

PROBLEMS ASSOCIATED WITH DISPOSAL OF PRE-AEA BYPRODUCT MATERIAL

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ABSTRACT

Current problems with disposal of legacy wastes from the Manhattan Engineer District, and concurrent problems with wastes of similar composition are discussed. Background is provided by tracing the evolution of regulatory authority over pre-Atomic Energy Act (AEA) byproduct materials. Processing wastes from the primary recovery of uranium or thorium are classified as 11e.(2) byproduct material under the AEA. This authority covers the radiological as well as the non-radiological (hazardous and groundwater) components, a unique situation. Wastes processed for constituents other than uranium or thorium (such as radium, vanadium, or rare earth minerals) are called naturally occurring radioactive material or sometimes non-11e.(2) wastes, even though their composition is very similar to 11e.(2) byproduct materials. Part of the problem is due to the fact that the definition and regulation of 11e.(2) didn't occur until 1978. The U.S. Nuclear Regulatory Commission (NRC) recently claimed not to have authority over pre-1978 11e.(2) byproduct material, but Court rulings would seem to challenge that point. The U.S. Environmental Protection Agency (EPA) has authority to regulate radioactive materials not covered by the AEA, as well as the non-radiological components of non-11e.(2) wastes. Primarily, states are taking the lead in regulating disposal of NORM, but the effort is focused primarily on industrial wastes from non-nuclear industries. Use of industrial landfills and reprocessing these waste streams for recovery of residual uranium are just two waste disposal issues that have arisen over these wastes. A weakened uranium recovery industry sees waste disposal as profitable. The NRC recently started preliminary hearings on the need for a new 10 CFR Part 41 addressing the licensing of uranium and thorium recovery facilities. Topics for the rulemaking include concurrent jurisdiction, disposal of non-11e.(2) material in 11e.(2) disposal cells, and use of alternate feed materials in uranium mills facilitating disposal of the resulting wastes in the 11e.(2) disposal cells. Environmental, liability, and policy issues are impacted by the current situation. Congress will be conducting hearings on the situation and litigation is likely to determine the ultimate status and disposition of these wastes.

INTRODUCTION

Processing wastes from the primary recovery of uranium or thorium are classified as 11e.(2) byproduct material under the Atomic Energy Act of 1954 (AEA) (1). This authority covers the radiological as well as the non-radiological (hazardous) components, a unique situation. Wastes processed for constituents other than uranium or thorium (such as radium or vanadium) are called non-11e.(2) byproduct materials, even though their composition is very similar to 11e.(2) materials. The more common term used is naturally-occurring radioactive material (NORM), and to differentiate from background radiation or radioactivity, the term technologically enhanced naturally-occurring radioactive material (TENORM) has been adopted (2).

The AEA, passed in 1946, and revised in 1954 and 1978, did not define and regulate 11e.(2) materials until 1978. The U.S. Nuclear Regulatory Commission (NRC) recently claimed not to have authority over pre-1978 11e.(2) byproduct material (3). Previously, NRC determined that these waste qualified as 11e.(2) byproduct material (4).

Cleanup of legacy waste at the Formerly Utilized Sites Remedial Action Program (FUSRAP) sites or other U.S. Department of Energy (DOE) sites was administered under DOE authority. Cleanup of FUSRAP sites was transferred to the U.S. Army Corps of Engineers (USACE) in 1997; however, at that time the cleanup process was not clearly specified by Congress. Unlike USACE, DOE has self-regulating authority under the AEA. In 1999, Congress stated in the funding authorization that USAEC should use the process outlined in the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA) (5).

The U.S. Environmental Protection Agency (EPA) has authority to regulate radioactive materials not covered by the AEA, as well as the non-radiological components of non-11e.(2) wastes. However, EPA has not yet promulgated regulations for cleanup of radioactive material, including TENORM. EPA has proposed regulations to address dual regulations of hazardous wastes mixed with NORM or low-level radioactive waste (6). CERCLA may ultimately be used in other situations for conducting cleanup of TENORM sites (7).

Primarily, states are taking the lead in regulating disposal of TENORM, but the effort is focused primarily on industrial wastes from non-nuclear industries. States do not have authority over AEA wastes, but under CERCLA states must agree with cleanup standards and practices. Agreement States follow NRC guidance for regulation of the non-radiological components, Non-Agreement states have more leeway in their authority, which has concerns industry interests.

