ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

July 3, 2007

Mr. Theodore Smith
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Division of Waste Management
U.S. Nuclear Regulatory Commission
11545 Rockville Pike
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SUBJECT: CONFIRMATORY SURVEY RESULTS FOR THE EMERGENCY OPERATIONS FACILITY (EOF) AT THE CONNECTICUT YANKEE HADDAM NECK PLANT, HADDAM, CONNECTICUT [DOCKET NO. 50-0213; RFTA NO. 06-006]

Dear Mr. Smith:

The Oak Ridge Institute for Science and Education (ORISE) performed a confirmatory survey of the Emergency Operations Facility (EOF) at the Connecticut Yankee Haddam Neck Plant in Haddam, Connecticut on June 5 and 6, 2007. These survey activities were requested and approved by the U.S. Nuclear Regulatory Commission (NRC). Enclosed are the radiological survey results documenting these survey activities. The survey activities included alpha plus beta and gamma surface scans, direct measurements for total alpha plus beta activity, and removable activity measurements.

If you have any questions or comments, please direct them to me at 865.576.0065 or Sarah J. Roberts at 865.241.8893.

Sincerely,

Wade C. Adams

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CONFIRMATORY SURVEY RESULTS FOR THE EMERGENCY OPERATIONS FACILITY (EOF) AT THE CONNECTICUT YANKEE HADDAM NECK PLANT HADDAM, CONNECTICUT

INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) requested that the Oak Ridge Institute for Science and Education (ORISE) perform a confirmatory survey on the Emergency Operations Facility (EOF) at the Connecticut Yankee Haddam Neck Plant (HNP) in Haddam, Connecticut (Figure 1). The EOF building was used for emergency operations, a training center, and as an in-processing center for the HNP site. Whole body counters and the respirator fit test facility were also located in the EOF. Currently, the EOF is used as office space for the decommissioning project and recently, the Health Physics (HP) Count Room and Final Status Survey (FSS) instrumentation calibration activities were relocated to this facility. The EOF has always been located outside of the Radiological Control Area (RCA). The only known licensed radioactive materials used or stored in the facility were sealed calibration/check sources used for HP instruments and the Whole Body Counter and soil samples containing small amounts of radioactivity (CYAPCO 2007a).

During the free release surveys (FRS), Connecticut Yankee Atomic Power Company (CYAPCO) personnel identified several areas of elevated activity; most of the areas of identified elevated activity were deemed to be from naturally occurring radioactive materials (NORM) within clay tiles (CYAPCO 2007a). One location of site-generated elevated activity was determined on the floor in the north hallway. At this location, a portion of the carpet was removed for further evaluation by gamma spectroscopy and the results indicated cesium-137 (Cs-137) and cobalt-60 (Co-60) contamination within the carpet. It was suspected that the contamination entered the facility by adhering to the bottom of a workers' shoe and was transferred to the carpet. The floor below the concrete was further evaluated with no other indication of elevated activity in this location.

PROCEDURES

ORISE performed radiological survey activities on June 5 and 6, 2007. Survey activities included alpha plus beta and gamma surface scans, direct measurements for total net alpha plus beta activity and removable activity measurements. The objective of the confirmatory survey was to verify that no areas of elevated activity remained within the facility.

Confirmatory surveys were performed in accordance with a site-specific survey plan that was submitted to and approved by the NRC (ORISE 2006a). The site-specific survey plan follows the guidance provided in the ORISE Survey Procedures and Quality Program Manuals (ORISE 2006b and 2007a).

Document Review

ORISE reviewed CYAPCO's survey documentation to determine the appropriateness and adequacy of the FRS radiological instrumentation and procedures (CYAPCO 2007a and b). The FRS results for the EOF Building were provided prior to ORISE's radiological survey activities.

