Separations Process Research Unit
Radiological Completion Report for Lower Level Land Areas

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Accelerated Remediation Company
A Portage-Shaw Joint Venture

Separations Process Research Unit
Radiological Completion Report for Lower Level Land Areas

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Acronyms

aRc	Accelerated Remediation Company
cpm	counts per minute
CSAP	confirmation sampling and analysis plan
DCGL	derived concentration guideline level
DOE	U.S. Department of Energy
FIDLER	field instrument for detection of low-energy radiation
FSS	final status survey
GE	General Electric Company
GPS	global positioning system
KAPL	Knolls Atomic Power Laboratory
LBGR	lower bound of the gray region
LLRBA	Lower Level Rail Bed Area
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
QAPjP	quality assurance project plan
ROC	radionuclide of concern
SOR	sum of ratios
SPRU	Separations Process Research Unit
SPRU-LL	Separations Process Research Unit Lower Level
VSP	Visual Sample Plan

1.0 Executive Summary

This report documents the completion of the Separations Process Research Unit Lower Level (SPRU-LL) land area excavations performed by the Accelerated Remediation Company (aRc) in accordance with requirements specified in the *Radiological Confirmation Sampling and Analysis Plan/Final Status Survey (CSAP/FSS) for the Separations Process Research Unit Lower Level Land Areas* (ARC-PLN-6511). This plan follows guidance in the *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) (EPA et al. 2000).

The aRc scope of work, as defined in the U.S. Department of Energy (DOE) Environmental Management Contract No. DE-AM-0905SR22399, TO DE-AT30-07CC60013/SP15, was to safely remediate the SPRU-LL land area to allow for industrial reuse. This included the excavation and offsite disposal of wastes consistent with established cleanup criteria.

Soil remediation activities took place from the fall of 2008 through the summer of 2010. During remediation of the SPRU-LL, the area was divided into 17 units where a total of 331 samples were collected for offsite radiological analyses to support final status survey (FSS) work. Evaluation of the validated laboratory data for each unit was conducted and results reported in individual interim reports. All of these reports concluded that the radiological release criteria had been met; thus, further excavation was unnecessary and radiological cleanup requirements for the SPRU-LL have been achieved.

2.0 Introduction

The SPRU is located on the Knolls Atomic Power Laboratory (KAPL) at 2425 River Road in Niskayuna, Schenectady County, New York. DOE considered potential future uses at the KAPL site and evaluated the residual chemical and radiological contamination to develop remedial action objectives for the SPRU-LL. These objectives include (1) restoring the SPRU land areas to a state suitable for reuse by KAPL in an area zoned for industrial and research use, (2) reducing surveillance and maintenance costs, and (3) reducing or eliminating the potential for future radiological and chemical releases from SPRU-LL (DOE 2006).

Cleanup goals for radiological contamination are based on DOE Order 5400.5, “Radiation Protection of the Public and the Environment.” To meet these objectives in the SPRU-LL, aRc has removed radiological contamination left in the soils impacted by the former SPRU operations.

3.0 Physical Setting and Site Description

KAPL is located in the town of Niskayuna, Schenectady County, New York, on the southern bank of the Mohawk River. The KAPL site mission is expected to continue indefinitely. SPRU research and development activities were not associated with or used for KAPL programs. KAPL consists of 170 acres, located mostly on a bluff approximately 115 to 120 ft above the Mohawk River surface (Figure 1). Along the northern margin of the KAPL site, the land surface slopes steeply to a natural bench about 15 to 20 ft above the river’s surface.

The KAPL site, which fronts approximately 4,200 ft of the river, is bounded to the north and east by the Mohawk River; to the south by a mixture of open land, parks, and Niskayuna’s closed municipal landfill; to the west and southwest by a low-density suburban residential area; and to the west and northwest by an industrial research center.

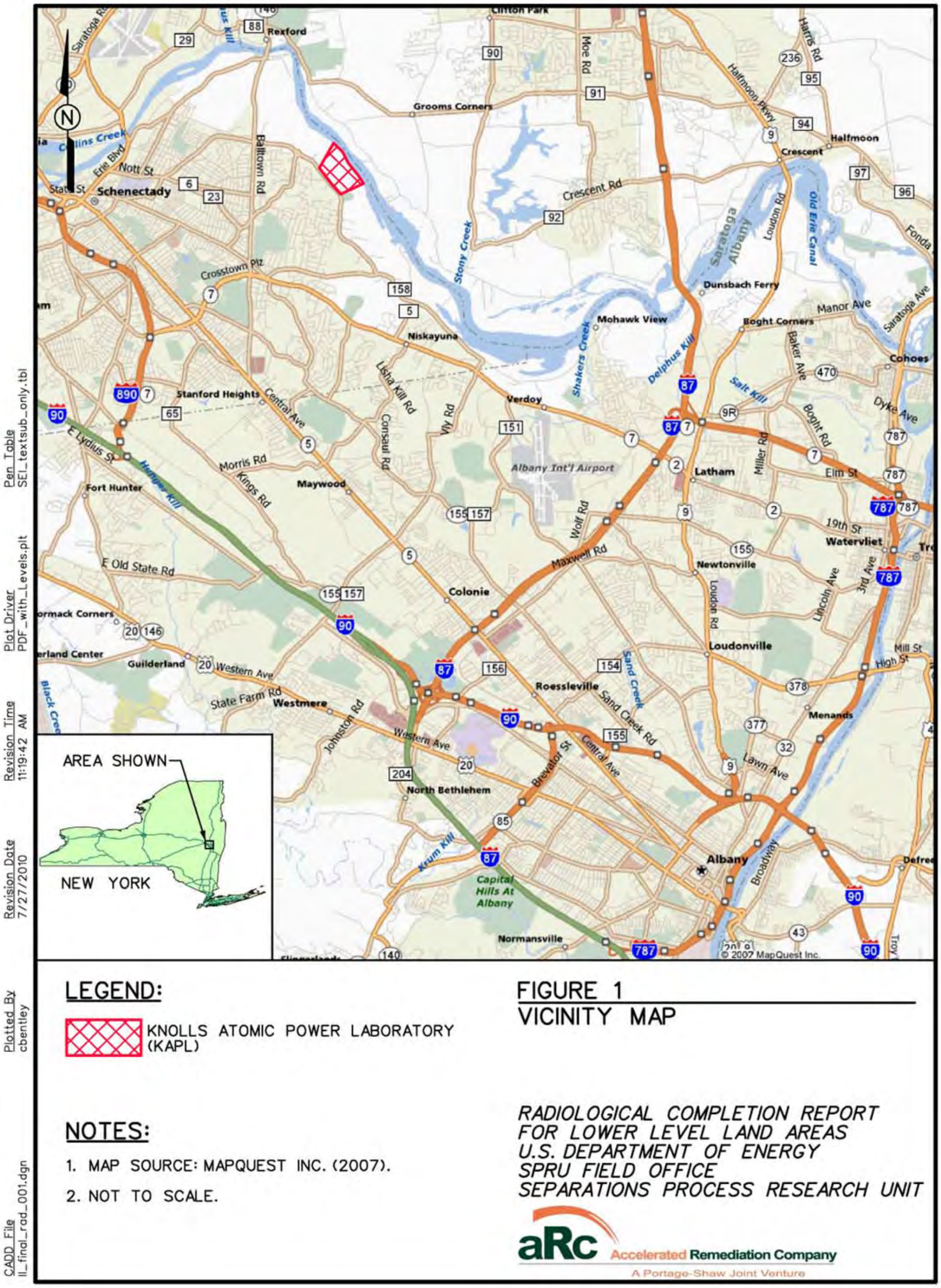

Figure 1 Vicinity map

KAPL is owned by the U.S. government and operated by Bechtel Marine Propulsion Corporation for the DOE Naval Reactors Laboratory Field Office-Schenectady. The KAPL site mission to design and develop nuclear-powered reactors for naval propulsion is expected to continue indefinitely. SPRU research and development activities were not associated with or used for the Naval Nuclear Propulsion Program.

The SPRU facilities were constructed in the late 1940s to research the chemical separation of plutonium and uranium. SPRU operated between February 1950 and October 1953, after which research activities ceased following successful development of reduction-oxidation and plutonium-uranium extraction processes. Research was performed on a laboratory and pilot-plant scale; SPRU was never a production plant. After discontinuing operations in October 1953, SPRU was maintained in a caretaking status until decommissioning began in 2000.

The SPRU-LL associated with this project is located on approximately 24 acres in the northwest corner of the KAPL site referred to as the Lower Level area (Figure 2). The SPRU-LL consists of two distinct areas (i.e., Lower Level Rail Bed Area [LLRBA] and Lower Level Parking Lot). The LLRBA contains the Former K6 Storage Pad, Former K7 Storage Pad, Railroad Staging Area, and the K5 Retention Basin.

The SPRU-LL area extends along the parking lot and old railroad spur within the bench between the SPRU-LL facility area and the hill slope rising up to the KAPL site upper level. The eastern portion of the SPRU-LL area is primarily a grassy surface with asphalt roadways bisecting the area (along the east-west and north-south axes). The western portion of the SPRU-LL area consists of an asphalt parking lot.

4.0 Scope of Work

The aRc scope of work, as defined in the DOE Environmental Management Contract No. DE-AM-0905SR22399, TO DE-AT30-07CC60013/SP15, was to safely remediate the SPRU land area to allow for industrial reuse of each site.

Remediation of the LLRBA included the removal of radiological contamination in the soil. These removal activities included the Railroad Staging Area, the former K7 Storage Pad, the former K6 Storage Facility, and the former K5 Retention Basin. Remediation of the Lower Level Parking Lot area included the removal of radiological contamination in the soil.

Remediation of the SPRU-LL also included the removal of chemically contaminated soil and debris in accordance with the New York State Department of Environmental Conservation, Resource Conservation and Recovery Act corrective action program that is documented in the *Separations Process Research Unit Final RCRA ICM Data Report for Lower Level Land Areas* (ARC-RPT-6035). The subject matter of this report is confined to radiological contamination and remediation only.

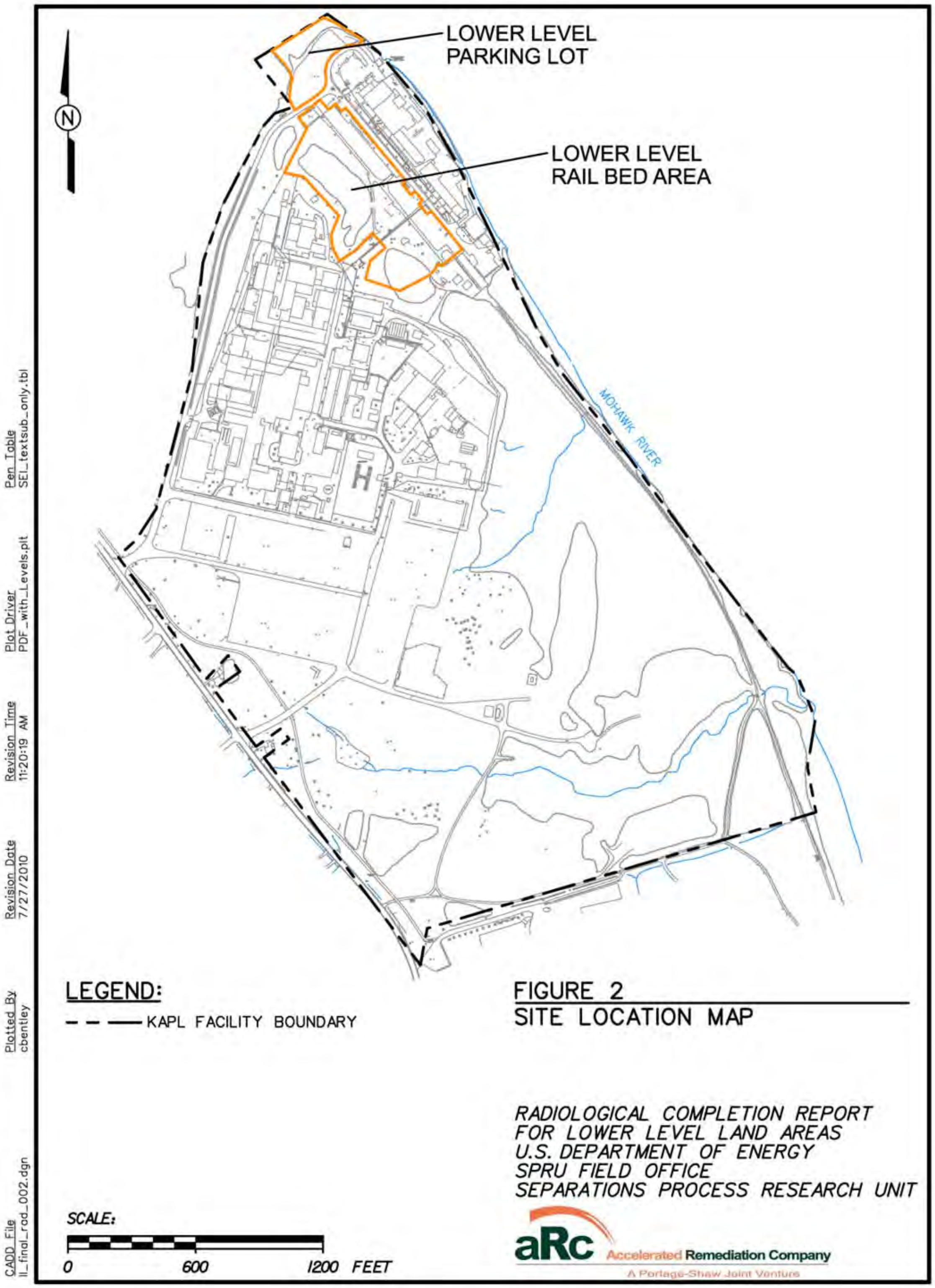

Figure 2 Site location map

5.0 Final Status Survey Program

5.1 General

Final status surveys of the SPRU-LL land areas were performed in accordance with the *Radiological Confirmation Sampling and Analysis Plan/Final Status Survey (CSAP/FSS) for the Separations Process Research Unit Lower Level Land Areas* (ARC-PLN-6511). This plan followed guidance in MARSSIM (EPA et al. 2000). Detailed implementation of the FSS is presented in individual survey unit design packages developed for each specific survey unit. Surveys were radiological assessments of field conditions using instruments as well as observations. Survey methods included gamma scintillation surface scans and discrete sampling. The survey activities were performed by trained, qualified personnel following documented operating procedures.

5.2 Area Classification

MARSSIM defines the following three classifications of impacted areas, based on potentials for residual contamination:

- Class 1—Areas that have, or had prior to remediation, a potential for radioactive contamination (based on site operating history) or known contamination (based on previous radiation surveys) above the derived concentration guideline level (DCGL). Examples include: site areas previously subjected to remedial actions; locations where leaks or spills are known to have occurred; former burial or disposal sites; waste storage areas; and areas with contaminants in discrete solid pieces of material with high specific activity.

- Class 2—Areas that have, or had prior to remediation, a potential for radioactive contamination or known contamination, but are not expected to exceed the DCGL. Examples include: locations where radioactive materials were present in unsealed form; potentially contaminated transport routes; areas downwind from stack release points; areas handling low concentrations of radioactive materials; and areas on the perimeter of former contamination control areas.

- Class 3—Any impacted areas that are not expected to contain any residual radioactivity, or are expected to contain levels of residual radioactivity at a small fraction of the DCGL, based on site operating history and previous radiation surveys. Examples include: buffer zones around Class 1 and Class 2 areas, and areas with a very low potential for residual contamination, but having insufficient information to justify a non-impacted classification.

Classifications and survey unit boundaries changed based on results of radiological monitoring and sampling as excavations progressed. However, it was intended that the SPRU Class 1 survey unit be aligned with and composed of two characterization grid units where practical.

5.2.1 Survey Units

A survey unit is a contiguous physical area of specified size and shape for which individualized decisions have been made as to whether the area exceeds the established cleanup criterion. All material in a survey unit possesses similar characteristics, such as the potential contaminants and contamination classification.

