

**NRC Staff Evaluation of NFS Responses to RAIs Regarding Final Status Survey Report  
for Survey Units 2, 8, 9, 19, and 20  
Draft Evaluation**

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**(1) RAI 1: REGARDING SURROGATE RATIOS AND PROPOSED NEW PLAN FOR HARD-TO-DETECT (INFERRED) RADIONUCLIDES**

**(a) Conceptual Agreement with Plan to Directly Measure Hard-to-Detect Radionuclides and Adjust DCGLs for Three Gamma-Emitting Radionuclides**

The NRC staff understands the concept proposed by NFS in its February 18, 2011, response to the RAIs, and as further discussed in the phone call on March 31, 2011 to be the following. NFS referred to the NRC's guidance on treatment of insignificant radionuclides. NRC guidance on this subject is found in NUREG-1757, Vol. 2, Rev. 1, Section 3.3. The guidance states that licensees may consider insignificant radionuclides that contribute less than 10% of the applicable dose criterion. The licensee may then address such radionuclides with less detail than would normally be done for the FSS. The dose from the insignificant radionuclides must be accounted for. NFS is intending to generally follow this guidance. Staff notes that NFS did not commit that the contributions of the hard-to-detect radionuclides will be less than 10% of the dose criterion. Staff notes that there may be some flexibility in the exact fraction of dose criterion contributed (i.e., flexibility in the 10% value), although it should still be a small fraction of the dose criterion.

For the hard-to-detect radionuclides (inferred radionuclides), for which NFS previously planned to use surrogate ratios, NFS has proposed to determine the contribution to dose based on the maximum measured concentration as a fraction of the DCGLs (sum of fractions, SOF). NFS would calculate a total SOF for the ten inferred radionuclides and then "de-rate" or reduce the surface soil DCGLs for the three gamma-emitting radionuclides (Am-241, Th-232, and U-235). The NRC staff considers this proposal to be conceptually acceptable. However, the staff does not agree with certain details of the proposal, and requires more details on certain aspects, as follows.

**(b) Historical Soil Data Use for Determining Contributions of Inferred Radionuclides**

In the March 31 phone call, NFS and its consultant indicated that the historical soil measurement data provide substantial information indicating the low (relative to DCGLs) concentrations of the hard-to-detect radionuclides. In the response to the RAIs, point 1 of the proposed approach appears to NRC staff to indicate that NFS would determine the maximum concentrations based on historical soil data (this was not explicitly indicated to be based on historical data) with validation during the subsurface characterization process (FSS). NRC staff would accept an approach of determining the contributions of the hard-to-detects based on the

historical soil dataset with confirmation by the 10% of samples during FSS (subsurface characterization) that will be analyzed for hard-to-detects.

To pursue this approach, NFS should:

- (i) evaluate the historical soil data and propose to NRC the contributions of the hard-to-detects based on that data;
- (ii) provide and commit to a plan for confirmation, or adjustment if needed, of the contributions of hard-to-detects, based on the FSS sample data;
- (iii) provide data or provide specific reference to the data used in its determination of maximum concentrations;
- (iv) if historical soil data should not be used due to remediation in certain areas, NFS should describe how this situation will be dealt with.
- (v) provide an electronic file to the NRC containing the historical soil data used, in an appropriate format file and with sufficient information that NRC staff may import the data into a GIS software or similar software (sample ID, coordinate location, date, depth, analyte, results—details can be discussed);
- (vi) overall, NFS should provide sufficient information and detail that the NRC staff can come to a conclusion with reasonable assurance that the DCGLs will be met and/or doses will meet the criterion.

### **(c) Area of Application of the Approach**

As discussed in the phone call, NRC has concern about applying this approach on an individual survey unit basis. The basic concern is that the amount of data available for a single survey unit will or may be relatively small. For the FSS, only 10% of samples will be analyzed for hard-to-detects. For the historical dataset, certain survey units may have relatively limited existing data. In addition, at this point, there is no clear reason to indicate that concentrations of hard-to-detects are expected to be different in different survey units; different results may be due to random variability and the limited number of samples in individual survey units. The NRC staff would accept application of this approach if the evaluation of contributions of the hard-to-detect radionuclides is performed for the whole North Site Area together, or potentially for areas of the site for which there is a logical reason that concentrations would be different (perhaps separate areas for former ponds area and former burial area). To pursue this approach, NFS should:

- (i) apply the approach to the North Site Area as a single combined area (that is, determine a value for contribution of the hard-to-detects for the whole are, not for individual survey units);
- (ii) If NFS proposes application to separate areas, justification should be provided.

### **(2) RAI 3: REGARDING DEMARCATION OF SURVEY UNIT 19**

The NRC staff agrees with the part of NFS's response that addresses survey unit size considerations as well as density of coreholes for the purpose of locating elevated volumes of contamination. However, the other purpose of the FSS is to assure that mean concentrations of contaminants are acceptable. As stated earlier, Section 2.7 of Chapter 5, Appendix B, of the NFS DP states that NFS will follow MARSSIM concepts for demarcating survey units. Part of

the MARSSIM methodology is done to provide appropriate statistical power for determinations of survey unit mean or median concentrations. The Wilcoxon Rank Sum Test is performed for this purpose, and MARSSIM provides a method for determining the number of samples needed. An underlying basis is that each survey unit should consist of areas of similar contamination potential. The NRC staff still is concerned that part of SU 19 was remediated, and thus has an elevated potential that it may contain residual radioactivity, while part of the SU (the protected wetlands area) was, according to NFS, not previously contaminated or remediated and thus should have a low potential for residual radioactivity. Typically, such distinct areas would be placed in separate survey units.

The NFS response, in part, stated that in January 2007 NFS had submitted its *Characterization Plan for Security Zone, Burial Ground and Pond Areas* to the NRC. While NRC staff did not comment on the proposed design for SU 19, NRC staff also did not approve the design for SU 19 or any other SU. Also, the NRC staff notes that in the 2007 Characterization Plan, NFS did *not* indicate that the wetlands area of SU 19 was not remediated and historical data indicated no elevated radioactivity existed in that area.

In conclusion, NRC staff does not accept the response to this RAI. NFS should:

- (i) split this survey unit into two survey units based on the contamination potential of the two halves of the areas; or
- (ii) provide justification that it is appropriate to combine two areas of seemingly different contamination potential into a single survey unit.