Health and Safety Overview

A safety walkdown of the EOF was performed to evaluate the area for potential health and safety hazards. Additionally, the proposed survey and sampling procedures were evaluated to ensure that any hazards inherent to the procedures themselves were addressed in current job hazard analyses (JHAs). As part of this required safety walkdown, a safety concern was identified by ORISE personnel and discussed with the Connecticut Yankee (CY) personnel. The concern was that building conditions were favorable for possible heat stress due to a malfunction in the air conditioning system. Fans were brought in to move and cool the air and water was provided. Adequate rest and re-hydration periods were observed.

Radiological Survey Procedures

Gamma scans were performed over approximately 70% of the accessible floor surface using sodium iodide (NaI) scintillation detectors coupled to ratemeters with audible indicators. Alpha plus beta scans were performed over approximately 50% of the accessible floor and 25% of the accessible lower wall (less than 2 meters) surfaces using gas proportional detectors coupled to ratemeter-scalers with audible indicators. Total and removable surface activity measurements were performed at 30 judgmentally selected locations throughout the facility. Measurement locations were selected based on past or present use of individual rooms, high trafficked areas, doors, lower walls and on the clay tiles which contained elevated levels of natural radioactivity. Locations where direct measurements and smears were taken in the EOF are indicated on Figure 2.

SAMPLE ANALYSIS AND DATA INTERPRETATION

Radiological data and sample media were returned to ORISE's laboratory in Oak Ridge, Tennessee for analysis and interpretation. Analyses were performed in accordance with the ORISE Laboratory Procedures Manual (ORISE 2007b). Smear samples were analyzed for alpha and beta activity using a low-background gas proportional counter. Smear results and direct measurements for total surface activity were converted to units of disintegrations per minute per 100 square centimeters (dpm/100 cm^2).

FINDINGS AND RESULTS

ORISE confirmatory survey activities did not detect any areas of elevated activity during surface scans. Direct measurements for total net alpha plus beta activity did not detect any areas of residual radioactivity greater than the minimum detectable concentration (MDC) of the measurement procedure as determined by ORISE. The ranges of total net beta surface activity and removable activity measurement for the EOF are provided in the table below:

TABLE 1: SURFACE ACTIVITY RANGES

Surface Activity Level Ranges (dpm/100 cm^2)		
Total Net Alpha plus Beta Surface Activity	Removable Activity	
	Alpha	Beta
-420 to 290	-0.4 to 1.5	-4.9 to 9.2

A complete listing of the surface activity level results is presented in Table 2.

COMPARISON OF RESULTS WITH GUIDELINES

The primary radionuclides of concern (ROCs) for the HNP are beta-gamma emitters including fission and activation products resulting from reactor operations. Cs-137 and Co-60 were identified during characterization as the predominant radionuclides present on surfaces.

CYAPCO used Appendix B of the *Vehicle and Material Release from Radiologically Controlled Areas and the CY Site* document to free release the EOF (CYAPCO 2007b). This document does not have any specific value release criteria for the EOF; instead it states that a positive instrument response is any "indication above background".

Alpha plus beta and gamma surface scans did not identify any locations of elevated activity on accessible surfaces within the EOF. All of the confirmatory results indicated that total and removable surface activity is at or below the MDC for the measurement procedure.

CONCLUSIONS

ORISE concludes that no area of elevated activity exists on the evaluated surfaces of the Emergency Operations Facility at the Connecticut Yankee Haddam Neck Plant in Haddam, Connecticut.

