Exclusions.

(a) Materials which are not solid wastes. The following materials are not solid wastes for the purpose of this part:

(4) Source, special nuclear or byproduct material as defined by the Atomic Energy Act of 1954, as amended, 42 U.S.C. 2011 et seq.

Source material is defined as:

UAC R313-12-3 Definitions (See also 10 CFR 40.4)

"Source material" means:

(a) uranium or thorium, or any combination thereof, in any physical or chemical form, or

(b) ores that contain by weight one-twentieth of one percent (0.05 percent), or more of, uranium, thorium, or any combination of uranium and thorium. Source material does not include special nuclear material.

In addition to the exclusion, EFRI's application provided RCRA analysis in Section 3.3.3 and the laboratory results are found in the appendices of the alternate feed application, the Moffat Tunnel 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 Moffat Tunnel 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 Moffat Tunnel uranium bearing material does not contain RCRA 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 Moffat Tunnel uranium bearing material will be processed for its source material. The Moffat Tunnel uranium bearing material is similar to the Dawn Mining alternate feed material that the Mill has processed and recovered uranium from, in that it results from the treatment of native groundwater for the removal of metals and radionuclides. As discussed above, the Moffat Tunnel uranium bearing material meets the definition of ore. Therefore, it is reasonable to conclude that uranium (source material) can be recovered from the Moffat Tunnel uranium bearing material.

1.2 Can the Moffat Tunnel Material be considered an Equivalent Feed?

As an independent basis to approve the Moffat Tunnel uranium bearing material, this Technical Evaluation concludes that this material should also qualify as “equivalent feed” under NRC’s published guidance, based on the analysis presented in this Section 1.2. This provides an alternate basis to support approval of the Moffat Tunnel uranium bearing material for processing at the Mill.

To evaluate whether the Moffat Tunnel uranium bearing material could be considered an equivalent feed the Division used the April 16, 2012, NRC REGULATORY ISSUE SUMMARY 2012-06 NRC POLICY REGARDING SUBMITTAL OF AMENDMENTS FOR

PROCESSING OF EQUIVALENT FEED AT LICENSED URANIUM RECOVERY FACILITIES guidance document. In this document the NRC stated the following:

“The NRC is issuing this RIS to provide guidance on the impact the processing of alternative feed may have for individual licensees. Specifically, this guidance addresses how to determine if the processing of certain alternative feed materials requires a license amendment from NRC. This guidance describes the agency’s policy that receipt and processing, of “equivalent feed”¹ (ion exchange resin media) at an NRC-licensed uranium recovery facility, whether conventional, heap leach, or ISR, does not require a license amendment when the resin is chemically and physically essentially the same as that which is currently processed, would be processed using the facility’s existing equipment, does not exceed the license’s uranium production limit and stays within the facility’s environmental and safety review envelope.”

The NRC continued:

“Small Community Water Systems (CWSs) are required to remove uranium from drinking water to meet EPA drinking water standards. The transport, treatment, and disposal of treatment residuals (e.g., ULR resulting from the water treatment) can be a significant cost. It has been noted by the EPA that for small-scale CWSs, handling of treatment residuals such as ULR may account for 50 percent of their total operating budgets. Similarly, mine dewatering operations involve the extraction of water from surface or underground mines and, when necessary, the treatment of extracted water to remove pollutants prior to discharge. Mine dewatering is often necessary to allow miners to safely extract ore. In the case of uranium mine dewatering, extracted water is often treated by IX resin to remove uranium prior to discharge. These IX resins must either be disposed in a landfill or could be eluted at a uranium recovery facility. It should be noted that in the past, mine dewatering resins have been treated as alternate feed at conventional mills (57 FR 20532). These license amendments were required because at that time, the staff considered the mine dewatering resins to be processed or refined ore distinct from natural ore normally processed at a conventional mill. As a result, the NRC staff has been queried by representatives of the uranium recovery industry and uranium water treatment suppliers/operators about the potential for licensed uranium recovery facilities to accept and process ULR generated by drinking water treatment facilities because the ULR can be processed in an ISR operator’s existing ion exchange recovery circuit. However, in the absence of the clarification provided by this RIS, the ISR uranium recovery facility would be required to submit, and have the NRC approve, an amendment to its NRC license prior to receiving and processing such resins. An amendment would be required because without this clarification these resins would be considered an alternate feed, despite the fact that such resins are chemically and physically essentially the same as those resins currently used at ISR facilities during uranium recovery operations. SUMMARY OF ISSUE Currently, the only options for the disposition of ULR generated from operations other than licensed uranium recovery operations (i.e., treating drinking water sources and mine dewatering) are processing as alternate feed at a mill or disposal in landfills permitted under the Resource Conservation and Recovery Act (RCRA) or

