

COST EFFECTIVE DISPOSAL AND RECYCLING OPTIONS FOR FUSRAP MATERIAL

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ABSTRACT

Execution of the United States Army Corps of Engineer's (USACE) Formerly Utilized Sites Remedial Action Program (FUSRAP) requires that large volumes of material (primarily soil) with low specific activity be disposed off-site. A significant portion of the total FUSRAP budget will be consumed by the cost of transportation, treatment (as necessary), and final disposition of this material at a waste disposal facility. In an effort to foster competition among disposal facilities when establishing unit disposal rates, preclude overall disposal facility capacity limitations, and reduce or eliminate transportation congestion which may result in schedule delays, USACE has explored alternate disposal and recycling options for FUSRAP materials. The term alternate disposal, as considered by USACE, means disposal of waste containing residual radioactive material at a facility not licensed by the United States Nuclear Regulatory Commission or an Agreement State. Recycling includes reprocessing of material for its beneficial resources at licensed milling facilities.

USACE conducted independent research of the technical, legal, and practical aspects of alternate disposal and recycling and concluded that there are a number of facilities available to accept most of the FUSRAP wastes. Use of such facilities will permit disposal at potentially much less cost to the taxpayer while still achieving protection of human health and the environment, as well as compliance with applicable laws and regulations.

This paper is a discussion of alternate disposal actions and recycling options successfully executed by USACE at FUSRAP sites during fiscal year 1998. Specifically, regulatory authorities, procedural requirements, procurement actions, and savings are reviewed for each case.

INTRODUCTION

Public Law 105-62, "The Energy and Water Development Appropriations Act for Fiscal Year 1998" was passed by Congress on 13 October 1997. The law designated the United States Army Corps of Engineers (USACE) the responsibility to manage and execute the Formerly Utilized Sites Remedial Action Program (FUSRAP) previously managed by the United States Department of Energy (DOE). USACE will conduct FUSRAP cleanup work in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9601 *et seq.* (CERCLA).

Many of the sites currently in FUSRAP will require, as part of the final remedy, the off-site disposal of large volumes of material (primarily soil) with low specific activity (i.e., average specific activity less than 74 becquerels per gram [Bq/g]). Perhaps as much as 1.5 million cubic meters, or more, of radioactively contaminated material, and

potentially some material also contaminated with hazardous wastes, will eventually require off-site disposal from FUSRAP sites.

Until recently, USACE has not had an established agency policy regarding disposal of low specific activity waste, other than to comply with all applicable laws and regulations, and to ensure the protection of public health and the environment. Recognizing the negative impact of limiting disposal options to a single facility, USACE has proceeded to evaluate and to define types of waste materials likely present at FUSRAP sites, the legal authorities which govern these materials, and the range of potential disposal sites that are approved to accept these types of materials. This approach was intended to ascertain if competition could be secured for the disposal of low specific activity FUSRAP material, while remaining fully in compliance with all laws and protecting the public interest, both from the health and fiscal perspectives.

USACE implemented this investigation by coordinating with the United States Nuclear Regulatory Commission (NRC), the United States Environmental Protection Agency (EPA), a number of state environmental and/or nuclear regulatory agencies, and private facilities. After conducting independent research of the technical, legal, and practical aspects of this issue, USACE determined that there are a number of facilities available to accept most of the different types of radioactive waste from its FUSRAP sites. USACE has, therefore, decided to pursue, as its policy, alternate disposal and recycling options for certain radioactive and hazardous waste types. The term alternate disposal, as considered by USACE, means disposal of waste containing residual radioactive material at a facility not licensed by the NRC or an Agreement State. Recycling includes reprocessing of material for its beneficial resources at licensed milling facilities.

