From: Weidner, Tara
To: Newman, Nancy (NIH/OD/ORS) [E]
Subject: NIH amendment
Date: Tuesday, February 18, 2014 3:11:00 PM

License No.: 19-00296-10
Docket No.: 030-01786
Control No.: 582594

SUBJECT: NIH, REQUEST FOR ADDITIONAL INFORMATION CONCERNING APPLICATION FOR AMENDMENT TO LICENSE, CONTROL NO. 582594

Dear Ms. Newman:

This is in reference to your application dated November 21, 2013 requesting to amend Nuclear Regulatory Commission License No. 19-00296-10. Based on a review of the results of the surveys, we request that additional evaluation of the results of the final status survey be performed and provided for our review. In particular, results should address the following issues:

1. Section 2.0 indicates that the acceptable screening value for U238 + C (natural uranium), developed using DandD version 2.1, is 250 dpm/100cm^2.

   a. NRC staff also ran DandD version 2.1, and determined that, for each radionuclide in the decay chain for U238, the acceptable screening value is 17.9 dpm. Given that there are 8 radionuclides in the decay chain which emit alpha particles, this would result in a screening value for alpha emissions from U238 + C of 143 dpm/100 cm^2. In Section 2.1, you selected a value of 125 dpm/100cm^2 as being half of the DCGL of 250 dpm/100cm^2. Although this is correct, it includes all emissions from the entire decay chain, not alpha alone. Based on a review of the results of surveys, measurements for U238 + C were performed using an instrument in alpha-only mode. The results of these measurements, provided in the attachments, compared the results of alpha measurements to the total screening value of 250 dpm/100cm^2 rather than to a screening value of 125 dpm/100cm^2, for alpha-only emissions. These results are not valid as presented. Please revise your screening value and re-evaluate your results. If the sensitivity is not sufficient, additional surveys will be required.

   b. Although the screening value for U238 + C, determined using DandD version 2.1, is 250 dpm/100cm^2 based on all emissions from the decay chaing, the measurements that were performed to detect this radionuclide chain were based on alpha measurements only. If only alpha emissions are considered, the screening value would be 143 dpm/100 cm^2. MARSSIM, Section 6.2.2.6 states that surveys (both static and fixed point) should be able to detect 10-50% of the DCGL. Based on the information provided, it does not appear that the survey plan was suitable to determine if the contribution to residual contamination from U238 + C significantly affects the release of the facility.

- Explain why a painted cinderblock was selected as the background for alpha and beta measurements, considering that many measurements were made on concrete floor, wood, metal, soapstone and laminate surfaces.

- Explain why the background, used in the alpha scan rate calculation, is stated to be 8 cpm for the 43-37 detector in the alpha mode. Attachment 3 shows that the 43-37 detector was not used in the surveys. Instead, four different 43-68 probes were used, and the information provided shows the background using these probes for alpha measurements to be 0 - 3 cpm. Attachment 4 shows that background counts actually measured during surveys ranged from 0 – 4 counts during a 1-minute count. The use of 8 cpm appears to have no basis.

- Section 2.1 states that the scan rate for alpha was based on 15 cm probe moving at 4 cm per second. This is equivalent to a 6-inch probe moving at 1.6 inches per second. Although the 43-37 instrument approximates this criteria (moving the 43-37 probe at ¼ probe width per second [or 1.5 inches per second] indicates that this is a 6 inch probe moving at 1.5 inches per second), this detector was not used. Rather, the 43-68 instruments were used, and the scan rate for these detectors does not approximate a 15 cm probe moving at 4 cm per second. The information provided indicates that the 43-68 probe is 4 inches, and was moved at 1/4 probe width per second (1 inch per second), therefore is a 4-inch probe moving at 1 inch per second.

    - Explain why this is suitable for the survey, especially if only 43-68 probes were used during surveys, as indicated in Attachment 3. Show any calculations used to support the use of this type probe.

    - Because you did not use the equivalent value of the DCGL for the alpha-only count mode, the calculations for the scan rate do not have very much meaning. Please recalculate the probability of detection and the time period that the surveyor should hold the detector over a suspect area for a probe used in the alpha-only mode. This calculation should be produced for both type of detectors, if both types of detectors were used.