licensed by the NRC or an Agreement State. Under past interpretations of RIS 00-23, a license amendment would be required for an NRC-licensed uranium recovery facility to accept ULR resulting from treatment of community water supplies. The staff has determined that this interpretation lacks technical integrity, does not reflect present day operating practices in the uranium recovery industry and is not consistent with the Commission's intent in issuing RIS 00-23. In particular, the NRC staff has determined that NRC and Agreement State-licensed uranium recovery facilities should be permitted to accept these ULR as equivalent feed without the need for a license amendment so long as the receiving facility can demonstrate the ULR meets the equivalent feed criteria (i.e., it is physically and chemically essentially the same as the resin being processed at the facility, can be processed on the current equipment at the facility, processing the equivalent feed is within the facilities' existing safety and environmental review envelope, and the processing does not exceed the license's uranium production limit). The basis for the staff's position relates to the original intent of RIS 00-23. The RIS 00-23 and the underlying Commission decision was intended to address a concern that without restrictions on the processing of material other than natural ore, a conventional uranium recovery mill could process any material containing uranium and dispose the waste in the "tailings pile."⁴ Thus, material very dissimilar to the material normally processed at a conventional mill would be processed largely to allow disposal as 11e.(2) byproduct material. In the case of ULR, the concern addressed in RIS 00-23 is not at issue. For example, ULRs are physically and chemically essentially the same as resins used to extract uranium at an in-situ recovery facility and the resulting processing and waste products would be the same as those associated with normal in-situ uranium recovery operations. Also similar to ISR resin, ULR from the CWS water treatment, mine dewatering, and other uranium recovery facilities is designed to only capture uranium and not other hazardous constituents. Consequently, in this guidance, the staff is defining the term "equivalent feed" to apply to those circumstances where the feed material is essentially the same chemically and physically as the source material that is normally processed at a uranium recovery facility. Such material should not to be considered as alternative feed requiring license amendments as described in RIS 00-23 if it meets the equivalent feed criteria articulated in this RIS. Equivalent feed can originate at a CWS or mine dewatering operation. In addition, equivalent feed can also include ULR originating from another licensed uranium recovery facility. However, it should be noted that processing of these ULRs for source material would need to occur before any waste would be considered as 11e.(2) byproduct material. To constitute equivalent feed, the ULR must be chemically and physically essentially the same to that which is currently used at the licensed uranium recovery facility and must not result in additional waste streams or risks not assessed during the process of licensing the receiving uranium recovery facility. For example, a typical uranium treatment resin for drinking water (Z92®) is produced by Lanxess (also known as Sybron Chemicals). The Z-92® resin is essentially the same in composition and function to the Dow 21K resin, the typical ion exchange resin used at most uranium recovery facilities. A comparison of the product information of Z92® resin to that of Dow 21K resin indicates the following: - Both are a strong-base, Type I anion

exchange resin; - The composition of both is divinylbenzene (dvb) styrene; - The functional group of both is a quarternary amine; - The physical form of both is resin beads with essentially the same bulk weight, color, and amine odor; - The Z-92® resin is available in a similar bead-size range to that of Dow 21K; - Water Remediation Technologies, Inc. identifies the Z-92® resin as selective for uranium; the Dow 21K resin is also selective for uranium. The primary difference between the Z-92® and the typical uranium recovery IX resin is that the water treatment resin is marked and packaged specifically for use in potable water systems and, therefore, undergoes an additional step of the Water Quality Association testing for certification to ANSI/NSF Standard 61. An example for mine dewatering would be Kennecott Uranium Company. Upon staff inquiry, Kennecott Uranium Company stated that its mine dewatering resin is the Dow 21K resin that is discussed above, which is the same resin used at ISR facilities. Therefore, the staff determined that mine dewatering resins, like loaded resins from CWSs, can be more appropriately classified as equivalent feed when they are sent for processing at a uranium recovery facility. Given that ULRs from a CWS and resins from mine dewatering processes are physically and chemically essentially the same as those resins processed at a uranium recovery facility; the staff sees no basis for requiring that uranium recovery operators with a NRC or Agreement State licensed resin processing plant obtain a license amendment to process this essentially same material. The same process is also used for eluting or recovering uranium from water treatment and resins used in the uranium recovery industry. Therefore, the NRC staff determined that water treatment resins and resins from mine dewatering processes should be defined as equivalent feed if the ULR from these sources meet the equivalent feed criteria. Thus, the processing of equivalent feed at a licensed facility will not require an amendment to an existing license so long as the existing license uranium production limits are not exceeded, the processing is within the existing safety and environmental review envelope, and the ULR would be processed using existing equipment at the receiving facility. This analysis would also be applicable to any other sources of ULR not specifically addressed in this RIS, as long as the resins meet all the equivalent feed criteria. In a similar fashion to ULRs originating from a CWS or mine dewatering operation, ULRs from another licensed uranium recovery facility can also be treated as equivalent feed if it meets the above mentioned criteria. As such, processing of this equivalent feed will not require an amendment to an existing NRC license so long as the existing limits on production of uranium in the license are not exceeded, the processing is within the existing safety and environmental review envelope, and the ULR would be processed using existing equipment at the facility. After processing the equivalent feed, the spent resin can be disposed as byproduct material in the same manner as the resin used in the primary uranium recovery activity. Disposal sites could either be existing mill tailings impoundments or other disposal facilities licensed by the NRC or Agreement States. No additional disposal requirements are necessary. This approach benefits our National interest by recovering a valuable resource and the environment by providing additional options such as recycling and reuse instead of disposal for this material. Alternately, the stripped resin may be disposed as byproduct material or returned to the water treatment facility, a mine dewatering

facility, or a licensed uranium recovery facility for reuse. Reuse of IX resin is a standard uranium recovery industry practice that reduces operating expenses as well as the volume of waste sent to disposal. Therefore, the reuse of IX resin by water treatment or mine dewatering facilities is consistent with current Commission policies and industry practices. This provides an economic benefit to the treatment facilities (particularly CWSs) by reducing operating costs and the amount of resin requiring disposal. Enclosure 1 to this RIS offers additional information, which addressees may find useful, about uranium recovery processing of equivalent feed. Enclosure 2 contains procedures which the NRC finds satisfactory for accepting equivalent feed.”