MARSSIM provides the following guidance for sizes of the land area survey units:

Class 1	Up to 2,000 m^2
Class 2	2,000 to 10,000 m^2
Class 3	No limit.

Land areas of less than 100 m^2 should not be designated as survey units. Instead, the level of survey effort should be (a) determined by the data quality objective process and data obtained, (b) based on judgment, and (c) compared directly to the DCGLs. No areas of less than 100 m^2 were surveyed as independent units on the SPRU-LL footprint.

5.2.2 Delineation of Survey Units

The extent and nature of contamination at the SPRU-LL were not thoroughly defined until remediation efforts were finished. The area received final classification and division into specific survey units after remedial actions were near completion and the FSS was imminent. Classification and survey unit boundaries followed the MARSSIM guidance as described in Sections 3.2.1 and 3.2.2 of the confirmation sampling and analysis plan (CSAP) (ARC-PLN-6511) and in consideration of physical site constraints, such as power poles and drainage culverts.

During CSAP/FSS activities, identification of residual activity above DCGL values in Class 2 or Class 3 survey units requires division, reclassification, and resurvey of impacted locations as Class 1. Residual activity between 25 and 100% of DCGL values in Class 3 survey units requires division, reclassification, and resurvey of impacted locations as Class 2. No such reclassification of Class 2 or Class 3 survey units occurred in the SPRU-LL.

5.3 Scans

Scans are in situ measurements of surface radiation levels performed with portable sodium iodide (NaI) gamma scintillation instruments to identify areas of elevated direct-gamma radiation that may indicate residual radionuclide concentrations in near-surface soil. Scanning was performed in accordance with ARC-PRC-6570, "SPRU Lower-Level Gamma Scintillation Walkover Scans." Instrument combinations used for scanning at SPRU include a Ludlum Model 44-10 2- × 2-in. detector, coupled with a Ludlum Model 2221 scaler/ratemeter. This instrument combination is particularly sensitive to gamma photons from cesium-137 (Cs-137)—the primary radionuclide contaminant at the site. Hereinafter, this instrument set will be called "2 × 2."

5.3.1 FSS Walkover Scans

"Walkover scans" are so named because they are performed by walking over the area of interest while monitoring the surface radiation levels with gamma scintillation detectors. Scans are performed with a 2 × 2 detector for gamma-emitting radionuclides. Headphones are used when ambient noise levels interfere with the surveyor's ability to detect increases in the audible signal of the instrument. Instrument audible responses are monitored for increases in count rate, and results are documented. Instruments are also equipped with global positioning system (GPS) capabilities to log survey coordinates and associated instrument response where survey or safety considerations and GPS signal availability permit. Locations identified as having elevated radiation levels are investigated; investigation may include rescanning and/or judgmental sampling.

5.3.2 Scanning Investigation Levels

Responses of 2 × 2 detectors have been determined for the SPRU-LL radionuclides of concern (ROCs) in a 1-m^2 surface soil area. In field conditions, distributions of contaminants in soil will not likely match the ideal conditions assumed in the response determination, and field survey techniques (e.g., distance from the detector to the surface and speed of detector movement) will vary, depending on surface conditions and the performance of the individual surveyor. In addition, count rates are based on observations over a short period. For these reasons, significant uncertainty is associated with logged and audibly detected count rates. If the increase is confirmed, the location and level of the maximum count rate are determined. The onsite analysis of a judgmental sample collected at this location is used to determine whether the DCGL for a gamma-emitting ROC is exceeded and, therefore, whether further excavation is required.

Cs-137 is the dominant ROC; it is the only ROC that has been identified in the SPRU-LL soils at a concentration exceeding its DCGL. The response of a 2 × 2 gamma scintillation detector for a 1-m^2 surface soil area has been calculated to be 300 counts per minute (cpm) per pCi/g of Cs-137. At the DCGL concentration for Cs-137 (30 pCi/g), a 2 × 2 detector should therefore yield a count rate of approximately 9,000 cpm above the ambient background count rate. Because of the associated uncertainties in field scan data, elevated count rates were investigated during the FSS; confirmed count rates greater than 5,850 cpm (65% of 9,000 cpm) with a 2 × 2 detector were evaluated further by sampling. If concentrations in these samples indicated that project criteria were exceeded, further remediation was performed and resurveys were conducted.

5.3.3 Discontinued Use of FIDLER Probe

The field instrument for detection of low-energy radiation (FIDLER), capable of detecting low-energy gamma emissions, was prescribed in the CSAP using the walkover scan technique to detect isotopic plutonium contamination by x-ray identification. In practice during remediation of the SPRU-LL land area, a high false positive count rate was experienced due to both Compton scattering of higher energy photons emitted by more prevalent isotopes (e.g., Cs-137) and an absence of plutonium contamination at levels that were detectable by the probe. Therefore, the probe and scans proved to be unreliable and did not contribute useful data regarding the as-left radiological conditions. Accordingly, a white paper (O'Hearn 2009) was prepared, and permission was received from the DOE (Feinberg 2010) to eliminate the use of the probe. Supporting information is located in Appendix F.

5.4 Samples

Soil sampling in support of the FSS can be divided into judgmental and systematic sampling. Soil sampling is conducted as described in ARC-PRC-6569, "SPRU Lower Level Project Radiological Soil Sampling Supporting Final Status Surveys." In addition, samples were obtained from locations of suspected contamination during excavation. These samples, known as investigative samples, are not part of the FSS, but they provide supplemental information for developing correlations between direct-gamma levels and Cs-137 concentrations. Also, analyses of investigative samples may be used to verify that gamma-emitting radionuclides, other than those already identified as ROCs, are not present.

5.4.1 Judgmental Sampling

Judgmental samples are collected concurrently with FSS gamma scintillation scanning. Judgmental sample results supplement systematic sampling data by providing more thorough survey unit coverage and confirm that elevated walkover gamma scintillation scan results are not associated with residual activity exceeding the project criteria.

5.4.2 Systematic Sampling

Systematic samples are so named because they are obtained on a systematic pattern to provide uniform coverage of the survey unit. The initial location of a sample in an FSS unit is determined randomly; afterward, surface (0- to 6-in. depth) sampling locations are systematically located on a triangular pattern with spacing between samples that is based upon the area of the FSS unit and the required number of samples.

The sample design method was performed in accordance with the requirements listed in the CSAP (ARC-PLN-6511) (refer to Section 4.0 of that document for details on FSS design). The sampling design used the sign test to determine the appropriate number of systematic samples to be taken. Because actual sample analytical data for comparable areas were not available at the time of sample design, aRc-SPRU used the MARSSIM-recommended generic values for shift (Δ) and standard deviation (σ) (EPA et al. 2000). With multiple ROCs, the unity rule, using the sum or ratios (SOR) of radionuclide concentrations to their respective DCGLs, is applicable. When using the unity rule, the overall project DCGL is 1.00, the MARSSIM-recommended lower bound of the gray region (LBGR) is 0.5, the value of Δ (DCGL – LBGR) is 0.5, and the recommended value for σ is 0.3. The relative shift, calculated based on these values, is 1.67. Based on this relative shift and decision errors of 0.025 for α and 0.10 for β, the minimum number of systematic samples (N) for demonstrating that the project criteria have been satisfied is 16, as determined from Table 4.5 of MARSSIM(σ) (EPA et al. 2000) .

To summarize, based on the unity rule and MARSSIM-recommended estimates in the absence of data, the following values were used for sample design for each of the survey units:

DCGL = 1.0

LBGR = 0.5

Δ = (DCGL – LBGR) = 1.0 – 0.5 = 0.5

σ = 0.3

Δ/σ = 1.67

α = 0.025

β = 0.10

N = 16.

The sample locations for each survey unit were set on a random-start triangular grid with spacing (L) determined as follows:

$$L = \sqrt{\frac{A}{(0.866)N}} \tag{1}$$

where

A = the survey unit area (ft^2)

N = the number of samples to be taken = 16.

Visual Sample Plan (VSP)™ software[a] was used to determine the random start point and coordinates of the triangular systematic sampling pattern.

The CSAP (ARC-PLN-6511) describes the post-excavation confirmation sampling for the SPRU-LL land area. The intent of the post-excavation sampling program was to confirm that soil had been removed to meet the soil cleanup objectives. Detailed quality assurance procedures for implementation of the CSAP are presented in the associated *Quality Assurance Project Plan for Radiological Confirmation Sampling at the Separations Process Research Unit Land Areas Remediation* (QAPjP) (ARC-PLN-6403).

5.5 Radiological Contaminants

Operational history and characterization surveys have identified 11 radionuclides, listed in Table 1, as potential contaminants or ROCs in SPRU-LL soils. The *Radiological Characterization Report for SPRU Outside Areas* (CH2M HILL 2006) identified Cs-137 as the only ROC in the SPRU-LL soils that exceeded its radiological cleanup goal (i.e., the DCGL). The other three ROCs detected in the SPRU-LL were thorium-232 (Th-232), plutonium-239/240 (Pu-239/240), and strontium-90 (Sr-90). These were all detected at concentrations that are less than their respective DCGLs. Although the latter three radionuclides were always collocated with Cs-137, the concentration ratios of these other three radionuclides to Cs-137 were not sufficiently consistent to enable use of Cs-137 as a surrogate for estimating their concentrations. However, the presence of Cs-137, detected by scan surveys, can be used as a reliable predictor that other radionuclides may be present.

Project criteria require that concentrations of all individual ROCs must be less than their respective DCGLs and that the SOR for all ROCs in soil must be less than 1.

A change was made to the analytical method for detection of strontium, specifically, from strontium-90 to total strontium, to reduce the analytical turnaround time from the laboratory. Supporting information regarding this change is provided in Appendix G.

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a. References herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise do not necessarily constitute or imply endorsement, recommendation, favoring, or condemnation by aRc or any company affiliated with aRc.

Table 1 Radionuclides of concern, DCGLs, and analytical methods

ROC	DCGL (pCi/g)	Offsite Analysis and Method						Onsite Analysis by Gamma Spectroscopy
		Required Minimum Detectable Activity (pCi/g)	Gamma (GA-01-R)	Iso Pu (A-01-R)	Iso Th (A-01-R)	Iso U (A-01-R)	Other	
Co-60	9.78	1	X					X
Sr-90	4,654	1					SR-03-RC	
Cs-137	30	2	X					X
Th-232	9.05	1			X			X
U-234	1,162	5				X		
U-235	188	2.5				X		X
U-238	851	5				X		X
Pu-238	792	2.5		X				X
Pu-239/240	714	2.5		X				X
Pu-241	19,120	2.5		X			With liquid scintilla-tion counting	
Am-241	574	1					A-01-R	X
Note: Offsite analyses are performed per Test America methods and procedures. Procedure Method A-01-R Mod is Iso (isotopic) U (uranium), Iso Pu (plutonium), Iso Th (thorium), and Am-241 (americium) by alpha spectrometry with extraction chromatography—sequential actinides. Procedure Method GA-01-R Mod is gamma spectrometry. Method SR-03-RC is Sr-90 by gas-flow proportional counting.								

5.6 Quality Assurance/Quality Control

5.6.1 Field Duplicates

In accordance with the QAPjP (ARC-PLN-6403), 5% of the systematic samples are field duplicated. This is performed by taking a second soil sample aliquot from the same location as one systematic sample for each FSS unit.

5.6.2 Comparison of Onsite Laboratory Results with Offsite Laboratory Results

All systematic samples were analyzed by both the onsite laboratory and the offsite laboratory. Offsite laboratory data take precedence over onsite laboratory data, because the offsite laboratory systems are generally more selective and sensitive. Furthermore, offsite laboratories generally have a quality assurance/quality control program that is more robust than the typical onsite laboratory.

In addition, 10% of all judgmental samples collected from each FSS unit and those for which onsite analysis indicates greater than 50% of the DCGL or a SOR greater than 0.75 were sent to the offsite laboratory for analysis. Onsite laboratory-generated data were compared with the offsite laboratory-generated data to ensure the accuracy of the onsite analysis in identifying residual contamination exceeding the project criteria.

5.6.3 Data Validation

One hundred percent of offsite laboratory data generated for FSS units was validated. The validation was a Level IV validation in accordance with the QAPjP.

6.0 Final Status Survey Units and Survey Results

6.1 Lower Level Survey Unit Descriptions

The following sections describe the condition of each of the SPRU-LL survey units at the time they were surveyed. Topographic maps of the excavations in the SPRU-LL are provided in Appendix A. The area has since been brought to final grade, paved, and/or hydro-seeded or left as found, as appropriate. All grid references refer to the grids in Figure 3.

6.1.1 Final Status Survey Unit 01

The FSS-01 unit has a surface area of 21,274 ft^2 (1,970 m^2). It is bordered on the north by FSS Unit 02 and on the east and the south by a security fence. The security fence location is slightly different than what is shown on previous project drawings. FSS-01 boundaries as described in this document are based on the "as found" security fence coordinates. FSS-01 is bordered on the west by FSS-04 and FSS-09. It occupies portions of characterization Grid Units 1108, 1109, 1112, 1113, 1115, 1116, 1119, and 1141. The excavation within this FSS unit has dimensions of approximately 365 linear ft, with a width up to 30 ft and a depth of up to 3 ft. Additional information can be found in the *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 01* (ARC-RPT-6003), included in Attachment 1.

6.1.2 Final Status Survey Unit 02

The FSS-02 unit has a surface area of 20,974 ft^2 (1,948 m^2). It is bordered on the west by FSS-09, FSS-11, and FSS-12; on the north by FSS-08; on the east by a security fence; and on the south by FSS-01. FSS-02 occupies portions of characterization Grid Units 1119, 1122, 1125, 1128, 1142, and 1143, and unnumbered grids east of 1128 and 1143. An excavation of the former rail bed runs the length of FSS-02. This survey unit includes portions of a fuel oil line, which was partially removed as part of the excavation of FSS-02. The area excavated in FSS-02 is approximately 70% of the total area with an average depth of 2 ft and a maximum depth of 8 ft where the fuel oil line was removed. The remaining portion of the fuel oil line was left in place in accordance with DOE direction (Upson 2009). Additional information can be found in the *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 02* (ARC-RPT-6004), included in Attachment 2.

6.1.3 Final Status Survey Unit 03

The FSS-03 unit has a surface area of 12,839 ft^2 (1,193 m^2). It is a rhomboid shape that shares borders with the fence line of the former K5 Retention Basin area. The survey unit occupies portions of characterization Grid Units 1106, 1107, 1110, 1111, and 1112. The excavation area within this FSS unit is approximately 3,000 ft^2; and the depth of excavation ranges to approximately 8 ft. Additional information can be found in the *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 03* (ARC-RPT-6011), included in Attachment 3.

6.1.4 Final Status Survey Unit 04

The FSS-04 unit has a surface area of 19,520 ft^2 (1,813 m^2). It is irregular in shape and shares borders with Survey Units FSS-01 on the northeast and FSS-03 on the northwest. It is bounded on the west side by Units FSS-05 and FSS-06. FSS-04 extends to the south beyond the security fence to the characterization Grid Line 1108. The survey unit occupies major portions of characterization Grid Units 1108 and 1112 and smaller portions of Grid Units 1107 and 1113. The excavation area within this FSS unit is approximately 9,450 ft^2; the average depth of excavation is approximately 2.5 ft with a maximum depth of approximately 4 ft. The southern portion of this survey unit contains small areas of dense groundcover. Additional information can be found in the *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 04* (ARC-RPT-6012), included in Attachment 4.

6.1.5 Final Status Survey Unit 05

The FSS-05 unit has a surface area of 15,099 ft^2 (1,403 m^2). The survey unit occupies major portions of characterization Grid Units 1106 and 1107. The FSS-05 unit is irregular in shape and shares borders with FSS-04 on the east and FSS-03 on the north. The southern boundary is that of characterization Grid Units 1106 and 1107, and the western boundary is that of characterization Grid Unit 1106. The survey unit has a steeply sloping topography with increasing elevation toward the south and west. Vegetative cover is also heavy, particularly in the southern portion of the survey unit. No remediation was performed in FSS-05, because no radiological contamination exceeding the project cleanup criteria was identified by previous characterization surveys of this parcel. Additional information can be found in the *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 05* (ARC-RPT-6013), included in Attachment 5.

