UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

REQUEST FOR ADDITIONAL INFORMATION

RELATED TO NUCLEAR ENERGY INSTITUTE (NEI)

TECHNICAL REPORT NEI 22-01

LICENSE TERMINATION PROCESS

By letters dated February 13, 2023, and April 11, 2023 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML23045A322 and ML23102A030, respectively), the Nuclear Energy Institute (NEI) submitted technical report NEI 22-01, "License Termination Process," on behalf of its members for U.S. Nuclear Regulatory Commission (NRC) review and endorsement. NEI 22-01 was developed to assist decommissioning reactor licensees in the development of License Termination Plans (LTPs) that satisfy NRC requirements and provide an approach that aligns with previously published NRC guidance.

The NRC staff has reviewed the information submitted and determined that additional information is required to complete its review. The specific requests for additional information (RAIs) are listed below. Included are some additional observations that may take additional time to address that the NRC staff has identified. Responses provided to the observations in conjunction with the RAIs would support the remainder of the review and a determination regarding an extension to the fee waiver request.

License Termination Plan (LTP)

RAI LTP-1

Basis:
The regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.82, "Termination of license," paragraph 50.82(a)(9) outline the requirements for submitting a license termination plan. Associated guidance in NUREG-1700, Revision 2 "Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans" (ML18116A124) and Regulatory Guide (RG) 1.179, Revision 2 "Standard Format and Content of License Termination Plans for Nuclear Power Reactors" (ML19128A067), guides the NRC staff in conducting safety reviews and assists licensees in developing an LTP.

Issue:
Section 1.1.1 of NEI 22-01 asks licensees to consider a phased approach to submitting LTP sections and consequently, a phased NRC review and approval. RG 1.179 states that a licensee can submit a site characterization package at any time before submitting the LTP and

reference it in the LTP or submit it as part of the LTP; however, there is no discussion in guidance about phased submittal of LTP sections.

Regulations in 10 CFR 50.82(a)(9) describe the required components of an LTP. NUREG-1700 states that NRC staff will determine if an application is complete by conducting an acceptance review, and if it is not, return it to the licensee. If the application is complete, then NRC staff will conduct a detailed review and prepare its preliminary technical evaluation. Additionally, according to regulation, the NRC must notice receipt of the LTP, make it available for public comment, and schedule a public meeting, which would not be feasible with phased submittal and review. The NRC staff believes that phased submission and review of documents would lengthen review time and inhibit review effectiveness without the ability to cross reference LTP sections to those that have not yet been submitted.

Request:
Please clarify the concept of phased LTP submittal and explain how you have determined that it fits in under regulation, guidance, and current best practices. Please address the quality of data to be reviewed and accepted by the regulator at each phase and the data quality objectives for ultimate use in the final status survey.

RAI LTP-2

Basis:
The regulations in 10 CFR 50.59, “Changes, tests and experiments,” outlines allowed changes, tests and experiments. Further guidance in NUREG-1700, Appendix B, “LTP Areas That Cannot Be Changed Without NRC Approval,” outlines LTP areas that cannot be changed without NRC approval, including those that require Commission approval under 10 CFR 50.59.

Issue:
Section 1.1.6 of NEI 22-01 discusses the process for LTP revisions including allowed changes without NRC approval. This section appears to be inconsistent with NUREG-1700, Appendix B, in several parts, leaving out partial information or excluding entire points. In addition, NEI 22-01 makes the statement that any changes which do not impact a license condition can be made to an approved LTP without NRC approval which does not align with guidance in NUREG-1700, Appendix B.

Request:
Please justify and explain these inconsistencies between NEI 22-01 and applicable guidance.

Partial Site Release (PSR)

RAI PSR-1

Basis:
The regulations in 10 CFR 50.83, “Release of part of a power reactor facility or site for unrestricted use,” outline release of part of a power reactor facility or site for unrestricted release before termination of the license.