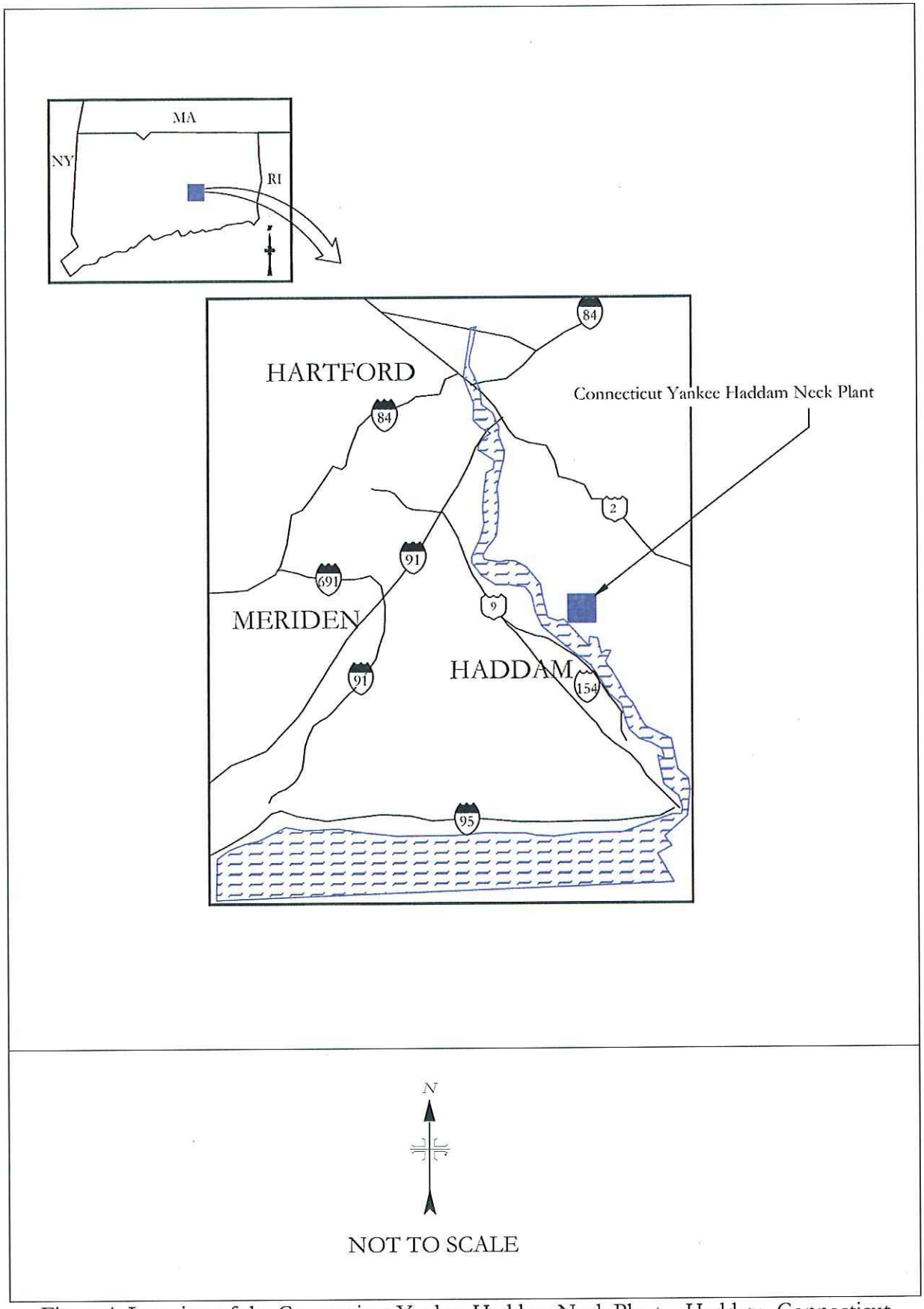

Figure 1: Location of the Connecticut Yankee Haddam Neck Plant – Haddam, Connecticut

