Conway, Kimberly

From: Conway, Kimberly
Sent: Monday, December 18, 2017 3:02 PM
To: 'Vasbinder, David'
Subject: Clarification of FSSR sections

Hi Dave,

As I mentioned to you earlier, there are a few areas where we need some clarification and I believe it should be relatively straightforward. I've included our comments below and what we will need in order to complete our review. Please let me know if you have any questions—I will be on leave December 20-25, but otherwise I should be in the office. We can set up a call to further discuss these items once you've had a chance to look through everything.

Thanks,
Kim

1. **Comment:**
   Section 3.1.5 of the FSSR indicates a 10 CFR 50.59 change process was utilized to update the FSS design for scanning surveys in Survey Units 1 – 4, and indicated the associated MicroShield calculations were attached to the FSSR. However, details on the licensee's review of these particular 50.59 changes were not provided, and MicroShield calculations were not attached to the FSSR.

   Path Forward:
   MicroShield calculations should be provided for NRC review.

2. **Comment:**
   The determination of scan investigation levels for Survey Units 1 – 4 is presented in Section 3.1.5 of the FSSR, however no comparison to the instrument scan MDC determination is provided. The scan MDC represents the capability of the instrument, and it should ideally be below the $DCGL_W$. If scan MDCs are only capable of detecting radiation at levels above the $DCGL_W$, then an evaluation is needed in Class 1 survey units to ensure that enough discrete samples are taken so that the largest possible hot spot (i.e., the area bounded by 4 sample points) would be detected during a scan. This is described further in Section 5.5.2.4 of MARSSIM.

   This point is particularly relevant in light of the site's survey adjustments to scan over soil, ice, or snow on top of bedrock. For reference, the FSSP indicated in Section 3.6 that the estimated scan detection capabilities were about 3.1 pCi/g for Co-60 contamination in soil (which is less than the Co-60 DCGL of 3.8 pCi/g). It was additionally noted in the FSSP that MicroShield analyses for Co-60 at the soil DCGL result in an exposure rate of 11 μR/hr. New analyses of the Co-60 exposure rate through 2.5 cm of soil (described in Section 3.1.5 of the FSSR) indicate that Co-60 present at DCGL levels on bedrock would result in an exposure rate of 5.494 μR/hr through a soil layer. Based upon a simple comparison to the detection capabilities calculated in the FSSP, it appears that the instruments utilized for scans of bedrock areas may not actually be able to detect Co-60 at its DCGL when a one inch covering of soil is present. As such, the evaluation of the number of discrete sampling points (and the respective bounded area) should have been performed as discussed above and in MARSSIM 5.5.2.4.

   Another important consideration is that surveyors should be pausing when elevated readings are encountered, regardless of whether an investigation level was triggered. The area factor which was utilized in the FSSR to develop the Class 1 scan investigation level was 5, and was based on an

evaluation of a 1 m^2 elevated area (as discussed in Section 3.11.3 of the FSSP). So, if surveyors only paused to evaluate elevated measurements when they were 5 times the DCGL, then the area bounded by 4 sample points would also need to be 1 m^2. The actual sampling density was less than that during FSS, as the area between 4 sample points ranged from 3.5 to 14.5 m^2 for Class 1 areas (as shown in Table 3-1 of the FSSR). It is, therefore, necessary to understand

that FSS surveyors were pausing and evaluating instrument readings at levels more appropriate to an area factor consistent with the actual area between 4 sample points. Based upon the discussion in Section 3.11.2 of the FSSP, "technicians respond to all audibly detectable elevated count rates while surveying," and "upon observing a count rate above the IL (MDCR), the technician stops and resurveys the suspect area to verify the count rate elevation and determine the areal extents of the elevated count rate." A point of confusion here is that the investigation level (IL) appears to be equated to the minimum detectable count rate (MDCR) in the FSSP, whereas the FSSR only discusses a "scan investigation level" for the bedrock areas (which is at a rate higher than MDCR values estimated in the FSSP). As such, the licensee should clarify that scan survey processes appropriately considered all elevated count rates.

Path Forward:
The following clarification statements should be addressed:

- Were the number of discrete sampling points (and the respective bounded area) appropriate for the scanning methods utilized during FSS, as discussed above and in MARSSIM 5.5.2.4?
- Did FSS survey technicians pause and respond to all audibly detectable elevated count rates during the FSS (i.e., not just to indications above the "scan investigation levels" discussed in the FSSP)?