Issue:
Section 1.1.5.1 of NEI 22-01 discusses partial site release requirements for both non-impacted and impacted areas, but inaccurately discusses regulations in 10 CFR 50.83. For example, NEI 22-01 states that an application must include "information specified above;" however, this language is vague and contrasting from regulations in 10 CFR 50.83 which requires more specific information. Applicants/licensees may find this language confusing when applying for partial site release. In addition, NEI 22-01 makes the statement that an application for release of an impacted area must include a reason why the impacted area needs to be removed from the license before the LTP is approved; however, this is not a requirement under 10 CFR 50.83.

Request:
Please clarify the use and applicability of Section 1.1.5.1 as it pertains to licensee's following NEI 22-01 and the intent to continue to meet the requirements in 10 CFR 50.83.

RAI PSR-2

Basis:
The regulations in 10 CFR 50.83 outline release of part of a power reactor facility or site for unrestricted release before termination of the license including the requirement to perform adequate surveys to demonstrate compliance with radiological criteria for unrestricted use specified in 10 CFR 20.1402, "Radiological Criteria for Unrestricted Use," for impacted areas. Associated guidance in NUREG-1575, "Multi-Agency Radiological Survey and Site Investigation Manual" (MARSSIM)," outlines recommended survey coverage for both structures and land areas.

Issue:
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Request:
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Surrogate Radionuclides (SR)

RAI SR-1

Basis:
The regulations in 10 CFR 50.82 outline requirements for license termination, which includes site characterization. Associated guidance in MARSSIM Section 4.3.2 discusses the identification of contaminants through the use of surrogate measurements.

Issue:
Section 2.3.5 of NEI 22-01 discusses a method for determining the surrogate ratio of Sr-90 to Cs-137 before selecting the 95th percentile of the reported concentrations as the chosen surrogate ratio but does not offer any explanation or justification. Applicants/licensees may find this vague or choose their own site-specific surrogate ratios without proper justification.

Request:
Please provide justification for choosing the 95th percentile of the reported concentrations as the surrogate ratio of Sr-90 to Cs-137 and explain why this was chosen over other values in Table 2-4 of NEI 22-01.

Final Radiation Survey Plan (RS)

RAI RS-1

Basis
The regulations in 10 CFR 50.83 outline release of part of a power reactor facility or site for unrestricted release before termination of the license including the requirement to perform adequate surveys to demonstrate compliance with radiological criteria for unrestricted use specified in 10 CFR 20.1402 for impacted areas. Associated guidance in NUREG-1575 outlines recommended survey coverage for both structures and land areas.

Issue
Section 5.3.2.3 of NEI 22-01 describes the final status surveys (FSS) of the caisson area at Humboldt Bay. It includes a discussion of a dewatering well that was used to dispose of excavation groundwater, and which became plugged with fine material which was radiologically contaminated. This section specifically describes how FSS was accomplished for the radiologically contaminated gravel pack that surrounded the well bore.

The narrative in NEI 22-01 leaves the NRC staff with the following unanswered questions:

1. In order to apply the Derived Concentration Guideline Levels-elevated measurement comparison (DCGL-emc), the areal extent (size of the lens) of contamination around the well must be known. How could this have been determined only from readings taken inside of the well casing?
2. The contamination in the gravel pack surrounding the well casing would have a depth. Over what depths of contamination were the DCGL-emc comparisons made?
3. How did this type of material (gravel pack) and location (at depth) in the survey unit compared to the exposure scenario under which the DCGLs were determined and approved?

Request
Please provide sufficient detail from the Humboldt Bay decommissioning project such that the technical approach used for the FSS of the dewatering well(s) is clear to avoid misapplication of the approach to future sites.

