



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

March 22, 2019

John Sauger
Executive Vice President
EnergySolutions
2701 Deborah Ave.
Zion, IL 60099

SUBJECT: ZION NUCLEAR POWER STATION UNITS 1 AND 2 – REVIEW OF FINAL
STATUS SURVEY REPORT – PHASE 1

Dear Mr. Sauger:

By letter dated November 1, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18331A015), you submitted Final Status Survey Report (FSSR) – Phase 1.

The staff has reviewed your FSSR and identified certain issues which will need to be corrected before the report can be approved. Further details on our review are provided in the enclosed safety evaluation. The identified issues will need to be corrected and the corrected report resubmitted for our review. Please provide details on the process changes you make to ensure that similar issues will not occur in future FSSRs.

Additionally, you submitted FSSR, Phase 2, Part 1, by letter dated March 11, 2019 (ML19077A095). No review of that submittal will be conducted until and unless you certify that the errors present in the Phase 1 report are not present in the Phase 2, Part 1 report.

In accordance with Title 10 of the *Code of Federal Regulations* section 2.390 of the U.S. Nuclear Regulatory Commission's (NRC) "Agency Rules of Practice and Procedure," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's ADAMS. ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

J.Sauger

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If you have any questions, please contact me at 301-415-3017 or via e-mail at John.Hickman@nrc.gov.

Sincerely,

/RA/

John B. Hickman, Project Manager
Reactor Decommissioning Branch
Division of Decommissioning, Uranium Recovery
and Waste Programs
Office of Nuclear Material Safety
and Safeguards

Docket Nos. 50-295
and 50-304
and 72-1037

Enclosure:
Safety Evaluation by Office of Nuclear
Material Safety and Safeguards

cc: Zion Service List

SUBJECT: ZION NUCLEAR POWER STATION UNITS 1 AND 2 – REVIEW OF FINAL STATUS SURVEY REPORT – PHASE 1 **DATE: March 22, 2019**

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ADAMS Accession No: ML19079A359

***via e-mail**

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SAFETY EVALUATION BY OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS

RELATED TO FINAL STATUS SURVEYS FOR PHASE 1

FACILITY OPERATING LICENSE NOS. DPR-39 AND DPR-48

ZIONSOLUTIONS, LLC

ZION NUCLEAR POWER STATION UNITS 1 AND 2

DOCKET NOS. 50-295 AND 50-304

1.0 INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed Final Status Survey Reports for Phase 1 (FSSR 1), as provided by letter on November 1, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession Number ML18331A015). The licensee's Final Status Survey (FSS) design criteria, implementation of the Data Quality Objectives (DQO) process, and survey approach/methods were reviewed, and final results were assessed against the licensee's approved release criteria.

2.0 EVALUATION

The staff identified several issues with FSSR 1 which prohibited us from completing our review of the report. The following issues will need to be corrected and the report resubmitted before we can complete our review.

Issue 1:

Clarification is needed on how judgmental scanning was performed in Class 3 areas.

Discussion:

It is stated in Section 2.2 of the overall "Final Report – Phase 1" document that "sample and scan coordinates were identified using a random sample tool in Visual Sample Plan (VSP), and a survey unit-specific required scan surface area was applied around the sample point." This strategy appears to utilize non-biased (randomly chosen) areas for scanning, whereas MARSSIM and the License Termination Plan (LTP) discuss judgmental scanning for Class 3 survey units. For example, MARSSIM recommends in Section 2.5.5 "that scanning surveys be performed in areas of highest potential (e.g., corners, ditches, drains) based on professional judgment," and indicates that "this provides a qualitative level of confidence that no areas of elevated activity were missed by the random measurements or that there were no errors made in the classification of the area." LTP Section 5.6.4.4 indicates that "for Class 3 survey units, judgmental (biased) surface scans will typically be performed on areas with the greatest potential of contamination," and notes that "for open land areas, this will include surface drainage areas and collection points." Section 5.6.4.4 further notes that "in the absence of these features the locations of these judgmental scans will be at the discretion of the survey designer." It is not clear from the reports why random scanning was chosen and what consideration may have been given to areas that could pose a higher potential for elevated areas of contamination.

Issue 2:

The FSS reports indicate that, for survey unit 10223 (Power Block Beach Area), a survey unit-specific surrogate ratio was used for compliance in lieu of the maximum ratios from LTP Section 5.2.11, Table 5-15. For these situations, Section 5.1 of the LTP indicates that “the survey unit-specific radiological data and the derived surrogate ratios will be submitted to the NRC for approval,” and that “if approved, then the survey unit-specific ratios used and the survey data serving as the basis for the surrogate ratios will be documented in the release record for the survey unit.” Approval was not requested for this usage.

During the review of the report for survey unit 10223, NRC staff noted that there was no discussion of additional bounding or investigation measurements taken in response to the Sr-90 measurement which resulted in the exceedance of the LTP Section 5.2.11, Table 5-15 values. It was also noted that, for “continuing characterization” purposes, the LTP describes an investigation method, but the LTP does not describe an investigation process for situations outside of “continuing characterization.” As such, the investigation process would be subject to NRC evaluation along with the licensee’s request for approval to use a survey unit-specific surrogate ratio in lieu of the maximum ratios from LTP Section 5.2.11, Table 5-15.

