

May 14, 2019

ZS-2019-0042

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Zion Nuclear Power Station, Units 1 and 2  
Facility Operating License Nos. DPR-39 and DPR-48  
NRC Docket Nos. 50-295 and 50-304

Subject: Final Status Survey (FSS) Report Phase 1 Request for Additional Information

References:

- 1) Gerard van Noordennen, ZionSolutions, Letter to U.S. Nuclear Regulatory Commission, "Final Status Survey Final Report - Phase 1," dated November 1, 2018
- 2) John B. Hickman, U.S. Nuclear Regulatory Commission, Letter to John Sauger, EnergySolutions, "Zion Nuclear Power Station Units 1 and 2 - Review of Final Status Survey Report - Phase 1," dated March 22, 2019

ZionSolutions submitted Final Status Survey (FSS) Report, Phase 1, for Nuclear Regulatory Commission (NRC) review on November 1, 2018, as documented in Reference 1. During the report review, the NRC staff identified several issues prohibiting completion of the review. NRC identification of issues requiring correction, as well as a request that ZionSolutions take actions as necessary to ensure similar issues do not occur in the future, is documented in Reference 2. These issues have been entered in the site Corrective Action Program and an Issue Review (IR) was conducted. The IR was completed on May 10, 2019, and describes the actions taken to correct the process weakness in preparing and reviewing the reports, to correct the errors identified in the tables, and to prevent future similar errors in the remaining FSS reports.

A detailed response to the issues identified and corrective actions taken to prevent recurrence is provided in Enclosure 1. Necessary revisions to the report submitted in Reference 1 will be provided in a separate correspondence.

ZionSolutions understands the importance of maintaining the controls and processes in place to prevent data transcription and editing errors from undermining the integrity of an important document such as the FSS report. We take these actions seriously and have assigned additional senior management onsite to oversee the Zion FSS group, in order to provide assurance that the corrective actions identified in the IR will be effectively implemented. We will also direct our Quality Assurance personnel to perform effectiveness reviews to verify that the corrective actions are preventing recurrence.

Regulatory commitments are contained in this submittal and are documented in Enclosure 2. If you should have any questions regarding this submittal, please contact me at (860) 462-9707.

NMSS01

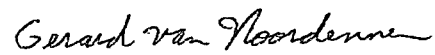
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ZionSolutions, LLC

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Respectfully,



Gerard van Noordennen

Vice President Regulatory Affairs

Enclosures:

Enclosure 1: Response to NRC FSS Phase 1 Review Issues

Enclosure 2: Regulatory Commitments

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**Enclosure 1**

**Response to NRC FSS Phase 1 Review Issues**

## **NRC ISSUE 1**

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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.

## **ZIONSOLUTIONS RESPONSE TO ISSUE 1**

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The ten (10) survey units (see Note below) presented in the "Final Report - Phase 1" document were:

- L3-10205 (Switchyard)
- L3-10212A (Northeast Corner of the Exclusion Area - Power House)
- L3-10213A (Northeast Corner of Exclusion Area)
- L3-10219A (Area Far South of Switchyard)
- L3-10219B (Area Far South of Switchyard)
- L3-10220C (Adjacent of South Restricted Area - Lakeshore)
- L3-10222 (North Beach Area)
- L3-10223 (Power Block Beach Area)
- L3-10224 (South Beach Area)
- L3-10301 (West Training Area)

The relevant sections of the Zion License Termination Plan (LTP) pertaining to the survey design of Final Status Surveys (FSSs) in Class 3 survey units are as follows:

- Section 5.6.4 states, "Class 3 survey units receive judgmental (biased) scanning and randomly located measurements or samples."

- Section 5.6.4.4 states, “For Class 3 survey units, judgmental (biased) surface scans will typically be performed on areas with the greatest potential of contamination. For open land areas, this will include surface drainage areas and collection points. In the absence of these features the locations of these judgmental scans will be at the discretion of the survey designer.”
- Table 5-24 states that scanning in Class 3 survey units is “judgmental” and the number of soil samples taken will be sufficient for the implementation of the statistical test.
- Section 5.6.4.5.2 states, “For Class 3 survey units, each sampling and measurement location will be randomly selected using a random number generator.”

