72-0017

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October 8, 1996

CPY-047-96

Mr. David Stewart-Smith
Oregon Department of Energy
625 Marion Street NE
Salem, OR 97310

Dear Mr. Stewart-Smith,

Response to Comments on Independent Spent Fuel Storage Installation Site Survey

On August 27 and 28, 1996, the Oregon Office of Energy and Oregon Health Division, Radiation Protection Services, performed a joint inspection of the Independent Spent Fuel Storage Installation (ISFSI) site survey. As a result of that inspection, comments were provided to PGE in your letter dated September 11, 1996. The responses to those comments are provided as Attachment I.

If you have any questions concerning these responses, please contact Margaret Megehee of my staff at 503-556-7334.

Sincerely,

C P Yundt

C. P. Yundt
General Manager Plant
Support and Technical Functions

Attachments

c: A. Bless, ODOE
M. Dibblee, Health Division, ODOE
T. Johnson, Health Division, ODOE
M. T. Masnik, NRC, NRR
L. E. Kokajko, NRC, NMSS

NA06

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Recip: NMSS/SFPO
ADD: NRR/DRPM

Question 1

In the Affected area (the area formerly occupied by the Radwaste Storage Annex), 100% surface scans were performed using a CM-11 detector. The detector used bottled P-10 gas. The detector was calibrated at approximately 20 degrees centigrade prior to the survey, and a source check was performed every morning. Since the operating temperature during the survey, which was in the direct sunlight, was up to 15 degrees centigrade greater than the temperature at which the calibrations were done in the laboratory, and there was no calibration check with a radiation source in the field, did the heating effect in the gas bottles affect the efficiency of the CM-11 detectors?

Response

Regarding temperature effect on CM-11 detector efficiencies:

The beta survey of open land areas has been determined to not be necessary for completion of the survey. The beta scan has been replaced by a gamma scan that uses a solid state detector. The sodium iodide (NaI) scintillation detector is not subject to efficiency variations with temperatures in the ranges found during the survey (20 - 30 degrees C).

When the CM-11 detector is removed from the hanger, a quick-release coupling seals the detector inlet, causing the detector to operate using only the gas stored in the detector body. The standard temperature, pressure correction formula would apply for beta/gamma detection efficiency:

$$C.F. = \frac{273 + T°C}{295} * \frac{760}{P(mmHg)}$$

Assuming pressure to be constant, the detector efficiency for beta detection would vary by less than 5% for the outside temperature range the instrument is used in.

An experiment was conducted with the CM-11 instrument to verify this expectation by obtaining 10 separate 1 minute counts with a beta reference source indoors (temperature about 20°C) and outdoors (temperature about 27°C) after a 2 hour acclimation. The ratios of the mean counts inside to outside were 0.98 and 1.01 respectively.

Question 2

We noted that the soil sample locations are identified according to their location on the site survey map (page 3 of the survey plan). Pursuant to the plan, there are only indirect ways to identify the absolute location (i.e., by Township, Range, minutes, and seconds) of samples. Your system of identifying soil sample locations is acceptable, but does not provide an absolute location, which

could be helpful in the future, particularly if the survey's validity is challenged, We suggest you consider some method of providing an absolute location for soil samples and survey measurements.

Response

The location of each soil sample site is physically marked with a labeled 3 foot steel rod driven about 12 inches into the ground. Sample locations on concrete surfaces are marked with a nail driven into the surface and marked with paint. Sample locations on building surfaces are physically marked with white labels or paint. This method of marking sample locations is adequate for the time interval (3 - 12 months) in which re-sampling or verification sampling may be required. Sample location markings can be maintained/preserved longer than a year if necessary. The survey site will be altered next year for construction of the ISFSI, at which time the majority of the soil sample markings will be removed.

Question 3

We reviewed calibration procedures for the intrinsic Germanium detector and gamma spectroscopy system. The calibration standard used to calibrate this system is lower in density (1.15 g/cc) than the soil that is being analyzed over (2g/cc) This will result in reduced detector efficiency, especially at low energy levels. Does this have any significant effect on the samples you are analyzing, and if not, why not? The inspection also noted that a daily check of the energy calibration and the peak resolution (FWHM) was being performed. You should consider allowing the gamma analysis system to go through the quantification of radionuclides in the standard on some frequency as well. This will serve as a more complete system check. We noted that when the system was recalibrated with a new gamma standard in the spring of 1996, the apparent detector efficiency at very low energies (Co-57) was considerably different than three years earlier. If detector efficiency has drifted in the meantime, such periodic analysis of the standard will pinpoint the problem.

Response

The relatively high energy of the gamma ray of interest (661 keV from Cs-137/Ba-137m) makes self-absorption in the sample negligible. A model using Microshield (a commercially available shielding computer program) showed concrete reduced the dose rate by about 8% compared to water.

The minimum detectable activity (MDA) for Cs-137 on the gamma spectroscopy system being used to analyze survey soil samples is about 0.01 pCi/g. The MDA for a lower energy photon emitter (e.g., Ce-144, 134 keV) is about 0.1 pCi/g. Results of 15 split samples analyses from Thermo Nutech showed all samples less than 0.2 pCi/g for fission and activation product gamma

emitters. The guideline values for determining acceptability for release (draft NUREG-1500, Table B-2) are greater than 2 pCi/g.

For the above reasons, the current efficiency calibration method is considered acceptable for the analysis of the soil samples collected for this survey.

Along with the energy calibration check and the peak resolution (FWHM), radioactivity for 3 radionuclides (Co-57, Co-60, Cs-137) is tracked and charted on a daily basis.

The photo peak that failed the initial calibration check was for Am-241 (59.54 keV) and not Co-57 as stated in ODOE comments. The other 10 photo peaks were within the allowable range. Quality control checks for energy, FWHM and activity track detector stability on a daily basis.

Question 4

The Health Division survey showed that there appeared to be a significant increase in background (up to 2 times) at the corner of the fenced area opposite the corner of the spent fuel building. This is not expected. However, using the decommissioning plan criteria and current waste inventory, there should be a correction calculated. This would show that survey measurements in this area are in part due to the influence of waste storage, and will not be considered the background against which final release will be based.

Response

The higher background radiation levels experienced were due to radioactive waste stored in the RadWaste annex of the Auxiliary Building. When the material was moved to another location in the plant further from the survey area, radiation levels returned to expected levels. The background readings used for the site release survey will not be adjusted to include the contribution from the waste inventory.