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DRC-2020-010570

Div of Waste Management
and Radiation Control

MAY 27 2020

May 19, 2020

SENT VIA E-MAIL AND EXPEDITED DELIVERY

Mr. Ty L. Howard
Director
Division of Waste Management and Radiation Control
Utah Department of Environmental Quality
195 North 1950 West
P.O. Box 144880
Salt Lake City, UT 84116

Re: Receipt and Processing of Ores and Equivalent Feed Materials from Japan Atomic Energy Agency ("JAEA") at the Energy Fuels Resources (USA) Inc. ("EFRI") White Mesa Mill

Dear Mr. Howard:

This letter is to advise the Utah Division of Waste Management and Radiation Control ("**DWMRC**") of EFRI's plan to receive and process at the White Mesa Mill (the "**Mill**") a small quantity (approximately 136 tons) of natural uranium ores and equivalent feed materials (collectively, the "**Materials**") from two JAEA uranium test centers, for the recovery of uranium. Because these materials are natural ores and equivalent feed materials, EFRI plans to receive and process these materials under the Mill's current Radioactive Materials License ("**RML**") No. 1900479.

Under the proposed transaction, EFRI would receive the Materials from the following two JAEA uranium recovery and fuel cycle test facilities in Honshu, Japan:

- JAEA Ningyo-toge Environmental Engineering Center (the "**Ningyo Center**" or "**Ningyo**"), and
- JAEA Tono Geoscience Center (the "**Tono Center**" or "**Tono**").

1. Background

The Ningyo Center, located in central Honshu island, researched uranium mining and recovery technologies, including recovery and conversion of off-spec yellowcake ("scrapped uranium"), recovery of UF_6 trapped in gas containers prior to enrichment ("hold-up uranium"), and technologies to improve reclamation of uranium mines and former uranium fuel cycle facilities. The Tono Center, located in southwestern Honshu island, conducted research to establish techniques for investigation, analysis and assessment of the deep geological environment related to radioactive material disposal, and develop uranium mining technologies. JAEA plans to ship only:

- unprocessed natural ores and ore-bearing natural media from storage and testing of natural uranium ores,
- equivalent feed materials in the form of uranium-loaded resin ("**ULR**") and associated uranium-loaded filter bed sands, from uranium recovery testing of natural uranium ores, and
- equivalent feed materials in the form of uranium-loaded carbon from natural uranium ore dewatering treatment testing.

The Materials do not include material from testing of any other downstream step of the uranium fuel cycle; that is,

JAEA will not ship any chemically converted, enriched, or depleted forms of uranium.

The quantities of Materials from the two JAEA test centers are listed in Tables A-1 and A-2 in Attachment A. The values in Tables A-1 and A-2 are approximate. Changes in moisture content and inconsistencies in measurement accuracy may cause the measured weights of loaded containers to vary appreciably.

A description of each of the types of Materials, modes of transportation, storage at the Mill after receipt, and disposal of the byproduct residuals are discussed below.

2. Natural Ores

JAEA tested uranium ores from 33 countries, primarily Canada, Niger and Japan, including natural ores from Japan's Ningyo-toge and Togo uranium mines, which are currently undergoing reclamation. The other source locations of the ores may have included U.S. and non-U.S. locations from which the Mill has previously received and processed ores.

The natural ores to be shipped from JAEA include raw uranium ores in bulk, containerized uranium ore samples, cores, test hole samples, and spilled ore material/soil scrapings of natural uranium ore mixed with native rock and/or soil, totaling approximately 85.4 tons (or approximately three typical ore trucks). The Mill has historically received natural uranium ore and ore-containing natural materials including rock, drill core, ore samples, soil cuttings, and spilled ore material/soil scrapings, from EFRI's own as well as other conventional mines under its existing RML.

All the natural ores have uranium grades consistent with natural uranium ores routinely received and processed at the Mill, ranging from less than 0.05% to 3.0% natural uranium (3.53% U_3O_8), with an average of approximately 0.29% U_3O_8, which is comparable to Colorado Plateau uranium ores. Based on the approximate quantities of natural ores in Table A-1, processing of the ore is expected to result in the production of approximately 0.24 tons of yellowcake. The recovery of this amount of yellowcake will not cause the Mill to exceed its RML production limit of 4380 tons of yellowcake per year.