6.1.6 Final Status Survey Unit 06

The FSS-06 unit has a surface area of 15,692 ft^2 (1,458m^2). The survey unit occupies almost the entire area of characterization Grid Unit 1110, smaller portions of Grid Units 1114 and 1111, and an unnumbered grid to the west of 1110. FSS-06 is irregular in shape and shares borders with FSS-03 and FSS-04. Survey Units FSS-07 and FSS-09 border FSS-06 to the north. A steam supply line crosses FSS-06 from southwest to northeast. Topography is sloping with increasing elevation to the south and west portions of the survey unit. Varying degrees of groundcover were present. An excavation approximately 20 ft in diameter and up to 1.5 ft in depth was performed in Grid Unit 1114 in the north-center portion of the survey unit. Surface soil (0- to 6-in. depth) was also scraped from an area of approximately 1 ft^2 beneath the steam supply line expansion joint in Grid Unit 1111. Additional information can be found in the *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 06* (ARC-RPT-6014), included in Attachment 6.

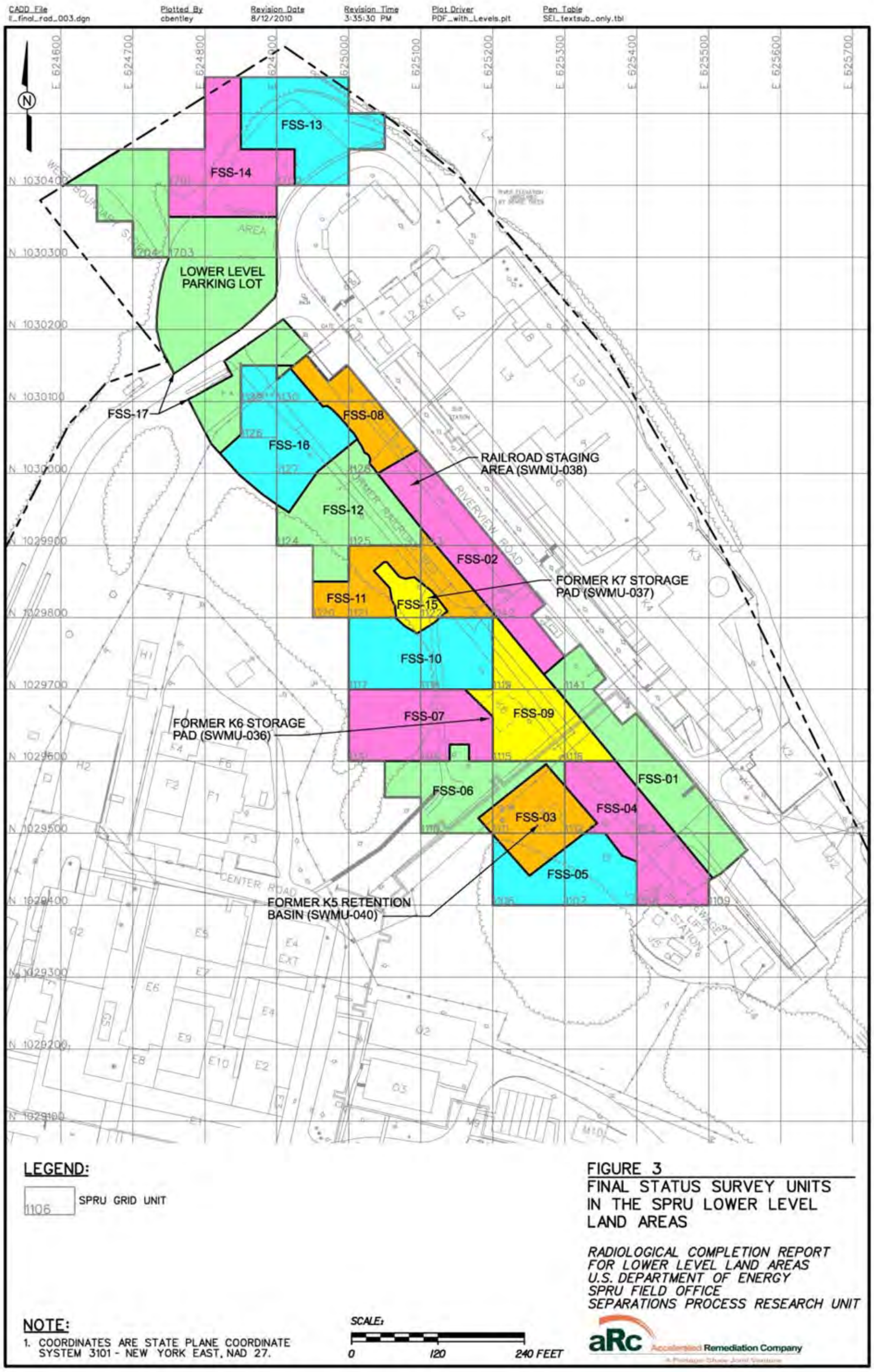

Figure 3 SPRU-LL FSS units map

6.1.7 Final Status Survey Unit 07

The FSS-07 unit has a surface area of 18,620 ft^2 (1,730 m^2). It is bounded on the north by FSS-10, on the east by FSS-09, on the south by FSS-06, and on the south and west by the unaffected hillside below the KAPL site. All of Grid Unit 1131 and a large portion of Grid Unit 1114 lie within FSS-07. No excavation was planned in this unit; however, after completion of the FSS, a small amount of nonradiological excavation encroached from FSS-09 into FSS-07 due to benching and overlaps from Excavation EX-10 in FSS-09; see related figure in Appendix A. Additional information can be found in the *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 07* (ARC-RPT-6024), included in Attachment 7.

6.1.8 Final Status Survey Unit 08

The FSS-08 unit has a surface area of 9,630 ft^2 (895 m^2). It is bounded on the north by a fence protecting the secure KAPL area, on the west by FSS-17, and on the south by FSS-02, FSS-16, and FSS-12. Portions of Grid Units 1127, 1128, 1130, and the unnumbered grid to the east of Grid Unit 1130 lie within FSS-08. The area excavated in FSS-08 is approximately 21% of the total area to an average depth of about 2 ft. Additional information can be found in the *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 08* (ARC-RPT-6022), included in Attachment 8.

6.1.9 Final Status Survey Unit 09

The FSS-09 unit has a surface area of 18,455 ft^2 (1,715 m^2).[b] This unit contains the footprint of the former K6 Storage Area. The unit is situated directly northwest of FSS-01 and extends beneath the steam pipe that transects the site. Approximately 45% of this unit was remediated with one excavation centered on the northeast edge of what was the former K6 storage pad and extending down to bedrock. The unit contains portions of the characterization Grid Units 1114, 1116, 1119, and nearly all of 1115. Additional information can be found in the *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 09* (ARC-RPT-6030), included in Attachment 9.

6.1.10 Final Status Survey Unit 10

The FSS-10 unit has a surface area of 19,279 ft^2 (1,791 m^2). It is bounded on the north by FSS-11 and FSS-15, on the east by FSS-09, on the south by FSS-07 and FSS-09, and on the west by unaffected land in the SPRU-LL. Parts of Grid Units 1117 and 1118 lie within FSS-10. The area excavated in FSS-10 is approximately 35% of the total area to a maximum depth of about 6 ft. Grid 1117, predominantly unaffected, is a part of the relatively steep hillside in the western part of the SPRU-LL, while Grid Unit 1118 was relatively flat before excavation. Additional information can be found in the *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 10 and 11* (ARC-RPT-6031), included in Attachment 10.

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b. The actual area surveyed was somewhat larger than this to accommodate excavation sloping extending into previously surveyed areas. For systematic sample design purposes, this reported area is retained with the recognition that the overall area is well within the 2,000 m^2 recommended by MARSSIM (EPA et al. 2000) for Class 1 areas.

6.1.11 Final Status Survey Unit 11

The FSS-11 unit has a surface area of 15,389 ft^2 (1,430 m^2). It is bounded on the north by FSS-12, on the east by FSS-02, on the south by FSS-10, and on the west by unaffected land in the SPRU-LL. The FSS-15 unit lies within the center of FSS-11. Grid Unit 1120 and part of Grid Units 1121, 1122, 1142, and 1143 lie within FSS-11. The area excavated in FSS-11 is approximately 10% of the total area to a maximum depth of about 3 ft, with most of the excavation at a depth of 1 ft.

Grid Unit 1120 and part of Grid Unit 1121 are predominantly unaffected and are a part of the relatively steep hillside in the western part of the SPRU-LL, while the remaining parts of Grid Units 1121, 1122, and 1142 were relatively flat before excavation. Additional information can be found in the *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 10 and 11* (ARC-RPT-6031), included in Attachment 10.

6.1.12 Final Status Survey Unit 12

The FSS-12 unit has a surface area of 20,626 ft^2 (1,916 m^2). It is bounded on the north by FSS-16; on the east by FSS-02, FSS-08, and FSS-11; on the south by FSS-11; and on the west by unaffected land in the SPRU-LL. Part of Grid Units 1120, 1124, 1125, 1127, and 1128 lie within FSS-12. The area excavated in FSS-12 is approximately 40% of the total area to a maximum depth of about 3 ft, with most of the excavation at a depth of 1 ft.

Grid 1120 and part of Grid 1124 are predominantly unaffected and are a part of the relatively steep hillside in the western part of the SPRU-LL, while the remaining parts of Grids 1124, 1124, 1127, and 1128 were relatively flat before excavation. Additional information can be found in the *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 12* (ARC-RPT-6033), included in Attachment 11.

6.1.13 Final Status Survey Unit 13

The FSS-13 unit has a surface area of 21,091 ft^2 (1,959 m^2). It is bounded on the north by the unaffected open land on the KAPL site and General Electric Company (GE) sites and by the Mohawk River and land controlled by the State of New York, on the east by the Mohawk River and land controlled by the State of New York and the KAPL lower level access road, on the south by the KAPL lower level access road and FSS-14, and on the west by FSS-14. Parts of Grid Units 1701 and 1702 lie within FSS-13. A portion of the KAPL Lower Level Parking Lot and the adjacent hillside are located in FSS-13. The area excavated in FSS-13 is approximately 33% of the total area to a depth of about 10 ft at the deepest as the hillside was excavated away at the edge of the parking lot.

The survey unit area includes 5,868 ft^2 (545 m^2) of area that was inaccessible to scan/sample survey due to safety concerns or area outside of the land turned over to SPRU from KAPL. Causes for the inaccessibility of areas included the steep gradient to the river, control of the access road, and site property boundaries. Additional information can be found in the *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 13 and 14* (ARC-RPT-6026), included in Attachment 12.

6.1.14 Final Status Survey Unit 14

The FSS-14 unit has a surface area of 20,480 ft^2 (1,903 m^2). It is bounded on the north by the unaffected open land on the KAPL and GE sites, on the east by FSS-13 and the KAPL lower level access road, on the south by FSS-17, and on the west by the unaffected open land on the KAPL site. Parts of Grid Units 1701, 1702 and 1703 lie within FSS-14. A portion of the KAPL Lower Level Parking Lot and the adjacent hillside are located in FSS-14. The area excavated in FSS-14 is approximately 25% of the total area to a depth of about 10 ft at the deepest as the hillside was excavated away at the edge of the parking lot. The survey unit area includes 558 ft^2 (52 m^2) of area that was inaccessible to scan/sample survey because the grid extended beyond the KAPL property boundary. Additional information can be found in the *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 13 and 14* (ARC-RPT-6026), included in Attachment 12.

6.1.15 Final Status Survey Unit 15

The FSS-15 unit has a surface area of 4,549 ft^2 (423 m^2). It is bounded on the north, east, and west by FSS-11 and on the south by FSS-10. Parts of Grid Units 1117, 1118, 1121, and 1122 lie within FSS-15. The area excavated in FSS-15 is approximately 10% of the total area to a maximum depth of about 2 ft.

The parts of Grid Units 1117, 1118, 1121, and 1122 that lie within FSS-15 were relatively flat and covered with asphalt before excavation. Additional information can be found in the *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 15* (ARC-RPT-6034), included in Attachment 13.

6.1.16 Final Status Survey Unit 16

The FSS-16 unit has a surface area of 21,530 ft^2 (2,000 m^2). It is bounded on the north by FSS-17, on the east by FSS-8, on the south by FSS-12, and on the west by an unaffected area in the LLRBA and FSS-12. Grid Units 1126, 1129, and parts of 1124, 1127, 1128, and 1130 lie within FSS-16. The area excavated in FSS-16 is approximately 80% of the total area to a maximum depth of about 2 ft.

The FSS-16 unit was relatively flat before excavation. A road covered with asphalt crosses the unit from northwest to southeast. There is a security fence and gate for the road in the north end of FSS-16. Additional information can be found in the *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 16 and 17* (ARC-RPT-6037), included in Attachment 14.

6.1.17 Final Status Survey Unit 17

The FSS-17 unit has a surface area of 49,570 ft^2 (4,605 m^2). It is bounded on the north by unaffected areas on the KAPL and GE properties and by FSS-14, on the east by unaffected KAPL property and FSS-14, on the south by FSS-08 and FSS-16, and on the west by unaffected area in the SPRU-LL and KAPL property. Grid Unit 1704 and part of 1703 lie within FSS-17. There was no excavation in FSS-17, and it is being classified as a Class 2 unit in accordance with MARSSIM (EPA et al. 2000). Note that the post-excavation topographical map for FSS-17 in Appendix A shows a small area of excavation in the southern portion of FSS-17; however, this area of excavation was conducted during and accounted for as part of the FSS-16 excavation.

Grid Unit 1704, which lies within FSS-17, is heavily wooded and has steep terrain. The remainder of the unit is relatively flat. Part of a parking area is in the center of the unit. Approximately 55% of FSS-17 is covered by asphalt. There is a section of security fence in the south end of FSS-17. Additional information can be found in the *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 16 and 17* (ARC-RPT-6037), included in Attachment 14.

6.2 Results Summary

The results are presented by isotope by survey unit in the interim FSS reports. Table 2 presents an overall summary of the FSS sample results (by SOR) and the numbers of FSS samples taken. Isotopic-specific results are included in each of the individual survey unit FSS reports as referenced in Table 2. A total of 272 systematic samples were analyzed in addition to 59 judgmental samples. The maximum SOR for any statistical sample was 0.491. The average SOR for all SPRU-LL statistical samples was 0.131, or 13% of the criteria limit. Figure 4 shows the sampling locations for all statistical samples taken in the SPRU-LL.

Figure 5 presents the aggregated GPS-correlated scan data for the 2 × 2 NaI (Tl) probe for the SPRU-LL. Cs-137 was the predominant radiological contaminant measured in SPRU soils. The calculated efficiency for uniformly distributed Cs-137 in the top 6 in. of soil is 300 cpm/pCi/g for the 2 × 2 NaI(Tl) probe. Because the site DCGL for Cs-137 is 30 pCi/g, the expected detector response to the DCGL in soil should be 9,000 (30 × 300) cpm.

The basis for ranges on Figure 5 is as follows: The green coding represents readings below the background mean (localized by survey unit) plus 65% of the DCGL. The yellow coding reflects data points above the mean plus 65% of the DCGL but less than the count rate that would indicate possible Cs-137 concentrations at the 30 pCi/g DCGL. Based on a detector response of 300 cpm per pCi/g, as determined for the scanning detection sensitivity, 9,000 cpm above the ambient background level would indicate a possible Cs-137 concentration of 30 pCi/g. Red coding would indicate a count rate associated with possible residual Cs-137 activity above the DCGL. Note that all areas plotted as red in Figure 5 were re-scanned, determined to not have reproducible elevated count rates, and/or confirmed to be acceptable by judgmental sampling.

As evident in Figure 5, there are areas where GPS-logged data were not available. This is due to the absence of GPS signal or inaccessibility of the area. Scans of these areas were performed by remotely accessing the areas and without GPS logging. Documentation of these non-GPS scans is retained as survey records.