Characterization was performed in these survey units in 2013. During the characterization, 104,350 m<sup>2</sup> or approximately 30% of the surface area was scanned. Seven hundred and eighteen (718) surface soil samples and three hundred and eighty (380) subsurface soil samples were taken at judgmental, random-based and investigation locations. Cs-137 was identified at concentrations greater than the MDC of the instrument in one hundred and seventy-five (175) of the one thousand and ninety-eight (1098) soil samples taken and Co-60 was identified at concentrations greater than MDC in one (1) sample. No other potential plant-derived radionuclides were positively identified. The average Cs-137 concentration observed in the analysis of the soil samples was 0.12 pCi/g, with a maximum observed concentration of 1.14 pCi/g. The one sample where Co-60 was positively identified had a Co-60 concentration of 0.13 pCi/g.

Section 5.0 titled “Survey Design,” in the Release Record for the survey units addressed in the Phase 1 Report, acknowledges the requirements of the LTP by stating, “LTP Chapter 5, Section 5.6.4.4 and Table 5-24, specifies that for Class 3 survey units, judgmental (biased) surface scans will be performed on areas with the greatest potential of contamination. For open land areas, this may include surface drainage areas and collection points.” Section 5.0 then indicates that the fraction of scanning coverage required for the survey unit was determined during the DQO process with the total amount and location(s) based on the likelihood of finding elevated activity during FSS. The LTP allows that in the absence of these features, the locations of these judgmental scans will be at the discretion of the survey designer. Based on the Historical Site Assessment (HSA), the results of the characterization survey, and the operational use of the survey unit, fourteen (14) different scan areas were designated with the areas chosen at random. The following table presents the random area scanned in each of the nine survey units, which represents approximately 5% of the total surface area in each survey unit. For survey unit 10205, safety concerns that arose during characterization were heeded during FSS, and it was decided that scanning would not be performed in order to negate the danger of using electrical hand-held instrumentation in close proximity to live high-voltage lines. The HSA, characterization, and process knowledge show, with confidence, that there was a negligible chance of any residual radioactivity residing in the survey unit. The bulleted list below Table 1 provides details on judgmental surveys and scans performed.

**Table 1 Surface Area Scanned**

<b>Survey Unit</b>	<b>Area Scanned</b>
L3-10212A	616 m <sup>2</sup>
L3-10213A	616 m <sup>2</sup>
L3-10219A	126 m <sup>2</sup>
L3-10219B	378 m <sup>2</sup>
L3-10220C	1,400 m <sup>2</sup>
L3-10222	1,205 m <sup>2</sup>
L3-10223	630 m <sup>2</sup>
L3-10224	756 m <sup>2</sup>
L3-10301	2,800 m <sup>2</sup>

In addition to the surface area scanned at “random,” the following additional judgmental and investigative scans and samples were acquired in the following survey units;

- In Survey Unit L3-10212A, the survey design required fourteen (14) surface soil samples for the non-parametric statistical test (sample size N = 14). In addition, six (6) judgmental surface soil samples were taken to investigate the drainage depression and the wash down area identified during the pre-survey walkdown. During the performance of the FSS, two (2) additional surface soil samples were taken of soil piles accumulated along the southern boundary of the survey unit from snow plowing activities, resulting in a total of twenty-two (22) surface soil samples (14 non-parametric, 6 judgmental and 2 investigation) collected for the FSS of this survey unit. Fourteen (14) different scan areas representing 616 m<sup>2</sup> of surface area were chosen at random. In addition, two (2) scan areas, including a drainage depression along the south boundary and the temporary water settling basin originating from the cleaning of the Unit 1 Discharge Tunnel, which represented an additional 299 m<sup>2</sup> of surface area, were chosen for additional biased scans. The total surface area scanned was 916 m<sup>2</sup>, or approximately 8% of the survey unit.
- In Survey Unit L3-10213A, the survey design required fourteen (14) surface soil samples for the non-parametric statistical test (sample size N = 14). As an investigation of scan alarms in scan area #13, two (2) additional biased surface soil samples were collected. The addition of the systematic and investigational samples resulted in a total of sixteen (16) surface soil samples collected for the FSS of this survey unit. In addition, scan areas #15 and #16, measuring 397 m<sup>2</sup> of area along the west road and south boundary were subjected to biased scans. The total surface area scanned was 1,013 m<sup>2</sup>, or approximately 8% of the survey unit.
- In Survey Unit L3-10219A, the survey design required fourteen (14) surface soil samples for the non-parametric statistical test (sample size N = 14). In addition to the fourteen (14) surface soil samples, while the area was not scanned as the surface was wet, eight (8) judgmental surface soil samples were taken along the southern boundary of the survey unit to investigate a wetlands area. In total, twenty-two (22) surface soil samples were collected for the FSS of this survey unit.