2. Section 2.0 “Survey Plan” and Section 3.0 “Final Status Survey” appear to compare the measurements for residual tritium contamination to the tritium DCGL, the measurements for residual alpha contamination to the natural uranium DCGL using all emissions, and the gross beta measurements to the weighted C14 and Na22 DCGL. Although it appears that survey results for each of these radionuclides, individually, do not exceed the applicable DCGL, there are no results of the sum-of-fraction calculation for dose from all radionuclides, to show that the facilities meet the release criteria in Subpart E. This is a concern because of the large uncertainties and high MDA (reported as 195 dpm/100cm^2 for some measurements), and the results in some areas (48 dpm/100cm^2 and 63 dpm/100cm^2 reported for ‘alpha only” measurements, representing a large fraction

of the 'alpha only' screening value of 143 dpm/100cm).

3. Section 2.0., "Survey Plan" states that the Sign test was used to compare levels of contaminants not present in the background to the DCGL values. This section did not address the test used for natural uranium, which is present in natural background. If the Sign Test was used for natural uranium, justify its use. Alternately, submit the criteria used to demonstrate that facilities with residual contamination from natural uranium are suitable for release for unrestricted use.

4. Section 2.0 states that the number of data points for each survey unit was determined by selecting the designated values using Table 5.5 in NUREG 1575. However, you do not provide the relative shift you believe is appropriate, and that is necessary in order to determine the appropriate number of samples. Please provide all the information used to determine the number of samples taken, so that we can confirm the determination of the number of samples.
5. Section 2.0 did not discuss the identification of elevated measurements (hot spots) using the scan surveys, or the derived concentration guideline level for elevated measurements ($DCGL_{emc}$). Describe the criteria used to establish a $DCGL_{emc}$ and to identify areas that would exceed the $DCGL_{emc}$.

6. Describe how results from swipe tests for tritium were incorporated into your evaluation of the results compared to the DCGL and $DCGL_{emc}$.

7. Section 2.1, "Field Measurements, Methods and Instrumentation", states that a gross beta DCGL was determined for C14 and Na22, equally weighted, and the weighted DCGL was determined to be 18,951 dpm/100cm^2.

    a. Provide the calculation for this, and the basis for equal weighting of C14 and Na22.

    b. Justify the use of a weighted DCGL through all your laboratory areas, rather than using the DCGL for C14 in laboratories that used only C14 and the DCGL for Na22 in laboratories that only use Na22. Given that the DCGL for Na22 alone is 9500 dpm/100 cm^2, use of the weighted DCGL would be inappropriate in laboratories that used only Na22 and no C14.

8. Section 2.4, "Activity Detected at or above Investigative Levels", states that investigative levels were exceeded in some areas, and the contamination was determined to be C14 using liquid scintillation spectrometry.

    a. It is not clear if the values listed in this section are total residual contamination, or removable contamination. If they are total contamination values, confirm if these values were determined from static surveys, scan surveys, or smear surveys.

    b. Confirm if smear samples were used to identify C14. If so, explain the basis for assuming that only C14 is present in the total residual contamination, rather than present only in the removable contamination on a smear.

c. Although this section refers to investigative levels, the investigative levels were not listed. Explain why the measurements listed were compared only to the DCGL for C14, not to the DCGL for Na22 or to the weighted DCGL described in Section 2.1.

9. Section 3.0, “Final Status Survey”, describes surface scan surveys and static surveys at selected grid points, but did not describe removable contamination surveys. Describe the removable contamination surveys that were performed, and explain how they were used to support the final status survey results.

10. Section 3.0 describes some units to be classified as Class 2 survey units, and others to be Class 3 survey units, but did not describe the difference in the number of samples or surveys performed in Class 2 survey units compared to Class 3 survey units. Provide this information.

11. Section 3.0 states that Sign test was not conducted because all results were less than the DCGLs, but the Sign test is only appropriate for the contaminants that are not normally present in background. Discuss which survey units had use of uranium compounds natural uranium, and the test used to demonstrate that the area is suitable for release. In addition, the results of all contaminants present in each survey unit must be considered together, using the sum-of-fractions (see also Items 2 and 3 above).

12. Please provide sample calculations for the following items, because NRC calculations could not confirm the information provided in the survey report:

a. Section 2.0 - number of data points for each survey unit
b. Section 2.1 - scan MDC for alpha-beta mode
c. Section 2.1 - scan MDC for alpha-only mode
d. Attachment 4 – MDAs reported in results

We will continue our review upon receipt of this information. Please reply to my attention at the Region I Office and refer to Mail Control No. 582594.

Thanks in advance,

Tara Weidner