3. **Comment:**
Section 3.1.6.1 of the FSSR describes a situation where scan surveys in SU5 indicated that levels or residual radioactivity were likely present above the $DCGL_W$ for Co-60, upon which the investigation levels were based. A determination was made that the area was less than 0.1 square feet in size, and a "grab sample" from the general area is referenced. It is additionally worth noting that SU5 was a Class 2 unit, and areas of contamination above the $DCGL_W$ would not be expected. Positive identification of contamination above the $DCGL_W$ would warrant reclassification to Class 1 per MARSSIM guidance. As it does not appear that reclassification occurred, additional clarification is needed to evaluate the licensee's mitigating measures.

Path Forward:
The following details should be addressed for this area:

- Was 100% scan coverage utilized in this area?
- Were scan results utilized to appropriately bound and determine the size of the elevated area?
- Was a soil sample of the actual elevated area taken, and how were those results utilized to determine whether or not a $DCGL_w$ was exceeded?
- What was the final disposition of the area defined as elevated (i.e., did remediation occur or was it left in place)?

4. **Comment:**
A discussion of soil stockpile sampling is provided in Section 3.3 of the FSSR, where it is noted that "no gamma readings greater than 1.5 times the background count rate were detected." Clarification is needed on the investigation levels utilized for scanning surveys, as these should be established relative to the DCGL, and not as a factor above background. In general, the licensee should confirm that all FSS scan surveys, and any necessary investigations, were performed in accordance with Section 3.11.2 of the FSSP, which indicates that:

> Technicians respond to all audibly detectable elevated count rates while surveying. Upon observing a count rate above the IL (MDCR), the technician stops and resurveys the suspect area to verify the count rate elevation and determine the areal extents of the elevated count rate. Technicians are cautioned, in training, about the importance of the elevated count rate and the verification survey. They are given specific direction regarding the extent and scan speed of the verification survey. If the elevated count rate is verified, the technician marks the area. Each marked area will receive an additional documented survey which requires a re-scan of the area and one or more direct measurements and removable contamination wipes. Results of each investigation are discussed and reported in the FSS Report.

Path Forward:
The following clarification statements should be addressed:

- Were appropriate investigation levels (relative to a DCGL) utilized for scanning of stockpiles (i.e., as described in Section 3.11.1 of the FSSP)?
- Did FSS survey technicians pause and respond to all audibly detectable elevated count rates during the FSS as discussed in Section 3.11.2 of the FSSP?

5. Comment:
Clarification is needed on the specific number, and type, of measurements used to meet the survey requirements of MARSSIM. It is not clear that the number of actual laboratory results (shown in Appendix F of the FSSR) matched the anticipated number of results shown in Table 3-1 of the FSSR (and also Table 3-7 of the FSSP).

Additionally, all radionuclides of concern do not appear to be represented in all survey unit results. For example, in Survey Units 5 and 6 a majority of the soil samples that were taken appear to be only measuring 1 or 2 of the radionuclides of concern (i.e., generally only C-14 and Ni-63).

Path Forward:
Several points should be addressed as follows:

- Clarify the apparent discrepancy between the number of soil samples taken in Survey Units 5 and 6 and the number described in the FSSP/FSSR, and confirm that an appropriate number of samples were taken per MARSSIM survey design parameters.

- Clarify why a majority of the samples in Survey Units 5 and 6 only indicate results for 1 or 2 of the radionuclides of concern (i.e., C-14 and Ni-63).
- Ensure that all radionuclides have been appropriately assessed for all FSS samples and that the final dose complies with the unrestricted release criteria in 10 CFR 20.1402.

6. Comment:

A statement is made in the conclusions to the FSSR (Section 4.0) that no other ROCs besides Cs-137 were detected in the FSS samples, and all gamma walkover count rates were at background levels. This statement appears to ignore the discussion of elevated scan results (particularly in Survey Unit 5) as well as the results of stockpile surveys.

With regard to stockpile surveys, NRC staff reviewed the Appendix H Stockpile Soil Analysis results, and noted that several Sum of Fraction (SOF) values are in the vicinity of 0.50, and several individual ROCs were measured greater than the stated MDC. As such, it appears that ROCs other than Cs-137 were in fact detected, and these results should be included in the final dose assessment for the site. There is the additional question raised in the previous bullet regarding whether or not a complete and accurate SOF has been established when laboratory results do not address all of the ROCs. A thorough evaluation of all ROCs from all impacted areas should be performed to ensure an accurate assessment of residual radioactivity left at the site.

Path Forward:

Ensure that all radionuclides have been appropriately assessed for all FSS samples (including stockpile samples) and that the final dose complies with the unrestricted release criteria in 10 CFR 20.1402.

7. Comment:

The mapped Class 1 scan results shown in Appendix G of the FSSR do not appear to indicate 100% coverage, but rather show a sparse sampling of data points across each Class 1 survey unit. Clarification is needed on why these maps appear to show open areas with no survey coverage, and that 100% scan coverage did occur in Class 1 areas.

Path Forward:

Confirm that 100% scan coverage did occur in Class 1 areas.