- In Survey Unit L3-10220C, the survey design required fourteen (14) surface soil samples for the non-parametric statistical test (sample size  $N = 14$ ). In addition to the fourteen (14) surface soil samples, while the area was not scanned as the surface was wet, five (5) judgmental surface soil samples were taken to investigate Bull Creek which runs through the survey unit. In total, nineteen (19) surface soil samples were collected for the FSS of this survey unit.
- In Survey Unit L3-10224, the survey design required fourteen (14) surface soil samples for the non-parametric statistical test (sample size  $N = 14$ ). In addition to the fourteen (14) surface soil samples, one (1) judgmental surface soil sample was taken to investigate black sand that was discovered in the survey unit.
- In Survey Unit L3-10301, the survey design required fourteen (14) surface soil samples for the non-parametric statistical test (sample size  $N = 14$ ). In addition to the fourteen (14) surface soil samples, one (1) judgmental surface soil sample was taken to investigate the area close to the roadway and two (2) investigational surface soil samples were collected to investigate a discovered manhole. Additionally, one (1) ISOCS measurement was collected to investigate the manhole. Additionally, 310 m<sup>2</sup> of area was scanned around a makeshift bridge in the survey unit. No elevated measurement locations were identified by surface scan. In total, seventeen (17) surface soil samples were collected for the FSS of this survey unit. The total surface area scanned was 3,110 m<sup>2</sup>, or approximately 6% of the survey unit.

Based upon the information provided in this response, ZionSolutions has shown that the cognizant FSS Engineers performing the survey design for FSS in each of these survey units understood, acknowledged, and complied with the requirements specified in the LTP for scanning in a Class 3 area. Furthermore utilizing the DQO process, the FSS Engineers concluded in three of the nine survey units that the historical information from the HSA, combined with the results of the site characterization, did not provide sufficient evidence for increased contamination potential and biased scans. Therefore in accordance with the LTP, at their discretion, the FSS Engineers chose random scan locations. In the six (6) survey units where sufficient evidence did exist for increased contamination potential, additional biased scans and soils sampling were performed to address the concern as described in detail above.

Note: The original submittal of the Phase 1 Final Report specifically addressed ten (10) Class 3 open land survey units. Class 3 survey units 10212A, NE Corner of Exclusion Area (Lakeshore), and 10213A, NE Corner of Exclusion Area, were originally included in the Phase 1 scope. However, following the initial submittal of the Phase 1 Final Report to the NRC, it was discovered that additional subgrade piping systems in both survey units required removal, and the original FSS was nullified. The FSS of survey units 10212A and 10213A will be redone and the results included with the Phase 3 or Phase 4 Final Reports. However, as the Release Records for Class 3 open land survey units 10212A and 10213A were included in the initial NRC review of the Phase 1 Final Report, their content is included in this RAI response.



## **NRC ISSUE 2**

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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 (1) 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).

