SAFETY EVALUATION FOR THE REQUEST FOR 10 CFR 20.2002 ALTERNATE DISPOSAL APPROVAL AND EXEMPTIONS FROM 10 CFR PART 30 FOR DISPOSAL OF VERMONT YANKEE POWER STATION WASTE AT THE US ECOLOGY IDAHO FACILITY DOCKET NO. 50-271 MARCH 18, 2021

Background

On May 20, 2020, NorthStar Nuclear Decommissioning Co., LLD (NorthStar), submitted an alternate disposal request (ADR) for wastewater from the Vermont Yankee Nuclear Power Station (VY) at the US Ecology, Idaho (USEI) Resource Conservation and Recovery Act disposal facility (Agencywide Documents Access and Management System [ADAMS] Accession No. ML20157A123). USEI submitted, under separate letter (ADAMS Accession No. ML20174A590), a request for an exemption from the licensing requirements published in 10 CFR 30.3 to allow for the disposal of this material at the USEI facility. The NRC accepted the request for review on June 23, 2020 (ADAMS Accession No. ML20175A212). The NRC issued RAIs on August 21, 2020 (ADAMS Accession No. ML20237F432). A response was received from VY on September 21, 2020 (ADAMS Accession No. ML20290A492). VY also submitted an email on March 15, 2021 (ADAMS Accession No. ML21075A144) that provided a revision to the projected railcar surveyor dose.

The waste included in this 20.2002 request consists of approximately 2,000,000 gallons (7.57 million L) of low-activity radioactive wastewater containing byproduct material associated with the decommissioning process at VY. This wastewater will be transported from VY to USEI by rail and will be solidified with clay at USEI prior to disposal. The shipment and disposal of this wastewater is expected to take two years and VY stated that it would ship a maximum of 1,000,000 gallons (3.785 million L) in a calendar year.

In 2016-17, VY requested and was approved to dispose of approximately 200,000 gallons (757,000 L) of wastewater associated with decommissioning in accordance with 10 CFR 20.2002 (ADAMS Accession No. ML 17087A178). This initial 20.2002 request involved the transport of wastewater from VY to USEI in tanker trucks. VY subsequently requested authorization to ship the wastewater by rail instead of by truck. The NRC confirmed that the shipment of the wastewater by railcar would not negatively affect the evaluations or assumptions used to confirm doses for alternate disposal at the USEI facility, and that railcar transportation could be used under the NRC's previous approval for this disposal method (ADAMS Accession No. ML19214A034). VY stated in the RAI response that the shipment of wastewater under the previous 20.2002 request was completed in 2020.

The potential dose from the disposal of this material at USEI was calculated using US Ecology's Site-Specific Dose Assessment Methodology (SSDA), Revision 3. This worksheet was previously submitted to the NRC for review by US Ecology (ADAMS Accession No. ML17230A221). During the NRC's review of the SSDA, Revision 3, USEI provided an updated version of the SSDA to the NRC, Revision 3a. The following statements apply to both the Revision 3 and 3a revisions of the SSDA. The NRC staff performed a technical review of the methodology and associated supplemental documents (i.e. the USEI SSDA Workbooks, ADAMS Accession Nos. ML18085A238 and ML18124A017). The USEI SSDA Workbooks are

proprietary and not publicly available. A publicly available version of the NRC staff's evaluation of the USEI SSDA Workbooks concluded that the use of Revision 3 of the SSDA is an appropriate method for evaluating future proposed disposals at USEI and that therefore the Revision 3 SSDA methodology can be used to satisfy the criteria in 10 CFR 20.2002(d) (ADAMS Accession No. ML18164A071).

To obtain approval for 10 CFR 20.2002 alternate disposals, the NRC requires the licensee (NorthStar) to demonstrate that doses will be maintained as low as reasonably achievable (ALARA). The NRC has determined that for 10 CFR 20.2002 alternate disposal approvals this limit requires a licensee to demonstrate that the dose to a member of the public (including all exposure groups) is no more than "a few millirem per year" per SECY-07-0060, "Basis and Justification for Approval Process for 10 CFR 20.2002 Authorizations and Options for Change" (ML062050587), and NUREG-1757. Guidance for NRC staff to use when performing reviews of requests for alternate disposal under 10 CFR 20.2002 is contained in "Guidance for the Reviews of Proposed Disposal Procedures and Transfers of Radioactive Material under 10 CFR 20.2002 does not specify a dose limit, as previously discussed, NUREG-1757, Volume 1, references "a few mrem" per year (i.e., 0.05 mSv per year (5 mrem per year)) as one potential guideline for on-site disposals. While the guidance in NUREG-1757 refers specifically to on-site disposals, 0.05 mSv per year (5 mrem per year) may be and has previously been used as a benchmark for evaluating the dose for off-site disposals."