3. Equivalent Feed Materials

3.1. Uranium Loaded Resins and associated Filter Bed Sands

EFRI is proposing to accept the ULR and associated filter bed sands as equivalent feed material, totaling approximately 40.5 tons, in accordance with the Nuclear Regulatory Commission ("**NRC**") Regulatory Issue Summary ("**RIS**") 2012-06. The NRC RIS 2012-06, dated April 16, 2013, entitled *NRC Policy Regarding Submittal of Amendments for Processing of Equivalent Feed at Licensed Uranium Recovery Facilities,* describes the NRC's position and licensee requirements for acceptance of ULR as equivalent feed materials. For ease of review the NRC RIS 2012-06 is included as Attachment B to this letter.

The RIS states:

> "In situ recovery (ISR), conventional mills, or heap leach facilities with NRC or Agreement State licensed resin processing plants, may accept equivalent feed, as defined in the regulatory issue summary, without a license amendment."

Enclosure 2 of the RIS specifies that the licensee should document that the ULRs meet the equivalent feed criteria by meeting the three criteria below. A summary of how the JAEA ULR meets the criteria is presented below each of the following NRC- specified criteria (which are shown in italics):

(a) Chemically and physically essentially the same as the resins processed at the facility;

The Mill has previously used ion exchange resins and technology to recover uranium from low-grade uranium bearing acidic solutions. The Mill utilized DOWEX 21K XLT anion exchange resin.

Both the Tono and Ningyo Centers experimented on the effectiveness of multiple uranium recovery IX resins, and uranium water treatment resins. The resins included in the material to be shipped to the Mill are as follows:

- Dowex XSF-43116-2
- Diaion PA-316, PA-318, and CR-50
- SA-11A

A comparison of the JAEA resins to the Mill resin follows:

- All are strong base, type 1, anion exchange resins;
- The composition of each is a trimethyl or tetramethyl amine functionalized chloromethylated copolymer of styrene and vinylic monomer backbone;
- Both the JAEA and Mill resins are in the form of resin beads with essentially the same weight;
- The bead sizes range from 0.3 to 1.3 mm. This range includes the size of the DOWEX 21K XLT; and
- Each product is selective for uranium.

The Mill could use any of the JAEA resins for future recovery of uranium from low-grade uranium bearing acidic solutions in the future, in the same manner as it has used the DOWEX 21K SLT anion exchange resin in the past.

Also included with the ULR is a small quantity (approximately 4.73 tons, or less than the amount of ore shipped in one quarter of a typical ore truck) of filter bed sands placed just upstream of the IX columns. These filter bed sands are natural particulate sand loaded with the same solutions as the ULR.[1] These sands are sometimes referred to as "process materials" or "process solids" in some translations of the documents supplied by JAEA. The sand matrix of these filter bed sands is as benign as the natural rock, soil or sand matrix from the natural uranium ores routinely processed at the Mill.

(b) Using existing equipment, will be processed in the same way as the resins processed at the facility; and

The Mill has previously processed ULR through the main circuit by contacting loaded resins with a separate solution to remove the uranium; a process referred to as stripping. The stripped solution, which contains the uranium is pumped to the solvent extraction ("**SX**") feed tank. The solutions are then handled in the same manner as solutions from all other feeds processed at the Mill. The equivalent feed ULR would be handled in the same manner utilizing the same stripping followed by delivery to the SX feed tank and the rest of the existing Mill facilities and processes.

[1] Although we are considering the filter bed sands to be part of the ULR equivalent feed stream because they are merely natural sands contaminated with the same solutions as found in the ULR equivalent feed and are an associated component of that equivalent feed, the filter bed sands could also be considered equivalent feed in and of themselves, for the same reasons the activated carbon below should be considered equivalent feed materials. This is because the filter bed sands can also be considered a media that is used for natural uranium recovery processing or water treatment, and which consequently become loaded with uranium, as contemplated by the RIS, as discussed in more detail in Section 3.2 below.