The Division considers the application of the NRC’s RIS here to be appropriate. The only distinction between the IX resin evaluated in the RIS and the Moffat Tunnel uranium bearing material relates to the form of the material. The RIS dealt with IX resins from water treatment, while the Moffat Tunnel uranium bearing material is in the form of centrifuge cake. The Division’s determination that sludge material (i.e. filter cake and centrifuge cake) from water treatment facilities as an equivalent feed is appropriate for conventional uranium mills because these materials are chemically and physically similar to what conventional uranium mills (i.e. the White Mesa Uranium Mill) already processes. Therefore, it is reasonable and appropriate for the Division to conclude that material in a form other than resin is appropriate for equivalent feed as long as it can be demonstrated that the material meets the purpose and criteria stated by the NRC REGULATORY ISSUE SUMMARY 2012-06 NRC POLICY REGARDING SUBMITTAL OF AMENDMENTS FOR PROCESSING OF EQUIVALENT FEED AT LICENSED URANIUM RECOVERY FACILITIES guidance document.

1.2.1 Is the Material from a water treatment facility?

Section 1.2 of the application describes the Moffat Tunnel uranium bearing material as centrifuge cake resulting from mechanical and inorganic treatment of native groundwater pumped for dewatering of the Moffat Railroad Tunnel, conducted in Union Pacific Railroad’s water treatment plant in Winter Park, Colorado. This means that the Moffat Tunnel uranium bearing material meets the purpose of the guidance document by providing a processing and recycling option for water treatment facilities.

1.2.2 Is the Material physically and chemically essentially the same as the “material” being processed at the facility?

Section 2.1 of the application describes the Moffat Tunnel uranium bearing material as generated by treatment of natural groundwater from dewatering of the Moffat railroad tunnel. The groundwater contains naturally occurring radioactive material (NORM) from contact with native rock, and picks up inorganic solids particles as it passes through the tunnel. This means that the

uranium content and the inorganic solids are the same material that would be found in native ore that is currently processed by the White Mesa Uranium Mill.

In Section 2.2 of the application, the Moffat Tunnel uranium bearing material is described as being comprised only of the centrifuged solids. No other materials or wastes are added to the Uranium Material. The Uranium Material contains approximately 75-83% moisture content (average 78% moisture) and contains up to 0.49% natural uranium on a dry weight basis.

Section 2.4, as noted, the process history demonstrates that the Uranium Material results from the treatment of native groundwater for the removal of metals and radionuclides. UPRR has estimated that the current Uranium Material has a uranium content ranging from 0.45 to 0.49 dry weight % natural uranium or 0.53 to 0.58 dry weight % U_3O_8 . Natural thorium content will likely range from 0.001 to 0.003 dry weight percent and may be expected to average approximately 0.002 dry weight %. A more detailed radiological characterization of the Uranium Materials is contained in the Radioactive Materials Profile Record (RMPR) (Attachment 2 of the application). The radionuclide activity concentration of the Uranium Material is comparable to Arizona Strip ores and alternate feed materials which the Mill is currently licensed to receive.

Section 2.1 of the Technical Memorandum in Attachment 4 of the application states:

“The Uranium Material consists of the centrifuge solids from the WTP, as described below.

Upon entering the treatment plant, the groundwater from tunnel dewatering is treated first by the addition of a coagulant, Calchem CC2000 aluminum chlorohydrate, followed by direct filtration in an ultrafiltration membrane system. Backwash water from the ultrafiltration membrane system containing coagulated solids is pumped through a dissolved air flotation system where a very small amount of 7th generation dish soap (<0.001 % by volume) is added to assist in thickening of the solids via flotation. The thickened solids are further dewatered using a centrifuge. A small amount of Zetag 120L polymer, <0.001 % by volume, is added to the thickened solids before the solids enter the centrifuge.”

The Division believes that the addition of these additives does not chemically alter the Moffat Tunnel uranium bearing material from its natural state. These additives do nothing more than enhance the ability of the centrifuge to remove the solid materials from the natural water. The chemical additives cause the particulates in the water to adhere to one another, making removal on the filter easier and more effective. The EPA has stated: “Residuals from WTPs are typically not hazardous and can be accepted by landfills or managed via land application.”¹ All of the chemical constituents of these additives are present in the mill tailings, and so no new hazard is introduced.

