ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

November 17, 2005

Mr. Tom McLaughlin
U.S. Nuclear Regulatory Commission
Division of Decommissioning/Waste Management
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SUBJECT: IN-PROCESS INSPECTION SURVEY RESULTS FOR THE BUILDING 7304 VAULT EXCAVATION AT THE FORT BELVOIR MILITARY RESERVATION, FORT BELVOIR, VIRGINIA (DOCKET NO. 030-36574, RFTA NO. 05-003)

Dear Mr. McLaughlin:

The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) performed in-process inspection survey activities at the Building 7304 Vault Excavation at the Fort Belvoir Military Reservation in Fort Belvoir, Virginia on October 5, 2005. These survey activities were requested and approved by the U.S. Nuclear Regulatory Commission (NRC). The survey activities included gamma surface scans, soil sampling and drain pipe sampling. Enclosed are the in-process survey results documenting these survey activities.

If you have any questions or comments, please direct them to me at (865) 576-0065 or Scott Kirk at (865) 574-0685.

Sincerely,

Wade C. Adams

Wade C. Adams
Health Physicist/Project Leader
Environmental Survey and
Site Assessment Program

WCA:ar

Enclosure

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IN-PROCESS INSPECTION SURVEY RESULTS FOR THE BUILDING 7304 VAULT EXCAVATION AT THE FORT BELVOIR MILITARY RESERVATION FORT BELVOIR, VIRGINIA

INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) requested that the Oak Ridge Institute for Science and Education's (ORISE) Environmental Survey and Site Assessment Program (ESSAP) perform an in-process inspection survey of the Building 7304 Vault Excavation (Vault) at the Fort Belvoir Military Reservation (FBMR) in Fort Belvoir, Virginia. The in-process inspection surveys were performed on October 5, 2005.

PROCEDURES

The in-process inspection surveys were performed in accordance with a site-specific survey plan that was submitted to and approved by the NRC (ORISE 2005a). The ORISE/ESSAP Survey Procedures and Quality Assurance Manuals were also followed (ORISE 2004 and 2005b).

Gamma surface scans were performed over 90% of accessible portions of the Building 7304 Vault Grounds excavation using Field Instrument for the Detection of Low-Energy Radiation (FIDLER) and 1.25 x 1.5 inch (in) sodium iodide (NaI) scintillation detectors coupled to ratemeters with audible indicators. Soil samples, collected from 12 locations within the Vault, and a miscellaneous sample collected from within the drain line, are indicated on Figure 1. Five background soil samples were collected from various locations on the FBMR. These locations are not indicated on a figure.

SAMPLE ANALYSIS AND DATA INTERPRETATION

Radiological data and sample media were returned to ESSAP's laboratory in Oak Ridge, TN for analysis and interpretation. Radionuclide analyses were performed in accordance with the ESSAP Laboratory Procedures Manual (ORISE 2005c). Samples were analyzed by gamma spectroscopy for the primary radionuclides of interest (i.e., Cs-137, Am-241, and Th-232). The spectra were also reviewed for other identifiable total absorption peaks. Tritium (H-3) and carbon-14 (C-14) analyses were also performed on the samples. Additionally, the NRC requested plutonium analyses for several of the soil samples that exhibited elevated H-3 concentrations. The miscellaneous sample and the soil sample results were reported in units of picocuries per gram (pCi/g).

FINDINGS AND RESULTS

Gamma surface scans identified one location of elevated direct gamma radiation on the soil surfaces just outside the Class 2 survey unit at the Vault area (Soil Sample #11). The range of radionuclide concentrations for the miscellaneous drain sample and the 12 confirmatory soil samples collected by ESSAP from the Vault and the five background samples are as follows:

Sample Location	Range of Radionuclide Concentrations in ESSAP-Collected Soil/Miscellaneous Samples (pCi/g)						
	H-3	C-14	Cs-137	Am-241	Th-232	Pu-238	Pu-239
Vault Excavation and Drain Line	-3.2 to 597	-1.15 to 0.90	-0.01 to 1.27	-0.01 to 0.06	0.52 to 1.06	-0.02 to 0.01	0.00[a] to 0.04
Backgrounds	-4.0 to 0.6	-0.92 to 0.39	0.02 to 0.56	0.01 to 0.08	0.54 to 0.99	---[b]	---

[a]Zero values are due to rounding.
[b]Analyses not performed.