7.0 Special Surveys

There were four additional non-MARSSIM surveys performed that represent the as-left status of the site. These are:

- An investigation of possibly contaminated soil discovered under a sheet of plastic. This report is included as Appendix B.
- Repeat surveys performed within the footprint of FSS-01 to verify that this area was not impacted from the discharge of potentially contaminated water in the area. This report is included as Appendix C.

- A survey investigation of the soils excavated as a result of the abandoned stormwater discharge system piping. This report is included as Appendix D.

- A survey investigation of soil remediation activities performed on a utility pole and associated guy wires in the LLRBA. These surveys are included as Appendix E.

None of the special surveys performed indicated that contamination in excess of the release criteria remains in place in the SPRU-LL.

Table 2 Systematic sum of ratios sample results summary for the survey units of the SPRU-LL

Survey Unit	Interim Report	Area (m^2)	Class	Systematic Samples	Judgmental Samples	FIDLER Scans Performed	SOR Maximum	SOR Mean	Standard Deviation
FSS-01	ARC-RPT-6003	1,970	1	16	4	Yes	0.22	0.14	0.032
FSS-02	ARC-RPT-6004	1,948	1	16	5	Yes	0.262	0.151	0.056
FSS-03	ARC-RPT-6011	1,193	1	16	6	Yes	0.218	0.142	0.034
FSS-04	ARC-RPT-6012	1,813	1	17	15	Yes	0.491	0.168	0.092
FSS-05	ARC-RPT-6013	1,403	1	16	0	Yes	0.193	0.134	0.024
FSS-06	ARC-RPT-6014	1,458	1	16	3	Yes	0.175	0.123	0.024
FSS-07	ARC-RPT-6024	1,730	1	16	3	No	0.411	0.140	0.076
FSS-08	ARC-RPT-6022	895	1	16	0	No	0.175	0.102	0.040
FSS-09	ARC-RPT-6030	1,715	1	16	12	No	0.422	0.180	0.096
FSS-10	ARC-RPT-6031	1,791	1	16	2	No	0.206	0.131	0.039
FSS-11	ARC-RPT-6031	1,430	1	16	1	No	0.425	0.150	0.088
FSS-12	ARC-RPT-6033	1,916	1	16	2	No	0.164	0.124	0.027
FSS-13	ARC-RPT-6026	1,959	1	16	3	No	0.165	0.117	0.022
FSS-14	ARC-RPT-6026	1,903	1	16	2	No	0.154	0.103	0.018
FSS-15	ARC-RPT-6034	423	1	16	0	No	0.181	0.138	0.022
FSS-16	ARC-RPT-6037	2,000	1	16	1	No	0.153	0.124	0.022
FSS-17	ARC-RPT-6037	4,605	2	16	1	No	0.178	0.117	0.025

NOTES:
All statistics presented are in SOR values.
The standard deviation values presented are based on SOR values.

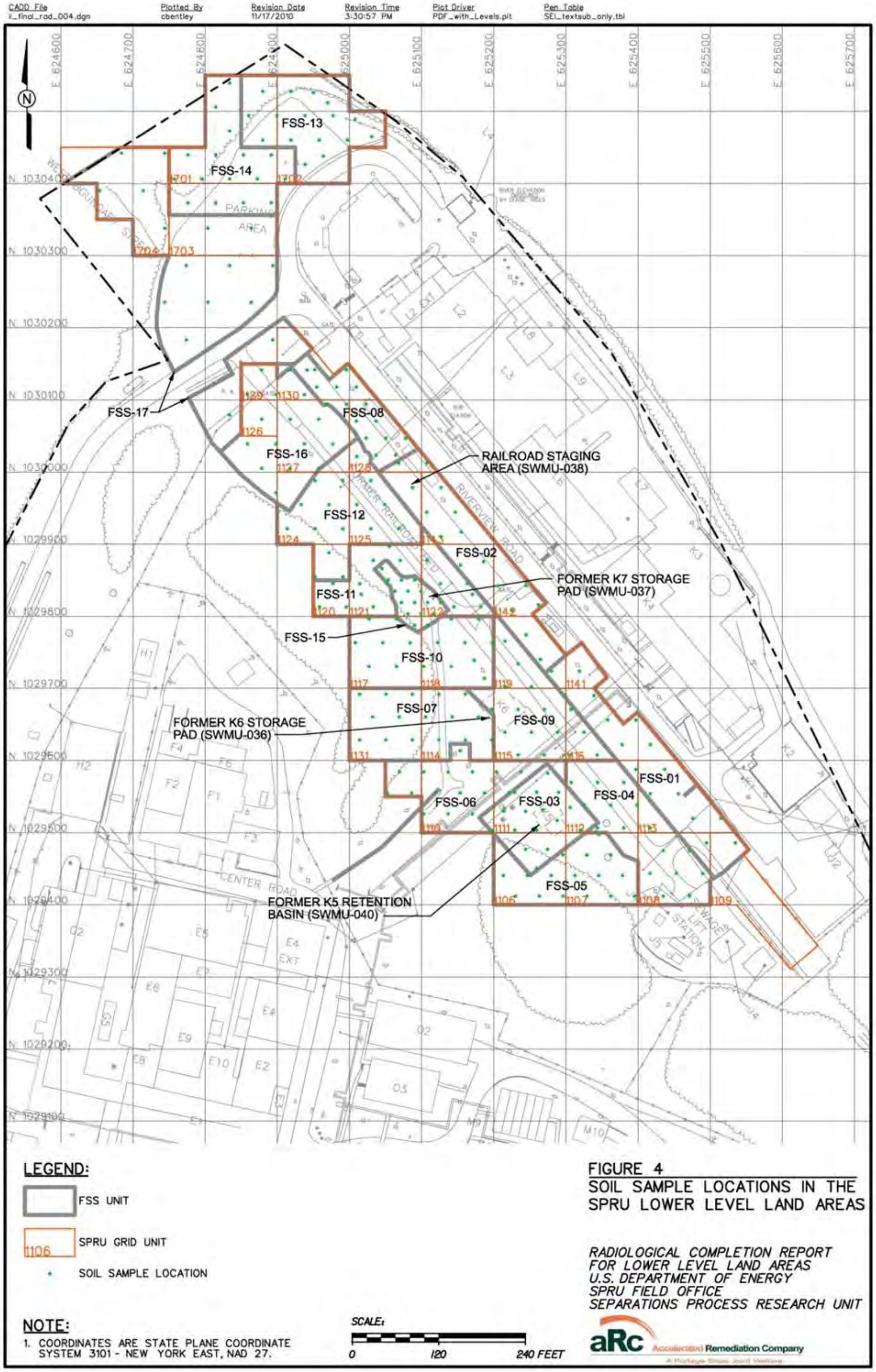

Figure 4 Sampling locations for all FSS units

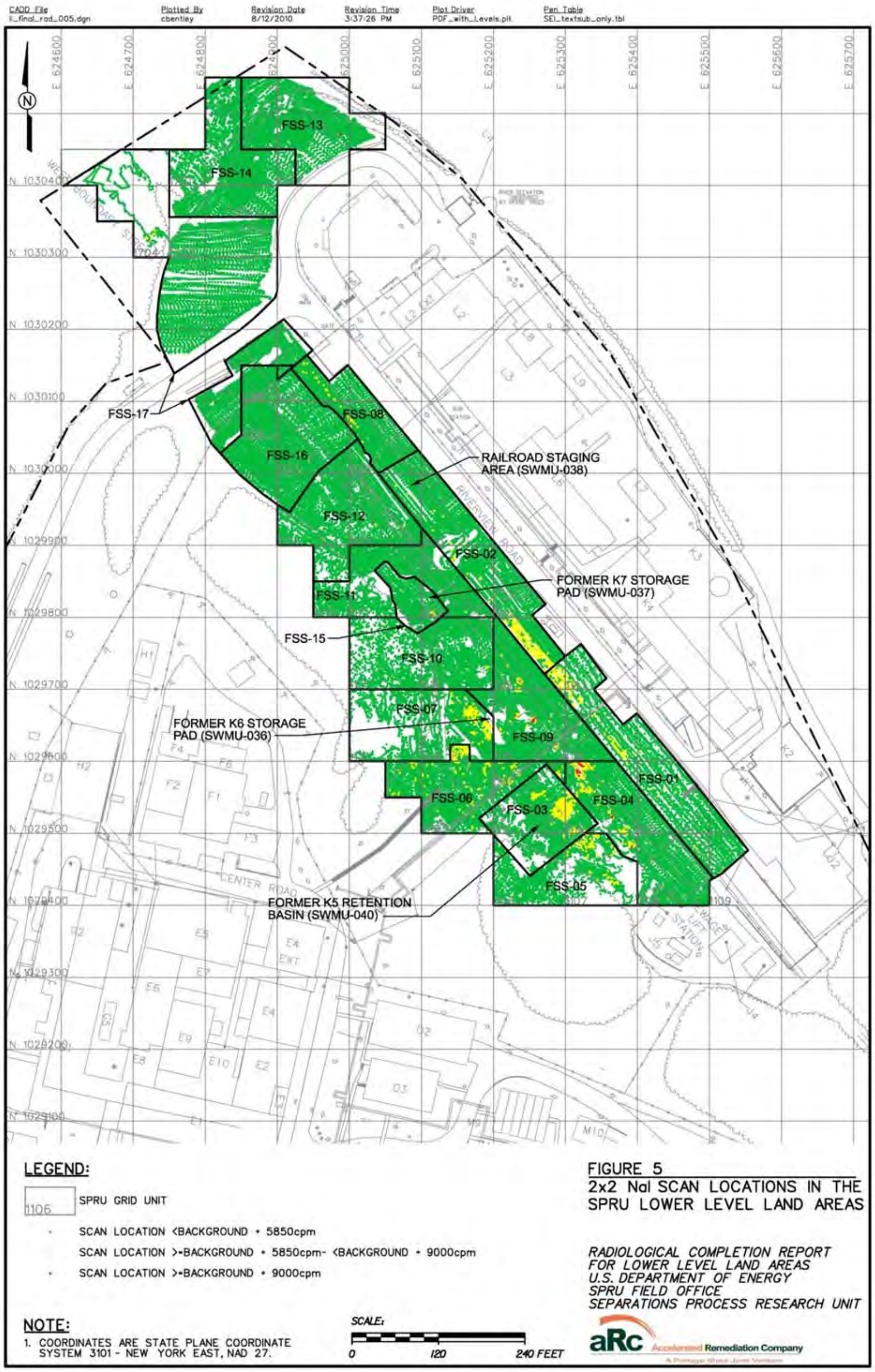

Figure 5 Aggregated GPS scan data

8.0 Conclusions

During remediation of the SPRU-LL, the area was divided into 17 survey units. Gamma scintillation walkover scans of each survey unit's surface were performed. Gamma scans did not identify gross gamma activity at a level that denotes contamination above the DCGLs for any ROC.

Systematic soil samples were taken from each survey unit in accordance with MARSSIM guidance (EPA et al. 2000). Analytical results for the systematic soil samples indicated no activity greater than the DCGLs for any ROC. Furthermore, no SOR for any systematic sample was equal to or greater than 1.00.

The MARSSIM analysis rejects the null hypothesis that the soil in the SPRU-LL is contaminated; therefore, in accordance with the acceptance criteria, the SPRU-LL survey units each individually satisfied the project radiological criteria.

After gamma scintillation surveys and sampling were completed, access to the survey units on the SPRU-LL was controlled to prevent the potential for contamination from ongoing activities in adjacent areas. Any future work performed in the area will be overseen by the radiological controls group and covered under a radiological work permit that is specific for FSS work.

Civil surveys were conducted after completion of each of the FSS units. These surveys represented the final contour of each unit after excavation was completed. Appendix A includes a series and compilation of topographical maps of all of the surveys conducted for the SPRU-LL remediation. An estimated total of 9,431 yd^3 of banked materials was removed during the SPRU-LL remediation. No further excavation is recommended at the SPRU-LL. Upon completion of the remediation in the Lower Level, the remediated areas were backfilled, graded, and hydro-seeded or paved to restore area conditions to initial pre-remediation status. See final topographical survey, which follows the post-excavation figures in Appendix A.

9.0 References

ARC-RPT-6003, *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 01*, Accelerated Remediation Company, current revision.

ARC-RPT-6004, *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 02*, Accelerated Remediation Company, current revision.

ARC-RPT-6011, *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 03*, Accelerated Remediation Company, current revision.

ARC-RPT-6012, *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 04*, Accelerated Remediation Company, current revision.

ARC-RPT-6013, *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 05*, Accelerated Remediation Company, current revision.

ARC-RPT-6014, *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 06*, Accelerated Remediation Company, current revision.

ARC-RPT-6022, *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 08,* Accelerated Remediation Company, current revision.

ARC-RPT-6024, *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 07,* Accelerated Remediation Company, current revision.

ARC-RPT-6026, *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Units 13 and 14*, Accelerated Remediation Company, current revision.

ARC-RPT-6030, *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 09,* Accelerated Remediation Company, current revision.

ARC-RPT-6031, *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Units 10 and 11*, Accelerated Remediation Company, current revision.

ARC-RPT-6033, *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Units 12,* Accelerated Remediation Company, current revision.

ARC-RPT-6034, *Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Units 15,* Accelerated Remediation Company, current revision.

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ARC-PLN-6403, *Quality Assurance Project Plan for Radiological Confirmation Sampling at the Separations Process Research Unit Land Areas Remediation,* Accelerated Remediation Company, current revision.

ARC-PLN-6511, *Radiological Confirmation Sampling and Analysis Plan/Final Status Survey (CSAP/FSS) for the Separations Process Research Unit Lower Level Land Areas*, Accelerated Remediation Company, current revision.

ARC-PRC-6569, "SPRU Lower Level Project Radiological Soil Sampling Supporting Final Status Surveys," Accelerated Remediation Company, current revision.

ARC-PRC-6570, "SPRU Lower-Level Gamma Scintillation Walkover Scans," Accelerated Remediation Company, current revision.

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DOE, 2006, *Engineering Evaluation Cost Analysis for the Separations Process Research Unit Disposition Project*, U.S. Department of Energy, December 2006.

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Fienberg, Steven, DOE-SPRU Field Office, to J. O'Hearn, aRc, January 6, 2010 "Discontinuance of FIDLER Scans in the SPRU Lower Level," SPRU 10-004.