There is an apparent regulatory gap at the federal level when the material is disposed of off-site as indicated by the facts that 1) DOE no longer has control over FUSRAP, 2) NRC does not regulate pre-AEA byproduct material, and 3) EPA has no regulations for non-11e.(2) wastes. NRC jurisdiction applies to the disposal of radioactive waste under 10 CFR 61. However, NRC's recent position that they do not regulate pre-AEA byproduct material means NRC cannot preclude disposal in facilities not licensed under Part 61. USACE solicited bids for disposal of FUSRAP wastes as non-AEA materials, a situation that led to the disposal of FUSRAP wastes at an industrial landfill not licensed for radioactive materials. A variety of regulatory drivers, legal definitions, guidance documents, and lines of authority have complicated the cleanup and disposal of these wastes. FUSRAP wastes are also disposed of in a licensed facility in Utah, and are being reprocessed at a uranium mill, also in Utah.

A weakened uranium recovery industry sees waste disposal as profitable. Industry has been lobbying NRC to allow a variety of wastes to be disposed in mill tailings piles, and to allow for reprocessing of waste streams from outside the uranium fuel cycle (8). Using alternate feeds (reprocessing) yields tailings that are disposed in the mill tailings piles, avoiding the costs of disposal at low-level waste facilities governed by the Nuclear Waste Policy Act (NWPA). The NRC recently started preliminary hearings on the need for a new 10 CFR Part 41 addressing the licensing of uranium and thorium recovery facilities. A change in the definition of what constitutes ore creates a new set of materials eligible for reprocessing and disposal in uranium mill tailings piles.

The Fuel Cycle Facility Forum lists various "decommissioning streams" that could be candidates for direct disposal or as alternate feed:

- Soils contaminated with uranium and thorium,
- Depleted uranium (DU) manufacturing facilities,
- Normal uranium conversion facilities,
- Facilities that handle NORM,
- Rare earth processing facilities,
- Zirconium manufacturing facilities,
- DU production facilities,
- Current and former low and high enriched uranium processing facilities,
- Lagoon sludges,
- Ash,
- Slag,
- DU in the form of UF₆,
- Waste from metal extraction plants,
- Special Nuclear Material (SNM) at low enrichments (few percent) (9).

STATES CONCERNS

Another topic for the rulemaking is the concurrent jurisdiction problem. Utah is re-evaluating their status as a non-Agreement State with respect to uranium processing facilities (10). New York State regulators have expressed concern over USACE administration of the FUSRAP program. In particular, New York

officials concerned about: lack of radiological experience within USACE; lack of site licensing; NRC's pre-1978 authority position; changes in status of waste; lack of application of the ALARA process; application of RESRAD without professional judgment; methodology of averaging; and political power of USACE. One regulator stated "...what we have is a free release of probably greater than a million cubic yards of radioactive material on our society with no radioactive material license behind it and not a radiation safety officer on any of these sites, nobody that's guaranteeing personal dosimetry, no one who is responsible or in charge of assuring the protection of the public health and safety" (11). In another instance, State regulators in New York sent a letter to USACE saying they do not concur with proposed soil cleanup levels at the Linde site, which is close to 22.2 Bq/g (600 pCi/g) Ra-226 based on RESRAD modeling. DOE had a proposed limit of 2.22 Bq/g (60 pCi/g) (11).

A series of motions and rules have been proposed in Utah as a result of concerns that have risen over the disposal and reprocessing of tailings. In 1998, the Utah DEQ wrote that a "policy decision which shifts "reprocessing" to "waste disposal in disguise" will trigger several issues – including the need for state siting approval, need for a Part 61 license for waste disposal on non-11e.(2), payment of appropriate waste disposal fees to the state, and acceleration of the need for a state groundwater discharge permit (12). On April 9, 1999 the Utah Radiation Control Board adopted a rule setting a requirement for uranium contents of 0.05% for materials to be accepted as alternate feed material for processing in a uranium mill. The rule was tabled, which effectively suspended the rule. That position changed in November, 1999. The State of Utah now is currently seeking comments on expanding their Agreement State program to include the regulation of uranium mills and tailings. Funding of the program also is being evaluated, which may include a disposal fee on mill tailings in Utah (which currently does not occur) (13). A rule had been in development at the State level that would require a financial test. Utah feels that new disposal capacity is really created without concurrence from the state. Legislative or other changes to allow other waste into mills under Federal preemption would just further disrupt Utah's ability to control its own waste destiny. The Utah Mining Association issued a position paper in June 1999, stating its opposition to the proposed Utah regulation. They cited four major points: Utah lacks jurisdiction, the need for a rulemaking, favoritism for Envirocare over IUC, and sham recycling is not an issue (14).