COMPARISON OF SOIL SAMPLE RESULTS AGAINST THE RELEASE CRITERIA

A comparison of the soil sample results against the derived concentration guideline levels (DCGLs) to determine whether or not the site was suitable for unrestricted release was performed. The DCGL's are listed in Table 1 for each radionuclide-of-concern (ROC) as specified in the final status survey plan [FSSP (CABRERA 2004)]. The in-process confirmatory surveys identified residual H-3 concentrations, in excess of the DCGL for H-3, in four soil samples within the Class 1 area, one soil sample at the drain pipe outfall and within the drain pipe residue sample. The radionuclide concentrations for all other ROC in these six samples and the remaining soil samples were below their respective DCGLs.

The results of these in-process survey activities indicate that the radiological conditions of the Building 7304 Vault Excavation are not suitable for unrestricted release in accordance with the cleanup criteria cited in the licensee's FSSP. A complete listing of the confirmatory sample results is presented in Table 2.

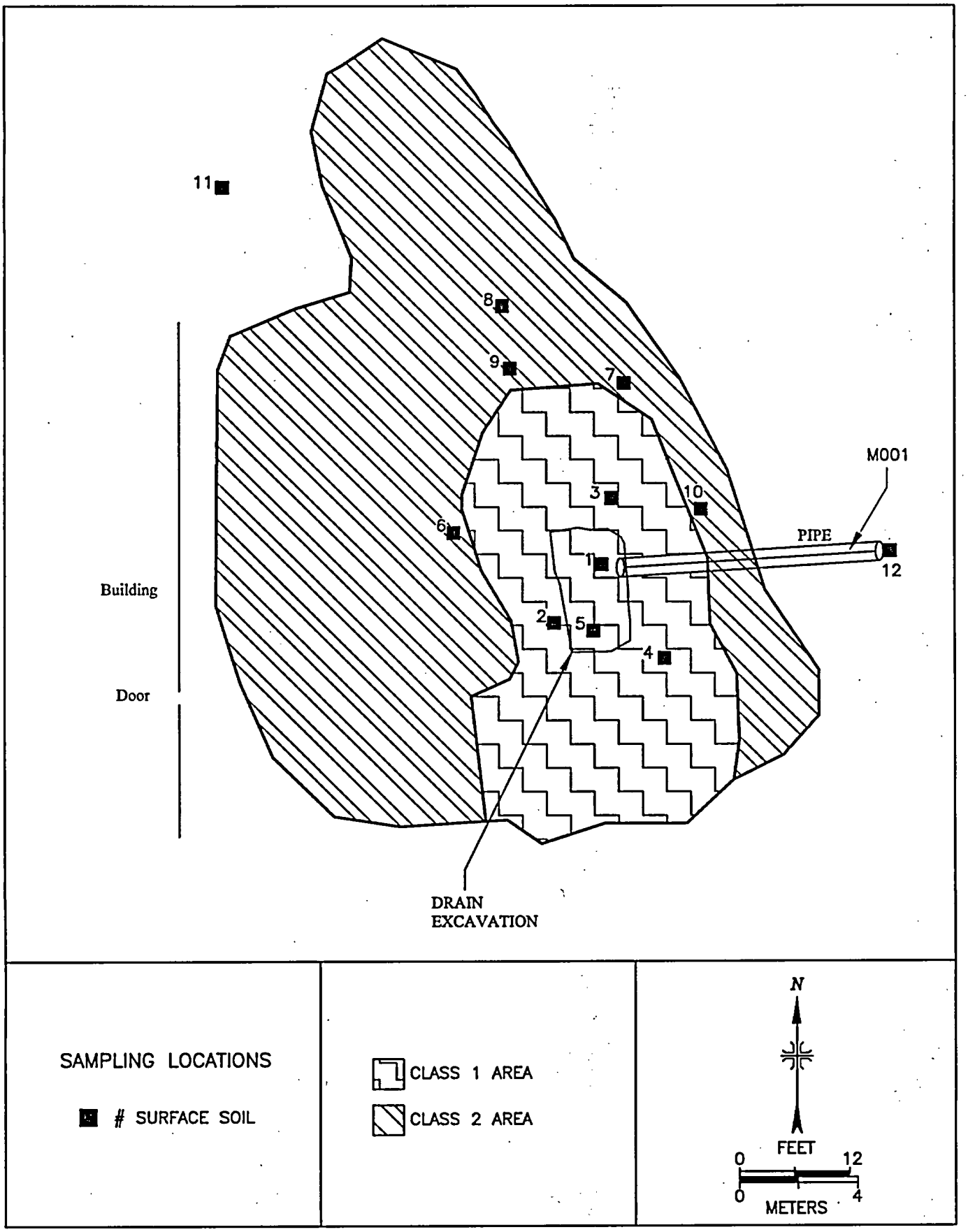

FIGURE 1: Building 7304 Vault Excavation - Sampling Locations

TABLE 1

SUMMARY OF SOIL DCGLs
FROM TABLE 3-1 OF THE DRAFT FINAL STATUS SURVEY PLAN
BUILDING 7304 VAULT EXCAVATION