Specific exemptions to the licensing requirements of 10 CFR 30.3 are provided for under 10 CFR 30.11. When evaluating 10 CFR 30.11 exemption requests in conjunction with 10 CFR 20.2002 alternative disposal requests, the NRC has applied a similar standard to both reviews. As discussed above, the NRC applies a dose standard of "not more than a few millirem per year" to any member of the public to its 10 CFR 20.2002 alternate disposal reviews.

Source Term

The source term in this 20.2002 request consists of 2,000,000 gallons (7.57 million liters) of plant process water and infiltration water. This water contains fission and activation products resulting from VY operations. This waste stream has been characterized through routine sampling and analysis as part of VY's 10 CFR 61 characterization program for plant process water. The VY submittal states that the assumed concentrations of the radionuclides in the 20.2002 request were purposefully selected to be at a higher level than the measured concentrations to bound the expected concentrations in the waste. The evaluated concentration for each of these radionuclides is above the measured amount for any radionuclide that was detected and is above the MDC (Table 1).

Table 1 Measured vs. Evaluated Radiological Concentrations

Radionuclide	Measured Concentration (pCi/mL)*	Lab MDC (if applicable) (pCi/mL)*	Evaluated Concentration (pCi/mL)*
Co-58	<mdc< th=""><th>0.61</th><th>1.00</th></mdc<>	0.61	1.00
Co-60	437	N/A	500.00
Cs-137	49.3	N/A	75.00
Fe-55	<mdc< th=""><th>0.73</th><th>50.00</th></mdc<>	0.73	50.00
H-3	1220	N/A	1300.00
Mn-54	<mdc< th=""><th>5.03</th><th>10.00</th></mdc<>	5.03	10.00
Ni-63	33.3	N/A	50.00
Tc-99	<mdc< th=""><th>1.47</th><th>5.00</th></mdc<>	1.47	5.00
U-238	<mdc< th=""><th>0.04</th><th>1.00</th></mdc<>	0.04	1.00
Zn-65	<mdc< th=""><th>16.1</th><th>30.00</th></mdc<>	16.1	30.00

(Based on Table 1 in BVY 20-007, Attachment 1 [ADAMS Accession No. ML20157A123])

*Multiply Ci by 3.7x10¹⁰ to obtain Bq

To confirm the concentrations in the waste and to ensure that the dose from the waste included in this 20.2002 disposal request remains bounded by the dose projected, the NorthStar May 20, 2020 submittal stated:

"As part of this submittal, VY commits to performing a representative sample prior to each shipment of water and confirming that the radionuclide concentrations result in doses that are equal to or less than the doses delineated within the attached Summary of Project Alternative Disposal Dose Results. This confirmation could be performed by verifying that the radionuclide concentrations are equal to or less than the concentrations evaluated in the analysis (i.e., the concentrations in Table 1). Alternatively, the confirmation could be performed by inputting the sample radionuclide concentrations into the Site-Specific Dose Assessment Methodology (SSDA) used in this submittal and verifying that the dose consequences are equal to or less than the doses delineated within the attached Summary of Project Alternative Disposal Dose Results. These dose assessment calculations would be documented and maintained on site under the records retention requirements of 10 CFR 20.2108 and be available for inspection by the NRC."

The water included in this 20.2002 request will be solidified with clay at USEI prior to disposal. To account for the increase in volume as a result of the solidification, a total mass of 4.18×10^7 lbs (1.9×10^{10} kg) was assumed for the disposed of the 2,000,000 gallons (7.57 million liters) of water at USEI. This mass was calculated assuming a density of water of 62.428 lb/ft³ (1 g/mL) and a bulking factor of 2.5. VY indicated that for conservatism, the assumed radiological concentrations in the solidified water were kept at the evaluated concentrations discussed above and credit was not taken for the dilution of the water with the clay.