The National Governors Association sent DOE a letter urging the DOE to retain the requirement that off-site waste disposal occur only in fully-licensed facilities. The Governors' Association does not oppose competition, or the use of commercial capacity, however they feel strongly that "any commercial disposal site used by DOE must be licensed in accordance with the regulations of the NRC or the NRC "agreement state" in which it is located." The letter also states "Any changes in this policy to allow DOE contractors to dispose of radioactive wastes in unlicensed private facilities would seriously compound the problems the nation already faces because of decades of self-regulation by DOE. Self-regulation has been shown over many years to be unworkable and insufficient... Most important, it ignores the legitimate role of the states in regulating the disposal of these wastes. States have a fundamental right to protect their citizens and the environment within their borders, and the Governors will continue to insist that the federal government act in a manner consistent with this right."(15)

The National Mining Association (NMA) states the problem succinctly in their White Paper Addendum: "Facilities that are *not* licensed under the AEA and have disposed of pre-1978 byproduct material (like the Buttonwillow facility in California) could have done so lawfully only if pre-1978 byproduct material does *not* qualify as 11e.(2) byproduct material. On the other hand, if pre-1978 byproduct material does not qualify as 11e.(2) byproduct material then facilities such as the Envirocare facility in Utah, that are licensed to dispose of 11e.(2) byproduct material without satisfying NRC's Non-11e.(2) Policy, would be acting unlawfully. Since pre-1978 byproduct material either *does* or *does not* qualify as 11e.(2) byproduct material, one of these facilities – either Buttonwillow or Envirocare – *is disposing of material unlawfully* and in a manner that creates commingled 11e.(2) and non-11e.(2) waste.(8)"

EVOLUTION OF FUSRAP AND UMTRAP

Prior to the development of atomic weapons, the primary use for radioactive ores was for extraction of radium and vanadium. Numerous mining and milling waste sites still exist in the west remaining from radium and vanadium recovery. Gateway, Loma, and Placerville, Colorado are just three examples of such abandoned processing sites. The primary use of these ores changed when the Manhattan Engineer District

(MED) was established in 1942 to develop nuclear materials for national security under jurisdiction of the U.S. Army through the first War Powers Act (16). Many MED-generated wastes were from imported ore and reprocessed vanadium tailings (today classified as TENORM) obtained before and during WWII. When MED was deactivated, its responsibilities were transferred to the Atomic Energy Commission (AEC) by the Atomic Energy Act of 1946. From 1942 to 1946, numerous contractors and several hundred subcontractors were involved in the production, research, and development operations at sites were federally, privately, or institutionally owned while AEC continued the practice of contracting the actual operations. The urgency and magnitude of the war effort limited outside knowledge of radioactive characteristics of uranium ore and processing residual such that many of these sites became contaminated with radioactivity as a result of work done for the government (17).

AEC also set out to develop a domestic uranium industry that included mining and milling. Uranium mills were built by private industry and operated under contract with the AEC. The mills were guaranteed sales of uranium concentrate by the AEC contracts. A distinction was made between those sites that processed uranium and thorium for sale to the U.S. Government as opposed to other operations where the government already owned the ore. Literally thousands of mine sites also exist across the west.

Little or no attention was paid to radiological or toxicological hazards associated with tailings until 1965. The Public Health Service (PHS) and the Colorado Department of Health discovered that uranium mill tailings were being removed from the Grand Junction, Colorado mill site and used for construction purposes in and around habitable structures (18). Regulations known as the Grand Junction Remedial Action Criteria (10 CFR 712) were promulgated in 1972 to clean up contaminated Grand Junction sites based on PHS recommendations, (19).

In 1974, Congress split AEC into two entities: the “regulatory” NRC and the “promotional” Energy Research and Development Agency (ERDA) the predecessor to DOE. The Formerly Utilized Sites Remedial Action Program (FUSRAP) was established in 1974. In 1978, Congress passed the Uranium Mill Tailings Radiation Control Act (UMTRCA) to address cleanup of mill sites and vicinity properties at inactive former uranium mill processing facilities. The definition of byproduct material was extended with the creation of 11e.(2) byproduct material to bring all uranium and thorium mill tailings under regulatory control. Inactive sites (those with no NRC license) were administered by DOE under Title I of UMTRCA. The 24 inactive sites included thousands of contaminated vicinity properties. Sites with an active NRC or Agreement State license fell under Title II of UMTRCA. The scope of UMTRCA was narrowly defined to only address sites and affected vicinity properties at which substantially all the uranium was produced for sale to the U.S. Government. DOE is the long-term custodian and licensee of UMTRCA facilities. FUSRAP sites did not qualify under UMTRCA because the uranium and thorium processed at these sites was generally owned by the government. No FUSRAP facilities were at any time licensed for conducting the MED/AEC activities because many were either in operation before licensing requirements were established or were excluded from licensing requirements pursuant to Section 110 of the AEA. In 1980, Congress authorized FUSRAP as a project and directed DOE to initiate cleanup. There were 46 identified sites in 14 states and 309 vicinity properties that were estimated to have 2.3 million cubic yards of soil and debris that required removal or other management. DOE determined that FUSRAP wastes qualify as 11e.(2) byproduct material. Two of the sites, Maywood and Colonie, were not MED sites, but were added by Congress (11).