The filter bed sands will be processed in the same way as natural ores, by acid or alkaline leaching of the uranium minerals alone or in combination with other ores. The sands will travel through the Mill process in the same way, and be disposed of in the tailings management system in the same way, as rock or sand components of natural ores. The filter bed sands could alternatively simply be washed, as they are merely naturally sands coated with the same solutions as the ULR, with the wash solutions processed along with the ULR. However, given the small quantity of filter bed sands, it would be easier to merely include them in the next conventional ore run at the Mill.

(c) Processing the equivalent feed material does not exceed the uranium production limits in the license and stays within the existing safety and environmental review envelope for the facility.

The processing of the ULR and associated filter bed sands, which will result in approximately 0.24 tons of yellowcake, will not cause the Mill to exceed the RML production limit of 4380 tons of yellowcake per year.

Processing the ULR and associated filter bed sands does not:

- require any additional chemicals beyond those already in use at the Mill
- produce any process conditions (pH, temperature) outside the range of those managed elsewhere in the Mill or previously at the Mill,
- generate increased levels of radionuclides in any part of the process beyond those produced in the previous process configurations, or
- generate any additional or increased quantities of air emissions.

3.2. Uranium-Loaded Carbon from Mine Water Treatment

In addition to the ULR and associated filter bed sands, the Company intends to receive and process a small quantity, (approximately 10.3 tons or less than the amount of ore shipped in one half of a typical ore truck), of activated carbon from testing of uranium mine water treatment at Ningyo. Activated carbon is another type of water treatment media, which we believe meets the criteria in the RIS and should be considered an equivalent feed material.

The RIS states:

> "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 primarily processed at a uranium recovery facility. Such material should not 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."

In the three types of operations identified by NRC in the foregoing excerpt, although not stated explicitly, IX resins are not the only media that are used for natural uranium recovery processing or water treatment, and which consequently become loaded with uranium. For example, depending on the water quality and discharge requirements, uranium mine water treatment media may include granular or powdered activated carbon in adsorption columns or beds.

EFRI believes that the application of the RIS to the activated carbon Material is appropriate. Even though these Materials are not IX resins, they are a material used for binding or holdup of uranium. The activated carbon was in contact with the same types of uranium solutions (uranium process solutions in contact with filter sands or mine water in contact with carbon) that would be in contact with IX as anticipated in the RIS.

Enclosure 2 of the RIS specifies that the licensee should document that the materials meet the equivalent feed criteria by meeting the three criteria below. A summary of how the activated carbon Material meets the criteria is presented below each of the following NRC- specified criteria (which are shown in italics):

(a) *Chemically and physically essentially the same as the materials processed at the facility;*

Activated carbon, used in water treatment, is prepared by reducing natural carbon-containing organic materials such as walnut shell fiber or coconut shell fiber to elemental carbon, or by purifying naturally occurring sources (coal) to elemental carbon. Regardless of source, treatment-grade activated carbon is elemental carbon varying only in particle size and geometry and/or pore size and geometry.

Carbon is a natural element that is more inert than IX resin, more chemically stable, binds a wider range of particle sizes regardless of ionic charge, binds constituents more strongly than ion exchange resins, and in fact is selected for some applications for these reasons. As a treatment medium, carbon differs from sand, from which uranium and other constituents may sometimes be mechanically "knocked" loose from the media pores by back-washing in place, or ion exchange resin, from which constituents can be removed by replacement with other ions from sources such as salts. Carbon cannot be freed of bound constituents, that is, it cannot be recovered, by processes or conditions available at a mine water treatment location. Constituents can only be removed from carbon by thermal regeneration in a low oxygen furnace, or by digestion of the constituents and/or carbon in strong acids such as in the Mill process. The carbon itself is as environmentally benign as the rock or sand matrices of natural ores, and more inert and more benign than IX resins.

(b) *Using existing equipment, will be processed in the same way as other uranium-bearing solids processed at the facility; and*

The activated carbon will be processed in the same way as natural ores, by acid or alkaline leaching of the uranium minerals alone or in combination with other ores. The carbon will travel through the Mill circuits in the same way, and be disposed of in the tailings management system in the same way, as rock or sand or other non-uranium components of natural ores.

