



YANKEE ATOMIC ELECTRIC COMPANY

49 Yankee Road, Rowe, Massachusetts 01367

November 16, 2006

BYR 2006-094

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-001

Subject: Submittal of Responses to NRC Request for Additional Information Regarding the Use of *In Situ* Gamma Spectroscopy for Final Status Surveys

This letter provides additional information requested by the NRC Staff during a teleconference held on October 12, 2006, on various Final Status Survey (FSS) Reports submitted by Yankee Atomic Electric Company.

The following are clarifications/corrections to the information previously submitted in Final Status Survey Reports:

- The calculated Cs-137 investigation level provided in the FSS Report AUX-02 is in error and has been corrected. The value previously calculated was conservative, so there was no negative impact on the survey performed. However, the error did make the discussion more difficult to review. The discussion provided during the teleconference is enclosed, so that a reasonably informed member of the public could follow the methodology.
- Where the SPA-3 was used in audible mode for scans, in the future a short discussion will be included in Section 5.4 of the FSS reports to state that the SPA-3 scans indicate that no residual radioactivity exists above background.
- For FSS Report NOL-04, it should be noted that the correct units for soil samples are pCi/g, not dpm/cm² as given in the report.
- Future reports will note what “unity” represents (such as fraction of investigation level or DCGL).
- The inclusion of survey unit OMB-06-02 in the FSSP for FSS Report OMB-06 was in error, as no such unit exists.

A copy of YA-REPT-00-018-06, “Estimated Doses from Inhalation, Ingestion, and Remote Exposure from Residual Discrete Particles at Yankee Nuclear Power Station Following License Termination,” has been included for your information and use. This calculation assumes that the particle in question is Co-60. This assumption was based upon the review of characterization data and final status survey results, which indicate that the particles identified to date have been Co-60. Although Sr-90, a strong beta-emitting radionuclide, has been detected at the YNPS site, it has been present uniformly in soil, not as discrete particles.

UMSS01

We trust that this information is satisfactory; however if you should have any questions or require any additional information, please contact Alice Carson at (301) 916-3995.

Sincerely,

YANKEE ATOMIC ELECTRIC COMPANY



Gerry van Noordennen
Regulatory Affairs Manager

Enclosures: As stated.

Cc (w/encl): S. Collins, NRC Region I Administrator
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Enclosure to BYR 2006-94
Supplemental Response to NRC Comments on
YNPS FSS Reports for AUX-02, BRT-02, NOL-04, OMB-06, OOL-05,
NOL-05, OOL-07, OOL-09, SVC-01, OOL-13, & OOL-16

Response to NRC Comments
YR Final Status Survey Reports: AUX-02, BRT-02, NOL-04, OMB-06,
OOL-05, NOL-05, OOL-07, OOL-09, SVC-01, OOL-13, & OOL-16

AUX-02

NRC Comment:

YR is requested to walk the Health Physics reviewer through the ISOCS data to show how they determined the value for the samples AUX-02-02-111-F-G used in Table 8 - Original & Replicate ISOCS scan data.

Yankee Response:

The development of the investigation level for building surfaces is identical to that for soil surfaces. The geometry modeled is the circular plane assuming uniformly distributed activity. Efficiency calibrations address a depth of 5 cm for concrete surfaces to account for activity embedded in cracks, etc. As is the case of soil surfaces, an adjustment factor was developed based on two scenarios. The first scenario assumes radioactivity uniformly distributed over the detector's (12.6m²) field-of-view. The second scenario assumes radioactivity localized within one square meter situated at the edge of the detector's field-of-view. As expected, the condition with localized (one square meter) radioactivity at the edge of the detector's field-of-view is the "worse case" of the two scenarios. The ratio between the MDC values for the two scenarios is used as the offset geometry adjustment factor. The adjustment factor is applied to the building surface DCGL_{EMC} values, resulting in investigation levels for each radionuclide.

When an assay is performed the results are reported, by way of Canberra modeling, as if all of the activity in the field-of-view is localized within in a 1 m² area at the edge of the field-of-view. The resultant concentration for each nuclide in the scan is divided by its investigation level and is compared to unity (i.e. sum-of-fractions). Sum-of-fraction equal to or greater than one prompts an investigation.