Discussion:

Section 3.5 of the overall “Final Report – Phase 1” document states that “analyses for hard-to-detect (HTD) radionuclides identified Sr-90 and Ni-63 in some samples, but the conditions related above were not encountered, except for in survey unit 10223, where Cs-137 and Sr-90 were both identified in one sample,” and “the surrogate ratio was calculated and used for data assessment, as it was greater than that given in the LTP.” The associated document “Zion Station Restoration Project Final Status Survey Release Record - Power Block Beach Area Survey Unit 10223” was reviewed, and Section 7 indicates one sample from the survey unit was processed for HTD analysis and that Sr-90 was detected above the minimum detectable concentration (MDC). As a follow up, an additional aliquot of the anomalous Sr-90 sample (L3-10223AFRGS-004-SS-B) was also taken and did not exceed the MDC. One more HTD sample was taken in an adjacent location within the survey unit (L3-10223A-FRGS-003-SS-B) as “a further investigation.” The surrogate ratio for this adjacent sample was greater than the maximum ratio in Table 5-15 of the LTP, so the analyses were used to update the surrogate ratio for all survey unit calculations. No further investigations were performed.

This approach appears to differ from the approach in Revision 2 of the LTP, which would require additional investigation and approval by the NRC. For reference, the following is quoted from Section 5.1 of the LTP and describes the investigation process during continuing characterization as well as the licensee’s commitment to request approval when survey-unit specific surrogate ratios are used for compliance, in lieu of the maximum ratios from LTP Section 5.2.11 Table 5-15:

The final Radionuclides of Concern (ROC) for the decommissioning of Zion are Co-60, Cs-134 and Cs-137 (as well as Eu-152 and Eu-154 for Containment), which are gamma emitters and Ni-63, Sr-90 and H-3 (applicable only to Containment), which are HTD radionuclides. For sample(s) analyzed for HTD radionuclides during continuing characterization, if the analysis of the sample indicates positive results (greater than MDC) for both a HTD ROC and the corresponding surrogate radionuclide (Cs-137 or Co-60), then the HTD to surrogate ratio will be derived. If the derived HTD to surrogate ratio is less than the maximum HTD to surrogate ratio from section 5.2.11, Table 5-15, then no further action is required. If the HTD to surrogate ratio exceeds the maximum ratio

from section 5.2.11, Table 5-15, then a minimum of five (5) additional investigation samples will be taken around the original sample location. Each investigation sample will be analyzed by the on-site gamma spectroscopy system and then sent for HTD analysis. As with the original sample, the HTD to surrogate ratio will be calculated for each investigation sample. The actual maximum HTD to surrogate ratio observed in any individual sample will be used to infer HTD radionuclide concentrations in the survey units shown to be impacted by the investigation. The survey unit-specific HTD to surrogate ratio and the survey data serving as the basis for the ratio will be documented in the release record for the survey unit(s).

Survey unit-specific surrogate ratios, in lieu of the maximum ratios from section 5.2.11 Table 5-15, may be used for compliance if sufficient radiological data exists to demonstrate that a different ratio is representative for the given survey unit. In these cases, the survey unit-specific radiological data and the derived surrogate ratios will be submitted to the NRC for approval. If approved, then the survey unit-specific ratios used and the survey data serving as the basis for the surrogate ratios will be documented in the release record for the survey unit.

Additionally, the discussion at the end of LTP Section 5.1 indicates the following:

For soil samples or concrete cores with positive results for both a HTD ROC and the corresponding surrogate radionuclide (Cs-137 or Co-60), the HTD to surrogate ratio will be derived. The maximum ratio (see section 5.2.11) will be used unless specific survey information from "continuing characterization" supports the use of a surrogate ratio that is specific to the area. In these cases, the area-specific ratios as determined by actual survey data will be used in lieu of the maximum ratios. The area-specific ratios used and the survey data serving as the basis for the ratios will be documented in the release record for the survey unit.

For comparison, it is worth noting that all of the FSS release records include a discussion on area-specific ratios. However, the language does not match what is written in LTP Section 5.1 (i.e., the text quoted above) with respect to "continuing characterization." The FSS release records indicate the following:

For soil samples with positive results for both a HTD ROC and the corresponding surrogate radionuclide (Cs-137 or Co-60), the HTD surrogate ratio will be derived and compared against the maximum ratio (see Table 7). If the derived ratio from the confirmatory samples exceeds the maximum ratios (see Table 7), then the area-specific ratios as determined by actual survey data will be used in lieu of the maximum ratios.

Additional information on the history of this topic is found particularly in the February 7, 2018 LTP Responses Letter (ML18052A536) and the RAI Set 3 Revised Responses (ML18052A537).

Issue 3:

Multiple FSS reports include errors in the presentation of results, and in some cases erroneous results are provided when compared to laboratory reports from FSS report appendices. These findings indicate the need for a detailed QA/QC review of the FSS report submittals and re-submittal of corrected reports. Some representative examples from two reports have been provided for reference, and these are described as follows (Note: this list is not an exhaustive list of all errors):

- Report for Survey Unit 10219B (Area Far South of Switchyard):
 - Pg. 20, Table 13 – All “Measurement ID” labels are for a different survey unit than 10219B
 - Pg. 21, Text discusses measurement results from a different survey unit than 10219B
 - Pg. 21, Table 15 – The table for Sample # L3-10219B-FRGS-007-SS-A does not list results from this sample, but lists results from a different survey unit. There also appear to be errors in the evaluation of whether or not results were detected at levels greater than the MDC.

- Report for Survey Unit 10224 (South Beach Area):
 - Pg. 13, Table 8 – The incorrect survey unit is listed
 - Pg. 19, Text discusses split sample measurements from a different survey unit than 10224
 - Pg. 22, Table 16 – The table heading refers to samples from a different survey unit than 10224. There are multiple results listed in Table 16 that do not match the radionuclide of concern shown in the table.

3.0 CONCLUSION

NRC staff concludes that the survey results presented in the Final Status Survey Reports for Phase 1 are inadequate to provide reasonable assurance that the licensee is able to demonstrate compliance with the unrestricted release criteria of Section 20.1402 of Title 10 of the *Code of Federal Regulations*.

Principal Contributor: John Clements, NMSS