(c) *Processing the equivalent feed material does not exceed the uranium production limits in the license and stays within the existing safety and environmental review envelope for the facility.*

The processing of the uranium-loaded carbon, which will result in approximately 0.1 tons of yellowcake, will not cause the Mill to exceed the RML production limit of 4380 tons of yellowcake per year.

Processing the uranium-loaded carbon does not:

- require any additional chemicals beyond those already in use at the Mill,
- produce any process conditions (pH, temperature) outside the range of those managed elsewhere in the Mill or previously at the Mill,
- generate increased levels of radionuclides in any part of the process beyond those produced in the previous process configurations, or
- generate any additional or increased quantities of air emissions.

(d) Is the material from a water treatment facility?

The activated carbon resulted from the mine water treatment testing facility at Ningyo, which evaluated

technologies for treating mine water to meet discharge standards. The carbon was only in contact with raw mine water or pre-treated mine water as component technology of a test scale water treatment unit.

4. Other Considerations

4.1. Transport

The bulk ores will be transported to the Mill in 100, 200 or 300 liter (30, 55, or 80 gallon) sealed metal drums. Smaller ore, soil and core samples will be sealed in 15 kg (approximately 5 gallon) metal containers. The resins will be transported to the Mill in 200 or 300 liter (55 or 80 gallon) sealed metal drums. The filter bed sands will be transported to the Mill in 300 liter (80 gallon) sealed metal drums. The activated carbon will be transported to the Mill in 200 liter (55 gallon) sealed metal drums. The resins, filter bed sands and activated carbon will be transported by the same route and equipment, and potentially in the same shipment, as the ores.

The Materials, in their various drums and metal containers, will be loaded into closed cargo containers, such as Container Express ("Conex"), Sea Boxes, Intermodal Containers ("**IMCs**") or the equivalent and transported by truck to a port of departure in Japan. The containers will be transferred to a container ship and will be transported by sea from Japan to a port of arrival, potentially in one seaborne shipment. The closed cargo containers will be transferred either to:

- intermodal rail cars at the port of entry and transported by rail to one of the existing rail transfer yards in Utah (e.g., Green River), followed by transfer to intermodal truck tractors from the railhead to the Mill, or
- multi-unit truck tractors at the port of entry and transported by truck over public highways from the port of entry to the Mill.

The number of trucks associated with transporting the Material from the port of entry or the railhead to the Mill will be approximately the same as the number of trucks required to transport the quantity of ore needed to produce the same mass of yellowcake. The number of trucks required to transport the resulting separated, precipitated, dried and packaged yellowcake to and from the Mill would be the same as required to transport yellowcake produced from processing natural ores or any other feed at the Mill.

4.2. Storage at the Mill, Pending Processing

The Materials will be transported to the Mill in sealed drums of various sizes as described above in closed transport containers. Upon arrival at the Mill, the drums will be unloaded from the transport containers, and the transport containers will be decontaminated, scanned and released from the site, or retained on site for use in Mill operations. To the extent any of the Materials are not fed directly into the Mill process upon receipt, they will be stored in their sealed drums on the Mill's ore storage pad, pending processing.

4.3. Disposal

The RIS states

> "Following elution of the ULR equivalent feed (i.e., removal of the uranium from the treatment resin), the resulting stripped resin can take two paths. Since the NRC is allowing equivalent feed to be processed at uranium recovery facilities, the wastes associated with processing equivalent feed (i.e. stripped resin) can be considered byproduct material, as defined in Title 10 of the *Code of Federal Regulations* Part 40. Therefore, these wastes could be disposed of at an NRC-licensed facility without further documentation."

In addition to disposing of the ore tailings in the Mill's tailings management system, in accordance with the RIS, EFRI plans to dispose of the resin from processing of the equivalent feed ULR, residuals from processing of the loaded sands and residuals from processing of loaded activated carbon in the Mill's tailings management system.

Once EFRI has recovered uranium from the URL, EFRI plans to return the eluted resins to their shipping containers, or other closed drums, for disposal in the beach area of the selected tailings cell. Tailings generated from the other Materials will be in the form of wet tailings sands, and will comprise a part of the normal tailings slurries piped to the tailings management system.