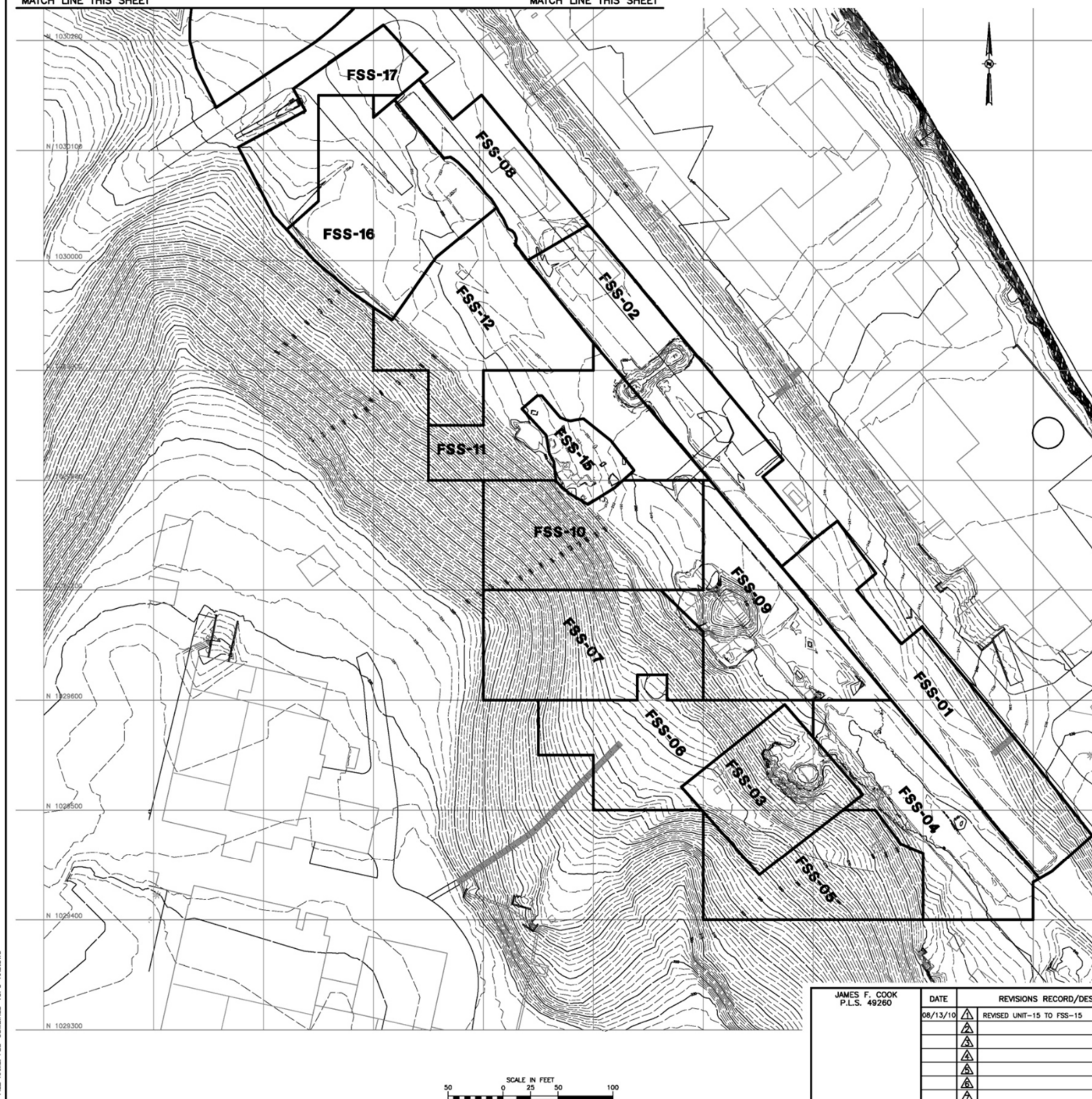
O'Hearn, J., aRc, to Steven Fienberg, DOE-SPRU Field Office, October 7, 2009, "Proposed Cost Savings Initiative Regarding a Discontinuance of FIDLER Scans in the Lower Level," LAR-09-118.

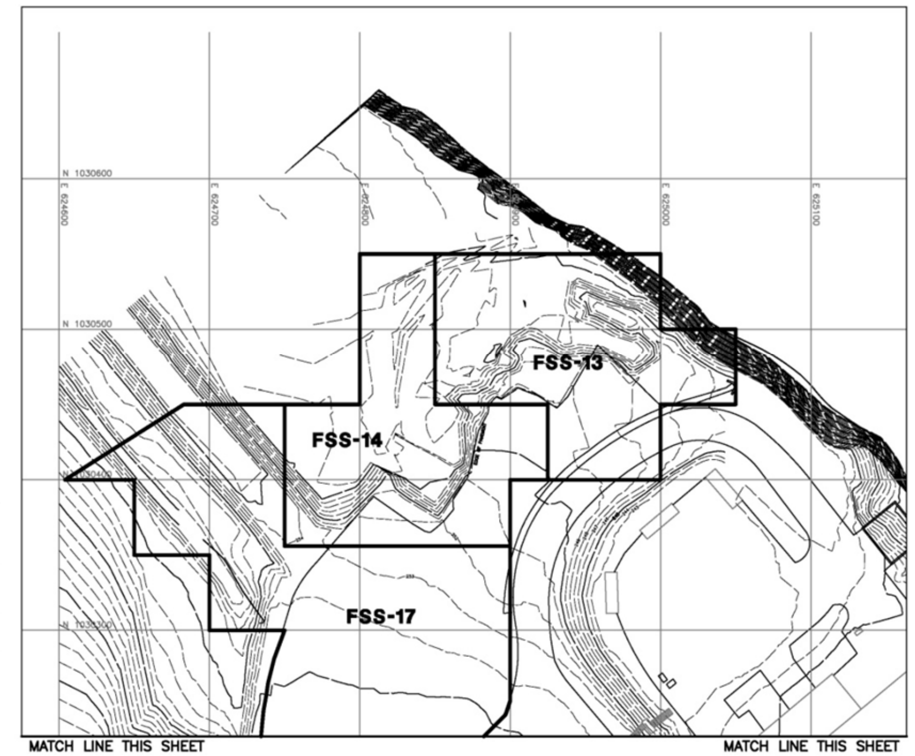
Upson, J. A., Naval Reactors Laboratory Field Office, to J. J. Rampe, DOE-SPRU Field Office, March 30, 2009, "DOE-SPRU contractor (aRc) Completion Reports for Final Status Survey Unit 01, NRFLO Comments and Request for DOE-SPRU Action."

Appendix A
Post Excavation Figures

XREFS: NONE

PROJECT NUMBER: 08.8078





MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted between November 2008 to June 2010.
2. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
3. Vertical datum established from KAPL Rubinski Control drawings.
4. Total bank soil volume removed from FSS Units was computed as 9,431 cu. yds. based on this, drawing and the associated drawing titled "Lower Level FSS Units Pre–Excavation Topography."

MAP REFERENCES:

1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01–144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities – Database Record" Drawing: Y–Y–13301 sheets 3, 8, 9, 10 – 28dec03; REV–1 – 19July06.

JAMES F. COOK
P.L.S. 49260

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTER	CHECK	APPR.
08/13/10	1	REVISED UNIT–15 TO FSS–15	MMB	JFC	
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CHECKED : JFC
PROJ. NO: 08.8078
SCALE :
DATE : JULY 14, 2010

**LOWER LEVEL FSS UNITS (RAD SAMPLING)
POST-EXCAVATION TOPOGRAPHY**

KAPL SPRU LAND AREAS REMEDIATION PROJECT

TOWN OF NISKAYUNA — SCHENECTADY COUNTY, NEW YORK

C.T. MALE ASSOCIATES, P.C.
50 CENTURY HILL DRIVE, LATHAM, NY 12110
518.786.7400 • FAX 518.786.7299
ARCHITECTURE & BUILDING SYSTEMS ENGINEERING • CIVIL ENGINEERING
ENVIRONMENTAL SERVICES • SURVEY & LAND INFORMATION SERVICES

SHEET 2 OF 2
DWG. NO: 10–473

CAD DWG. FILE NAME: FSS-COMBINED-TOPO-RAD.DWG

Accelerated Remediation Company
A Portage-Shaw Joint Venture

XREFS: NONE

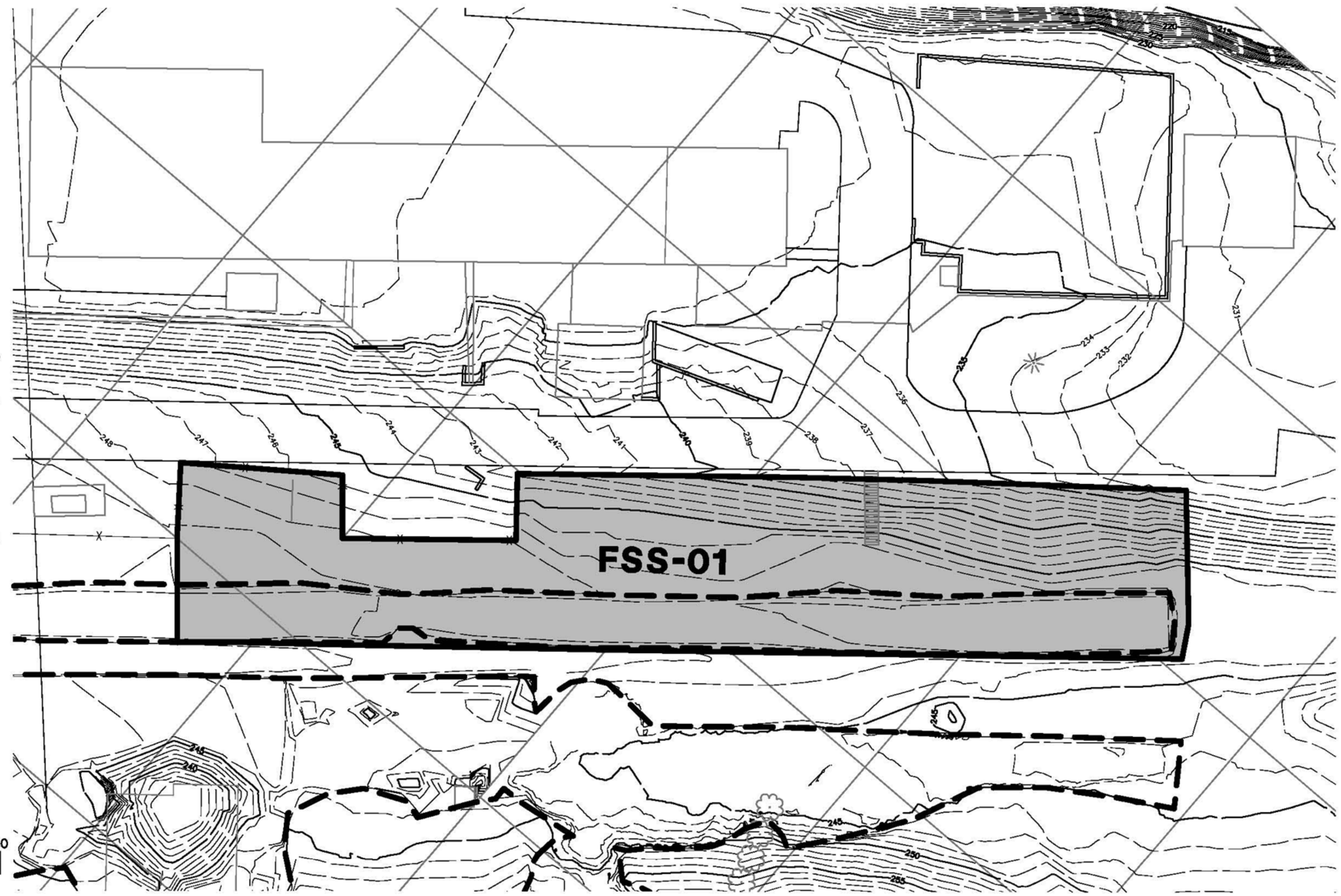
PROJECT NUMBER: 08.8078

MAP NOTES:

1. Excavations and Sample locations shown hereon were compiled from an actual field survey conducted during the months of November and December 2008.
2. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
3. Vertical datum established from KAPL Rubinski Control drawings.
4. Total bank soil volume removed from EX06, FSS–01 was computed as 481 cu. yds. based on this drawing and the associated drawing titled "FSS–01 Area Pre–Excavation Topography."

MAP REFERENCES:

1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01–144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities – Database Record" Drawing: Y–Y–13301 sheets 3, 8, 9, 10 – 28dec03; REV–1 – 19July06.



LEGEND

EXCAVATION LIMITS

SCALE IN FEET

40 0 20 40 80

CAD DWG. FILE NAME:FSS–COMBINED–TOPO–RCRA.DWG

CAD DWG. FILE NAME:FSS–COMBINED–TOF

JAMES F. COOK
P.L.S. 49260

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
06/30/10	1	ADDRESSED CLIENT COMMENTS	MMB	JFC	
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FSS-01 AREA POST-EXCAVATION TOPOGRAPHY

KAPL SPRU LAND AREAS REMEDIATION PROJECT

TOWN OF NISKAYUNA SCHENECTADY COUNTY, NEW YORK

C.T. MALE ASSOCIATES, P.C.
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ENVIRONMENTAL SERVICES • SURVEY & LAND INFORMATION SERVICES

SHEET 2 OF 2
DWG. NO: 08–734

XREFS: NONE

PROJECT NUMBER: 08.8078

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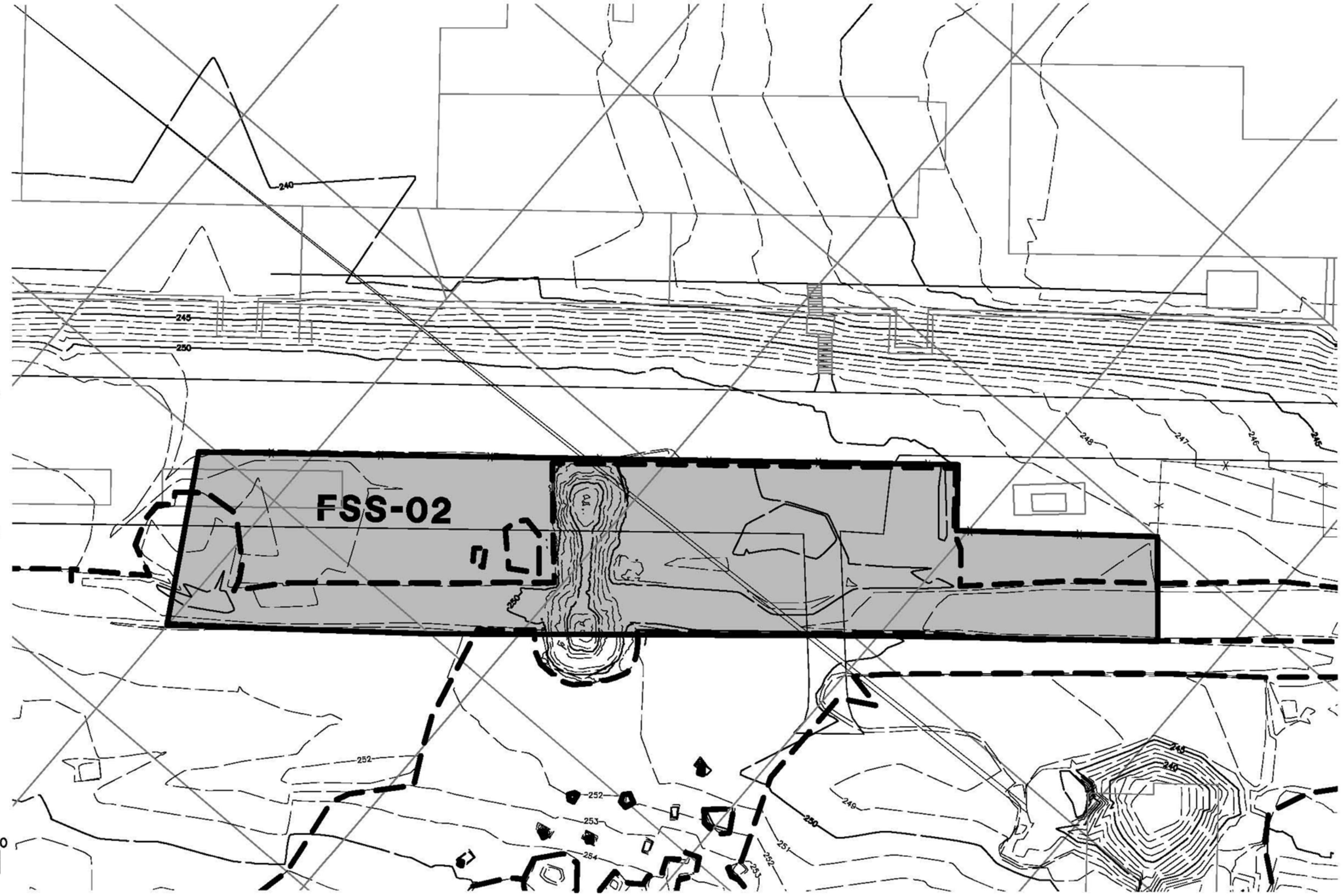

MAP NOTES:

1. Excavations and Sample locations shown hereon were compiled from an actual field survey conducted during the months of November and December 2008 and April 2009.
2. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
3. Vertical datum established from KAPL Rubinski Control drawings.
4. Total bank soil volume removed from FSS–02 was computed as 939 cu. yds. based on this drawing and the associated drawing titled "FSS–02 Area Pre–Excavation Topography."

MAP REFERENCES:

1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01–144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities – Database Record" Drawing: Y–Y–13301 sheets 3, 8, 9, 10 – 28dec03; REV–1 – 19July06.