## **ZIONSOLUTIONS RESPONSE TO ISSUE 2**

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Two (2) soil samples in Survey Unit 10223A, L3-10223A-FRGS-004-SS-A and L3-10223A-FRGS-003-SS-B initially showed low-level detectable Sr-90, and Sr-90/Cs-137, respectively, as described in detail below. Due to the location (water's edge on the Lake Michigan beach) and lack of any known or credible pathway, the presence of either ROC was considered implausible. However, for both samples, an aliquot was retrieved from the archives, and the false positive result for each was confirmed by off-site laboratory analysis, with no ROCs greater than MDC on either of the sample reanalysis results. Details regarding use of a more conservative (by a factor of 716) surrogate ratio and bounding measurements are discussed below.

The FSS of Class 3 open land survey unit 10223 was performed in April of 2016, which was approximately one (1) year prior to the development of the approved Revision 2 of the LTP. Section 7, titled "Survey Results" of the Release Record for survey unit 10223 states, "Eberline Analytical, originally processed one (1) sample selected for HTD ROC analysis as specified in the survey design. Sample number L3-10223A-FRGS-004-SS-A was selected. Only HTD radionuclides included as ROC (Ni-63 and Sr-90 for soils) were included in the analysis. The analysis revealed a positive concentration of Sr-90. As an investigation to the anomalous Sr-90 identification, another aliquot (L3-10223A-FRGS-004-SS-B) of the same sample was analyzed by Eberline, which revealed no ROC greater than MDC. As a further investigation, a sample from an adjacent location in the survey unit, sample number L3-10223A-FRGS-003-SS-B, was sent off-site for HTD analysis. The results of the analysis for L3-10223A-FRGS-003-SS-B revealed concentrations of Cs-137 and Sr-90 greater than MDC. LTP Chapter 5, Section 5.1 states that 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. This threshold was encountered during the FSS of survey unit 10223 as Sr-90 and Cs-137 were positively detected on L3-10223A-FRGS-003-SS-B at concentrations greater than MDC. Consequently, the original Sr-90/Cs-137 surrogate ratio (0.002) for the survey unit was conservatively adjusted to the derived ratio (1.436) from the HTD analysis.

The Sr-90 concentration quantified in soil sample L3-10223A-FRGS-003-SS-B was 0.526 pCi/g with a MDC of 0.476 pCi/g and an uncertainty of 0.247 pCi/g vs. an Operational DCGL of 3.095 pCi/g. The Cs-137 concentration quantified in soil sample L3-10223A-FRGS-003-SS-B was 0.367 pCi/g with a MDC of 0.095 pCi/g and an uncertainty of 0.078 pCi/g, vs. an Operational DCGL of 3.630 pCi/g. While the Cs-137 result appeared to be legitimate as the observed concentration was significantly greater than MDC and within the expected range for the ROC as presented in *ZionSolutions* TSD 13-004, the result for Sr-90 was positively detected at a concentration greater than the MDC but within the range of uncertainty for the analysis. As with the false positive for Sr-90 from soil sample L3-10223A-FRGS-004-SS-A, *ZionSolutions* believed that the Sr-90 in sample L3-10223A-FRGS-003-SS-B was also a false positive. The location (water's edge on the Lake Michigan beach) and lack of any known or credible pathway were factors in this belief. The C/LT group had discussions with Eberline Analytical about these results, and the laboratory concurred that the reported results for Sr-90 were most likely false positives. As confirmation, *ZionSolutions* recovered sample number L3-10223A-FRGS-003-SS-B from the archives and sent the sample for reanalysis. The reanalysis results did not indicate concentrations of any ROC including Sr-90 and Cs-137 greater than MDC. As it was determined by the reanalysis that Sr-90 was not present in the samples at concentrations greater than MDC, no reassessment of the HTD ratio was required. Consequently, the Release Record for Class 3

survey unit 10223 will be revised to state that the maximum ratios from LTP Chapter 5, Table 5-15 were used to infer the concentrations of Ni-63 and Sr-90 and the inferred concentrations were adjusted accordingly.