Scenarios, Modeling, and Results

The potential dose to members of the public due to the disposal of this water at US Ecology Idaho was calculated using the SSDA. Exposure scenarios considered in these evaluations included: the transport dose to the public, the dose to workers at the USEI facility, and the post-closure dose to the general public. The 20.2002 request submitted in May 2020 initially used Revision 3 of the SSDA to calculate the potential dose. In the RAI responses, a revised calculation of the potential doses was provided that utilized "Revision 3b" of the SSDA. Revision 3b of the SSDA is identical to Revision 3 other than some minor items noted in Table 2. As was discussed above, the NRC previously reviewed the SSDA, Revision 3 and concluded that the use of Revision 3 of the SSDA is an appropriate method for evaluating future proposed disposals at USEI.

Table 2 Revision History for the SSDA between Revision 3 and Revision 3b

(Based on table in BVY 20-025, Attachment 1 [ADAMS Accession No. ML20290A492])

Rev.#	Record of Revisions
	1. Assigned 'Tanker Truck Drivers' task to account for tankers being used for Front-End Dray and/or Back-End Dray activities. The activity is the same so there was no need to create a new worker task for FED/BED drive time at USEI.
3a	2. Renamed 'Gondola Railcar Surveyors' to 'Railcar Surveyors' since rail tankers could also be included in this activity.
	 Incorporated Tanker Survey Time into 'Treatment Worker' task. Added 10 minutes exposure time for all water shipments (now 0.92 hours vs original 0.75 hrs).
	4. Corrected omission of number of iterations for 'Bulk/IMC Surveyors' for certain scenarios of Bulk and Containerized loads.
	 'Mayfield Processing Facility (MPF)' name changed to 'Mayfield Verification Facility (MVF)'.
	 Corrected "Gallons per Cubic Foot" conversion factor from "7.35" to correct value of "7.48."
3b	3. Updated 5-year average landfill volume in 'RESRAD' tab. Value of 223,029 tons now used (average for years 2015-2019).
	 Parameter adjustments to Inadvertent Intruder Scenarios to reflect more realistic operating values versus conservative assumptions in previous versions of the SSDA.

USEI Worker Dose

The wastewater included in this 20.2002 request will be transported by rail from VY to the USEI rail transfer facility in Mayfield, Idaho. Following receipt of the water at the USEI rail transfer facility, each rail tanker car will be surveyed, and the wastewater will be transferred into tanker trucks for the final ~35-mile (~56 km) drive to the USEI disposal facility. The wastewater will then be solidified by mixing it with clay. Following stabilization, the solidified waste will be transferred to a dump truck for transport to a landfill. A bulldozer operator then spreads and compacts the waste in the disposal cell.

NorthStar included a dose assessment that evaluated the potential dose to the workers who will be performing the above actions. The evaluated workers include: Gondola Railcar Surveyors, Tanker Truck Drivers (Back-End Dray from rail transfer facility to the disposal facility), Treatment Workers, Treatment Plant Truck Driver, and Landfill Cell Operator (Table 3). As mentioned above, the waste is assumed to be shipped over a two-year period with no more than half of the 2,000,000 gallons of wastewater to be shipped the first year. The doses to the workers are averaged out over the year so the spacing or timing of the shipments (i.e., concurrent shipments) over the year do not impact the final evaluated dose for that year. In an email dated March 15, 2021 (ADAMS Accession No. ML21075A144), VY stated that their initial submittal had a typo in the volume of water that each railcar could hold, and they provided an updated dose analysis for the railcar surveyor. Using the correct volume of 20,000 gallons per railcar (75,700 L per railcar) results in there being 101 shipments of water for the project (versus the previous estimate of 67 shipments).

Table 3 USEI	Job Fund	tion Scenario	o Assumptions
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Job Function	Number of Workers in Group	Time (hrs)	Distance (m)	Number of Repetitions per Year
Gondola Railcar Surveyor	4	0.33	1.0	33.5
Tanker Truck Drivers	8	0.75	3.3	200
Treatment Workers	6	0.92	2	200.5
Treatment Plant Truck Driver	2	0.16	0.6	495.5
Landfill Cell Operator	2	0.25	1.0	209

The projected dose to these workers calculated using SSDA, Revision 3b. The licensee-projected dose to all workers in some cases approached but were less than 5 mrem/yr (0.05 mSv/yr) (Table 4).