LEGEND

EXCAVATION LIMITS

SCALE IN FEET

40 0 20 40 80

JAMES F. COOK
P.L.S. 49260

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
4/23/09	1	ADDITIONAL EXCAVATION AREAS SHOWN	MMB	JFC	
6/1/09	2	REVISED FSS–2 BOUNDARY PER CLIENT COMMENT	MMB	JFC	
06/30/10	3	ADDRESSED CLIENT COMMENTS	MMB	JFC	
07/01/10	4	REVISED EXCAVATION LIMITS	MMB	JFC	
	5				
	6				
	7				
	8				
	9				

DESIGNED :
DRAFTED : MMB
CHECKED : JFC
PROJ. NO: 08.8078
SCALE :
DATE : DEC. 16, 2008

FSS-02 AREA POST-EXCAVATION TOPOGRAPHY

KAPL SPRU LAND AREAS REMEDIATION PROJECT

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SHEET 2 OF 2
DWG. NO: 08–735

XREFS: NONE

PROJECT NUMBER: 08.8078

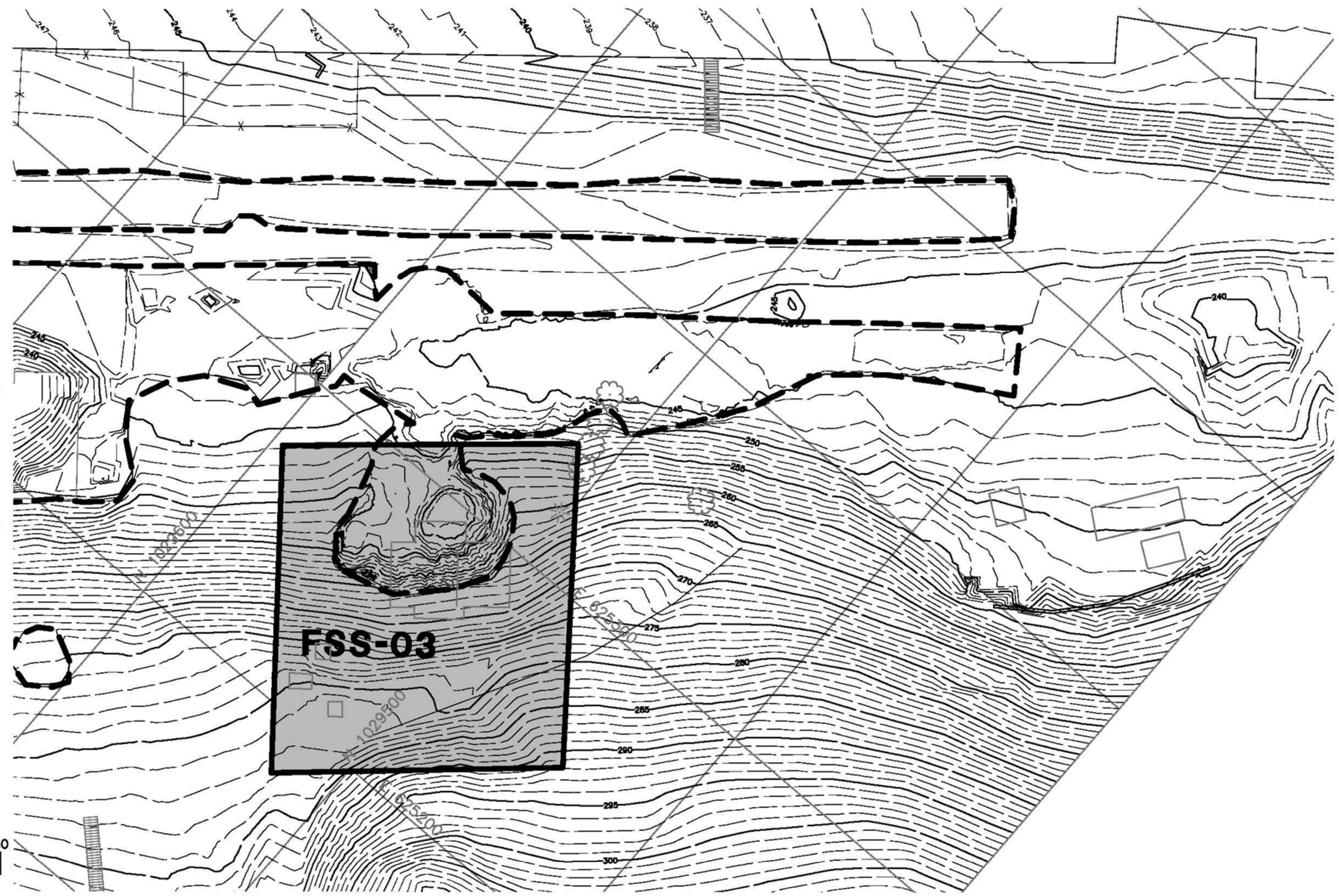
CAD DWG. FILE NAME:FSS-1-4.DWG

MAP NOTES:

1. Excavations and Sample locations shown hereon were compiled from an actual field survey conducted during the month of May 2009.
2. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
3. Vertical datum established from KAPL Rubinski Control drawings.
4. Total bank soil volume removed from FSS-03 was computed as 521 cu. yds. based on this, drawing and the associated drawing titled "FSS-03 Area Pre-Excavation Topography."

MAP REFERENCES:

1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01-144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities - Database Record" Drawing: Y-Y-13301 sheets 3, 8, 9, 10 - 28dec03; REV-1 - 19July06.



LEGEND

EXCAVATION LIMITS

SCALE IN FEET
40 0 20 40 80

JAMES F. COOK
P.L.S. 49260

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
06/18/09	1	REVISED SOIL SAMPLE LOCATIONS PER CLIENT REVIEW	MMB	JFC	
06/30/10	2	ADDRESSED CLIENT COMMENTS	MMB	JFC	
	3				
	4				
	5				
	6				
	7				
	8				
	9				

DESIGNED :
DRAFTED : MMB
CHECKED : JFC
PROJ. NO: 08.8078
SCALE :
DATE : JUN. 12, 2009

FSS-03 AREA POST-EXCAVATION TOPOGRAPHY

KAPL SPRU LAND AREAS REMEDIATION PROJECT

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SHEET 2 OF 2
DWG. NO: 09-433

CAD DWG. FILE NAME:FSS-1-4.DWG

XREFS: NONE

PROJECT NUMBER: 08.8078

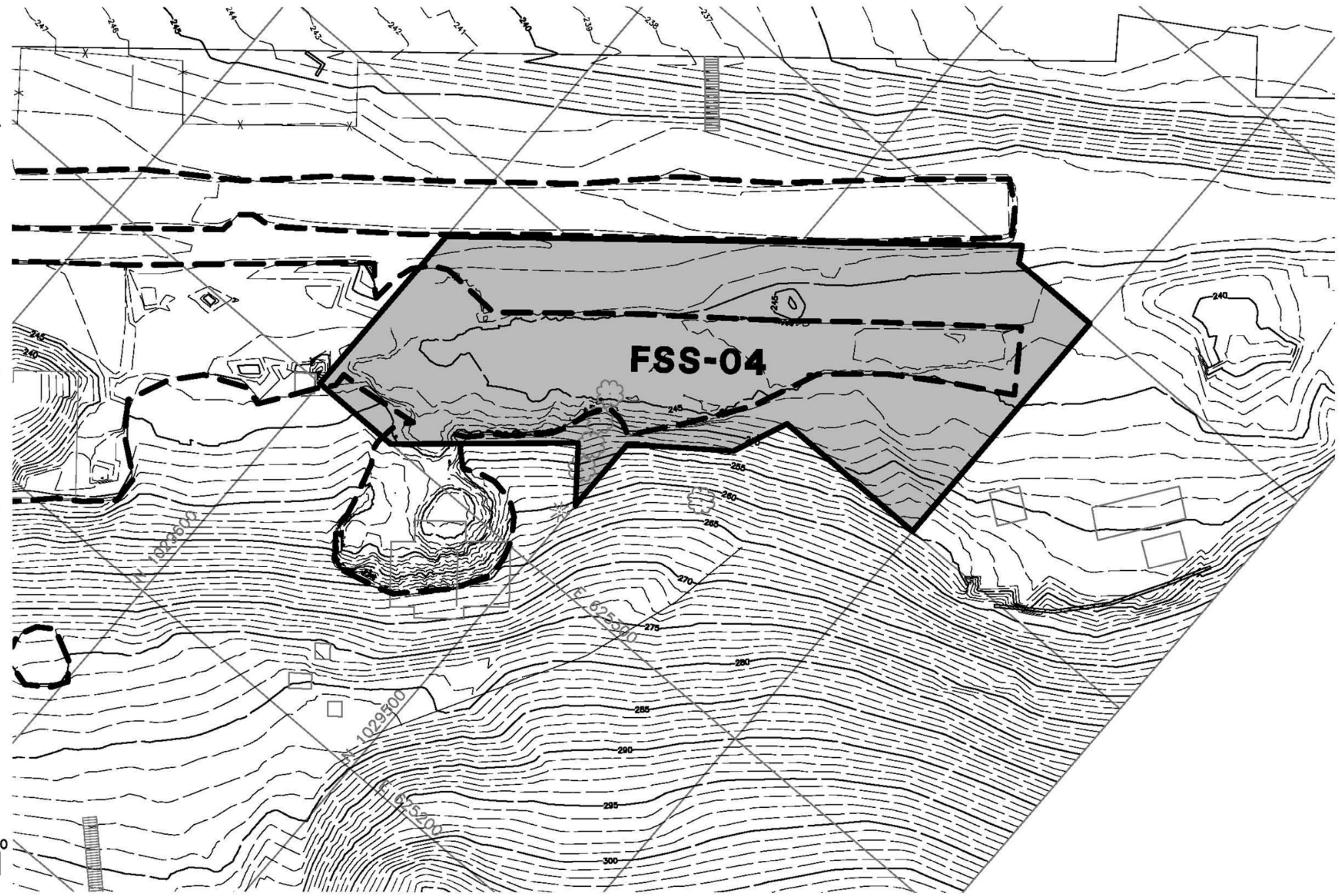
CAD DWG. FILE NAME:FSS-1-4.DWG

MAP NOTES:

1. Excavations and Sample locations shown hereon were compiled from an actual field survey conducted during May 2009.
2. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
3. Vertical datum established from KAPL Rubinski Control drawings.
4. Total bank soil volume removed from FSS-04 was computed as 465 cu. yds. based on this, drawing and the associated drawing titled "FSS-04 Area Pre-Excavation Topography."

MAP REFERENCES:

1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01-144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities – Database Record" Drawing: Y-Y-13301 sheets 3, 8, 9, 10 – 28dec03; REV-1 – 19July06.



LEGEND

EXCAVATION LIMITS

SCALE IN FEET

40 0 20 40 80

JAMES F. COOK
P.L.S. 49260

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
06/30/10	1	ADDRESSED CLIENT COMMENTS	MMB	JFC	
	2				
	3				
	4				
	5				
	6				
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	8				
	9				

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DESIGNED :

DRAFTED : MMB

CHECKED : JFC

PROJ. NO: 08.8078

SCALE :

DATE : JUN. 24, 2009

FSS-04 AREA POST-EXCAVATION TOPOGRAPHY

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SHEET 2 OF 2

DWG. NO: 10-371

CAD DWG. FILE NAME:FSS-1-4.DWG

XREFS: NONE

PROJECT NUMBER: 08.8078

CAD DWG. FILE NAME:FSS-COMBINED-TOP

MAP NOTES:

1. Soil Samples shown hereon were supplied by client.
2. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
3. Vertical datum established from KAPL Rubinski Control drawings.
4. No excavation has taken place in this area.

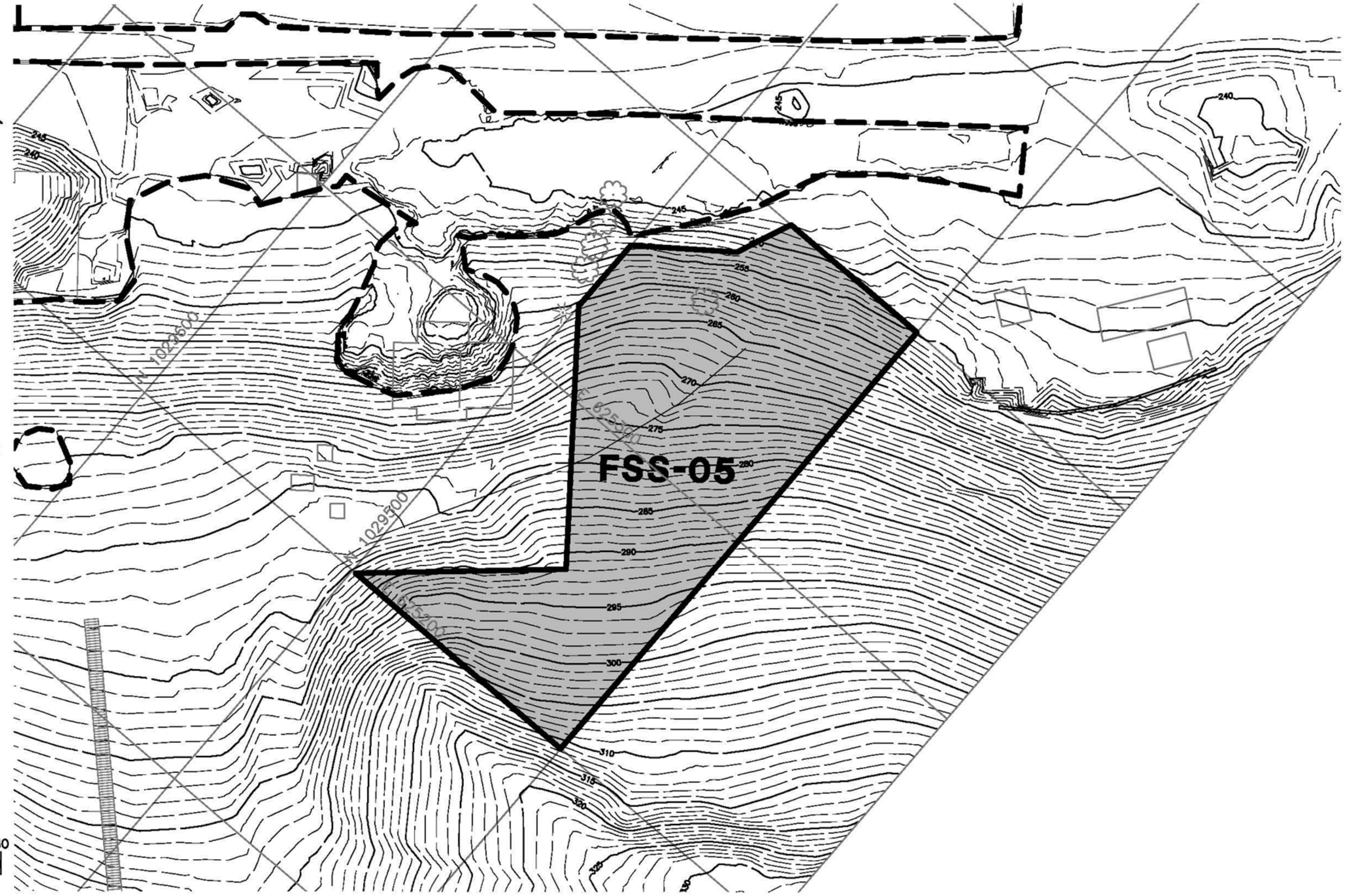
MAP REFERENCES:

1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01-144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities – Database Record" Drawing: Y-Y-13301 sheets 3, 8, 9, 10 – 28dec03; REV-1 – 19July06.