4.4. Import License not Required

The Material may be imported into the United States as "source material" under 10 CFR 110.20(a), because it is covered by the NRC general license described in 10 CFR 110.27(a), and because the Uranium Material:

- is not in the form of irradiated fuel, as contemplated by 10 CFR 110.27(b); and
- is not a radioactive waste, as contemplated by 10 CFR 110.27(c). As an ore or equivalent feed material, the Material will not be a radioactive waste as defined in 10 CFR 110.2 because (A) the Material will be processed for its source material content, and will therefore be imported solely for the purposes of yellowcake production and not for waste management or disposal, and (B) there is a market for the produced yellowcake.

In its November 1998 approval of Amendment 9 to the Mill's Source Material License SUA-1358, White Mesa Uranium Mill – Approval to Process Materials from Cameco Corporation's Facilities in Ontario, Canada," which are alternate feed materials from Canada, the NRC came to the same conclusion with respect to an alternate feed material ore that was being processed for its source material content at the Mill:

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

Because the import of the Material into the United States is covered by the general license in 10 CFR Part 110.27(a), a specific import license is not required.

If you should have any questions regarding this submittal, please contact me.

Yours very truly,

ENERGY FUELS RESOURCES (USA) INC.
David C. Frydenlund
Chief Financial Officer, General Counsel and Corporate Secretary

cc: Scott Bakken

Mark Chalmers
Paul Goranson
Logan Shumway
Terry Slade
Kathy Weinel
Harold R. Roberts
Jo Ann Tischler

ATTACHMENT A
JAEA FEED QUANTITY DATA

Table A-1
Natural Ores

		Ores (metric tons)	Ores (tons)	Total (tons)	Ores Total (tons)
Ningyo	Canada	10.6	11.7		
	Niger	0.7	0.8		
	Central Africa	0.2	0.22		
	Brazil	0.3	0.33		
	Gabon	0.1	0.11		
	Various	8.3	9.1	22.2	Total Ningyo
Tono	Various	0.5	0.55		
	Canada	0.4	0.44		
	Niger	1.3	1.43		
	Japan	6.3	6.9		
	Various	0.5	0.55		
	Calibration Ores	41.9	46.1		
	Ore Cores	4.4	4.84		
	Ore soils	2.1	2.31	63.1	Total Tono
		77.6	85.4	85.4	Total Ores

Table A-2
Equivalent Feed Materials

		Equivalent Feed (metric tons)	Equivalent Feed (tons)	Total (tons)	Equivalent Feed Total (tons)
Ningyo	Loaded Resin	30.6	33.7		
	Loaded Carbon	9.4	10.3	44.0	Total Ningyo
Tono	Loaded Sands	4.3	4.73		
	Loaded Resin	1.9	2.09	6.8	Total Tono
		46.2	50.82	50.8	Total Equivalent Feeds

ATTACHMENT B
NRC RIS 2012-06

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF FEDERAL AND STATE MATERIALS
AND ENVIRONMENTAL MANAGEMENT PROGRAMS
WASHINGTON, D.C. 20555

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

ADDRESSEES

U.S. Nuclear Regulatory Commission (NRC) licensed uranium recovery facilities; all holders of NRC operating licenses for water treatment; all companies that have submitted applications to construct all types of new uranium recovery facilities (conventional mills, heap leach facilities, and in situ recovery (ISR) facilities); and all Radiation Control Program Directors and State Liaison Officers.

INTENT

In 2000, the NRC developed Regulatory Issue Summary (RIS) 00-23, "Recent Changes to Uranium Recovery Policy," (ADAMS Accession No. ML003773008) to address issues related to uranium recovery. These issues include jurisdictional responsibilities of NRC and Environmental Protection Agency (EPA) with respect to processing of alternate feed and tailings and waste at uranium recovery sites. 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. It is not the intent of this RIS to change the policy expressed in RIS 00-23 or redefine the definition of alternate feed. Rather, this guidance addresses one aspect of how the alternative feed guidance in RIS-00-23 may be reflected in making a determination of the need for a license amendment for individual licensees.