Table 4 Projected USEI Worker Dose*

Job Function	Annual Dose mrem/yr (mSv/yr)
Gondola Railcar Surveyor	1.83 (0.0183)
Tanker Truck Drivers	4.90 (0.0490)
Treatment Workers	4.79 (0.0479)
Treatment Plant Truck Driver	1.60 (0.0160)
Landfill Cell Operator	4.53 (0.0453)

*The evaluation of the transport dose to the public is not required under current NRC guidance for the review of disposal of radioactive material under 10 CFR 20.2002.

Post-Closure Dose to the Public

The projected dose to a member of the public and to potential inadvertent intruders was calculated using the SSDA, Revisions 3 and 3b. The licensee considered three inadvertent intruder scenarios: a construction scenario in which an inadvertent intruder excavates or constructs a building on site, a well driller scenario in which an inadvertent intruder is exposed to contaminated drill cuttings while installing a well, and a driller occupancy scenario in which an inadvertent intruder occupies the site after a well has been drilled through contaminated material. The methodology and input parameters used in the SSDA, Revision 3, were the same as those previously reviewed by the NRC. In the Revision 3b calculations, the "dilution factor" was decreased from a value of 1 to a value of 0.07 and the cover depth was increased to 6 m. The Revision 3b calculations also included an updated value for the average annual landfill disposal volume, which affects the calculation of the post-closure dose.

The projected doses for the post-closure scenario and the three inadvertent intruder scenarios calculated using SSDA, Revision 3b were all less than 5 mrem/yr (0.05 mSv/yr) (Table 5). Two of the doses calculated for the intruder scenarios using the assumptions in SSDA, Revision 3 were slightly above 5 mrem/yr (0.05 mSv/yr), with the maximum projected dose being 7.67 mrem/yr (0.0767 mSv/yr).

Scenario	Revision 3 Annual Dose mrem/yr (mSv/yr)	Revision 3b Annual Dose mrem/yr (mSv/yr)
Post-Closure	0.941 (0.00941)	1.50 (0.0150)
Inadvertent Intruder – Construction	7.67 (0.0767)	1.07 (0.0107)
Inadvertent Intruder – Well Driller	7.20 (0.0720)	0.504 (0.00504)
Inadvertent Intruder – Driller Occupancy	0.498 (0.00498)	0.0336 (0.000336)

Table 5 Projected Post-Closure and Inadvertent Intruder Doses Calculated using SSDARevision 3 and SSDA Revision 3b

Commitments

VY made the following commitments regarding this 20.2002 request:

- VY commits that the total amount or quantity of water to be transported under this request will be limited to 2,000,000 gallons [7.57 million L].
- VY commits that the maximum quantity of water to be transported under this request will be limited to ≤ 1,000,000 gallons [3.785 million L] in any calendar year.
- VY commits to perform a representative sample prior to each shipment of water and confirm that the radionuclide concentrations result in doses that are equal to or less than the doses delineated within the Summary of Project Alternative Disposal Dose Results in Attachment 3 of their RAI response submittal (Revision 3b of the SSDA). This confirmation can be performed by verifying that the radionuclide concentrations are equal to or less than the concentrations assumed in this analysis (i.e., the concentrations identified in the Data Input Worksheet of Attachment 2) or, the confirmation can be performed by inputting the sample radionuclide concentrations into the SSDA, used in this submittal, and verifying that the dose consequences are equal to or less than the doses delineated within the Summary of Project Alternative Disposal Dose Results.

- VY commits that the dose assessment calculations will be documented and maintained on site under the records retention requirements of 10 CFR 20.2108 and be available for inspection by the NRC.
- VY commits that any shipments made pursuant to this pending ADR (2,000,000 gallons [7.57 million L]) will be provided to USEI for processing on or after January 1, 2021.