¹ Drinking Water Treatment Plant Residuals Management Technical Report: Summary of Residuals Generation, Treatment, and Disposal at Large Community Water Systems, September 2011, United States Environmental Protection Agency (EPA 820-R-11-003), p. 11-22.

In addition, Division Staff reviewed the radiological analytical reports attached to the application in Attachment C-1. The analytical data indicates that the radionuclides found in the Moffat Tunnel uranium bearing material are consistent with Naturally Occurring Radioactive Material and the Uranium-238/Uranium-235/Uranium-234 percentages are consistent with natural uranium (See the NRC definition of Natural Uranium in their glossary at nrc.gov).

Based on the information provided in the application, the Moffat Tunnel uranium bearing material meets the criteria of being physically and chemically the same as material currently being processed at the White Mesa Uranium Mill.

1.2.3 Can the material be processed with the current equipment at the facility?

Section 4.4 of the application states: *“The Uranium Material will be introduced to the process in either the alternate feed circuit or in the main circuit either alone or in combination with other conventional ores or other alternate feed materials. Because the material is moist with 75 to 90 % moisture content, it is not expected to produce dust upon emptying of drums or introduction into the Mill process. The material will be processed through existing acid leach, solid liquid separation and solvent extraction circuits for the recovery of uranium values. The leaching process will begin either in the main circuit leach tanks with the addition of sulfuric acid, or in the alternate feed circuit. The solution will be advanced through the remainder of the Mill or alternate feed circuit with no significant modifications to either the circuit or the recovery process anticipated. The only wastes or effluents to be generated from processing the Uranium Material are solutions or solids to be transferred to the Mill's existing tailings management system.*

Since no significant physical changes to the Mill circuit and no new process chemicals will be necessary to process this Uranium Material, no significant construction impacts beyond those previously assessed will be involved. Recovery of additional contained metals is not anticipated at this time.”

Based on the information provided in the application the Moffat Tunnel uranium bearing material meets the criteria for the material being processed using current equipment at the Mill.

1.2.4 Is Processing the equivalent feed within the facilities' existing safety and environmental review envelope?

EFRI made the following statements in the application 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...

Section 4.3 "Because the Uranium Material does not significantly differ in radiological activity from other ores and alternate feed materials, and because the Uranium Material will be stored in sealed drums on the Mill's ore pad pending processing, there will be no environmental impacts associated with the Uranium Material over and above those associated with other drummed alternate feed materials handled at the Mill on a routine basis."

Section 4.10.2 "The radiation safety program which exists at the Mill, pursuant to the conditions and provisions of the Mill's Radioactive Materials License, and applicable State Regulations, is adequate to ensure the protection of the worker and environment, and is consistent with the principle of maintaining exposures of radiation to individual workers and to the general public to levels As Low As Reasonably Achievable ("ALARA")."

The Division concurs with EFRI that the Moffat Tunnel uranium bearing material is within the environmental envelope of the Mill. This concurrence is a result of the Division MILDOS Area modeling done in support of the Mill's RML renewal.

The Division also concurs that the Mill's radiation safety program is adequate to protect occupational workers at the Mill and the Public and the addition of the Moffat Tunnel uranium bearing material will not increase the radiological impact to safety at the Mill. This concurrence is based on observations made by Division Staff during the annual radiation safety inspections performed at the Mill.

Based on the information provided in the application and observations made by Division Staff, the Moffat Tunnel uranium bearing material meets the criteria that processing the Moffat Tunnel uranium bearing material is within the environmental and safety envelope of the Mill.

1.2.5 Will processing the material cause the exceedance of the license's annual uranium production limit?

Section 2.3 of the application states: "The WTP will be required to operate indefinitely, as long as the Moffat Tunnel remains in service. To date, Uranium Material produced since the start-up of the WTP has been removed from the WTP site and disposed elsewhere. There is no current accumulated backlog of material on site at the WTP. UPRR anticipates that the WTP will continue to produce a maximum of approximately 100 tons per year on a wet basis, or approximately 25 tons per year on a dry basis, indefinitely."

This application anticipates that the Mill could potentially receive the Uranium Material indefinitely. In order to accommodate potential future expansion of the Moffat Tunnel and a range of dewatering rates, EFRI has anticipated dewatering and centrifuge cake production up to twice the current rate, that is, a maximum of approximately 200 tons per year on wet basis and 50 tons per year on a dry basis.”

Section 4.5.2 continues: “The amount of tailings that would potentially be generated from processing the Uranium Material is equivalent to the volume that would be generated from processing an equivalent volume of conventional ore. Processing of the Uranium Material will have no effect on the capacity of the tailings management system over the lifetime of the Mill operations beyond that of processing a similar amount of natural ore. The WTP, as described above, may be expected to ship a total of approximately 5,000 tons of Uranium Material to the Mill over its lifetime. This volume is well within the maximum annual throughput rate and tailings generation rate for the Mill of 720,720 tons per year. EFRI has updated the Tailings Capacity Review, a copy of which is available for review at the Mill. The Tailings Capacity Review confirms that there is more than adequate capacity to accommodate the tailings from the Uranium Material. Additionally, the design of the existing tailings management system has previously been approved by the Utah DWMRC (Cells 4A and 4B), and EFRI is required to conduct regular monitoring of the leak detection systems and of the groundwater in the vicinity of the tailings management system to detect any potential leakage should it occur. A copy of the updated Tailings Capacity Review is available for review at the Mill.”