LEGAL STATUS OF WASTE TYPES AND REGULATORY AUTHORITIES

AEA Regulated Material

The Atomic Energy Act (AEA) as amended (42 U.S.C. § 2011 *et seq.*), establishes regulatory authority, exercised by the NRC, over certain activities involving a number of the types of radioactive materials at FUSRAP sites, but not all. For example, the AEA governs the ownership, production, and distribution of special nuclear material. The NRC has promulgated regulations for issuing domestic licenses for special nuclear material in 10 CFR Part 70. The AEA governs the mining, processing and distribution of source material. The NRC regulations for issuing licenses for source material are located in 10 CFR Part 40. These include licensing for, and standards relating to, onsite disposal in piles of mine tailings or wastes resulting from source material production, listed in Appendix A. The AEA also governs the management and distribution of byproduct material, including the management of disposal sites. The NRC regulations for licensing of the management of byproduct material are located in 10 CFR Parts 30, 31, 32 and 33. This includes both 11(e)(1) material, which is material yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material, and 11(e)(2) material, which is the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content. Low level radioactive waste (LLRW) disposal is governed by the AEA, which provides that it is radioactive material which is not high level radioactive waste, spent nuclear fuel, or 11(e)(2) byproduct material, and is classified as such by the NRC.

Non-AEA Regulated Material

Other types of FUSRAP radioactive material that will be disposed off-site by USACE are not regulated by the NRC under its AEA authority. These types include naturally occurring radioactive material (NORM), and, in some cases, 11(e)(2) byproduct material. A significant portion of the materials from FUSRAP sites that will be disposed off-site fit the definition of 11(e)(2) byproduct materials. These sites were operated by contractors for the Manhattan Engineer District (MED) or the Atomic Energy Commission (AEC) during or after World War II (into the 1950's in some cases). Ores were processed at these sites to extract uranium in support of the nations atomic weapons program.

In response to questions from USACE, the NRC stated in writing that no NRC license is required for USACE or its contractors to handle these historic radioactive materials, and, further, that no NRC license is required for off-site disposal of these materials. This determination is based on the fact that the AEA 11(e)(2) definition of byproduct materials subject to AEA regulation was not enacted until 1978 as part of the Uranium Mill Tailings Radiation Control Act (UMTRCA), Public Law 95-604. The regulatory jurisdiction over 11(e)(2) materials now exercised by the NRC is not deemed to be retroactive to materials processed prior to the 8 November 1978 date of the law creating this jurisdiction. The NRC advises that neither a NRC license nor an Agreement State license (issued pursuant to authority delegated under the AEA) is required for handling the materials from the specified sites, and therefore no NRC or Agreement State license is required for disposal of the materials from the sites. The NRC also stated that it would not object to the disposal of FUSRAP waste materials which are pre-1978 11(e)(2) byproduct materials at RCRA Subtitle C hazardous waste management facilities, if such disposal is in compliance with applicable state law. Further clarifications with the NRC reveal that this jurisdictional limitation applies to all pre-1978 MED or AEC uranium or thorium milling sites, or sites with materials, which are byproducts of processing from those sites. Thus, gathering all available historical documents regarding activities at the site to determine the origin of the radioactive materials which are present is critical to correctly characterize the materials for disposal purposes. In addition, the NRC has clarified that the determination of lack of regulatory jurisdiction due to the prospective application of UMTRCA does not change the proper characterization of the materials as 11(e)(2) byproduct materials.

POTENTIAL DISPOSAL FACILITIES

USACE has investigated several types of facilities for the disposal of its AEA and non-AEA regulated FUSRAP material. The facilities examined were licensed LLRW disposal facilities, licensed source material mills, licensed and permitted low level mixed waste facilities, RCRA Subtitle C facilities, and RCRA Subtitle D facilities.

For AEA regulated FUSRAP material (including LLRW, source material, special nuclear material, post-1978 11(e)(2) material, and low level mixed waste), USACE has determined that a number of options are available. These include licensed LLRW disposal facilities as well as licensed source material milling facilities where the material may be reprocessed for its beneficial resources with subsequent placement of the tailings

in an on-site impoundment. Where the AEA requires that only persons with a license may transfer, possess, use or process materials removed from a FUSRAP site, USACE will ensure that only licensed facilities receive the materials for those actions.