Disposal of DOE waste is addressed by DOE O 435.1 (formerly DOE Order 5820.2A). Release of materials from DOE control is addressed in DOE Order 5400.5, which has been proposed for codification at 10 CFR 834 (20). DOE waste must meet applicable EPA regulations for disposal.

States role

The 1954 AEA did not define any specific role for the states. In 1959 Section 274 was added to define the state’s role and to provide a statutory basis under which the federal government could relinquish portions of its regulatory authority to the states. These amendments made it possible for the states to license and regulate byproducts, source materials, and small quantities of special nuclear materials. In general, states are taking the lead in regulating disposal of NORM, but the effort is focused primarily on industrial wastes from non-nuclear industries, not legacy wastes from MED and other weapons and nuclear power programs.

EPA Authority and Regulations

EPA has the authority from Congress to set general radiation protection standards. Hence, EPA promulgated generally applicable cleanup standards for Title I and standards for Title II sites of the UMTRA program at 40 CFR 192(21), in 1983. Standards for Title II sites differed from Title I requirements in that groundwater protection standards, designed to be equivalent in protection to the RCRA groundwater standards, were included. Final groundwater standards were not published until 1987 (22), were revised in 1996 to allow for alternate concentration limits (ACLs) and cover radiological and non-radiological hazards of uranium mill tailings. UMTRA standards are the basis for the FUSRAP guidelines (), and also the DOE Order 5400.5 "generic" guidelines used at DOE sites. For non-11e.(2) wastes, EPA also regulates the non-radiological components (primarily groundwater) under the Clean Water Act (CWA), Safe Drinking Water Act (SDWA), the Comprehensive Environmental Recovery Compensation and Liability Act (CERCLA) (23), Toxic Substances Control Act (TSCA), and the Resource Conservation Recovery Act (RCRA).

To avoid dual regulation, the definition of hazardous wastes and hazardous substances under RCRA exclude source, byproduct, or special nuclear material. Given that the radiological component of these wastes are part of a larger waste stream, such as tailings that contain heavy metals and groundwater, it was decided that the whole stream be regulated under one umbrella regulation rather than having dual regulation over different parts of the waste stream, as happens in other situations. EPA has authority to regulate radioactive materials not covered by the AEA, as well as the non-radiological components of non-11e.(2) wastes. At this time, EPA has chosen not to promulgate blanket regulations for cleanup of NORM. EPA has published a notice of proposed rulemaking to relax requirements for storage of mixed low level radioactive wastes, including mixed TENORM wastes.

NRC Regulations

NRC regulations addressing the licensing of byproduct material are found at 10 CFR Part 40. Specific requirements for 11e.(2) byproduct material are found in Appendix A of Part 40. Disposal of radioactive material is addressed under 10 CFR 61.

To comply with NRC requirements for Agreement State status, the Agreement States must conform to strict controls on radiological and non-radiological components of 11e.(2) byproduct materials. Non-agreement states, however, have concurrent jurisdiction over the non-radiological components through ground water protection programs, and state hazardous waste laws.

TRANSFER OF FUSRAP

By 1995, 22 FUSRAP sites and 175 vicinity properties had been cleaned up under DOE oversight. DOE estimated that the completion of the program would cost an additional \$2.5 billion and extend the program until 2016. The House Appropriations Energy and Water Subcommittee recommended moving the program to the Corps of Engineers. The FY 1998 Energy and Water Appropriations Bill transferred management of FUSRAP to USACE beginning in FY 98. The selected remedy chosen in the Record of Decision for the USACE FUSRAP sites called for the material to be "excavated and shipped offsite for disposal at an appropriately licensed or permitted facility"(24).

On October 15, 1998, the Natural Resources Defense Council (NRDC) petitioned the NRC to exert authority to ensure that the USACE handling of radioactive materials in connection with FUSRAP is effected in accord with properly issued license and all other applicable requirements. NRC forwarded the petition to both USACE and DOE for review and comment.