FORT BELVOIR MILITARY RESERVATION
FORT BELVOIR, VIRGINIA

Radionuclide	DCGL (pCi/g)
H-3	110
C-14	12
Pm-147	8.2 E+03
Cs-137	11
Am-241	2.1
Th-232	1.1

TABLE 2

RADIONUCLIDE CONCENTRATIONS IN SOIL AND MISCELLANEOUS SAMPLES BUILDING 7304 VAULT EXCAVATION FORT BELVOIR MILITARY RESERVATION FORT BELVOIR, VIRGINIA

Sample Identification	Radionuclide Concentrations (pCi/g)						
	H-3	C-14	Cs-137	Am-241	Th-232	Pu-238	Pu-239
Class 1 Survey Unit[a]							
1633S0001	80.5 ± 7.5[b]	-0.61 ± 0.97	0.01 ± 0.02	0.01 ± 0.03	0.62 ± 0.06	0.00[c] ± 0.02	0.00 ± 0.01
1633S0002	150 ± 13	0.64 ± 0.92	0.02 ± 0.02	0.06 ± 0.03	0.58 ± 0.06	-0.02 ± 0.02	0.01 ± 0.01
1633S0003	597 ± 49	0.36 ± 0.92	0.18 ± 0.02	-0.01 ± 0.02	0.56 ± 0.05	0.00 ± 0.02	0.00 ± 0.00
1633S0004	529 ± 44	-0.48 ± 0.92	0.20 ± 0.03	0.00 ± 0.03	0.61± 0.05	0.01 ± 0.02	0.00 ± 0.01
1633S0005	360 ± 30	0.16 ± 0.91	0.13 ± 0.03	0.03 ± 0.04	0.57 ± 0.05	0.01 ± 0.02	0.00 ± 0.01
Class 2 Survey Unit[a]							
1633S0006	34.6 ± 4.1	0.8 ± 1.0	-0.01 ± 0.02	0.00 ± 0.04	0.73 ± 0.06	-0.01 ± 0.02	0.00 ± 0.01
1633S0007	33.9 ± 3.9	-0.02 ± 0.92	0.00 ± 0.01	0.01 ± 0.03	0.59 ± 0.05	-0.01 ± 0.02	0.00 ± 0.01
1633S0008	0.2 ± 2.1	-1.15 ± 0.90	0.01 ± 0.02	-0.01 ± 0.03	0.66 ± 0.06	---[d]	---
1633S0009	-1.0 ± 1.9	-0.63 ± 0.87	0.00 ± 0.02	0.00 ± 0.04	0.72 ± 0.06	---	---