NRC Evaluation

The NRC staff reviewed the assumed source term for this 20.2002 request and concluded that the use of concentrations that are greater than the maximum measured amounts in the calculations of the projected doses is appropriate and is a conservative and bounding assumption. The NRC staff also finds that the commitment by VY to collect a representative sample of water prior to each shipment and confirm that the radionuclide concentrations result in doses that are equal to or less than the doses delineated within the Summary of Project Alternative Disposal Dose Results in Attachment 3 of this request provides assurance that the actual dose from the waste will be bounded by the dose presented in the 10 CFR 20.2002 request.

The NRC staff reviewed the exposure scenarios evaluated in this 20.2002 request and concludes that they are consistent with NRC guidance on 20.2002 requests. The NRC staff notes that the evaluation of the transport dose to the public is not required per the most recent revision to the "Guidance for the Reviews of Proposed Disposal Procedures and Transfers of Radioactive Material under 10 CFR 20.2002 and 10 CFR 40.13(a)" (ADAMS Accession No. ML18296A068) and the NRC staff does not evaluate doses from the disposal of radioactive material while it is in transit for disposal therefore did not review the transport dose during their review of this 20.2002 request. Dose limits for transportation are under the authority of the U.S. Department of Transportation. The NRC guidance on the review of 20.2002 requests also notes that a licensee can take credit for a thick cover to eliminate exposure scenarios involving intrusion into the waste, such as eliminating a basement excavation scenario if a cover is thicker than 3 m, because excavations are typically less than 3 m. Since the USEI cover is expected to be 6 m thick, the NRC staff concludes that the intruder construction scenario is not likely at the USEI site.

As noted above, the NRC staff previously concluded that the use of the SSDA methodology and assumptions is appropriate for determining the projected dose from the disposal of waste at the USEI site. The NRC staff reviewed this request to confirm that the assumptions in the SSDA, Revision 3a methodology were applicable and concluded that this proposed 20.2002 disposal was consistent with the previously reviewed assumptions. The NRC staff also reviewed the changes that were made to the SSDA worksheet between the previously reviewed Revision 3a and the Revision 3b calculations performed in support of this disposal request. As is described in Table 2 above, there were 4 changes made to the SSDA worksheet between Revision 3a and 3b. The first change (renaming the Mayfield Processing Facility) does not have any impact on the calculations. The second and third change, correcting a conversion factor and updating the average landfill volume, respectively, result in minor changes to the results. The NRC staff finds that correcting the conversion factor is appropriate since it corrects an error in the calculations. The NRC staff also finds that updating the average annual landfill volume based

on more recent data is appropriate. The fourth change, updating the intruder scenario parameters, affects the projected dose more significantly than the other three changes. The NRC staff agrees that the assumption of no dilution within the disposal cell that was used in the SSDA, Revision 3 calculation is conservative. In the Revision 3b calculations, the waste in the current disposal request was assumed to be mixed with and diluted by all of the other waste disposed of at USEI over the year. The NRC staff concludes that, depending on the way the waste is placed in the disposal cell, the amount of mixing and dilution might not be this high.

The NRC staff concludes that the assumed dilution factor in SSDA Revision 3b may therefore not always be appropriate. Therefore, the NRC staff performed a sensitivity analysis for the assumed dilution factor, as described in more detail below. The NRC staff also performed an independent analysis using a using a modified version of the SSDA Revision 3a spreadsheet with the parameter values included in this submittal and the modifications made in the Revision 3b spreadsheet and obtained comparable results.