In regard to NRC's discussion on surrogate ratios, had this been an actual positive detection, License Condition 2.C.(17) of "Zion Nuclear Power Station, Units 1 and 2 - Issuance of Amendments 191 and 178 for the Licenses to Approve the License Termination Plan" (SER) states *ZionSolutions* may make changes to the LTP without prior approval provided the proposed changes do not meet any of the following criteria: subpart (M) - Use area-specific surrogate ratios that are less than the maximum surrogate ratios (H-3/Cs-137, Ni-63/Co-60, Sr-90/Cs-137) presented in Table 5-15 (Revision 2) of the LTP. The survey unit-specific surrogate ratio initially used by *ZionSolutions* was conservative, i.e. it was not less than the maximum surrogate ratio in LTP Revision 2 Table 5-15.

*ZionSolutions* acknowledges that the process detailed in the initial Release Record under LTP Revision 0 for survey unit 10223 was not in compliance with the process specified in the approved Revision 2 of LTP Chapter 5, Section 5.1. At the time of this RAI response, the location where soil sample L3-10223A-FRGS-003-SS-B was taken is underwater and the sand media has subsequently been swept away by the record high Lake Michigan water levels and associated shoreline fluctuations of Lake Michigan, making any further bounding or investigation impracticable. Recognizing that ultimately the positive results were determined to be false positives, no further bounding actions were pursued by *ZionSolutions*. In accordance with the approved Revision 2 of LTP Chapter 5, Section 5.1, the survey unit-specific radiological data (the results of the sample analysis of surface soil sample L3-10223A-FRGS-003-SS-B) and the previous derived surrogate ratios (Sr-90/Cs-137 ratio of 1.436 versus 0.002 from Table 5-15), although conservative by a factor of 716, should have been submitted to the NRC for approval under LTP Revision 2. However, as previously stated, the FSS of this survey unit was performed prior to the establishment of this requirement. Additionally, compliance was initially demonstrated in survey unit 10223 using a ratio of 1.436 to infer concentrations of Sr-90 versus the maximum ratio of 0.002 from LTP Chapter 5, Table 5-15. Using the increased inferred concentrations of Sr-90 resulting from applying the higher ratio, no measurement exceeded 50% of the Operational DCGL for surface soils, the survey unit passed the Sign Test and the mean SOF when compared against the Base Case DCGLs was 0.0036, which equates to a dose of 0.0914 mrem/yr TEDE. Consequently, the survey was still acceptable for unrestricted release when using the higher survey unit-specific ratio. Additionally, as the ratio used was higher than the maximum ratio presented in LTP Chapter 5, Table 5-15, the license condition requirement of 2.C.(17) subpart (M) was not violated.

In conclusion, *ZionSolutions* will address the NRC concern that the verbiage in each Release Record pertaining to the assessment of HTD ratios does not follow language in LTP Chapter 5, Section 5.1 by revising each Release Record to read as follows:

"The maximum ratios (Table 7) will be used unless specific survey information supports the use of a surrogate ratio that is specific to the area. 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."

### **NRC ISSUE 3**

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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):

#### **Discussion:**

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.

### **ZIONSOLUTIONS RESPONSE TO ISSUE 3**

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The six (6) bulletized presentation errors identified by NRC were corrected in the *ZionSolutions* Phase 1 FSS Report, resulting in no additional changes within the Phase 1 documents. *ZionSolutions* document review processes received a thorough review, and the extent of the review, as well as Planned Actions, is contained in the *ZionSolutions* Issue Review ES-ZION-CR-2019-0033 dated May 10, 2019. The Phase 1 submittal is in the process of being re-reviewed utilizing the enhanced processes as detailed in the ES-ZION-CR-2019-0033 Issue Review.

Subsequent to the original identification of the NRC Issue #3 errors on March 14, *ZionSolutions* identified the following immediate and planned actions:

- The errors identified in NRC Issue #3 were corrected (completed March 14, 2019)
- The *EnergySolutions* (ES) Director, Radiological Site Closure, was dispatched to the site to assist in identifying/completing corrective actions (March 18, 2019)
- The ES Chief Nuclear Officer commissioned a special QA Audit (A-19-001) to investigate the matter (completed April 22, 2019)

- The Characterization/License Termination group initiated detailed technical and administrative content reviews (March 14, 2019)
- This Sig 2 Issue Review was initiated on March 15, 2019

Audit A-19-001 identified two causal elements as probable and potential contributing factors: (1) focus on technical versus administrative aspects and (2) improvements to the formalized process.