This Division concurs with these conclusions. In Table 2 of Attachment A of the 2017 Technical Evaluation and Environmental Assessment (TEEA) for the White Mesa Uranium Mill renewal application of the Division’s MILDOS–AREA modeling write up (See below), during the license renewal process Division Staff evaluated the number of tons of ore (both native ore and alternate feed) that was processed from 2007 to 2014. The amount of material that would be sent to the Mill from the Moffat Tunnel will not significantly increase the amount of ore that has been processed from year to year.

Table 2: Ores/AF Received (tons)

Year	CP Ores	AS Ores	AF - Bulk	AF - Container
2007	0	0	40877	1202
2008	246503	0	0	0
2009	144434	0	0	171
2010	217430	17037	0	291
2011	149719	24826	10069	1969

2012	37879	39455	0	6631
2013	105920	18370	0	3661
2014	0	2052	22	1207

Table 11: Yellowcake Produced (in pounds)

Year	CP Ores	AS Ores	AF - Bulk	AF - Container
2007	0	0	83461.63	141372.37
2008	801314	0	0	0
2009	416146	0	0	186365
2010	700971.09	157334.91	0	299033
2011	566905.97	281614.03	46768.93	131013.07
2012	234236.17	603134.83	0	433218
2013	421811.06	233460.94	0	351323
2014	0	803621.08	0	102870

License Condition 10.1.A. in the Mill’s RML limits the amount of yellowcake production to 4,380 tons of yellowcake per year. In Table 11 of the Division’s MILDOS-AREA modeling write up (See above) the amount of yellowcake produced at the Mill for 2007 to 2014 was calculated in pounds. That table indicates that the Mill currently produces less yellowcake than License Condition 10.1.A allows. Therefore, processing the Moffat Tunnel uranium bearing material will not cause the Mill to exceed its processing limits and meets this criteria.

1.3 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 currently approved Dawn Mining 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 Moffat Tunnel equivalent 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 equivalent 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 Moffat 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 has a high water content, and will likely ship as a paste. If properly packaged and handled, danger of fluid leaks from the transport containers should not be an issue. However, robust packaging requirements and inspection criteria have been prepared to reduce the probability of a release, to limit the scope of any that do occur, and detect any release rapidly. Specifically, the material is to be drummed, with the transport trailer providing secondary containment. Being in a wet state, dust production is not likely. Wet materials have been transported and processed in the main mill circuit and Alternative Feed Circuit in the past without incident, so this material does not pose challenges not already encountered and overcome at the mill. No additional requirements will be necessary regarding handling of this material.

1.4 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 Moffat Tunnel Uranium Material review is to determine if the incoming material will change the potential contaminant source in the conventional

impoundments and create a 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 Moffat Tunnel Uranium Material disposition (Cell 4A), 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 Moffat Tunnel Uranium 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.

1.5 Legal Review

Ore vs. Waste

Based on previous alternate feed requests, the Division anticipates that it may receive public comments claiming that the Moffat 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 Moffat Tunnel Alternate Feed Materials.

Exclusion from RCRA based on 40 CFR 261.4(a)(4)

Section 3.3.3 of the application states: “*The Uranium Material, which has materially not changed in form or content since first being produced in 2017, remains definitional source material as per 40 CFR Part 261.4, and is explicitly exempt from regulation under RCRA.*”

1.6 Technical Conclusion

Based on the foregoing, the Moffat Tunnel 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 ; and
3. Will it be processed for its source material?

Furthermore, as an independent basis for approval, the Moffat Tunnel uranium bearing material meets the five criteria that the NRC has designated to be considered an equivalent feed found in the April 16, 2012, *Regulatory Issue Summary 2012-06 NRC Policy Regarding Submittal of Amendments for Processing of Equivalent Feed at Licensed Uranium Recovery Facilities* of:

1. The material comes from a water treatment facility;
2. The material is physically and chemically essentially the same as the “material” being processed at the facility;
3. Existing license uranium production limits are not exceeded;
4. The processing is within the existing safety and environmental review envelope; and
5. The material would be processed using existing equipment at the receiving facility.

Under both analyses, the EFRI License Amendment Request adequately identifies and evaluates potential chemical hazards regarding processing and disposal locations of the Moffat Tunnel uranium material. This review consisted of a comprehensive evaluation of the chemical compatibility of the Moffat Tunnel 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 Moffat Tunnel 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 Moffat Tunnel uranium material. Additionally, the current Division inspections at the facility and reporting requirements are currently adequate to address the Moffat Tunnel uranium material.

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

1. The White Mesa Uranium Mill’s Radioactive Material License. Specifically License Conditions 10.1 D. & E.; and
2. The White Mesa Uranium Mill’s Groundwater Discharge Permit.