On April 5, 1999, in response to the NRDC request, the NRC determined that it lacks the authority to license the USACE's FUSRAP activities. In its response to NRC, the USACE stated:

"The Corps' principal argument is that no NRC license is required because of the federal permit waiver for on-site removal or remedial actions in Sec. 121(e)(1) of CERCLA. The Corps also believes that the AEA exempts FUSRAP activity from NRC licensing. In its opinion, "Congress intended for USACE to fill the shoes of the AEC successor agency responsible for FUSRAP cleanup, that is DOE, an agency not considered a "person" subject to licensing under the AEA." The Corps further posits that, in transferring the

FUSRAP program, Congress expressed no intent that the agency obtain an NRC license for that activity and, instead, sought a seamless transition ``unimpeded by procedural requirements outside of CERCLA.”

DOE's response differs in several respects from that of the Corps:

“On the matter of DOE's continued involvement with FUSRAP and oversight of the Corps, the Department ``respectfully disagrees" with the Corps. According to its submittal, DOE is not authorized to regulate the Corps' FUSRAP activities and cannot transfer its AEA authorities to the Corps. In the Department's view, ``(t)he transfer legislation did not make the Corps a DOE contractor, or otherwise subject the Corps' activities to the control or direction of DOE. The letter concludes that NRC should ``evaluate the licensability of the Corps' activities in the same manner as it would evaluate the activities of any other `person' within the meaning of the Atomic Energy Act." DOE defers to NRC on this question. "The letter does not contain a DOE position concerning the viability of the Corps' CERCLA argument. (25)

NRC, in its decision stated: “Congress has given NRC no clear directive to oversee USACE's ongoing effort under CERCLA to complete the FUSRAP cleanup project. Indeed, Congress has provided NRC no money and no personnel to undertake an oversight role. In addition, Congress has made it clear that the Corps is to undertake FUSRAP cleanup pursuant to CERCLA which waives permit requirements for onsite activities. In these circumstances, we are disinclined to read our statutory authority expansively, and to commit scarce NRC resources, to establish and maintain a regulatory program in an area where, under Congressional direction, a sister federal agency already is at work and has committed itself to following appropriate safety and environmental standards. Absent specific direction from Congress to the contrary, NRC will continue to refrain from regulating the Corps in its clean up activities at FUSRAP sites.” (25).

DISPOSAL OF FUSRAP WASTES

On December 21, 1998, before NRC issued its decision discussed above, USACE issued a solicitation for up to ten indefinite-delivery/indefinite-quantity contracts for the removal of five different types of waste at sites within FUSRAP. The five types of waste were: 1) low-activity radioactive waste; 2) NORM materials; 3) 11e.(2) materials generated prior to November 18, 1979; 4) hazardous mixed waste materials; and 5) RCRA hazardous waste containing residual radioactivity. The solicitation stated that 11e.(2) waste is not subject to regulation under the AEA, but USACE required contractors to dispose of waste in accordance with “all applicable or relevant and appropriate Federal, State, and local regulations and permits”. Some of the FUSRAP wastes are more radioactive than mill tailings encountered under UMTRA. For example, the K-65 wastes at the Niagara Falls Storage Site are estimated to have over 69.56 TBq (1,880 curies) of activity, classified as greater than Class C waste (11).

In March 1999, DOE and USACE signed a memorandum of understanding (MOU) regarding program administration and execution of FUSRAP. In this MOU, DOE and USACE acknowledge that DOE does not have regulatory responsibility or control over the FUSRAP activities of USACE or USACE contractors. USACE is responsible for all response actions at the remaining FUSRAP sites until two years after closeout. DOE is responsible for any required activities at FUSRAP sites beginning two years after closeout (26).

Disposal of the FUSRAP wastes at White Mesa was challenged by Envirocare in Federal Court. Envirocare is licensed by NRC for disposal of 11e.(2) byproduct material, and the state for disposal of NORM and LLW. Envirocare had contracted previously with DOE for disposal of FUSRAP (and other LLW) wastes. The lawsuit was dismissed in June 1999. The finding of the court over the Envirocare suit was that NRC failed to address the issue of whether a license is required for the disposal of certain radioactive waste. Additionally, the judge did not stop the solicitation on the technicality that a task order (contract) had not been issued, so a violation had not yet occurred (27). USACE moved ahead in late June 1999, and issued contracts to Envirocare and Waste Control Specialists. These facilities are licensed for Subtitle C RCRA wastes, but not radiological wastes. USACE has recognized significant cost savings (at least for now) compared to what DOE was estimating by utilizing these optional disposal practices.