For non-AEA regulated FUSRAP material with low specific activity (e.g., NORM and pre-1978 11(e)(2) material) disposal options may include licensed LLRW disposal facilities (this may be subject to the concurrence of the facility's regulatory authority), licensed source material milling facilities, and RCRA Subtitle C permitted facilities.

In all cases, USACE transports off-site shipments of FUSRAP waste in accordance with the Hazardous Materials Transportation Act, 49 U.S.C. § 5101 *et seq.* USACE also complies with all applicable NRC and EPA manifest requirements.

LIABILITY FOR DISPOSED WASTE

Disposition of FUSRAP material at more than one facility has raised liability issues. Specifically, it has been questioned whether or not it is prudent to potentially establish liability at multiple facilities. This question is moot since the federal government, as a large waste generator, has already established liability at most, if not all, disposal facilities in the United States. However, whenever materials are arranged for disposal, it must be considered that some future liability may attach to the generator as a result of this disposal. The National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300 (NCP), requires that whenever a federal agency arranges for off-site disposal of hazardous substances, it must ensure that all necessary permits are obtained and in good standing at the time of the disposal. Also, any financial assurance mechanisms required by the regulatory agency must be in place. These compliance assurances must be secured by contacting the regulatory authority and must be documented at the time of shipment.

PROJECT ILLUSTRATIONS

Middlesex Municipal Landfill Pile, Middlesex, NJ

USACE environmental restoration activities at the Middlesex FUSRAP site have included removal of an interim storage pile (Middlesex Municipal Landfill Pile). The storage pile contained approximately 23,700 cubic meters (31,000 cubic yards) in-situ of soil with small amounts of pitchblende and debris. The radionuclides of concern in the pile were uranium-238 (average specific activity 0.72 Bq/g), radium-226 (average specific activity 0.70 Bq/g), and their respective decay products. Concentrations of leachable lead (D008) in the storage pile exceeded the regulatory limit (average concentration 19.3 mg/L). The material in the pile was never processed and, thus, it is not 11(e)(2) material. The pile was characterized as RCRA hazardous waste containing residual radioactivity that is not subject to control under the AEA.

Requests for proposals were solicited from RCRA Subtitle C facilities and some remediation contractors. A RCRA Subtitle C facility was selected from the technically responsive bidders based on price. The RCRA Subtitle C facility sampled the pile material and determined that the material met the standards and requirements of the regulations and the site operating permit. The facility was audited by USACE contractor representatives to review waste receipt/acceptance procedures, permits, and regulatory inspections.

Upon receipt of written approval from the RCRA state regulatory agency, the material was transported to the RCRA Subtitle C facility for treatment and disposal. In this case, the cost to load, transport, treat and dispose the interim pile at the RCRA Subtitle C facility was approximately \$300 per cubic yard. The overall savings realized by utilizing this facility, as opposed to a facility licensed to receive low level mixed waste, exceeded an estimated \$20 million despite the increased cost of transportation.

Linde Building 30 Debris, Tonawanda, NY

At the Linde FUSRAP site, separation of uranium from ores/residues to produce uranium oxide and conversion of uranium oxide to uranium dioxide were conducted in Building 30. Demolition of Building 30 was recently completed generating approximately 4940 cubic meters (6500 cubic yards) of debris contaminated with primarily uranium-238, thorium-230, and radium-226 (total specific activity less than 74 Bq/g). No RCRA hazardous wastes were present in the waste stream.

Fixed unit price proposals were solicited from potential vendors including a RCRA Subtitle D facility, RCRA Subtitle C facilities, and licensed LLRW disposal facilities. Following an evaluation of proposals, a RCRA Subtitle C facility was selected as "best value to the Government." The cost for transportation and disposal was \$422 per cubic yard. The estimated savings achieved by utilizing alternate disposal of 6500 cubic yards of debris contaminated with residual radioactivity at a permitted facility versus a licensed facility exceeded \$1.3 million again despite the increased cost of transportation and the increased cost of packaging.