Dose Modeling (DM)

RAI DM-1

Basis:
The NRC must have reasonable assurance that the dose-based requirements in 10 CFR Part 20, “Standards for Protection Against Radiation,” Subpart E, “Radiological Criteria for License Termination,” are met to reach favorable decisions regarding license termination. Guidance is provided in NUREG-1757, Volume 2, Revision 2, “Consolidated Decommissioning Guidance, Characterization, Survey and Determination of Radiological Criteria” (ML22194A859) on acceptable methods for demonstrating that dose criteria are met through dose modeling to develop clean-up criteria (or DCGLs) and radiological survey to demonstrate mean or median concentrations in the survey unit are less than the release criteria while minimizing decision errors. DUWP-ISG-02, “Radiological Survey and Dose Modeling of the Subsurface to Support License Termination,” date October 2023 (ML23177A008), provides guidance on acceptable methods to consider risk from existing groundwater contamination.

Issue:
NEI-22-01 provides guidance on methods to derive dose or DCGLs for existing groundwater contamination in Sections F.1.2 and F.1.3. Section F.1.2 refers to guidance from Argonne National Laboratory (ANL) on constructing a dose model to determine the dose from residual radioactivity in groundwater using the following parameter/values: (i) time since placement of material equal to 1 year, (ii) time for calculations equal to 1 year, (iii) mass balance model, and (iv) distribution coefficient in the SZ of 0 L/kg. Section F.1.2 goes on to state that the well water concentration will be found to be greater than or equal to the equilibrium concentration in the contaminated zone under saturated conditions with the time of peak dose at 0 years. The radionuclide concentration in soil is specified to be a unit concentration of 1 pCi/g (0.037 Bq/g), although the write-up indicates that this value is arbitrary and does not affect the results of the calculation.

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NEI-22-01’s instructions to use one of the five options available in RESRAD-ONSITE typically used to derive the distribution coefficient for calculation of dose from groundwater residual radioactivity is unclear. For example, the RESRAD Version 6 User’s Manual indicates that the option described in NEI-22-01 is only available with the non-dispersion model (not the mass balance model as indicated in NEI-22-01). Furthermore, even if the groundwater concentration input into the code was realized in the first year of the simulation, the statements about maximizing the well concentration above the equilibrium groundwater concentration in the contaminated zone with the stated assumptions do not appear to be relevant to calculation of a groundwater DCGL. Finally, it is unclear what guidance ANL provided regarding this method as stated on page F-4 of NEI-22-01.

Request:
Please clarify the source of the information in Section F.1.2 and provide clear instructions on the method that is being used to consider dose from existing groundwater contamination or derive groundwater DCGLs. Additionally, as an observation, NEI-22-01 could cite Section 4 of DUWP-ISG-02 for subsurface investigations related to development of groundwater pathway dose

conversion factors and determination of exposure concentrations to estimate the dose from existing groundwater contamination.

RAI DM-2

Basis:
The NRC must have reasonable assurance that the dose-based requirements in 10 CFR Part 20, Subpart E, are met to reach favorable decisions regarding license termination. Guidance is provided in NUREG-1757, Volume 2, Revision 2, on acceptable methods for demonstrating that dose criteria are met through dose modeling to develop clean-up criteria (or DCGLs) and radiological survey to demonstrate mean or median concentrations in the survey unit are less than the release criteria while minimizing decision errors. However, limited guidance is provided in NUREG-1757, Volume 2, Revision 2, Appendix G, "Special Issues Associated with Dose Modeling, Characterization, and Survey," on exposure scenarios for buried piping.

Issue:
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] Section F.9.3 provides an example from the Ranch Seco LTP where DCGLs are calculated for buried piping assuming only external gamma radiation exposure. Additionally, Section F.10.5 discusses external exposure to the industrial worker from embedded piping at Rancho Seco. For Trojan, Section F.10.3 indicates that 5 of the 25 mrem/yr were allotted to embedded piping and that the embedded piping was grouted to eliminate inhalation as an exposure pathway.

In the various examples used for buried and embedded piping, it is unclear what exposure pathways are being considered in developing the DCGLs (only external dose and inhalation in the industrial worker scenario). If radionuclide dose is dominated by pathways other than external radiation and inhalation, then the DCGLs could be significantly lower. Additionally, the exposure scenarios and DCGLs appear to be based on gross beta/gamma radiation, with no mention of the survey methods for hard-to-detect radionuclides.