Buttonwillow

USACE shipped 83 rail cars full of FUSRAP wastes from a building demolition project at the Linde site outside of Buffalo, New York to a RCRA Subtitle C disposal site near Buttonwillow, California between October 1998 and March 1999. The state license for the site does not authorize disposal of radioactive waste over 74 Bq/g (2 nCi/g), (the site had accepted oil field NORM wastes below 74 Bq/g in the past). There are serious questions being raised by the state of California about the composition and activity of the waste. Only 26 samples were collected before the building was demolished. At least one of the samples was over 111 Bq/g (3 nCi/g). The USACE averaged the results of the 26 samples to represent the entire 83 train carloads of waste. It should be noted that uranium was not just refined to yellowcake at this location, but additional processing that converted the yellowcake to uranium dioxide, and then uranium hexafluoride was performed. It is not clear if the waste was source material or byproduct material because the uranium content in the samples was much higher than the radium content. There was no sample plan presented for California to review, and the methodology of sample collection and interpretation is still under review (11). The site sits atop three aquifers, is one-half mile from the California Aqueduct, and has raised concerns. California has been embattled over siting of a low-level radioactive waste disposal site at Ward Valley, and sees disposal of FUSRAP wastes at Buttonwillow as inconsistent with the NWPA (28). The Southwestern Low-Level Radioactive Waste Commission is drafting a policy statement to require notification of the Commission of any proposed disposal of radioactive waste within the region (29).

White Mesa Mill

The White Mesa Mill, located in Blanding, Utah and operated by International Uranium Corporation has received NRC license amendments to use alternate feedstocks for recovery of uranium. The Cotter concentrates, as well as other FUSRAP wastes from Ashland I and II sites, Seaway Area D, and the St. Louis Airport Site are approved for alternate feed at White Mesa. Other wastes approved for reprocessing include rare earth wastes from Canada and Pennsylvania (30). The White Mesa mill is seen by some as not a properly licensed disposal facility. Disposal of the FUSRAP wastes at White Mesa was challenged by Envirocare of Tooele, Utah in Federal Court. Chloroform levels 47 times higher than allowed by Utah state rules were found in a monitoring well at the White Mesa mill. Utah Department of Environmental Quality issued a "notice of violation" of the state's groundwater protection rules (31).

It is not clear at this time if cost savings realized by ACOE by utilizing these disposal options instead of Envirocare are going to be offset by potential compliance and reclamation costs.

NRC REGULATORY GUIDANCE FOR NON-11E.(2) BYPRODUCT MATERIAL

The development of this inconsistent disposal situation may be partly seen by changes in staff guidance addressing co-disposal of non-11e.(2) wastes in byproduct material disposal cells. In 1980 issued an advisory legal opinion concluding that federal law does not preempt exercise of non-agreement state authority over the non-radiological aspects of 11e.(2) material. So, non-radiological components of wastes can be regulated by the states. NRC further contended that states have concurrent jurisdiction since the states regulate NORM, including the non-radiological components. States have the ability to take over the sites after license termination, which NRC interpreted to imply that states have an independent authority over the wastes. The savings clause of the AEA (Section 275) states that the UMTRCA amendments are intended to impact EPA authority under the CWA or the CAA. To the extent that states have derivative authority from the EPA, they can continue to exercise authority over hazardous constituents (8).

The next guidance appeared in the Federal Register in 1992 (32). There were four requirements:

1. Disposal could not have significant additional effects on public safety and health, and the environment,
2. Disposal had to comply with the reclamation and closure criteria set forth in 10 CFR 40, Appendix A,
3. Disposal could not result in the tailings pile becoming subject to RCRA or CERCLA, or
4. DOE or the state had to agree to take title to the site upon completion of reclamation.

NRC subsequently published “Final Revised Guidance on Disposal of non-AEA 11e.(2) Byproduct Material in Tailings Impoundments; Final Position and Guidance on the Use of Uranium Feed Materials Other Than Natural Ores” on September 22, 1995 (33). NRC listed ten criteria that had to be met for disposal of non-11e.(2) material. It should be noted that NRC defined “non-11e.(2) byproduct material” as “...simply an encompassing term for source, special nuclear, and 11e.(1) byproduct materials.” It kept the first four criteria, but then expanded on them.