The NRC staff concludes that the projected doses for the worker scenarios were calculated appropriately and that the projected doses are less than 5 mrem/yr (0.05 mSv/yr) as long as key aspects of the job functions (e.g., number of workers, waste contact time) are consistent with the assumptions for the job functions documented in Table 3 above. The NRC staff similarly concludes that the post-closure dose was calculated appropriately, and the projected dose is less than 5 mrem/yr (0.05 mSv/yr). Of the two intruder scenarios that are plausible given the thick cover on the site, the intruder-drilling scenario dose is slightly above 5 mrem/yr (0.05 mSv/yr) when using the conservative assumption of no dilution and the intruder-drilling occupancy scenario is less than 1 mrem/yr (0.01 mSv/yr) even if assuming that there is no dilution. Based on the projected intruder-drilling dose of 7.2 mrem/yr (0.072 mSv/yr) estimated assuming no dilution, a dilution factor of less than approximately 0.7 would be needed for the potential dose to be less than 5 mrem/yr (0.05 mSv/yr). The NRC staff expects that there would be much more dilution of the waste from VY than this given the large amount of waste disposed each year at USEI from other sources. For example, the mass of waste included in this disposal is 2.13*10⁴ tons (~19 million kg), which will be disposed of over a two year period, and USEI estimates that they receive an average of mass of 2.23 *10⁵ tons (~202 million kg) of waste on average per year. There are also several conservatisms associated with the projected intruder-drilling scenario. The intruder dose analysis is based on the assumption that an individual occupies the site after a well is drilled directly through the VY waste and that this individual is exposed to the tailings. This scenario is not likely in the near-term because the site is a currently operating RCRA disposal facility in a remote area and it is unlikely to be used for residential use. Additionally, even if an individual were to construct a drinking water well and live on site, there is a low probability that the well would be placed through the waste included in the current 20.2002 request, and this low probability is not considered in the projected dose calculation. Finally, the projected intruder dose is based on the assumption that the waste from different shipments from VY is all collocated without significant dilution from other waste streams. Given that the waste from VY will be shipped in numerous shipments over a 2-year period, it is unlikely that the waste would end up being collocated without mixing from other waste streams. Therefore, the NRC staff concludes that the potential dose to an inadvertent intruder at the USEI site would be less than 5 mrem/yr (0.05 mSv/yr).

For the reasons described above, the NRC staff concludes that the projected doses from the waste included in this VY 20.2002 disposal request are consistent with an "a few millirem per year" criterion for 10 CFR 20.2002 requests and are ALARA. The conclusion that the dose is ALARA is based on the fact that the projected doses are less than few millirem per year and are much lower than the public dose limit of 100 mrem/yr (1 mSv/yr). Additionally, the projected doses of a few millirem are likely to be bounding and to overestimate the dose because the calculations do not take into account protective actions that the workers take (e.g., respirators), they assume that the waste will be co-located in the disposal cell, and they do not account for the low probability that an individual will live on site and drill a drinking water well that is located at the exact location of the waste.

The shipment of waste from the previously approved 20.2002 request for VY was completed in 2020 and there is therefore no possibility of the workers receiving a combined dose from the two alternate disposal requests within the same calendar year. An inadvertent intruder is not likely to receive a significant dose from waste from both disposal requests unless the waste from both disposal requests happens to be co-located in the disposal cell. Given the volume of other waste that is disposed of at USEI and the difference in the time of between disposals, this is unlikely. However, the projected inadvertent intruder doses from the first VY 20.2002 were less than 1 mrem/yr (0.01 mSv/yr) and even in the unlikely event that an intruder hit waste from both disposals, the combined dose would still be low. The post-closure scenario receptor could potentially receive a dose from the waste from both disposal requests since that scenario includes the groundwater pathway and plumes of the contaminants from the waste in the two disposals could overlap. The projected post-closure dose in the first 20.2002 request was more than an order of magnitude less than 1 mrem/yr (0.01 mSv/yr) and the projected post-closure dose in the current request is less than 1 mrem/yr (0.01 mSv/yr), so the combined post-closure dose from the waste in the two requests would also be less than 1 mrem/yr (0.01 mSv/yr). For these reasons, the NRC staff concludes that the combined dose from both VY 20.2002 disposal requests is consistent with a "a few millirem per year" criteria for 10 CFR 20.2002 requests and is ALARA. Lastly, because the dose from the disposal of waste at USEI by a particular licensee is small (i.e., less than a few mrem), the maximum possible combined dose from waste disposals from all licensees approved by the NRC under 20.2002 at USEI would also be small and would be much less than the public dose limit of 100 mrem/yr. Additionally, it is not likely that the same individual would be exposed to the maximum possible dose from all waste disposed under separate 20.2002s at USEI. Finally, the USEI site is a RCRA permitted site that is required, by its RCRA permit, to track the combined dose from all radioactive materials disposed of at their site, whether exempted Atomic Energy Act materials or Technologically Enhanced Naturally Occurring Radioactive Material (such as oil and gas residues), and demonstrate to the State of Idaho that no person will receive an annual dose exceeding 15 mrem/yr for 1,000 years after closure of the facility.

