

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 budget³.

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

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.

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/

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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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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.