1. Disposal of material similar to 11e.(2) will be conducted under Part 40,
2. Radioactive material not authorized under the AEA shall not be authorized for disposal in an 11e.(2) byproduct material impoundment (NARM or NORM excluded because of NRC authority issue).
3. Special Nuclear Material and 11e.(1) byproduct material should not be considered as candidates without compelling reasons to the contrary. Specific proposals should be prepared.
4. The licensee must demonstrate that the material is subject to applicable RCRA or other EPA standards for hazardous or toxic wastes.
5. No CERCLA disposal issues,
6. No significant environmental impact from disposal
7. Will not compromise reclamation of the tailings impoundment by demonstrating compliance with appendix A of 10CFR40
8. Must show concurrence from regional compact from where waste originates as well as where its being disposed.
9. Concurrence and commitment from either DOE or the State to take title to the impoundment after closure must be received before granting the license amendment.
10. The mechanism to authorize disposal of non-11e.(2) byproduct material in a tailings impoundment is a license amendment under 10 CFR Part 40. An exemption to the requirements of 10 CFR Part 61 must be granted. If the disposal impoundment is in an Agreement State with low-level licensing authority, the State must take appropriate action to exempt the non-11e.(2) waste from regulation as low level waste.

Final Position and Guidance on the Use of Uranium Mill Feed Material Other Than Natural Ores

1. Feed material must qualify as ore under the following definition:
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. No listed hazardous waste.
3. The waste must be processed primarily for its ore content. There are two tests to pass: a) If the material would qualify for co-disposal without processing, then it can be assumed that the operator is reprocessing for the ore content; and b) the licensee must certify under oath.

The purpose of the ten criteria was to prevent “commingling” of mill tailings with non-11e.(2) materials in tailings piles in order to prevent a mixed-waste situation. This would cause dual regulation by either EPA or a state, which may keep DOE from taking long-term custody of the wastes. The mining lobby argued that the criteria were too restrictive, and keeping the alternate feed policy and codisposal from being utilized to its potential. In fact, NMA proposed to open the tailings piles to SNM through a generic license amendment framework that would list conditions needed to be met so that a review wouldn’t be required every time a new waste was proposed for processing. Such a framework, under current law, would allow a pile to be a low-level waste site and an UMTRA site, with complex regulatory requirements. It is questionable whether DOE could or would want to take title, thus, leaving the license in a condition where it cannot be terminated. Additionally, states can impose groundwater standards up the boundary of the pile for hazardous and non-hazardous properties that may be much stricter than NRC (34). The revised definition of ore may allow disposal of all types of NORM wastes into the 11e.(2) through reprocessing.

10CFR41 rulemaking

These changes in policy over the years have created a situation that is at odds with the NWPA, state regulations, other federal agencies, environmental and local groups, and has resulted in political and industry pressure to resolve the issue. The NRC recently decided to start preliminary scoping of the need for a new 10 CFR Part 41 addressing the licensing of uranium and thorium recovery facilities, partly because of the in-situ leach method of uranium recovery, which is not adequately covered under current

rules. There are basically four regulatory areas for NRC to reassess In the rulemaking : Each will be discussed briefly below.

1. Jurisdiction of nonagreement states over nonradiological components on 11e.(2) byproduct material.

NRC agrees that it will not terminate any site-specific license until the site licensee has demonstrated that all issues with the state regulatory authorities have been resolved. The NRC's failure to assert Federal preemption over all components of 11e.(2) byproduct material is leading to the very thing that the staff says should be avoided, that is non-Agreement State review of NRC approved reclamation plans. Another staffer pointed out that dual regulation can work, there are times where it is productive.

Under a recent Supreme Court ruling, EPA does not have regulatory authority over byproduct material under the CWA. Clearly, there is a discrepancy in policy and ruling.

2. NRC jurisdiction over ISL facilities

Pre-AEA milling for the most part did not involve in-situ leaching , and its wastes are not similar to 11e.(2) tailings, and therefore is beyond the scope of this paper.

3. Disposal of non-11e.(2) byproduct material and tailings impoundments

10CFR40 App A, Criterion 5, has design requirements calling for liners, however many NRC tailings cells were built before this requirement passed, so many are not in compliance. Additionally, Subtitle C calls for leachate collection systems and double liners, not a requirement of Appendix A. It is not clear what types of containerization would be required for various wastes. Nor is it clear what responsibility the generator will have in properly characterizing the waste coming into the facility. How is the waste characterized, and does there need to be some verification of the characterization (and classification). Is the groundwater monitoring program at these facilities adequate? (Utah is requiring IUC to get a permit).

