

SAFETY EVALUATION REPORT

DOCKET NO.: 70-1151

LICENSE NO.: SNM-1107

LICENSEE: Westinghouse Electric Company, LLC

SUBJECT: REQUEST FOR ALTERNATE DISPOSAL PROCEDURES AND EXEMPTIONS FOR CALCIUM FLUORIDE SLUDGE FROM COLUMBIA FUEL FABRICATION FACILITY FOR DISPOSAL AT THE US ECOLOGY IDAHO FACILITY

INTRODUCTION

On June 1, 2021, Westinghouse Electric Company, LLC (WEC) requested that the U.S. Nuclear Regulatory Commission (NRC) approve an alternate disposal request (ADR) (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21153A001) under Title 10 of the *Code of Federal Regulations* (10 CFR) Section 20.2002, "Method for obtaining approval of proposed disposal procedures," for the disposal of low-activity radioactive materials from the Columbia Fuel Fabrication Facility (CFFF). On September 14, 2021, in a response to an NRC staff request for additional information (RAI) (ADAMS Accession No. ML21257A468), Westinghouse Electric Company, LLC (WEC) supplemented and narrowed its request (ADAMS Accession No. ML21257A439) for the disposal of calcium fluoride (CaF₂) sludge containing byproduct and special nuclear material (SNM) from the CFFF. US Ecology, Inc., in coordination with WEC, requested corresponding specific exemptions from 10 CFR 30.3 and 10 CFR 70.3 pursuant to 10 CFR 30.11(a) and 10 CFR 70.17(a) (ADAMS Accession No. ML21258A221) to accept this material for disposal at the US Ecology Idaho (USEI) facility located near Grand View, Idaho. In the same supplement, WEC stated that the other waste material types discussed in the June 1, 2021 request will be addressed in response to the NRC staff's RAI at a later time and are not considered here.

USEI is a Resource Conservation and Recovery Act (RCRA) Subtitle C hazardous waste facility that is permitted by the Idaho Department of Environmental Quality to accept low-level radioactive waste for disposal. The NRC's approval of this 10 CFR 20.2002 request, along with the requested exemptions, would allow WEC to transfer waste meeting the established criteria for disposal at the USEI RCRA Subtitle C disposal facility rather than requiring the disposal of the material in a 10 CFR Part 61 low-level waste disposal facility.

WEC has submitted a series of 10 CFR 20.2002 ADRs for disposal of licensed material from CFFF at USEI. An initial request, submitted on May 8, 2020 (ADAMS Accession No. ML20129J934) with a corresponding exemption request for USEI on May 11, 2020 (ADAMS Accession No. ML20280A601) was approved on December 9, 2020 (ADAMS Accession No. ML20302A083 and ML20304A341). A second request dated February 8, 2021 (ADAMS Accession No. ML21039A719) to amend the previous approval was reviewed and approved, and an updated safety evaluation report evaluating both requests with corresponding exemptions for USEI was issued on March 11, 2021 (ADAMS Accession Nos. ML21061A277 and ML21061A278). This review considers a portion of the scope of the June 1, 2021 request for disposal (ADAMS Accession No. ML21257A439); the scope of the remainder of the request will be clarified in WEC's future response to the NRC's September 13, 2021 RAI.

Enclosure

This ADR considers the remainder of the CaF₂ sludge pile from which the CaF₂ sludge evaluated in the amended request approved on March 11, 2021 originated. The previous review only approved a portion of the CaF₂ sludge pile for disposal. Unlike the previous requests, WEC's June 1, 2021 ADR requested the NRC approve disposal of unspecified material based on the assumption that this material, in combination with the other material previously approved for disposal at USEI, would not exceed USEI's annual waste acceptance criteria, which is 3,000 pCi/g total activity considering the contributions from all radionuclides. Following discussions with NRC staff and the issuance of the September 13, 2021 RAI, WEC stated in its ADR supplement that the disposal of this sludge was its immediate priority and requested that the NRC staff review this revised ADR request first. As with the previous reviews, since this request includes both byproduct material and SNM in the form of low enriched uranium from uranium recovery waste treatment processes on the site, the NRC staff also considered nuclear criticality safety in addition to the potential doses to the workers and members of the public from the requested radioactive waste disposal.

SOURCE TERM

The waste being considered in this request consists of CaF₂ sludge that was previously dredged from Calcium Fluoride Lagoons on the site and placed in a storage pile on the site. Similar material from the same pile was previously approved for disposal as part of the amended request approved by the NRC on March 11, 2021 (ADAMS Accession Nos. ML21061A277 and ML21061A278). Specific concentrations of radionuclides in the CaF₂ waste, summarized in Table 1, are similar to the concentration measurements in the previously approved request (ADAMS Accession No. ML21039A719).