TABLE 2 (continued)

RADIONUCLIDE CONCENTRATIONS
IN SOIL AND MISCELLANEOUS SAMPLES
BUILDING 7304 VAULT EXCAVATION
FORT BELVOIR MILITARY RESERVATION
FORT BELVOIR, VIRGINIA

Sample Identification	Radionuclide Concentrations (pCi/g)						
	H-3	C-14	Cs-137	Am-241	Th-232	Pu-238	Pu-239
Class 2 Survey Unit[a] – continued							
1633S0010	7.7 ± 2.3	-0.15 ± 0.89	0.28 ± 0.04	0.03 ± 0.04	0.52 ± 0.07	---	---
1633S0011	-3.2 ± 1.9	-0.11 ± 0.89	0.12 ± 0.02	0.01 ± 0.03	0.93 ± 0.07	---	---
1633S0012	166 ± 14	-0.34 ± 0.92	0.90 ± 0.07	0.01 ± 0.03	0.58 ± 0.06	0.01 ± 0.02	0.04 ± 0.02
Drain Line[a]							
1633M0001	363 ± 30	0.9 ± 1.1	1.27 ± 0.09	0.01 ± 0.04	1.06 ± 0.09	-0.02 ± 0.02	0.00 ± 0.01
Backgrounds[e]							
1633S0013	0.6 ± 2.0	-0.75 ± 0.90	0.29 ± 0.05	0.01 ± 0.05	0.99 ± 0.08	---	---
1633S0014	-3.3 ± 1.9	-0.92 ± 0.85	0.56 ± 0.06	0.08 ± 0.05	0.85 ± 0.08	---	---

TABLE 2 (continued)

RADIONUCLIDE CONCENTRATIONS
IN SOIL AND MISCELLANEOUS SAMPLES
BUILDING 7304 VAULT EXCAVATION
FORT BELVOIR MILITARY RESERVATION
FORT BELVOIR, VIRGINIA

Sample Identification	Radionuclide Concentrations (pCi/g)						
	H-3	C-14	Cs-137	Am-241	Th-232	Pu-239	Pu-240/241
Backgrounds[e] - continued							
1633S0015	-2.9 ± 1.9	0.39 ± 0.90	0.45 ± 0.05	0.01 ± 0.03	0.63 ± 0.06	---	---
1633S0016	-4.0 ± 2.0	-0.55 ± 0.91	0.02 ± 0.02	0.02 ± 0.03	0.54 ± 0.05	---	---
1633S0017	-3.1 ± 2.0	-0.46 ± 0.90	0.02 ± 0.02	0.05 ± 0.04	0.95 ± 0.08	---	---

[a]Refer to Figure 1.
[b]Uncertainties represent the 95% confidence level, based on total propagated uncertainties.
[c]Zero values are due to rounding.
[d]Analyses not performed.
[e]Figure not provided.

REFERENCES

Cabrera Services, Inc. (CABRERA). Draft Final—Final Status Survey Plan, Building 7304 Vault, Fort Belvoir, Virginia. Baltimore, Maryland; March 2004.

Oak Ridge Institute for Science and Education (ORISE). Survey Procedures Manual for the Environmental Survey and Site Assessment Program. Oak Ridge, Tennessee; September 2, 2004.

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Oak Ridge Institute for Science and Education. Quality Assurance Manual for the Environmental Survey and Site Assessment Program. Oak Ridge, Tennessee; July 28, 2005b.

Oak Ridge Institute for Science and Education. Laboratory Procedures Manual for the Environmental Survey and Site Assessment Program. Oak Ridge, Tennessee; June 20, 2005c.