Conclusions

VY requested that NRC approve alternate disposal, in accordance with 10 CFR 20.2002, of 2,000,000 gallons (7.57 million L) of water associated with the decommissioning of VY at the USEI facility near Grand View, Idaho. NRC staff reviewed the information provided by VY to support their 10 CFR 20.2002 alternate disposal request

Section 20.2002, "Method for obtaining approval of proposed disposal procedures," provides that:

A licensee or applicant for a license may apply to the Commission for approval of proposed procedures, not otherwise authorized in the regulations in this chapter, to dispose of licensed material generated in the licensee's activities. Each application shall include:

- (a) A description of the waste containing licensed material to be disposed of, including the physical and chemical properties important to risk evaluation, and the proposed manner and conditions of waste disposal; and
- (b) An analysis and evaluation of pertinent information on the nature of the environment; and
- (c) The nature and location of other potentially affected licensed and unlicensed facilities; and
- (d) Analyses and procedures to ensure that doses are maintained ALARA and within the dose limits in this part.

As documented above and consistent with Section 20.2002(a), the NRC staff concludes that VY has provided an adequate description of the waste to be disposed of and the proposed manner and conditions of waste disposal.

Consistent with Section 20.2002(b), the NRC staff concludes that the use of the SSDA methodology to evaluate the projected dose from the disposal of the waste included in this request is acceptable. Specific site features, including its arid climate, low average precipitation rate, and thick unsaturated zone below the disposal zone as well as the administrative controls put in place satisfy the requirements in Section 20.2002(c). The NRC staff also concludes that, consistent with Section 20.2002(d), the NRC staff reviewed the input parameters included in this modeling and found that they are appropriate for the scenarios considered. The NRC staff has evaluated the potential doses associated with waste handling and disposal as a part of the review of this request under 10 CFR 20.2002. As described above, NRC staff found that the projected doses to USEI workers have been appropriately estimated and are demonstrated to meet the NRC's alternate disposal requirement of contributing a dose of not more than "a few millirem per year" to any member of the public and are ALARA. The NRC staff also concluded that the projected doses from the post-closure and intruder scenarios are also within "a few millirem per year" over a period of 1,000 years.

These conclusions are based on the commitments described above, including the commitment to perform a representative sample prior to each shipment of water and confirm that the radionuclide concentrations result in doses that are equal to or less than the doses delineated within the Summary of Project Alternative Disposal Dose Results in the RAI responses submitted on September 21, 2020. If the radionuclide measured would result in doses higher than the Summary of Project Alternative Disposal Dose Results, or if the volume of wastewater that needed to be disposed exceeds 2,000,000 gallons, then the shipment could not occur absent an additional ADR approval or as otherwise provided in NRC requirements. The NRC staff concludes that the disposal of the waste included in this ADR is consistent with the criteria

in 10 CFR 20.2002 provided that the representative sample concentrations result in doses that are equal to or less than the doses delineated within the Summary of Project Alternative Disposal Dose Results in the RAI responses submitted on September 21, 2020 for each shipment, that the worker activities are consistent with the assumptions in Table 3, and that that all of the other commitments made by VY for this request are met.

Further, in accordance with the provisions of 10 CFR 30.11, "the Commission may, upon application by an interested person or upon its own initiative, grant such exemptions from the requirements of the regulations as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest." Based on the above analyses, the material authorized for disposal poses no danger to public health and safety, does not involve information or activities that could potentially impact the common defense and security of the United States, and it is in the public interest because it would provide for the efficient and safe disposal for the subject wastewater, would facilitate the decommissioning of the facility, and would conserve low-level radioactive waste disposal capacity at licensed low-level radioactive disposal sites while ensuring that the material being considered is disposed of safely in a regulated facility. Therefore, based upon the evaluation above, an exemption is appropriate pursuant to 10 CFR 30.11. Therefore, to the extent that the material authorized for disposal in this § 20.2002 approval is otherwise licensable, the NRC staff approves the ADR and concludes that the material authorized for disposal at the USEI disposal facility is exempt from the requirement to hold a license to receive, process, and dispose of the material.