Planned Actions have been specified to address the cultural and mindset aspects of the C/LT Group relative to Causal Element #1. Those actions include:

- Training and Discussion Relative to Causal Elements and Planned Actions (due May 21, 2019)
- Institution of a C/LT Typical Error list to capture both typical technical errors and typical administrative/presentation errors (due May 21, 2019)
- Proceduralizing the use of Comment Resolution Forms/electronic tracking to ensure all comments are resolved and including dispute resolution measures (due May 21 2019)
- Issuance of periodic group reminders and tailgate topics will be instated to reinforce the importance of Administrative-type reviews (due May 21, 2019)

Planned Actions have been included to address the following items relative to Causal Element #2, Improvements in Formalized Process:

- Reinstigate and formalize Version Control/File Naming Protocol (due May 14, 2019)
- Include a process for addressing comments where resolution cannot be reached between reviewer and approver (due May 21, 2019)
- Institute the use of Comment Resolution Forms for reviews (due May 21, 2019)
- Improve Qualitative Review Criteria via changes to ZS-LT-300-001-005 and associated Job Aides to add process changes and reviewer tools designed to ensure that similar issues will not occur in future FSS Reports. (due May 21, 2019)
- Include in the procedure changes a separate review focused on presentation/administrative-type errors, and a final review of the full document (due May 21, 2019)

Extent of condition reviews are being performed for the Phase 1 and Phase 2 FSS Report submittals. In addition, two other reviews, considered to be prudent to perform, are being conducted:

- Review of C/LT processes to ensure Causal Elements identified are not present in those processes (due June 14, 2019)
- Reviews of the Zion C/LT QAPP to ensure updated language from LTP Revision 2 is included (due May 14, 2019)

In addition to the probable and potential contributing causal factors identified, five (5) Condition Reports were written for related Characterization/License Termination and Regulatory Affairs issues that were considered isolated issues, without likelihood of causal implications to the larger FSS documentation process in the areas of:

- Control of Records
- Missed Opportunities
- Two cases where C/LT procedures do not ensure the requirements of the LTP are met
- Comments on Phase 1 and 2 Records
- Informalities exist in NRC interactions that should be addressed

In addition to the actions identified above, additional senior level support is being deployed to the site. Mr. Mike Brothers, who has an extensive background in nuclear operations, will be reporting to the Zion General Manager, and his duties will include ensuring development of products for NRC review are as error free as possible; reviewing/approving potential deviations or interpretations of the LTP, as they related to field activities; and approving FSS and C/LT communications with NRC Headquarters and Region 3 personnel.

## Enclosure 2

### Regulatory Commitments

The following commitments are contained in the response to the NRC Request for Additional Information:

1. The FSS of survey units 10212A and 10213A will be redone and the results included with the Phase 3 or Phase 4 Final Reports.
2. The Release Record for Class 3 survey unit 10223 will be revised to state that the maximum ratios from LTP Chapter 5, Table 5-15 were used to infer the concentrations of Ni-63 and Sr-90 and the inferred concentrations were adjusted accordingly.
3. *ZionSolutions* will revise each Release Record to read as follows;

“The maximum ratios (Table 7) will be used unless specific survey information supports the use of a surrogate ratio that is specific to the area. 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.”

4. *ZionSolutions* will complete the planned actions specified to address the cultural and mindset aspects of the C/LT Group relative to Causal Element #1.
5. *ZionSolutions* will complete the planned actions specified to address the items relative to Causal Element #2, Improvements in Formalized Process.
6. Quality Assurance personnel will perform effectiveness reviews to verify that the corrective actions are preventing recurrence.
7. The Phase 1 FSS Report will be resubmitted to the NRC.