Nuclide	Investigation Level (dpm/100 cm ²)	AUX-02-02-111 (dpm/100 cm ²)	AUX-02-02-111 (Rep.) (dpm/100 cm ²)
Co-60	2900	<MDA	<MDA
Cs-137	3920 ³	253	<MDA
Cs-134	4700	<MDA	<MDA

$$Investigation\ level = {}^1DCGL_w \times {}^2AF \times AdjustmentFactor$$

¹Building Surface DCGL_w from Appendix 6J of YNPS LTP

²Area Factor for 1 m² taken from Appendix 6S of YNPS LTP

³Cs-137 Investigation Level should have been 10,600 dpm/100 cm². However, a more conservative number of 3,920 was employed in the calculation.

For AUX-02-02-111:

$$\frac{253 \text{ dpm}/100\text{cm}^2}{3920 \text{ dpm}/100\text{cm}^2} = 0.06, \text{ which } < 1$$

BRT-01

NRC Comment:

Where are the results of the SPA-3 surveys for BRT-01-08 (electric duct tray), BRT-01-10, BRT-01-12 and BRT-01-13?

Yankee Response:

SPA-3 scan surveys were performed in accordance with YNPS Procedure DP-8540 "Operation and Source Checks of Gamma Friskers," in audible scan mode. This procedure instructs the technician to scan the survey unit in audible mode, and to investigate levels greater than background. The procedure does not require the technician to log data. The supervisors record in their journal that no scan measurements were detected above background. (If an investigation is performed, it is recorded in the field journal.)

In future reports, a statement will be included in Section 5.4 to indicate that the results of the SPA-3 scans indicate that no residual radioactivity exists above background.

NOL-04

NRC Comment:

Table 2 - the scan investigation level is provided in units of dpm/100-cm². It would seem that a scan investigation level in units for soil of pCi/g would be appropriate?

Yankee Response:

The ISOCS scan investigation level for NOL-04 is incorrectly stated in units of dpm/100 cm². The correct value for Co-60 is 0.18pCi/gm and for Cs-137 is 0.7pCi/gm.

NRC Comment:

Table 6 - ISOCS Scan Summary - provides the scan results in "unity". Are the units for "Unity" in terms of sum of fractions or fraction of DCGL_{EMC}?

Yankee Response:

The units are in terms of “sum of fractions of investigation levels.”

Where

C = concentration

I_{LV} = Investigation level for each individual radionuclide

NRC Comment:

Section 7.0 - Conclusion - indicates that none of the “direct measurements” exceed DCGLw. Does this statement refer to the soil sample data or the ISOCS scan survey results. [Why does YR refer to soil sample results as direct measurements?]

Yankee Response:

The statement refers to soil sample data. Future reports will clarify for the reader that a direct measurement is a soil sample.

- MARSSIM defines “direct measurement” as “a radioactivity measurement obtained by placing the detector near the surface or media being surveyed. An indication of the resulting radioactivity level is read out directly.” At YNPS, soil samples (media) are removed from the survey area, and placed directly on the detector, indicating the resulting radioactivity directly.
- MARSSIM defines “scanning” as “an evaluation technique performed by moving a detection device over a surface at a specified speed and distance above the surface to detect radiation.” At YNPS, the ISOCS System is positioned over a survey unit’s surface at a given distance. These static measurements are in lieu of the typical instrument This process is more conservative than the scan requirements but is employed to satisfy them.

OMB-06

NRC Comment:

Where is the scan data for OMB-06-01?

Yankee Response:

SPA-3 scan surveys were performed in accordance with YNPS Procedure DP-8540 “Operation and Source Checks of Gamma Friskers,” in audible scan mode. This procedure instructs the technician to scan the survey unit in audible mode, and to investigate levels greater than background. The procedure does not require the technician to log data. The supervisors record in their journal that no scan measurements were detected above background. (If an investigation is performed, it is recorded in the field journal.)

In future reports, a statement will be included in Section 5.4 to indicate that the results of the SPA-3 scans indicate that no residual radioactivity exists above background.

NRC Comment:

Where is the survey data for the class 2 survey unit - OMB-06-02? Appendix A covers survey design & generally discusses the survey results, but not in terms of pass/fail based on radiological units (pCi/g) or DCGL_w.

Yankee Response:

The FSS survey unit OMB-06-02 does not exist. The report states that OMB-06 has a single survey unit, OMB-06-01. The inclusion of a FSSP for OMB-06-02 in Appendix A was in error.

OOL-15

NRC Comment:

Figure 2 indicates that gamma scans were done for three (3) areas, but the survey results are not provided in the Section 5.4 - Survey Results.

