November 3, 2015

Mr. John Sauger
General Manager
Zion Restoration Project
Zion*Solutions* LLC
101 Shiloh Boulevard
Zion, IL 60099-2797

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION RELATED TO PARTIAL SITE RELEASE REQUEST FOR ZION NUCLEAR POWER STATION, UNITS 1 AND 2 (TAC NOS. J53070 AND J53071)

Dear Mr. Sauger:

By letter dated August 27, 2015, you submitted a request for a partial site release. We have reviewed your request and have some additional information that will be needed to complete our review. The additional information requested is enclosed.

Should you have any questions regarding this action, please contact me at 301-415-3017 or 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
License Nos.: DPR-39 and DPR-49

Enclosure: Request for Additional Information

cc: Zion Service List w/enclosure

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OFFICE	NMSS	NMSS	NMSS	NMSS
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DATE	11/2/15	11/3/15	11/3/15	11/3/15

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Zion Partial Site Release Request for Additional Information

1. The determination of background values for Cs-137 needs clarification.

Basis: Section 2.3.1 summarizes the three background studies performed at the site (February 2012 ESCSG Study, March 2012 Crib House Study, and July 2012 Zion*Solutions* Soil Study). During the first study in February of 2012, 15 samples of concrete, asphalt and soil were collected from the Vertical Concrete Cask Construction area. This study determined that only natural radioactivity was detected. The second study, during which concrete core samples were taken from the Crib House, also determined that only natural radioactivity was detected. In the third study of soil samples from Hosah Park, Cs-137 was identified in addition to naturally occurring radionuclides. In the Hosah Park study, 30 soil sample locations were chosen where static measurements were taken, as well as surface and subsurface volumetric samples. It is postulated that the Cs-137 is attributable to global fallout. The LTP states that while there did appear to be evidence of soil disturbance at Hosah Park, the evidence suggested that this occurred in the past and the land has been undisturbed for a number of years. The study concluded that the majority of the soil samples from Hosah Park were from disturbed soils. The Hosah Park results are summarized in Table 2-10, which shows an average of 0.0626 pCi/g and a maximum of 0.241 pCi/g.

Section 2.3.1.4 of the LTP states:

> "The soil sample data compiled in the TSD concludes that the majority of the soil samples taken for the background studies were from disturbed soils. The Hosah Park data as well as the data obtained during the ESCSG study corresponded with documented fallout levels from disturbed soil at sites in Massachusetts, New York and Pennsylvania. Consequently, predicted ranges for background concentrations of Cs-137 were established for disturbed soils as well as undisturbed soils based on literature. These ranges are presented in Table 2-11. The upper Cs-137 concentration for each category was used as the investigation levels for non-impacted open land survey units. The upper Cs-137 concentration for disturbed, non-drainage in Table 2-11 was used as the investigation level for Class 2 and 3 open land area survey units."

Section 2.3.1.4 of the LTP suggests that the background study data from the Hosah Park and ESCSG study corresponded to global fallout levels; the LTP does not provide a basis for why this conclusion was reached even though Cs-137 was not found in the ESCSG Study or Crib House Study. The upper values of global fallout ranges were assigned as investigation levels for Cs-137 when initially characterizing the survey units. Table 2-11 provides Investigative Levels for Cs-137 Based on Background Studies. The upper value for undisturbed soil is 2.8 pCi/g or 0.66 pCi/g for a drainage or non-drainage area respectively. The upper value for disturbed soil in drainage area is 1.67 pCi/g. The upper value for a disturbed, non-drainage area, which was used for Class 2 and 3 open land area survey units, is 0.34 pCi/g. These upper values are well above the average of 0.0626 pCi/g or maximum of 0.241 pCi/g found in Hosah Park. The LTP does not provide a basis for using the upper values of the global fallout ranges from Massachusetts, New York and Pennsylvania, as opposed to the site-specific data.

NUREG 1757 Vol. 2, Rev. 1, Section A.3.2, providing guidance on soil reference areas, states that “if there is a choice of possible reference areas with similar soil types, consideration should be given to selecting reference areas that are most similar in terms of other physical, chemical, geological, and biological characteristics.” Section A.3.4 provides additional guidance on differences in background areas.

Path Forward:

- Provide a basis for why the ESCGG study corresponds to documented global fallout ranges, even though Cs-137 was not found in the ESCSG study.

- Provide a basis for assuming the upper values of the global fallout ranges from Massachusetts, New York and Pennsylvania as investigation levels, as opposed to the site-specific background reference data.

- Provide "Determination of Radionuclide Activity Concentrations in Soils in Non-Impacted Soils Adjacent to the Zion Nuclear Station" (Reference 2-21)

- Provide Zion*Solutions* TSD 13-004, "Examination of Cs-137 Global Fallout In Soils At Zion Station" (Reference 2-22)

2. The use of Cs-137 global fallout values as an investigation level during site characterization and initial survey unit classification needs clarification.