The DWMRC Staff has concluded that the Moffat Tunnel uranium bearing material meets the technical requirements to be an alternate feed material and an equivalent feed. No new monitoring equipment, monitoring, or construction permits will be required for acceptance of the Moffat Tunnel uranium material. Therefore, it is consistent to amend the License to allow acceptance of the Moffat Tunnel 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 Moffat Tunnel 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 U.S. Census data from 2010.
Historic, Scenic,	White Mesa Reclamation	The description and the data provided

Archeological and Cultural Resources	Plan Section 1.3	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 Embryo/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	See Radiation Protection Program	The description provided in this section fulfills the requirement.

Public		
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 specific to the Moffat 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 particulates removed from tunnel water. As such, its constituents are suspended solids from the rock with which the water has come into contact. The chemical makeup of these particulates do not differ in any material sense from the ores which the mill was designed to process. These materials will not expose the liner system to any stresses for which it was not designed. The treatment chemicals, as was discussed earlier, do not produce a hazardous residual when applied as treatment aids. The treatment residual will be higher in aluminum than is typically present in other tailings residuals, but elevating the aluminum level in the tailings will not affect liner integrity. The aluminum will be sequestered by combining with the sulfuric acid in the process solution, and so will not be available to react with the liner. Furthermore, the quantity of Moffat material to be processed is small enough that the overall chemistry of the tailings will not be affected.

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 Moffat Tunnel 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))

EFRI is required to conduct and report on environmental monitoring at the Mill in compliance with the Permit. As required by 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) includes 21 monitoring wells which are required to be sampled, quarterly or semi-annually, 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 expected constituents in uranium ore. The GWCL's were originally included in a 2005 Permit and discussed in the Permit 2005 Statement of Basis. The monitoring wells are designed and located for timely detection of potential tailings wastewater discharge to the groundwater as determined by well spacing analysis and detection monitoring efficiency. Per discussion below, no new monitoring wells, constituents or increased frequency is warranted based on acceptance, processing and disposal of the Moffat Tunnel Uranium Material at the Mill.

Per the EFRI License Amendment Request it was noted that *“all constituents identified in the Uranium Material are already present or can be assumed to be present in the Mill's tailings management system, are already included in the Mill's groundwater monitoring program, or both”* (p. 18), and *“chemical and radiological make-up of the Uranium Material is similar to other ores and alternate feed materials processes at the Mill, and their resulting tailings will have the chemical composition of typical uranium process tailings, for which the Mill's tailing*

management was designed. As a result, the existing groundwater monitoring program at the Mill will be adequate to detect any potential future impacts to groundwater.” Based on statements in the Amendment Request and Division review of the available data in the EFRI License Amendment Request, the constituents in the tailings wastewater will not change based on discharge of the processed Moffat Tunnel Uranium Material to an active tailings cell. Per the EFRI License Amendment Request it was noted that after milling and processing, the Moffat Tunnel Uranium Material will be disposed of in the tailings management system Cell 4A which has been constructed according to Division approval and meets Best Available Technology Requirements. Although, depending on the time period that Moffat Tunnel Uranium Material is accepted, it may be necessary to dispose of some material in newer tailings cells (e.g. Cell 4B). EFRI monitors the tailings wastewater in all tailings cells (and Evaporation Cell 1) annually to evaluate the concentrations of all constituents and groundwater monitoring networks to detect potential releases of tailings wastewater are evaluated and approved by the Division for each Mill disposal cell. Any changes in constituent concentrations due to the Moffat Tunnel Uranium Material would be timely detected in tailings wastewater. Per review of the EFRI License Amendment Request, the addition of constituents to the current Permit monitoring requirements is not warranted based on review of the material and chemical characteristics.

Attachments to the EFRI License Amendment Request are included which provide material descriptions and analytical parameter results, including: 1) Attachment 2 – Radioactive Material Profile Record and affidavit (Includes a waste material photograph, radiological analysis data packages and organic and inorganic data packages), and; 2) Attachment 4 – Review of Chemical Constituents in Moffat Tunnel Uranium material to Determine the Potential Presence of RCRA Characteristic or RCRA Listed Hazardous Waste. These attachments were reviewed to determine and support the EFRI License Amendment Request statements regarding Moffat Tunnel Uranium Material chemical constituents and concentrations and statements that all constituents in the material are currently in the tailings wastewater.

Per the “Radioactive Material Profile Record,” the Moffat Tunnel Uranium Material will be received as a brown sludge (clay-like consistency) from centrifuged residue material (centrifuge cake). As summarized in sections above, Aluminum Chlorohydrate, dish liquid, and Zetag (polyacrylamide), are used in the current process of creating the filter cake sludge for disposal.

The EFRI License Amendment Request includes the following data (analytical reports):

1. GEL Laboratories LLC analytical results (Pb-210, Ra-226, Ra-228, Th-228, Th-230, Th-232, U-234, U-235 and U-238) for samples received on July 9, 2018 consisting of two samples collected on July 2, 2018 and labeled; 1) Winter Park Material Grab, and 2) Winter Park Material Composite.
2. AmericanWest Analytical Laboratories analytical results for inorganic and organic parameters for samples received on June 21, 2018 consisting of two samples collected

on June 20, 2018 and labeled; 1) Winter Park Material Grab, and 2) Winter Park Material Composite.