Request:
Provide additional clarification of the exposure scenarios and pathways of exposure considered for buried and embedded piping. Provide information on how the risk from hard-to-detect radionuclides was considered, as applicable.

Groundwater

RAI GW-1

Basis:
The guidance in NUREG-1576, "Multi-Agency Radiological Laboratory Analytical Protocols [MARLAP] Manual," dated July 2004, provided definitions for critical level and minimum detection concentration (MDC) on which to base detection decisions for water samples. This information is needed to assure compliance with 10 CFR 20.1501, "General," that the site has been adequately characterized.

Issue:
Several locations in NEI 22-01 mention detection decisions or limits in reference to groundwater samples. Section 5.1.1 discussed DQOs, which included the water media, and the information needed to make decisions. Those decisions would be based on performance measures that included detection limits. [

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MARLAP guidance was not cited in any of these discussions for groundwater, which would be most relevant to DQOs in Section 5.1.1. The NRC staff also notes that many groundwater monitoring programs use the term lower limit of detection (LLD) and MDC. MARLAP discouraged the use of LLD for detection decisions due to the variety of definitions associated with the term over the past several decades. MARLAP noted that MDC is not appropriate for a detection decision because it reflects a high statistical probability that the analyte concentration is above the critical level (the latter term is based blank samples).

Request:
Clarify what is meant by detection of radionuclides in groundwater in the context of MARLAP guidance.

Observations

Dose Modeling Observation (DMO)

DMO-1

Basis:
The NRC must have reasonable assurance that the dose-based requirements in 10 CFR Part 20, Subpart E, are met to reach favorable decisions regarding license termination. Guidance is provided in NUREG-1757, Volume 2, Revision 2, on acceptable methods for demonstrating that dose criteria are met through dose modeling to develop clean-up criteria (or DCGLs) and radiological survey to demonstrate mean or median concentrations in the survey unit are less than the release criteria while minimizing decision errors. NUREG-1757, Volume 2, Revision 2, has guidance in Appendix J, “Assessment Strategy for Buried Material,” about consideration of scenarios for decommissioning sites with significant quantities of buried or subsurface residual radioactivity to assist with development of clean-up criteria for the subsurface residual radioactivity.

Issue:
NEI-22-01 does not appear to provide any guidance on consideration of exposure or intrusion scenarios for buried residual radioactivity and presents several examples of previous approvals where subsurface residual radioactivity was present and only in-situ groundwater leaching scenarios were considered. Lack of discussion or examples of scenarios where buried or subsurface residual radioactivity is disturbed and brought to the surface may lead licensees to believe that intrusion scenarios for buried residual radioactivity do not need to be considered.

NUREG-1757, Volume 2, Revision 2 contains guidance on acceptable methods for development of DCGLs to demonstrate compliance with radiological criteria for license termination found in 10 CFR Part 20, Subpart E. NUREG-1757, Volume 2, Appendix J provides information about the types of intrusion scenarios that would need to be considered for buried (or subsurface) residual radioactivity. Licensees should consider reasonably foreseeable future land use and the types of activities that could lead to a disturbance of residual radioactivity in the subsurface and potentially expose members of the public using the site in the future following license termination.

For unrestricted release sites, no controls are in place or relied on to alert or prevent exposure of members of the public to residual radioactivity remaining in the subsurface at a decommissioned site. Therefore, without consideration of appropriate exposure scenarios, risk-significant quantities of residual radioactivity could be left behind in the subsurface. While DCGLs for more mobile radionuclides may be more restrictive for in situ groundwater leaching, the risk of less mobile radionuclides may be dominated by surface dose pathways, such as external exposure, if the radioactive material is brought to the surface following potential future human disturbance or would need to be considered as the only potential mechanism for exposure to subsurface residual radioactivity if the groundwater pathway is eliminated. To ensure adequate protection of human health and safety, a set of reasonably foreseeable or bounding scenarios should be considered to guide development of clean-up levels for decommissioning sites with significant quantities of subsurface residual radioactivity as described in NUREG-1757, Volume 2, Revision 2, Appendix J.