Basis: Section 2.3.1.4 of the LTP states that the upper values of global fallout ranges were assumed as background for Cs-137 when characterizing the open land survey units. However, it is not clear how this assumption impacted the initial classification of survey units (if at all).

It is also not clear if the global fallout levels were also assumed as background in characterizing survey units consisting of concrete, asphalt, or piping. NUREG 1757 Vol. 2, Section A.3.3, states that “when there are different materials with substantially different backgrounds in a survey unit, the licensee may use a reference area that is a non-impacted room with roughly the same mix of materials as the survey unit…If a survey unit contains several different materials, but one material is predominant or if there is not too great a variation in background among materials, a background from a reference area containing only a single material may still be appropriate. However, the licensee should demonstrate that the selected reference area will not result in underestimating the residual radioactivity on other materials.” The LTP suggests that the Hosah Park soil background reference area will be applied for the open land areas. It is not clear if the global fallout values will be assumed for background in other materials such as concrete, asphalt, or piping.

Table 2-31 summarizes the characterization for Class 3 Open Land Survey Units. The footnote on Table 2-31 (pg. 2-153) for Survey Unit 10220C (south of the Radiological Restricted Area) indicates that while 41 out of 55 samples exceeded the MDC for Cs-137, with the maximum being 1.14 pCi/g Cs-137, an investigation concluded that the elevated levels of Cs-137 are due to global fallout. However, the details of this investigation for Survey Unit 10220C do not seem to be discussed in the body of the LTP.

Path Forward:

- Define the term investigation level as applied during initial classification of survey units.
- Clarify how the investigation level may impact whether an open land survey unit area is classified as non-impacted versus impacted.
- Evaluate whether initial classifications would change if actual site data were used instead of global fallout data.
- Describe the analysis that was performed to conclude that the non-impacted areas are indistinguishable from background.
- Provide the investigation details that concluded that the elevated levels of Cs-137 in Survey Unit 10220C are due to global fallout.

3. Section 2.2.1 (Data Quality Objectives), Section 2.3.4 (Non-Impacted Open Land Areas), and Section 2.3.5 (Impacted Open Land Areas)

Section 2.2.1 of the LTP indicates that "direct measurements and scans of concrete and surface soils were also made using the same instruments and Minimal Detectable Concentrations (MDC) as will be employed for FSS," and that "volumetric samples that exhibited the highest activity were sent to an off-site laboratory for analysis of Hard-to-Detect (HTD) radionuclide(s)." This discussion indicates that HTD radionuclides are only measured during characterization when an elevated direct measurement was encountered, but it is not clear that a surrogate correlation has been established between HTD and easy-to-detect radionuclides, or that these radionuclides are co-located at the site. As such, it is not evident that a sufficient number of HTD samples were taken during characterization to establish a surrogate or to adequately characterize the radiological status of the site. For example, Section 2.3.4.1 of the LTP discusses surface soil sampling in non-impacted areas and indicates that "of the total number of surface soil samples taken and analyzed, Cs-137 was identified at concentrations greater than the MDC of the instrument in 106 surface soil samples," and that "no other potential plant-derived radionuclides were positively identified." However, it is not evident from the discussion in Section 2.3.4.1 and the corresponding results summary in Table 2-29 (Non-Impacted Open Land Survey Units – Characterization Survey Summary) that an analysis of these soil samples was performed for radionuclides other than Cs-137 and Co-60. A similar question exists for the discussion of soil sampling related to Class 2 and 3 impacted areas, as presented in Section 2.3.5 of the LTP and

Tables 2-31 and 2-32 (though footnotes associated with Class 3 areas in Table 2-31 indicate that some samples were analyzed for H-3, Fe-55, Ni-63 and Sr-90).
Basis: Per the acceptance criteria/information to be submitted described in NUREG-1757, Vol. 2, Rev. 1, Section 4.2 (Scoping and Characterization Surveys), licensees should provide:

- A description and justification of the survey measurements for impacted media (for example, building surfaces, building volumetric, surface soils, subsurface soils, surface water, ground water, sediments, etc., as appropriate);

- The justification for considering areas to be non-impacted; and

- A discussion of why the licensee considers the characterization survey to be adequate to demonstrate that it is unlikely that significant quantities of residual radioactivity have gone undetected.

Path Forward: Describe the basis for only analyzing for hard-to-detect radionuclides when an elevated direct measurement was encountered during characterization. Describe the analytical measurements that were performed to ensure potential plant derived radionuclides other than Cs-137 and Co-60 would be positively identified in both non-impacted and impacted areas. Provide a justification for considering areas to be non-impacted, when it appears that HTD radionuclides may not have been considered in those areas.

Zion Nuclear Power Station, Units 1 and 2 Service List

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