Ashland 2, Tonawanda, NY

The Tonawanda, NY FUSRAP site consists of four properties one of which is Ashland 2. Low-grade uranium ore tailings (i.e., pre-1978 11(e)(2) materials) were deposited in Ashland 2. This area was being used by the property owner as an industrial landfill at that time. Principal radionuclides of concern included uranium-238, thorium-232, thorium-230, and radium-226 (average specific activity 0.77, 0.05, 3.2, and 0.23 Bq/g respectively). No organic substances were associated with the waste and the inorganics (e.g., copper, lead, vanadium, etc.) were not present at levels that exceeded regulatory limits.

Competitive bids were solicited from potential vendors for transportation and, separately, for disposal. Approximately 32,680 cubic meters (43,000 cubic yards) of soil-like material and debris was excavated and transported for uranium recycling at White Mesa Mill, an NRC licensed facility operated by International Uranium Corporation (IUC) and located in Blanding, UT. Prior to shipment, IUC's radioactive material license (issued by NRC) was amended to allow the mill to process the Ashland 2 material as alternate feed. The Corps estimates that \$2.4 million was saved/avoided by recycling this material in lieu of placing the material in a licensed landfill. This estimate is conservative as it does not take into account the increased unit disposal rate for debris at a licensed landfill.

CONCLUSION

Within the next few years, USACE anticipates that a large volume of low specific activity waste from its FUSRAP sites will be disposed off-site. The public interest is best served if there is competition for disposal or recycling of these wastes among facilities which are permitted or licensed by the necessary regulatory agencies and which are properly managed for the protection of human health and the environment. If a number of different facilities can be identified to receive all or portions of these wastes, then more waste can be managed for disposal or recycling at one time. This can result in quicker completion of the projects and substantial savings due to competition among providers of these services.

As has been discussed, USACE has determined that such competition is available, and that there are a number of facilities available to take most of the different types of wastes that will require off-site disposal from its sites. These facilities may be regulated by the NRC for certain source or byproduct materials which are already subject to NRC licenses or which meet the definition of source material subject to NRC standards. These facilities may be regulated by EPA, or a RCRA authorized state, with a permit to receive hazardous wastes with residual radioactivity (this will allow acceptance of some low specific activity material). These facilities may possess a RCRA permit and a NRC or an Agreement State license to receive low level mixed waste. These facilities may be regulated by an Agreement State, instead of the NRC, with a license to dispose of source material, regulated byproduct material, or low level radioactive waste at either a state or compact facility. Lastly, these facilities may be licensed by an Agreement State to accept NORM for disposal.

At every site, USACE must and will do what is necessary to reliably characterize all regulated constituents in the materials at the site. This will include obtaining and reviewing historical records for process information, as well as any other, especially later, operations on the site which could have resulted in disposal of regulated waste materials. In addition, all necessary analytical testing will be conducted to identify the radioactive materials and/or hazardous waste present in the areas subject to CERCLA response. USACE will then use this historic information and analytical data to determine the type of materials to be disposed off-site and the types of regulatory requirements that apply to those materials. Once this has been determined, the range of possible disposal facilities will be reviewed to determine the alternatives available for the types of materials to be disposed from the site. Procurement alternatives will then be reviewed to determine the most effective and appropriate contracting mechanism.

USACE requires that all waste materials sent off-site for disposal go to facilities with either a license or a federal or state permit for the proper disposal of these materials. USACE has and will continue to take a cautious approach in requiring that the disposal facility hold a permit or license in order to ensure that a governmental regulatory authority is providing oversight of the disposal facility.

By applying these processes, USACE will ensure that materials are disposed off-site in a manner which protects public health and the environment, complies with applicable laws and regulations, and is the most cost effective for the type of materials present.