It was noted that all analytical information regarding the Moffat Tunnel Uranium Material in the EFRI License Amendment Request is limited to one grab sample and one composite sample. If any changes in treatment procedures or treatment chemicals occurs which may change the chemical composition of the sludge filter cake, it may be warranted to require resampling of the sludge filter cake at that time to ensure that no new, and potentially mobile, contaminants are added to the tailings wastewater in significant amounts.

A discussion of the EFRI License Amendment Request analytical data is below.

Metals Constituents

Per review of the metals constituents in the Moffat Tunnel Uranium Material it appears that all metals constituents are currently in the Mill tailings wastewater inventory. It was noted that high concentrations of aluminum are present in the Moffat Tunnel Uranium Material due to the use of aluminum chlorohydrate in the treatment process. Aluminum is not a current parameter for evaluation in the Permit so additional review and discussion is included below.

It was also noted that barium is present in the Moffat Tunnel Uranium Material at low concentrations. Barium was also reviewed and is discussed below since it is not a parameter currently required for sampling in the Permit.

Aluminum:

Per review of the laboratory analysis reports submitted with the License Amendment Request it was noted that aluminum concentrations in the sludge (dry weight mg/kg) are high in the June 20, 2018 collected samples (grab and composite) as summarized on the table below. The sludge filter cake material is approximately 7 to 8% aluminum by dry weight. It was noted that aluminum will exist in dissolved solution in high acidic conditions found in the tailings wastewater. Per the 2005 Statement of Basis for the 2005 Permit, aluminum data was summarized on Table 5 regarding measured concentrations in the Tailings wastewater (average concentration 1,826.9 mg/L), however the parameter was not included since it is not a primary heavy metal in uranium ores. This determination was made with knowledge that aluminum was present in the tailings wastewater.

Per the 2005 Fansteel Safety Evaluation Report (p. 12) it was determined that aluminum would not be included as a groundwater monitoring parameter in the Permit due to “1) Aluminum and iron have similar geochemical behavior in groundwater environments, 2) the increase in concentration of aluminum in the tailings will be small (approximately 0.13 %), 3) iron is already a required groundwater monitoring parameter in the Permit, 4) it is estimated that there will be similar concentrations of aluminum and iron in the mill’s tailings inventory after

processing the FMRI material (IUSA, March 2005), and 5) iron has an estimated lower Kd than aluminum (iron estimated Kd of 1.4 and aluminum estimated Kd of 9.9 (Tetra Tech, 2005)). Consequently, iron should be detected at the compliance monitoring wells before the arrival of aluminum and therefore an acceptable analog.”

The License Amendment Request states that a total of approximately 5,000 tons of Moffat Tunnel uranium material will be processed at the mill over its lifetime. The Division notes that this amount of material is negligible in relation to the volume of room for disposal in tailings cell 4A and to the annual maximum throughput rate and tailings generation rate for the mill of 720,720 tons per year.

Based on review of the EFRI License Amendment Request, the 2005 determinations that aluminum not be included in the monitoring constituent list is based on; 1. It is not a primary heavy metal in uranium ore; and, 2. Analogous geochemical behavior of iron in the tailings wastewater with iron as a more conservative tracer of potential tailings wastewater in the groundwater than aluminum; are still valid technical bases to omit aluminum and applicable to the Moffat Tunnel Uranium Material based on the low additional mass and potential minor increases of aluminum in the tailings wastewater due to processing and disposal of the Moffat Tunnel Uranium Material. Therefore, aluminum will not be included.

Sample ID/ Sample Date	Parameter	Units	Result
Winter Park Material Grab/ 6/20/2018	Aluminum	mg/kg	72,000
Winter Park Material Composite/ 6/20/2018	Aluminum	mg/kg	79,300

Barium:

Barium was measured in the Moffat Tunnel Uranium Material dry weight in very low concentrations as summarized on the table below. Per past reviews regarding potential inclusion of barium as a monitoring constituent in the Permit, the inclusion is not warranted based on the insolubility of barium 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 original determination that barium not be included in the Permit monitoring constituent list is not changed by processing and disposal of the Moffat Tunnel Uranium Material at the Mill, and barium will not be included.

Sample Id/ Sample Date	Parameter	Units	Result
Winter Park Material Grab/ 6/20/2018	Barium	mg/kg	276
Winter Park Material Composite/ 6/20/2018	Barium	mg/kg	311

Organic Constituents

Per Division review of the organic analytical reports (grab and composite) for the Moffat Tunnel Uranium Material it was noted that a large constituent list of volatile organic and semi-volatile organic analysis was sampled. The Division reviewed the current Permit required volatile organic constituent list in the Moffat Tunnel Uranium Material analytical data, and noted that per the included constituents (included all Permit constituents except naphthalene and tetrahydrofuran) all concentrations were non-detect.

Based on the source of the Moffat Tunnel Uranium Material from rock seepage, and a limited use of chemicals in the water treatment process it is not expected that volatile or semi-volatile constituents would be included in the materials. No new organic constituent monitoring is warranted due to processing and disposal of the Moffat Tunnel Uranium Material at the Mill.