Request:
NEI-22-01 should be updated to include general information in the main body (Chapter 6) from NUREG-1757, Volume 2, Revision 2, Appendix J, on exposure scenarios for buried residual radioactivity. Given the large number of examples provided, NEI-22-01 could also include examples from more modern LTP approvals on how well drilling, basement excavation, or large construction projects have been considered in developing DCGLs for subsurface residual radioactivity. Alternatively, the licensee can conservatively assume the residual radioactivity is located at the surface (no clean cover) and calculate DCGLs (or assess dose) from both surface and in situ groundwater leaching scenarios simultaneously as described in NUREG-1757, Volume 2, Revision 2, Appendix J.

DMO-2

Basis:
The NRC must have reasonable assurance that the dose-based requirements in 10 CFR Part 20, Subpart E, are met to reach favorable decisions regarding license termination. Guidance in NUREG-1757, Volume 2, Revision 2, provides acceptable methods for demonstrating that dose criteria are met through dose modeling to develop clean-up criteria (or DCGLs) and radiological survey to demonstrate mean or median concentrations in the survey unit are less than the release criteria while minimizing decision errors. DUWP-ISG-02, "Radiological Survey and Dose Modeling of the Subsurface to Support License Termination," date October 2023 (ML23177A008), supplements NUREG-1757, Volume 2, and provides guidance on radiological survey approaches for substructures as well as limitations of codes such as RESRAD-ONSITE in assessing groundwater dependent pathway doses for submerged sources such as reactor basement substructures.

Issue:
NEI-22-01 provides various examples of how the "basement fill model" was applied in the LTPs for different sites. The basement fill model is the term used by industry to assess the risk from residual radioactivity associated with substructures. Variations in the approach have been used but typically entail modeling or estimating the release of residual radioactivity into the backfill used to fill the substructure, assessment of dose from a unit concentration in groundwater, and assessment of the amount of residual radioactivity that can remain on the surfaces (or volumetrically near the surface) of substructures and meet the license termination rule criteria.

Three approaches that have been used include the following: (i) instantaneous release or diffusion limited transport of a unit inventory from basement substructures to fill with groundwater concentrations estimated using DUST-MS, (ii) the entire substructure inventory assumed to be associated with the entire volume of backfill (equilibrium sorption), and although not discussed in detail in NEI-22-01, (iii) the entire substructure inventory assumed to be associated with various volumes of backfill located a certain distance away from substructure walls and floors. In all cases, RESRAD-ONSITE is used to estimate the dose per unit groundwater concentration to assess the allowable inventory to remain on the substructures and still meet the dose limit (or fraction of the dose limit) for future groundwater pathway doses associated with the substructures. For example, Section 5.2.10.2 describes the Zion version of the "basement fill model" which is used to assess acceptable levels of residual radioactivity allowed to remain on substructures and associated with penetrations into the various substructures with the backfill fill groundwater assumed to be used for drinking water and irrigation.

While various versions of the basement fill model have been used by licensees, typically this model has been the subject of a large number of RAIs. In general, it may not be “conservative” to assume the entire inventory associated with the substructures is placed in the backfill due to potential sorption of the radioactivity onto the solid phase of the backfill volume (i.e., may lead to lower concentrations in the backfill pore water than would otherwise occur if the residual radioactivity diffused or was released to a smaller volume of backfill material closer to the source). Other issues associated with application of the basement fill model include non-conservative use of the RESRAD-ONSITE non-dispersion model to simulate dilution of residual radioactivity released to the backfill pore water. In fact, the RESRAD-ONSITE conceptual model is inconsistent with the conceptual model used for the basement substructures which involves a low hydraulic conductivity, resistive flow barrier. More sophisticated models are needed to simulate more realistic flow conditions and source to well geometries. Alternatively, conservative approaches can be used to assess the risk from residual radioactivity associated with basement substructures.