[1] For the purposes of this RIS, equivalent feed is ion exchange (IX) resin that is loaded with uranium at facilities licensed for source material (i.e. water treatment plants or mine dewatering operations) or licensed uranium recovery facilities whether conventional, heap leach, or ISR facilities.

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BACKGROUND

As stated above, the NRC is issuing this RIS to clarify the NRC's policy regarding alternate feed. In SECY-99-012, "Use of Uranium Mill Tailings Impoundments for the Disposal of Other Than 11e.(2)[2] Byproduct Materials, and Reviews of Applications to Process Material Other Than Natural Uranium Ores," (available at http://www.nrc.gov/reading-rm/doc-collections/commission/secys/1999/) the staff defined alternate feed as material other than natural uranium ores. Alternate feed can, therefore, be certain wastes, including sludges or soils, from other sites that contains recoverable amounts of uranium. The RIS 00-23 provided guidance on evaluating requests for a license amendment for a uranium recovery facility (i.e., conventional mill) to accept this material, recover the uranium, and dispose of the tailings (i.e., waste material) as byproduct material in the mill tailings impoundment. In contrast to a conventional uranium recovery mill, in the ISR method, ore is not extracted from the ground for processing at a mill. Rather, the ore is processed in-situ with the resulting uranium-bearing fluids being passed through columns containing IX resins located on the surface. The uranium ions in the fluids adhere to the IX resin (which is referred to as uranium loaded resin (ULR)). The ULR is considered source material under NRC regulations and processed to remove the uranium. Typically, the processed (stripped) resin is reused in ion exchange circuits until the resin can no longer capture uranium ions (spent resin). The spent resin is considered 11e.(2) byproduct material under the Atomic Energy Act (AEA) and must be disposed of according to NRC regulations.

The NRC staff's analyses have concluded the resin from certain source material operations, such as community water treatment facilities and mine dewatering operations, are essentially the same as the resin being used at licensed uranium recovery facilities (e.g. ISRs or conventional mills/heap leach facilities using ion exchange circuits). The NRC staff based this finding on the fact that the resins are chemically and physically essentially the same, and would be processed in the same way, as resins used in normal uranium recovery operations at these facilities.

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 budget[3].

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

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[2] The Atomic Energy Act, as revised in 1978 and in 2005 by the Energy Policy Act, defines byproduct material in Section 11e(2) 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".

[3] The EPA currently defines uranium-loaded resin generated by drinking water treatment to remove the uranium as a Technically-Enhanced Naturally-Occurring Radioactive Material (TENORM) that requires disposal at a facility permitted under Subtitle C or D of the Resource Conservation and Recovery Act.

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,

[4] See page A2 of SECY-99-011, *Draft Rulemaking Plan: Domestic Licensing of Uranium and Thorium Recovery Facilities-Proposed New 10 CFR Part 41*, and SECY-09-012, *Use of Uranium Mill Tailings Impoundments for the Disposal of Waste Other than 11e.(2) Byproduct Material and Reviews of*

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 (Z-92®) 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 Z-92® 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.

Applications to process Materials Other than Natural Uranium Ores, available at http://www.nrc.gov/reading-rm/doc-collections/commission/secys/1999/)

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.

BACKFIT DISCUSSION

This RIS requires no action or written response. Any action that addressees take to implement changes or procedures in accordance with the information contained in this RIS ensures compliance with current regulations, is strictly voluntary, and, therefore, is not a backfit under any of the backfitting provisions contained in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.109, 70.76, 72.62, 76.76, or the issue finality provision of 10 CFR Part 52. Consequently, the staff did not perform a backfit analysis.

FEDERAL REGISTER NOTIFICATION

A notice of opportunity for public comment on this RIS was published in the *Federal Register* (76 FR 60942) on September 30, 2011, for a 30 day comment period. Comments were received and considered in finalizing this RIS.

CONGRESSIONAL REVIEW ACT

This RIS is a rule as designated in the Congressional Review Act (5 U.S.C. 801–808). The Office of Management and Budget has determined that this RIS is not a major rule.

RELATED GENERIC COMMUNICATIONS

RIS 00-23, "Recent Changes to Uranium Recovery Policy."