The DOE wants congressional direction (legislation or guidance) before there are any actions that increase the burden on DOE. Allowing material that is chemically and radiological (sic) similar to byproduct material to be placed in the tailings pile is a reasonable thing to consider, however, DOE does not want to get into a problem with dual regulation (9). NMA issued an addendum to its White Paper in August, 1999 encouraging NRC to recognize Pre-1978 byproduct materials as 11e.(2) byproduct material, and that pre-1978 byproduct material at FUSRAP sites (or other DOE sites) become subject to licensing and regulation by NRC if disposed of at a non-DOE facility (35).

4. NRC's alternate feed policy.

Some of the issues raised in the NRC hearings include: 1) When originally proposed in 1994, the guidance was trying to prevent processing of radioactive waste that would have to be disposed of primarily in a low level waste facility, simply to change its classification from low level waste to 11e.(2) byproduct material. That is how sham recycling was defined. "Primarily processed for" meant was the waste being processed really to get uranium out, or is it processed to change the definition of what the waste is? The Presiding Officer in a 1999 hearing interpreted "primarily" to mean merely that the licensee actually did run the feed through the mill and did extract uranium from that material without regard for the financial benefit that accrued from removal of that uranium. There is also the direct disposal test in that if the material meets the proposed classification as being able to classified as 11e.(2) by definition, then it could be directly deposited in the cell without processing such that if they do process the waste, it must be for the purpose of recovering the uranium. A third issue is that the revised guidance also proposed a performance-based amendment whereby the licensees wouldn't have to come back to staff every time they wanted to process alternate feed material. They would have to assess the material that they are considering to run through the mill to whether it is reasonable to process it for its uranium content. An opposing view is: "From a policy basis, from a citizen's perspective, performance-based licensing poses great concern because what it does is that it significantly reduces the accountability of a licensee to the public, and also the public's ability to participate in the decision-making process, because, in general, it involves making very, very broad prescriptions in the license and then allowing the licensee to make changes as it goes along in the operation of the facility without providing the kind of public notice and decision-making process that is usually provided in the license amendment cases. So that as a practical matter, the public is effectively excluded from being an effective participant in this decision-making process which may have significant impacts on the health of the safety of the citizens surrounding these facilities." (9)

A NRC staffer noted that uranium ore at a few tenths of a percent yield several pounds of uranium per ton, whereas soil containing 0.37 Bq/g (10 pCi/g) (a typical cleanup level) uranium is a pound per 34 tons. This example was brought up to show the lack of economic validity the process can have. Uranium is selling for less than \$15.00 a pound, yet the mills can charge thousands of dollars per ton for disposal. Mock mills may spring up. If a mill operator only is making pennies per ton on the value of the uranium in the ore, but is making hundreds of dollars a ton for disposal, the mill efficiency becomes irrelevant, then one gets the question of what is a mill. What the essence of the problem is that the mill becomes a low level waste facility that is not licensed under Part 61 (9).

NRC staff issued recommendations in November, 1999 with respect to licensing of source material below 0.05% (36).

CONCLUSION

To summarize, the types of TENORM wastes and regulations covering them are varied. Legacy radium wastes are regulated by some States, pre-AEA 11e.(2) byproduct material may or may not be regulated by NRC, post-UMTRA 11e.(2) wastes are regulated by NRC. There have been inconsistencies in disposal practices recently that have lead to litigation and now, and NRC's status as regulator is also under scrutiny by Congress.

Changes in regulatory authority over the FUSRAP program and NRC's position on pre-1978 byproduct material has caused confusion and inconsistency in disposal practices. The USACE is using expedited methods to characterize and remediate FUSRAP sites. Part of the expedited process involves disposal of these wastes in industrial landfills not licensed to take radioactive materials, as well as reprocessing them through uranium recovery facilities, which has concerned some stakeholders, including the States. The NRC has been evaluating its role and position over byproduct material. NRC believes that the CERCLA licensing exemption from on-site activities and the Congressional intent of switching programs from DOE to USACE to not fund NRC oversight justifies their position. EPA has proposed regulations for reduction of dual regulation of hazardous waste mixed with technologically enhanced naturally-occurring radioactive material. Three issues are particularly germane to the issue: concurrent jurisdiction over the radiological and non-radiological components, co-disposal of non-11e.(2) material in licensed 11e.(2) disposal cells, and reprocessing wastes in uranium mills for recovery of uranium facilitating the disposal of the resulting waste streams in the 11e.(2) cells. Some see the process of alternate feed materials as "laundering" of waste to avoid expensive disposal costs under the current NWPA compacts. Additional concerns about the volume of wastes that disposal of non-11e.(2) wastes in 11e.(2) cells would allow. The uranium industry sees reprocessing and disposal as a revenue-generating practice. Congress is going to investigate the issue and litigation is likely to determine the ultimate status and disposition of these wastes.

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