Inorganic Constituents

Ammonia as N, Nitrate/Nitrite as N, Chloride, Fluoride and Sulfate will be present at low concentrations in the Moffat Tunnel Uranium Material especially in relation to 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.

Conclusions

The addition of the Moffat Tunnel Uranium Material to the Mill License as an alternate feed will not require additional monitoring wells, monitoring constituents, or other new Permit conditions for the protection of groundwater. The License Amendment request and attached analytical results from sampling the Moffat Tunnel Uranium Material indicate that the current Permit monitoring network and monitoring constituent list is appropriate to identify potential releases of Moffat Tunnel 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 Moffat Tunnel uranium bearing material falls within the envelope of the original purpose of the White Mesa Uranium Mill. This purpose is processing material for its uranium content. This includes the NRC's conclusions of processing alternate feed material as documented in guidance documents and additionally 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 (including progeny) content as the Arizona Strip 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 Moffat Tunnel 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 Moffat Tunnel uranium bearing material will not increase the public and occupational dose because:

1. The uranium content of the Moffat Tunnel uranium bearing material has an equivalent uranium content as the Arizona Strip ores which are currently processed at the Mill. The Arizona Strip ores were analyzed in the two MILDOS-AREA models that were done as part of the RML renewal; and
2. The total tonnage of Moffat uranium bearing material is very small (a maximum of 200 tons per year) compared to amount of ore and alternate feeds processed that was analyzed in 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 Moffat Tunnel 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 Moffat Tunnel uranium bearing material shall be IP-1 and IP-2 type packages. According to the application, the drums will be shipped to the Mill by truck under “exclusive use” protocols.

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 Moffat Tunnel uranium bearing material are unloaded, all transport containers and trucks shall be decontaminated and Radiation Safety Technicians shall perform radiological survey 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 Moffat Tunnel Uranium Material

The Moffat Tunnel uranium material will be stored in drums. As per License Condition 9.6 of the Mill’s RML, receiving and storage of the Moffat Tunnel 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 Moffat Tunnel Uranium Material

As per License Condition 9.6 of the Mill's RML, processing the Moffat Tunnel uranium material shall also follow existing and previously reviewed SOP's, unless a specific SOP for the Moffat Tunnel Uranium Material is developed. If a specific SOP is developed it shall be approved by the Mill's SERP review process and 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 Moffat Tunnel 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 Moffat Tunnel uranium bearing material, then EFRI and its employees shall follow the most current version of the White Mesa Mill Emergency Response Plan. Processing the Moffat Tunnel 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 Moffat Tunnel 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 Moffat Tunnel uranium material will not significantly increase the truck volume to the White Mesa Uranium Mill. UPRR will ship 5 trucks per day, five to six times a year. 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 Moffat Tunnel uranium material would be transported on. The shipment would increase the truck traffic 2% for one day, five to six times per year.

2.3.2.2 Receiving and Storage of the Moffat Tunnel Uranium Material

See Section 2.3.1.2 above.

2.3.2.3 Mill Processing the Moffat Tunnel Uranium Material

Processing the Moffat Tunnel 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 Moffat Tunnel uranium bearing material is necessary.

2.3.2.4 Accidents at the Mill while processing the Moffat Tunnel 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 Moffat Tunnel 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 Moffat Tunnel uranium material with Arizona Strip grade ore that was originally considered and approved by the NRC. Also because there are no EPA listed constituents in the Moffat Tunnel uranium material there are no additional chemical impacts for processing the Moffat Tunnel uranium bearing material.

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

There are two alternates for DWMRC staff to consider for this licensing request. They are, to approve the request or to deny the request.

Staff has found that the Technical Evaluation and the Environmental Analysis are complete and adequate to support approval of the request. Both the Technical Evaluation and the Environmental Analysis above support the following conclusions:

- After it is processed for uranium recovery, the Moffat Tunnel uranium bearing material will qualify as 11e.(2) byproduct material within the meaning of the Atomic Energy Act;
- Processing the Moffat Tunnel uranium bearing material does not change the Mill process for alternate feeds and ores;
- Processing the Moffat Tunnel uranium bearing material will not require expansion of the White Mesa Uranium Mill facility;
- Addition of the Moffat Tunnel uranium bearing material will not require changes to the Mill's Environmental Monitoring or Surface/Groundwater Monitoring;
- Processing the Moffat Tunnel uranium bearing material will not cause any exceedances of occupational or public dose; and
- Addition of the Moffat Tunnel 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 Moffat Tunnel 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, Division Staff have concluded that the Moffat Tunnel 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 Division Staff recommends that the Director approve adding the Moffat Tunnel uranium bearing material to the list of approved alternate feed materials in the License.

Division Staff also recommends allowing all uranium bearing residual from water treatment plants to be processed as approved alternate feeds.

4. Proposed Language for the New Alternate Feed License Condition

License Condition 10.12

The Licensee is authorized to receive source material (the Moffat Tunnel uranium bearing material) from the Union Pacific Railroad's Water Treatment Plant in Winter Park, Colorado, in accordance with statements, representations, and commitments contained in the License Amendment Request submitted to the Director dated December, 2019.

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

License Condition 10.12 indicates that EFRI's application provided all of the required information for the amendment application to be approved.

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