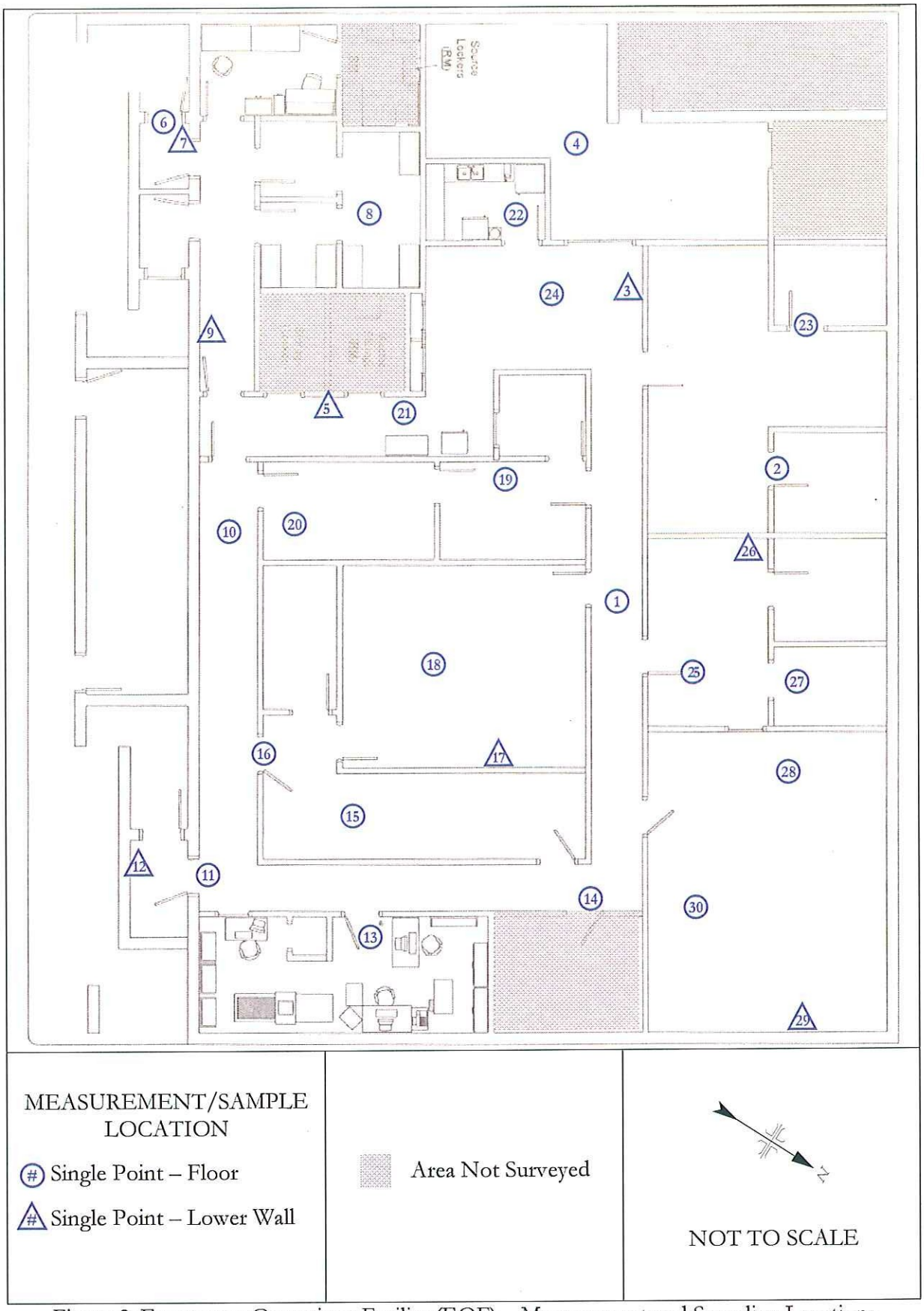

Figure 2: Emergency Operations Facility (EOF) – Measurement and Sampling Locations