Request:
Consider providing a section in the main body providing a general description of the “basement fill model,” and a more detailed description of the evolution of the basement fill model over time. This should include examples provided from more recent LTP submittals that have addressed technical issues associated with the use of RESRAD-ONSITE for simulating flow through low hydraulic conductivity basement substructures. DUWP-ISG-02 provides additional guidance on calculation of dilution factors for unsubmerged and submerged sources associated with substructures and acceptable methods to demonstrate compliance with release criteria.

DMO-3

Basis:
The NRC must have reasonable assurance that the existing groundwater residual radioactivity has been adequately characterized in compliance with 10 CFR 20.1501 and the dose-based requirements in 10 CFR Part 20, Subpart E, are met to reach favorable decisions regarding license termination. DUWP-ISG-02 provides guidance on acceptable methods to consider risk from existing groundwater contamination.

Issue:
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Request:
Clarify in the main body of the text that there is a range of approaches to use for applying dose to survey units for existing groundwater contamination, each approach having its own graded level of required supporting information.

Environmental Observation (EO)

EO-1

Basis:

The regulations in 10 CFR 51.45, “Environmental report,” describes the requirements related a licensee’s environmental report. Associated guidance in NUREG-1748, “Environmental Review Guidance for Licensing Actions Associated with NMSS [Office of Nuclear Material Safety and Safeguards] Programs,” dated August 2003 (ML032450279) encourages applicants and licensees to use Chapter 6 when preparing environmental reports for submission to the NRC. This guidance applies when developing environmental reports to support License Termination Plans (LTPs). Additionally, RG 1.179, Revision 2 “Standard Format and Content of License Termination Plans for Nuclear Power Reactors,” contains information on the format and technical content of a LTP submittal, including a supporting environmental report.

Issue:
NEI-22-01 does not include the most current guidance for developing environmental reports and contains a number of gaps and inconsistencies related to the data needs and consultation process for threatened and endangered species and historic and cultural resources required to support consultations under the Endangered Species Act (ESA) and National Historic Preservation Act (NHPA).

Request:
Clarify the regulatory guidance that will be included in NEI-22-01 Chapter 8.

Final Radiation Survey Plan Observation (RSO)

RSO-1

Basis:
The regulations in 10 CFR 50.83 outline release of part of a power reactor facility or site for unrestricted release before termination of the license including the requirement to perform adequate surveys to demonstrate compliance with radiological criteria for unrestricted use specified in 10 CFR 20.1402 for impacted areas. Associated guidance in NUREG-1575 outline recommended methods for analyzing hard-to-detect radionuclides and the use of surrogate measurements.

Issue:
Section 5.3.2.1 of NEI 22-01 indicates that at Connecticut Yankee a minimum of 5 percent of the samples were analyzed for hard-to-detect (HTD) radionuclides. The basis for 5 percent is not provided. Because HTD radionuclides can be significantly more mobile in the subsurface compared to easy to measure radionuclides, a larger percentage of samples may need to be analyzed for HTDs at other decommissioning sites depending on the radionuclides of concern and list of significant dose contributors.

The NRC staff notes that common practice is to analyze 10 percent of samples and include those with the highest activity to verify surrogate ratios. Guidance in MARSSIM Section 4.3.2 also recommends, if ratios were determined using FSS data, that at least 10 percent of measurements should include analysis for all radionuclides of concern, including HTD radionuclides.

Request:
Please provide the basis for analyzing 5 percent of samples for hard-to-detect radionuclides.

Financial Assurance Observation (FO)

FO-1

Basis:
The regulations in 10 CFR 50.82(a)(9)(ii)(F) requires a licensee to provide an updated site-specific decommissioning cost estimate (DCE) that includes an estimate of the cost of remaining decommissioning work as part of its LTP. This update must reflect any changes that occurred since the original DCE was submitted. The update should also include the effects of inflation, and changes in radioactive waste disposal costs.