Yankee Response:

SPA-3 scan surveys were performed in accordance with YNPS Procedure DP-8540 "Operation and Source Checks of Gamma Friskers," in audible scan mode. This procedure instructs the technician to scan the survey unit in audible mode, and to investigate levels greater than background. The procedure does not require the technician to log data. The supervisors record in their journal that no scan measurements were detected above background. (If an investigation is performed, it is recorded in the field journal.)

In future reports, a statement will be included in Section 5.4 to indicate that the results of the SPA-3 scans indicate that no residual radioactivity exists above background.

NOL-05

NRC Comment:

The SPA-3 scan survey data or the data summary were not provided in the Section 5.4 - Survey Results.

Yankee Response:

SPA-3 scan surveys were performed in accordance with YNPS Procedure DP-8540 "Operation and Source Checks of Gamma Friskers," in audible scan mode. This procedure instructs the technician to scan the survey unit in audible mode, and to investigate levels greater than background. The procedure does not require the technician to log data. The supervisors record in

their journal that no scan measurements were detected above background. (If an investigation is performed, it is recorded in the field journal.)

In future reports, a statement will be included in Section 5.4 to indicate that the results of the SPA-3 scans indicate that no residual radioactivity exists above background.

OOL-07

NRC Comment:

The SPA-3 scan survey data or the data summary were not provided in Section 5.4 - Survey Results. Attachment 3 includes survey logs which indicate that "no scan indications identified." The scan survey results need to be provided in terms of objective criteria specified in the LTP.

Yankee Response:

SPA-3 scan surveys were performed in accordance with YNPS Procedure DP-8540 "Operation and Source Checks of Gamma Friskers," in audible scan mode. This procedure instructs the technician to scan the survey unit in audible mode, and to investigate levels greater than background. The procedure does not require the technician to log data. The supervisors record in their journal that no scan measurements were detected above background. (If an investigation is performed, it is recorded in the field journal.)

In future reports, a statement will be included in Section 5.4 to indicate that the results of the SPA-3 scans indicate that no residual radioactivity exists above background.

OOL-09

NRC Comment:

OK, but see comments on Conclusions. A summary of the soil sample results and the gamma scan survey results were provided. The Conclusion Section indicates that the soil sample summary meet the DCGLw criteria & that a retrospective power curve demonstrates that the number of soil samples taken were adequate to support the DQOs, but Conclusions section did not comment on the gamma scan survey results.

Yankee Response:

SPA-3 scan surveys were performed in accordance with YNPS Procedure DP-8540 "Operation and Source Checks of Gamma Friskers," in audible scan mode. This procedure instructs the technician to scan the survey unit in audible mode, and to investigate levels greater than background. The procedure does not require the technician to log data. The supervisors record in their journal that no scan measurements were detected above background. (If an investigation is performed, it is recorded in the field journal.)

In future reports, a statement will be included in Section 5.4 to indicate that the results of the SPA-3 scans indicate that no residual radioactivity exists above background.

SVC-01

NRC Comment:

The SPA-3 scan survey data or data summary were not provided in Section 5.4 - Survey Results.

Yankee Response:

SPA-3 scan surveys were performed in accordance with YNPS Procedure DP-8540 "Operation and Source Checks of Gamma Friskers," in audible scan mode. This procedure instructs the technician to scan the survey unit in audible mode, and to investigate levels greater than background. The procedure does not require the technician to log data. The supervisors record in their journal that no scan measurements were detected above background. (If an investigation is performed, it is recorded in the field journal.)

In future reports, a statement will be included in Section 5.4 to indicate that the results of the SPA-3 scans indicate that no residual radioactivity exists above background.

OOL-13

NRC Comment:

OK & The Survey Results section provides the direct measurements and ISOCS scan summary.

Yankee Response:

No response required.

OOL-16

NRC Comment:

The SPA-3 scan survey data or data summary were not provided in Section 5.4 - Survey Results.

Yankee Response:

SPA-3 scan surveys were performed in accordance with YNPS Procedure DP-8540 "Operation and Source Checks of Gamma Friskers," in audible scan mode. This procedure instructs the technician to scan the survey unit in audible mode, and to investigate levels greater than background. The procedure does not require the technician to log data. The supervisors record in their journal that no scan measurements were detected above background. (If an investigation is performed, it is recorded in the field journal.)

In future reports, a statement will be included in Section 5.4 to indicate that the results of the SPA-3 scans indicate that no residual radioactivity exists above background.