LEGEND

EXCAVATION LIMITS

SCALE IN FEET
40 0 20 40 80



JAMES F. COOK P.L.S. 49260	DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
	06/30/10	1	ADDRESSED CLIENT COMMENTS	MMB	JFC	
		2				
		3				
		4				
		5				
		6				
		7				
		8				
		9				

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PROJ. NO: 08.8078
SCALE :
DATE : JUN. 24, 2009

FSS-05 AREA
POST-EXCAVATION TOPOGRAPHY

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SHEET 2 OF 2
DWG. NO: 09-638

CAD DWG. FILE NAME:FSS-COMBINED-TOPO.DWG

XREFS: NONE

PROJECT NUMBER: 08.8078

CAD DWG. FILE NAME:RAD_REPORT.DWG

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted during July 2009.
2. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
3. Vertical datum established from KAPL Rubinski Control drawings.
4. Total bank soil volume removed from FSS–06 was computed as 17 cu. yds. based on this, drawing and the associated drawing titled "FSS–06 Area Pre–Excavation Topography."

MAP REFERENCES:

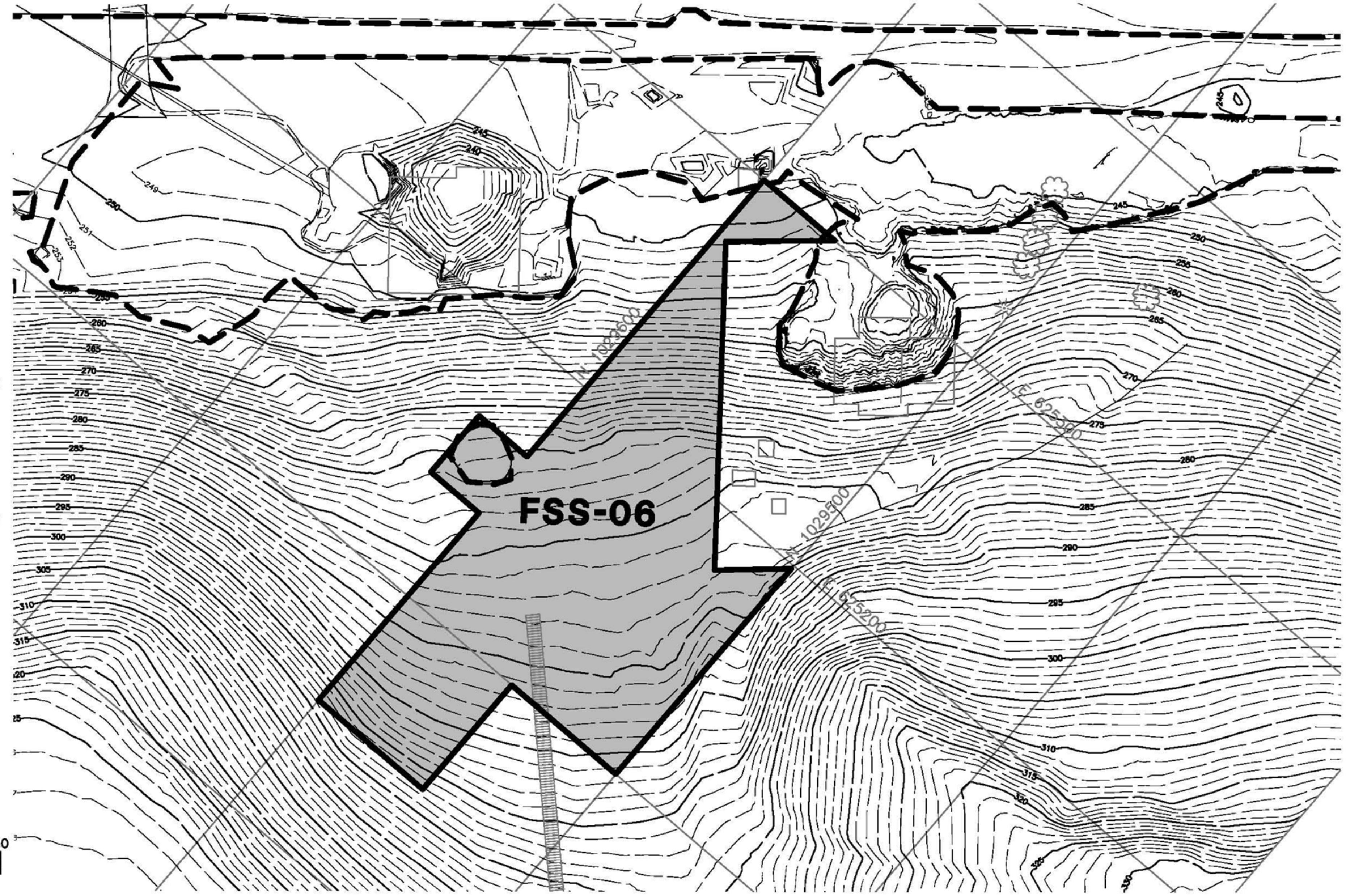
1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01–144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities – Database Record" Drawing: Y–Y–13301 sheets 3, 8, 9, 10 – 28dec03; REV–1 – 19July06.

LEGEND

EXCAVATION LIMITS

SCALE IN FEET

40 0 20 40 80



JAMES F. COOK P.L.S. 49260	DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
	06/30/10	1	ADDRESSED CLIENT COMMENTS	MMB	JFC	
		2				
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		8				
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PROJ. NO: 08.8078

SCALE :

DATE : JULY 30, 2009

FSS-06 AREA POST-EXCAVATION TOPOGRAPHY

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SHEET 2 OF 2

DWG. NO: 09–510

CAD DWG. FILE NAME:RAD_REPORT.DWG

XREFS: NONE

PROJECT NUMBER: 08.8078

CAD DWG. FILE NAME:RAD_REPORT.DWG

MAP NOTES:

1. Topographic information shown hereon were compiled from an actual field survey conducted during the month of July 2009.
2. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
3. Vertical datum established from KAPL Rubinski Control drawings.

MAP REFERENCES:

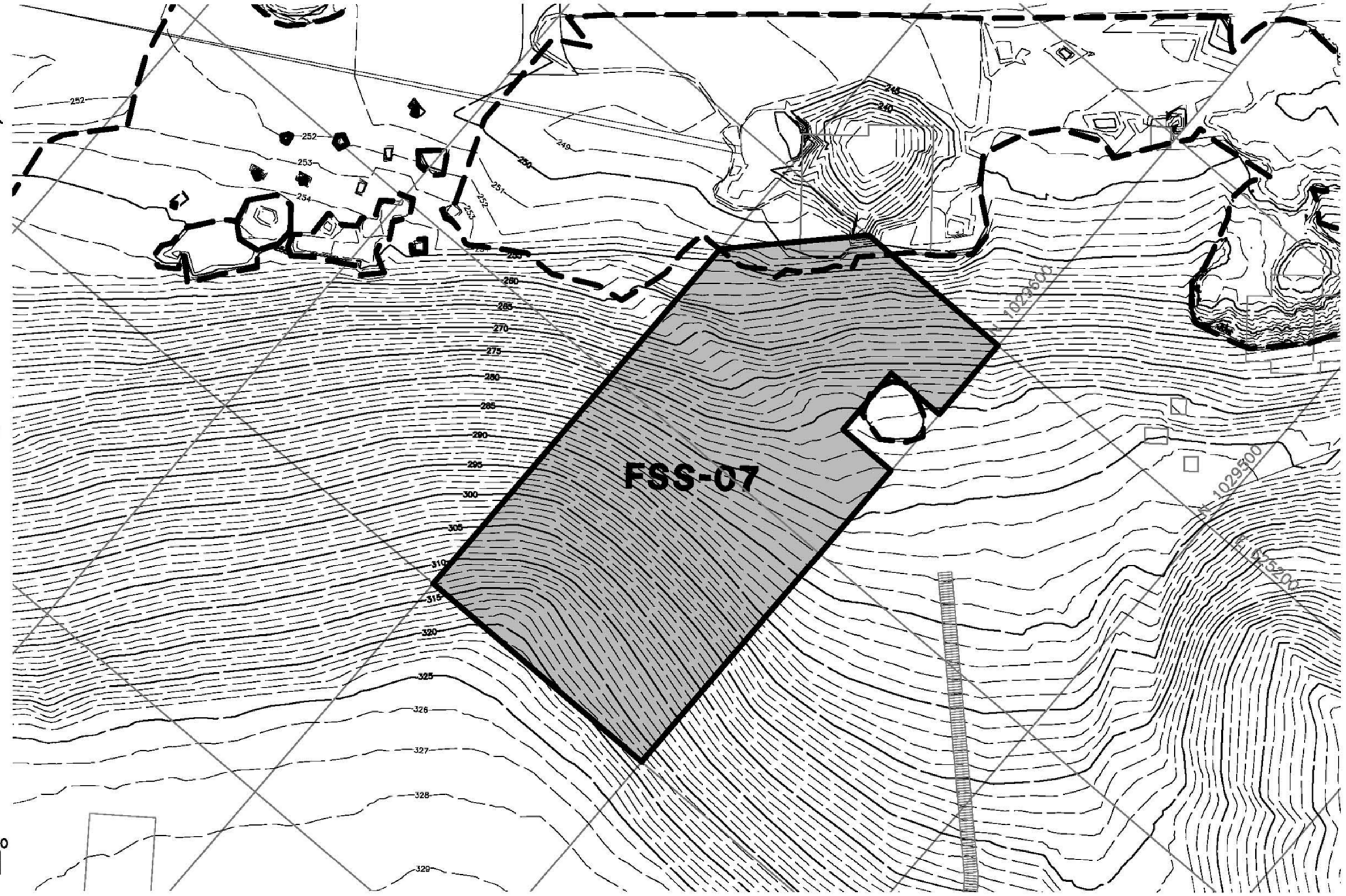
1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01-144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities – Database Record" Drawing: Y-Y-13301 sheets 3, 8, 9, 10 – 28dec03; REV-1 – 19July06.

LEGEND

EXCAVATION LIMITS

SCALE IN FEET

40 0 20 40 80



JAMES F. COOK P.L.S. 49260	DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
	06/30/10	1	ADDRESSED CLIENT COMMENTS	MMB	JFC	
		2				
		3				
		4				
		5				
		6				
		7				
		8				
		9				

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DESIGNED :

DRAFTED : MMB

CHECKED : JFC

PROJ. NO: 08.8078

SCALE :

DATE : JULY 30, 2009

FSS-07 AREA POST-EXCAVATION TOPOGRAPHY

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SHEET 2 OF 2

DWG. NO: 09-511

CAD DWG. FILE NAME:RAD_REPORT.DWG

XREFS: NONE

PROJECT NUMBER: 08.8078

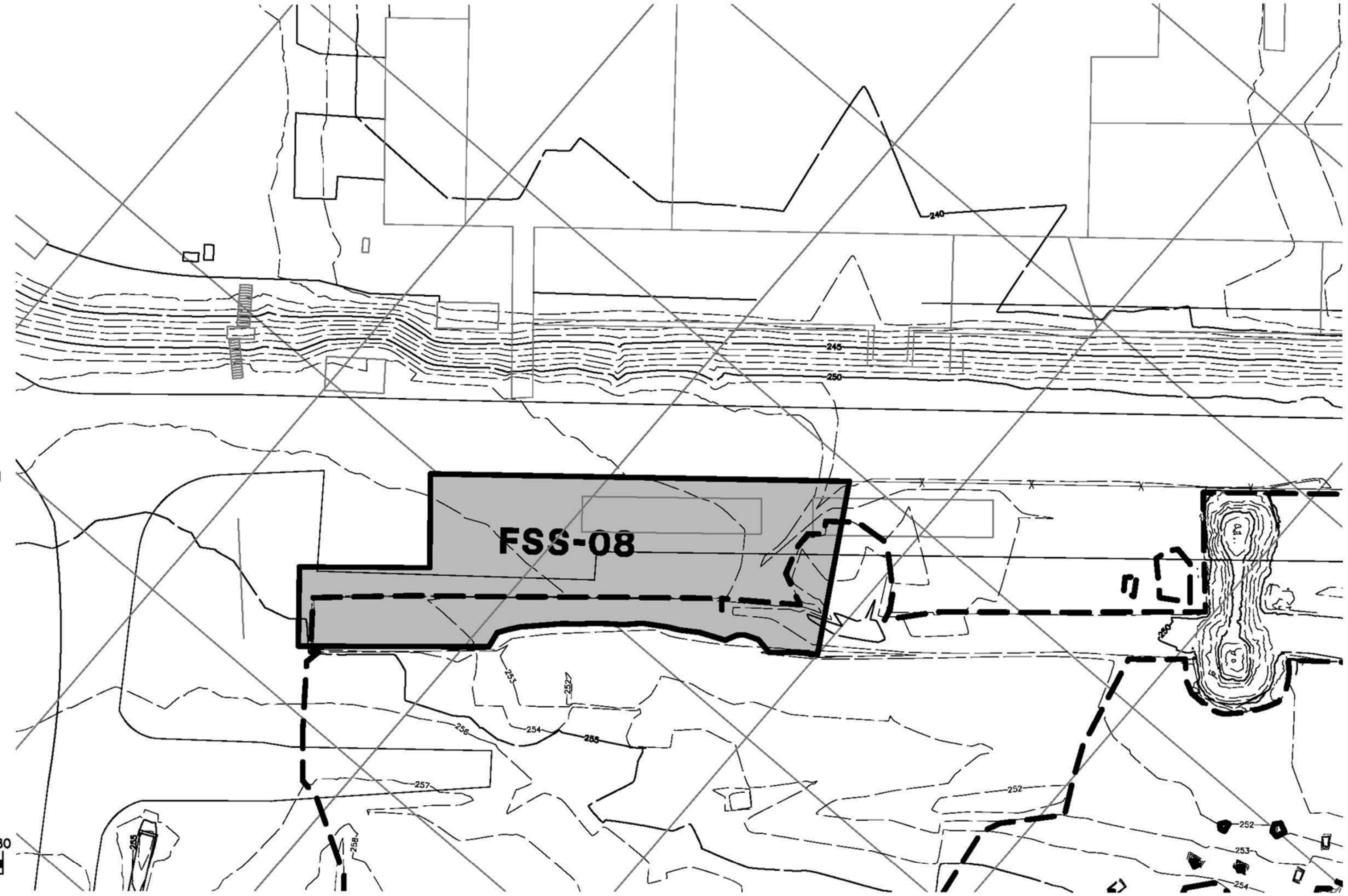
CAD DWG. FILE NAME:FSS-08—02-2010

MAP NOTES:

1. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
2. Vertical datum established from KAPL Rubinski Control drawings.
3. Total bank soil volume removed from FSS-08 was computed as 258 cu. yds. based on this, drawing and the associated drawing titled "FSS-08 Excavation Area Pre-Excavation Topography."

MAP REFERENCES:

1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01-144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities – Database Record" Drawing: Y-Y-13301 sheets 3, 8, 9, 10 – 28dec03; REV-1 – 19July06.



LEGEND

EXCAVATION LIMITS

SCALE IN FEET
40 0 20 40 80

JAMES F. COOK P.L.S. 49260	DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
	2/2/10	1	REVISED SAMPLE LOCATIONS AND FSS-08 LIMITS	MMB	JFC	
	06/30/10	2	ADDRESSED CLIENT COMMENTS	MMB	JFC	
		3				
		4				
		5				
		6				
		7				
		8				
		9				

DESIGNED :
DRAFTED : MMB
CHECKED : JFC
PROJ. NO: 08.8078
SCALE :
DATE : JUN. 24, 2009

FSS-08 EXCAVATION AREA POST-EXCAVATION TOPOGRAPHY

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SHEET 2 OF 2
DWG. NO: 09-504

CAD DWG. FILE NAME:FSS-08—02-2010.DWG

XREFS: NONE

PROJECT NUMBER: 08.8078

CAD DWG. FILE NAME:RAD_REPORT.DWG

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted during August 2009 and updated March 2010.
2. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
3. Vertical datum established from KAPL Rubinski Control drawings.
4. Total bank soil volume removed from FSS–09 was computed as 1,694 cu. yds. based on this, drawing and the associated drawing titled "FSS–09 Area Pre–Excavation Topography." And an additional 51 cu. yds. in May 2010.