PAPERWORK REDUCTION ACT STATEMENT

This RIS references information collection requirements that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). These information collection requirements were approved by the Office of Management and Budget, approval numbers 3150-0020.

PUBLIC PROTECTION NOTIFICATION

The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

CONTACT

This RIS requires no specific action or written response. If you have any questions about this summary, please contact the technical contact listed below.

/RA/

Larry W. Camper, Director
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

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Enclosures:
1. Uranium Recovery Processing of Equivalent Feed: Additional Information
2. Procedure for Accepting Equivalent Feed
3. Responses to Comments on the Policy Regarding Submittal of Amendments for Processing of Equivalent Feed at Licensed Uranium Recovery Facilities
4. FSME Recently Issued Generic Communications

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Office	DWMEP	FSME	OGC	DWMEP	DWMEP
Name	TCarter	AMcIntosh	JOlmstead	SAchten	PMichalak
Date	02/3/12	02/10/12	03/29/12	03/29/12	03/30/12
Office	DWMEP	OIS	OE	DWMEP	
Name	KMcConnell	TDonnell	NHilton	LCamper	
Date	4/03 /12	4/09 /12	4 /16 /12	04/16 /12	

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Uranium Recovery Processing of Equivalent Feed: Additional Information

Processing as equivalent feed, the uranium loaded resins (URL) from water treatment plants, mine dewatering operations or other uranium recovery facilities (e.g. in-situ recovery (ISR) or conventional mills/heap leach facilities with ion exchange circuits) results in a lower overall environmental impact and is the preferred option when compared to disposal of these resins in a Resource Conservation & Recovery Act (RCRA)-permitted landfill or NRC and Agreement State licensed landfill. Transportation impacts for the facility producing the URL are similar since in either option, the resin is trucked to an isolated location away from population centers (RCRA-permitted or NRC/Agreement State licensed landfill or a uranium recovery facility). Although disposal of equivalent feed in a lined RCRA-permitted landfill or NRC/Agreement State licensed landfill provides short term isolation of the URL, the long term environmental and financial liability associated with potential landfill failure coupled with the societal benefit of putting the uranium into the nuclear fuel cycle results in uranium recovery facility processing of equivalent feed, such as uranium-loaded water treatment and mine dewatering resin, as the preferred environmental option.

Processing water treatment resins as equivalent feed provides a significant cost benefit to small Community Water Systems. For these small water treatment operators, disposal at RCRA-permitted or NRC/Agreement State licensed landfills is cost prohibitive. Although, at this time, it is not possible to know the exact financial arrangements between the water treatment and uranium recovery facilities with respect to the processing of equivalent feed, it is reasonable to assume that the financial arrangements would be significantly more beneficial to the small water treatment operators than landfill disposal.

Procedures for Accepting Equivalent Feed

In situ recovery (ISR), conventional mills, or heap leach facilities with NRC or Agreement State licensed resin processing plants, may accept equivalent feed, as defined in this regulatory issue summary, without a license amendment. The licensee should document that the received uranium loaded resins (ULRs) meet the equivalent feed criteria by being: (1) chemically and physically essentially the same as the resins processed at the facility; (2) using existing equipment, processed the same way as the resins processed at the facility; and (3) processing the equivalent feed material does not exceed the uranium production limits in the license and stays within the existing safety and environmental review envelope for the facility. The NRC inspectors will review this documentation during the inspection process to verify that the received ULR meet the equivalent feed criteria such that the licensee's processing of the material can be considered consistent with their license.

Following elution of the ULR equivalent feed (i.e., removal of the uranium from the treatment resin), the resulting stripped resin can take two paths. Since the NRC is allowing equivalent feed to be processed at uranium recovery facilities, the wastes associated with processing equivalent feed (i.e., stripped resin) can be considered byproduct material, as defined in Title 10 of the *Code of Federal Regulations* Part 40. Therefore, these wastes could be disposed of at an NRC-licensed facility without further documentation. Alternatively, the stripped resin may be returned to a 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. Spent resin that can no longer be re-used in the IX process is considered 11e.(2) byproduct material and must be disposed in accordance with NRC regulations.