Issue:
NEI states that “If little decommissioning has been completed, and inflation and disposal costs have not changed, the cost estimate originally submitted pursuant to 10 CFR 50.82(a)(4)(i) and 10 CFR 50.82(a)(8)(iii) may be acceptable.”

Request:
Under the chapter on decommissioning, NEI 22-01 would benefit licensees by reiterating that the licensee must tcontinue to provide the annual decommissioning funding assurance report under 10 CFR 50.75, “Reporting and Recordkeeping for Decommissioning Planning,” until the license is terminated.

Groundwater Observation (GWO)

GWO-1

Basis:
The regulations in 10 CFR 20.1402 and 10 CFR 20.1501 assures that the total dose to potential future site occupants is less than the dose criteria and that the site has been adequately characterized. RG 1.179 indicated that the demonstration of dose for residual radionuclides

include the groundwater media. DUWP-ISG-02 provides details on dose models and inputs to address existing groundwater contamination.

Issue:
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Section 5.3.4 (Groundwater Assessments) stated that dose from existing groundwater contamination must also be included in the overall dose to demonstrate compliance with site release criteria. Section 5.3.4 cites NEI 07-07 (Industry Groundwater Protection Initiative – Final Guidance Document, Rev. 1) for methods to characterize and monitor effectiveness of any remediation toward showing compliance. Section 5.3.4 also cites EPRI (2011) Groundwater and Soil Remediation Guidelines for details on meeting the NEI 07-07 guidance statement. The NRC staff notes that the NEI 07-07 groundwater monitoring program objectives include detection and effluent calculation. NEI 07-07 guidance for monitoring networks does not include the objective required for license termination, which is estimation of the existing groundwater contamination everywhere on the site or a maximum concentration for an area.

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Request:
The NRC staff recommends that a generic, high-level discussion be added to the main body of the text (e.g., Section 5) describing the elements needed for estimating dose due to existing groundwater contamination that includes both the dose model approaches and estimation approaches for groundwater contamination. The latter should account for the fact that monitoring well concentrations may not reflect higher concentrations nearer to known or unknown sources.

GWO-2

Basis:
NUREG-1700 recommended the LTP include a summary and description of techniques and equipment for groundwater remediation needed during decommissioning to meet proposed criteria of DCGLs, and ultimately to assure compliance with 10 CFR 20.1402 for the total dose to potential future site occupants.

Issue:
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] Section 3.4 stated that potential needs for remediation of soils and/or groundwater should be identified. However, Section 4.4 on Techniques & Approaches to Remediating Structures, Soils, and Groundwater does not summarize nor describe techniques and equipment that will be employed, whether for known contamination or new contamination caused by dismantlement activities during decommissioning. Nor was there any reference to other guidance or literature on remediation approaches.

Section 4.3 discussed ALARA evaluation for groundwater in terms of water use analysis (resident farmer, or large population). Groundwater contamination is discussed for ALARA, but there was no discussion on remediation needs or approaches on which to base costs in the ALARA analysis. [

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Request:
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GWO-3

Basis:
NUREG-1757, Volume 2, Section F.3, “Development of CSMs [conceptual site models] and Mathematical Models,” described the importance of CSMs for contaminant migration at the site. This information is needed to assure compliance with 10 CFR 20.1402 that the total dose to

potential future site occupants is less than the dose criteria and with 10 CFR 20.1501 that the site has been adequately characterized.

Issue:
NEI 22-01 did not provide guidance related to the importance and utilization of CSMs for the license termination process. The CSM is important for both the characterization of groundwater contamination and the abstraction and development of hydrological inputs for the dose models. Appendix C of NEI 22-01 included several items that mentioned conceptual models, but the main body of the text (especially Section 6) does not. However, Section 5.3.2.3 on the Humboldt Bay caisson example for subsurface soils mentioned the hydrological site model.
ASTM E1689-95 (2014) provides information on CSMs.

Request:
NEI 22-01 would benefit from a discussion of CSM and how it is utilized for the license termination process for groundwater system.