TABLE 2

SURFACE ACTIVITY LEVELS
EMERGENCY OPERATIONS FACILITY (EOF)
CONNECTICUT YANKEE HADDAM NECK PLANT
HADDAM, CONNECTICUT

Location[a]	Surface[b]	Material	Surface Activity Levels (dpm/100 cm^2)		
			Total Net Alpha plus Beta Activity[c]	Removable Activity	
				Alpha[c]	Beta[c]
1	F	Linoleum	-77 ± 161[d]	-0.4 ± 1.6[e]	9.2 ± 9.4[e]
2	F	Linoleum	-57 ± 162	-0.4 ± 1.6	1.6 ± 7.5
3	LW	Plastic	160 ± 170	-0.4 ± 1.6	-1.6 ± 6.5
4	F	Concrete	-130 ± 190	-0.4 ± 1.6	-1.6 ± 6.5
5	LW	Clay Tile	-33 ± 259	-0.4 ± 1.6	1.6 ± 7.5
6	F	Concrete	-170 ± 180	1.5 ± 4.0	-2.7 ± 6.2
7	LW	Concrete	-370 ± 180	-0.4 ± 1.6	2.7 ± 7.8
8	F	Clay Tile	-120 ± 260	-0.4 ± 1.6	-1.6 ± 6.5
9	LW	Sheetrock	210 ± 170	-0.4 ± 1.6	1.6 ± 7.5
10	F	Carpet	120 ± 170	-0.4 ± 1.6	1.6 ± 7.5
11	F	Carpet	240 ± 170	-0.4 ± 1.6	-0.5 ± 6.9
12	LW	Concrete	-420 ± 170	-0.4 ± 1.6	-0.5 ± 6.9
13	F	Carpet	220 ± 170	-0.4 ± 1.6	-3.8 ± 5.8
14	F	Carpet	-20 ± 160	-0.4 ± 1.6	2.7 ± 7.8
15	F	Linoleum	-57 ± 162	-0.4 ± 1.6	1.6 ± 7.5
16	F	Linoleum	-140 ± 160	1.5 ± 4.0	0.5 ± 7.2
17	LW	Sheetrock	-85 ± 155	-0.4 ± 1.6	-1.6 ± 6.5
18	F	Carpet	-45 ± 159	-0.4 ± 1.6	3.8 ± 8.1
19	F	Carpet	-77 ± 157	-0.4 ± 1.6	2.7 ± 7.8
20	F	Carpet	-61 ± 158	-0.4 ± 1.6	-2.7 ± 6.2
21	F	Carpet	290 ± 180	-0.4 ± 1.6	0.5 ± 7.2
22	F	Linoleum	220 ± 180	1.5 ± 4.0	-4.9 ± 5.4
23	F	Linoleum	4 ± 165	-0.4 ± 1.6	-2.7 ± 6.2
24	F	Carpet	250 ± 170	-0.4 ± 1.6	-1.6 ± 6.5

TABLE 2 (continued)

SURFACE ACTIVITY LEVELS
EMERGENCY OPERATIONS FACILITY (EOF)
CONNECTICUT YANKEE HADDAM NECK PLANT
HADDAM, CONNECTICUT

Location[a]	Surface[b]	Material	Surface Activity Levels (dpm/100 cm^2)		
			Total Net Alpha plus Beta Activity[c]	Removable Activity	
				Alpha[c]	Beta[c]
25	F	Carpet	250 ± 170	-0.4 ± 1.6	0.5 ± 7.2
26	LW	Sheetrock	-110 ± 150	-0.4 ± 1.6	3.8 ± 8.1
27	F	Carpet	-77 ± 157	-0.4 ± 1.6	-0.5 ± 6.9
28	F	Carpet	-100 ± 160	-0.4 ± 1.6	-3.8 ± 5.8
29	LW	Sheetrock	260 ± 170	1.5 ± 4.0	1.6 ± 7.5
30	F	Carpet	-130 ± 150	-0.4 ± 1.6	-2.7 ± 6.2

[a]Refer to Figure 2.
[b]F=floor; LW = lower wall.
[c]The *a priori* minimum detectable concentrations (MDC) for these measurement procedures are 337, 9, and 15 dpm/100 cm^2 for total net alpha plus beta, alpha removable and beta removable activity, respectively.
[d]Total net activity uncertainties represent the 95% confidence level, based on counting statistics only.
[e]Removable activity uncertainties represent the 95% confidence level, based on total propagated uncertainties.

REFERENCES

Connecticut Yankee Atomic Power Company (CYAPCO). Technical Support Document: Free Release Survey Results for the Emergency Operations Facility (EOF). Document Number: CY-HP-0242, Revision 0. Haddam, Connecticut; May 10, 2007a.

Connecticut Yankee Atomic Power Company. Vehicle and Material Release from Radiologically Controlled Areas and the CY Site (RPM 2.2-22). Document Number: GGGR-R2206-001, Revision CY-005. Haddam, Connecticut; January 15, 2007b.

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