Table 1. Average radionuclide concentrations measured in the CaF₂ pile

U-234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)	Tc-99 (pCi/g)
49.2	1.7	6.1	0

As with the previous approvals, the CaF₂ sludge may contain minimal amounts of debris, but these non-radiological materials will not negatively impact the overall radiological concentrations in the waste.

DOSE ASSESSMENT

The dose evaluation for this 10 CFR 20.2002 request was performed using USEI's Site-Specific Dose Assessment (SSDA), Version 3a, methodology. This is the same approach used to evaluate the previous WEC disposal requests. As noted in prior submittals, doses to CFFF workers, including USEI personnel and other subcontractors on the site, are not considered in these reviews since the workers are monitored separately in accordance with CFFF's NRC license requirements.

Unlike the previous CFFF approvals that included multiple waste streams, this review only considers the disposal of CaF₂ sludge. Therefore, the parameters and values used to describe the shipping and disposal of aggregate waste from the previous reviews were used with modifications made to the "Volume of Waste (ft³)" parameter and the concentrations for the specific radionuclides of concern. Table 2 summarizes the SSDA inputs used for calculating doses associated with disposing of the CaF₂ sludge.

Table 2. Summary of key SSDA parameter values used to calculate worker doses, post-closure doses, and inadvertent intruder doses associated with the transport and disposal of CaF₂ sludge at USEI

Waste Stream Information	CaF ₂ Sludge
Volume of waste (ft ³)	133,000
Primary waste form	Soil
Method of shipment	Rail and Truck
How many miles of front-end dray are required?	5
Containerized or bulk shipping?	Bulk
Waste density (lb/ft ³)	93
Does waste contain source material?	No
Does waste contain special nuclear material?	Yes
Radionuclide concentrations (pCi/g)	
U-234	49.2
U-235	1.7
U-238	6.1

Table 3 provides a summary of the doses for each job function. The “Waste Contact Time” equates to the amount of time needed for one person to perform each function one time and the “Total Number of Repetitions” are based on the number of times each action will need to be performed to complete the entire disposal action for all of the material. A review of the calculated doses for job functions in which workers may overlap indicate that even if one worker carried out all the tasks the resulting project dose would be not be significant.

Table 3. Summary of doses to transportation workers and USEI workers involved with the transport, treatment, and disposal of the CaF₂ sludge

Job Function	Minimum Number of Workers	Waste Contact Time (hr)	Total Number of Repetitions	Total Project Dose per Worker (mrem/yr) ¹
Front-End Dray Truck Drivers	4	0.09	310	4.74E-04
Gondola Railcar Surveyors	4	0.33	62	2.34E-04
Bulk/IMC Truck Surveyors (RTF)	4	0.08	182	1.90E-04
RTF Excavator Operator	2	0.75	62	4.87E-02
Gondola Railcar Cleanout	4	0.16	62	5.22E-03
Back-End Dray Truck Drivers	8	0.75	182	1.14E-03
Landfill Cell Operators	2	0.25	124	3.21E-02

¹Multiply mrem/yr by 0.01 to convert doses to mSv/yr

In addition to evaluating worker scenarios, the SSDA calculated doses for a post-closure residential scenario and multiple inadvertent intruder scenarios. Table 4 provides a summary of these doses.

Table 4. Projected post-closure and inadvertent intruder doses

Scenario	Dose (mrem/yr) ¹
Post-Closure Residential Dose	1.63E-03
Inadvertent Intruder Doses	
Construction Scenario	6.61E-01
Well Driller Scenario	7.47E-02
Driller Occupancy	1.20E-02

¹Multiply mrem/yr by 0.01 to convert doses to mSv/yr

CRITICALITY SAFETY ASSESSMENT

As noted in the previous reviews for similar CaF₂ sludge and for the same reasons, due to the low concentrations of uranium and the established safety measures, NRC staff finds that criticality is not an issue for this ADR.

CONCLUSIONS

Based on these findings, NRC staff concludes that the requested alternate disposal of 133,000 ft³ of CaF₂ sludge at the USEI facility is acceptable under 10 CFR 20.2002. Details provided in this request, in combination with past reviews considering similar material from the same site, provided an adequate description of the waste and the proposed manner and conditions of waste disposal. In addition, as provided in 10 CFR 30.11 and 10 CFR 70.17, the NRC staff finds that issuance of exemptions to WEC and USEI, consistent with this and previous reviews, to be authorized by law, will not endanger life or property, is consistent with the common defense and security, and that authorizing this ADR is in the public's interest. Therefore, the 10 CFR 20.2002 request should be approved, WEC's license should be amended accordingly, and the exemptions to sections 30.3 and 70.3 should be granted to WEC and USEI.

PRINCIPAL CONTRIBUTOR:

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