MAP REFERENCES:

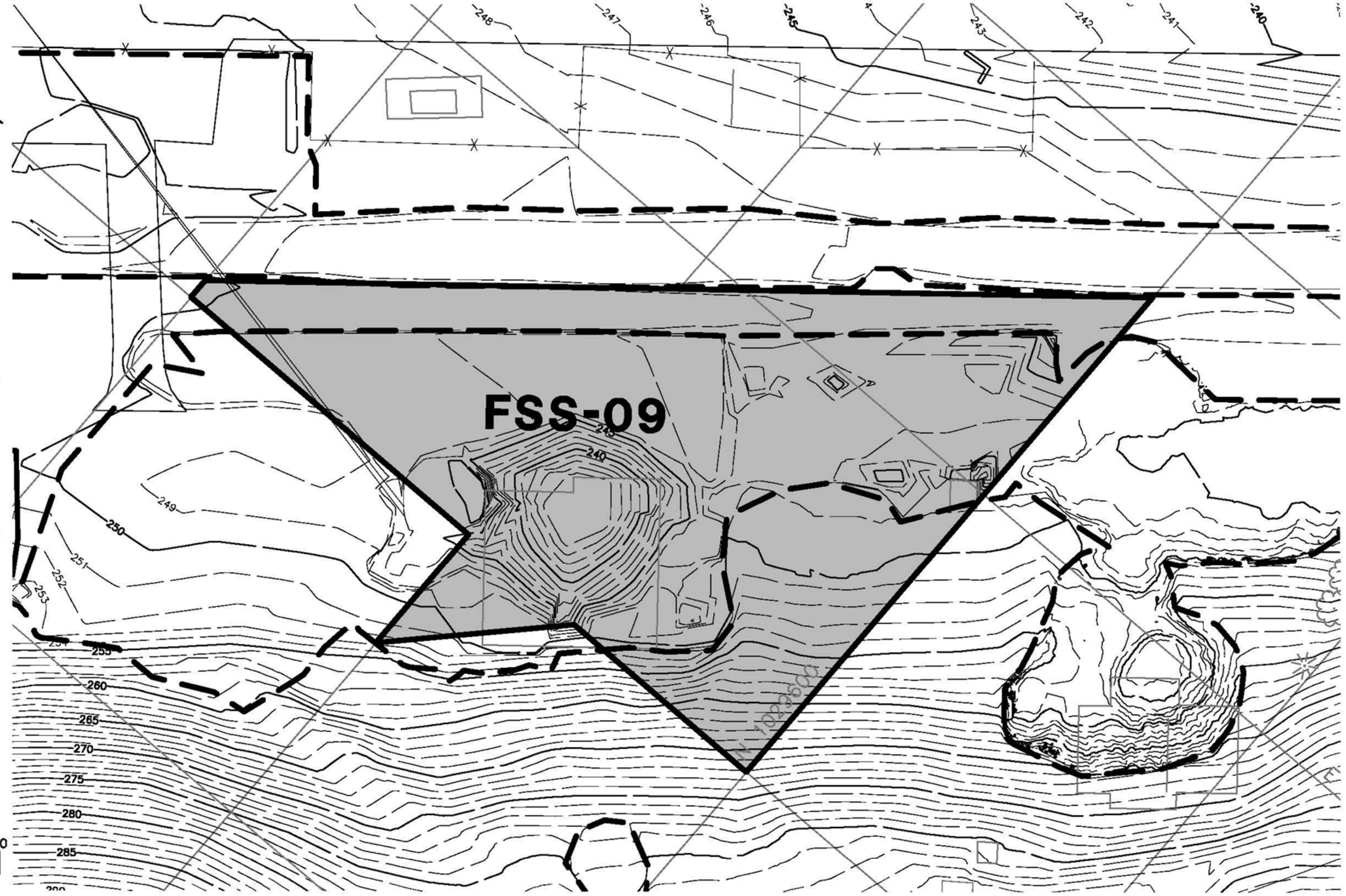
1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01–144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities – Database Record" Drawing: Y–Y–13301 sheets 3, 8, 9, 10 – 28dec03; REV–1 – 19July06.

LEGEND

EXCAVATION LIMITS

SCALE IN FEET

30 0 15 30 60



JAMES F. COOK P.L.S. 49260	DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
	3/31/10	1	REVISED VOLUME TO SHOW ADDITIONAL CUTS	MMB	JFC	
	5/13/10	2	ADDED ADDTIONAL EXCAVATION INFORMATION	MMB		
	5/28/10	3	ADDED ADDITIONAL SOIL SAMPLE	MMB	JFC	
	07/01/10	4	ADDRESSED CLIENT COMMENTS	MMB	JFC	
		5				
		6				
		7				
		8				
		9				

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DESIGNED :

DRAFTED : MMB

CHECKED : JFC

PROJ. NO: 08.8078

SCALE :

DATE : SEPT. 8, 2009

FSS-09 AREA POST-EXCAVATION TOPOGRAPHY

KAPL SPRU LAND AREAS REMEDIATION PROJECT

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SHEET 2 OF 2

DWG. NO: 09–578

CAD DWG. FILE NAME:RAD_REPORT.DWG

XREFS: NONE

PROJECT NUMBER: 08.8078

CAD DWG. FILE NAME:RAD_REPORT.DWG

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted during March 2010.
2. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
3. Vertical datum established from KAPL Rubinski Control drawings.
4. Total bank soil volume removed from FSS–10 was computed as 636 cu. yds. based on this, drawing and the associated drawing titled "FSS–10 Area Pre–Excavation Topography." And an additional 22 cu. yds. in May 2010.

MAP REFERENCES:

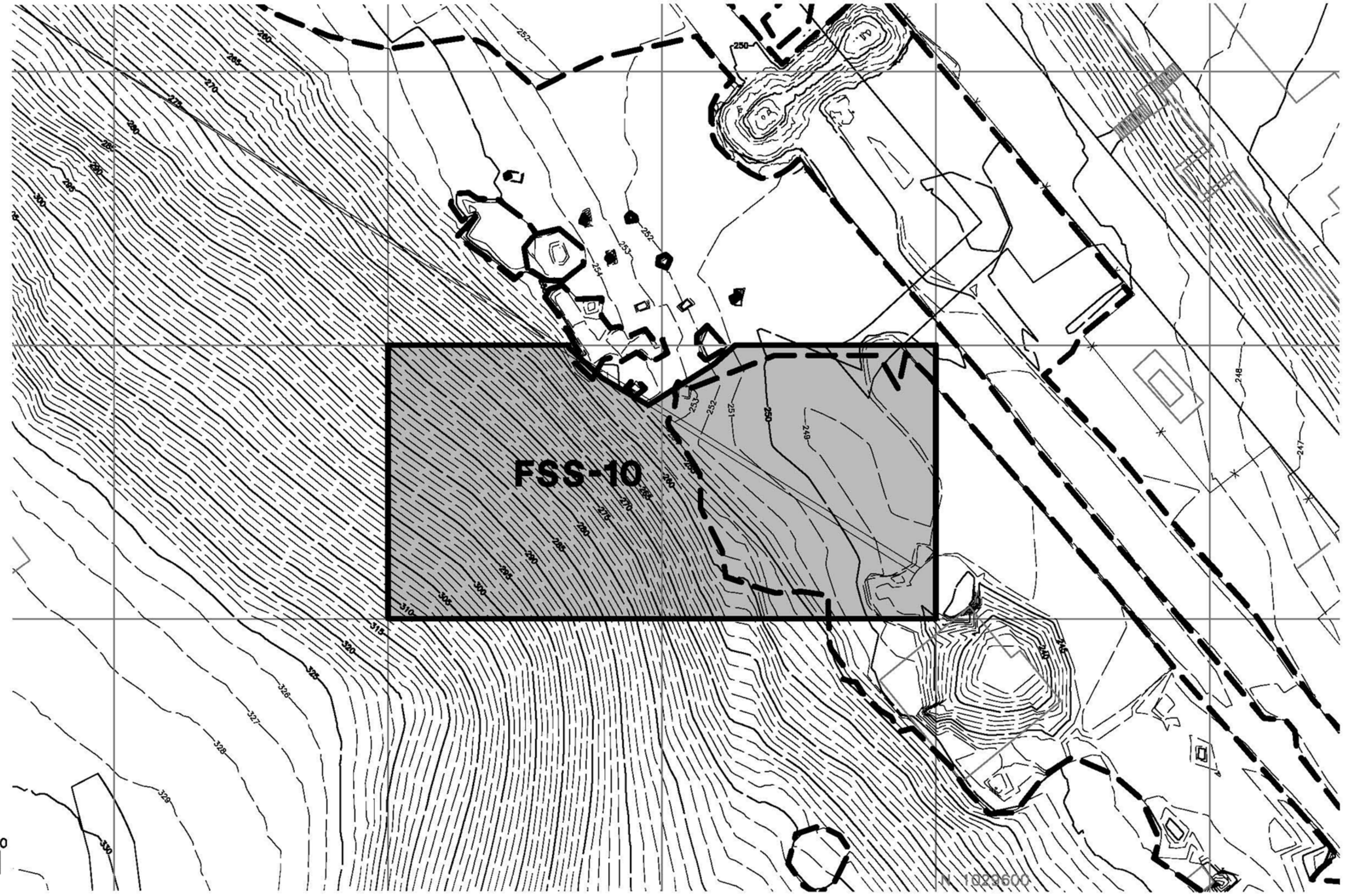
1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01–144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities – Database Record" Drawing: Y–Y–13301 sheets 3, 8, 9, 10 – 28dec03; REV–1 – 19July06.

LEGEND

EXCAVATION LIMITS

SCALE IN FEET

30 0 15 30 60



JAMES F. COOK
P.L.S. 49260

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
3/30/10	1	REVISED PARCEL VOLUME	MMB	JFC	
4/5/10	2	ADDED SOIL SAMPLE LOCATIONS	MMB	JFC	
5/13/10	3	ADDED ADDITIONAL EXCAVATION INFORMATION	MMB		
5/26/10	4	ADDED S040 TO DRAWING	MMB	JFC	
07/01/10	5	ADDRESSED CLIENT COMMENTS	MMB	JFC	
	6				
	7				
	8				
	9				

DESIGNED :
DRAFTED : MMB
CHECKED : JFC
PROJ. NO: 08.8078
SCALE :
DATE : FEB. 8, 2010

FSS-10 AREA POST-EXCAVATION TOPOGRAPHY

KAPL SPRU LAND AREAS REMEDIATION PROJECT

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SHEET 2 OF 2
DWG. NO: 10–237

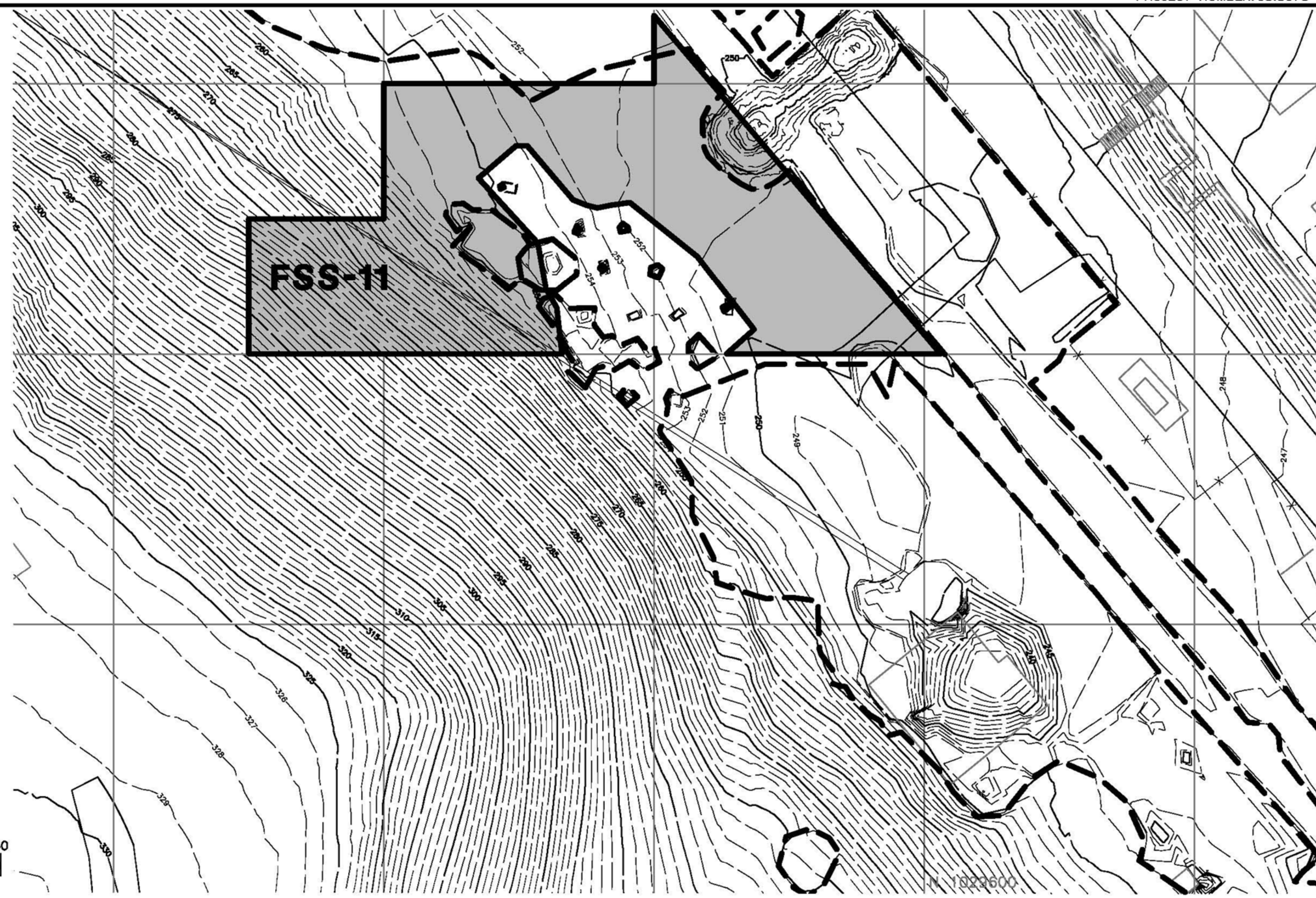
CAD DWG. FILE NAME:RAD_REPORT.DWG

aRc Accelerated Remediation Company
A Portage-Shaw Joint Venture

XREFS: NONE

PROJECT NUMBER: 08.8078

CAD DWG. FILE NAME: RAD_REPORT.DWG



MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted during March 2010.
2. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
3. Vertical datum established from KAPL Rubinski Control drawings.
4. Total bank soil volume removed from FSS-11 was computed as 47 cu. yds. based on this, drawing and the associated drawing titled "FSS-11 Area Pre-Excavation Topography." And an additional 2 cu. yds. in May 2010.

MAP REFERENCES:

1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01-144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities – Database Record" Drawing: Y-Y-13301 sheets 3, 8, 9, 10 – 28dec03; REV-1 – 19July06.

LEGEND

EXCAVATION LIMITS

SCALE IN FEET

30 0 15 30 60

JAMES F. COOK
P.L.S. 49260

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
4/5/10	1	ADDED SOIL SAMPLE LOCATIONS	MMB	JFC	
5/13/10	2	ADDED ADDITIONAL EXCAVATION INFORMATION	MMB		
07/01/10	3	ADDRESSED CLIENT COMMENTS	MMB	JFC	
	4				
	5				
	6				
	7				
	8				
	9				

DESIGNED :
DRAFTED : MMB
CHECKED : JFC
PROJ. NO: 08.8078
SCALE :
DATE : FEB. 8, 2010

FSS-11 AREA
POST-EXCAVATION TOPOGRAPHY

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SHEET 2 OF 2
DWG. NO: 10-238

CAD DWG. FILE NAME: RAD_REPORT.DWG

XREFS: NONE

PROJECT NUMBER: 08.8078

CAD DWG. FILE NAME:FSS-12.DWG

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted during May 2010.
2. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
3. Vertical datum established from KAPL Rubinski Control drawings.
4. Total bank soil volume removed from FSS-12 was computed as 478 cu. yds. based on this, drawing and the associated drawing titled "FSS-12 Area Pre-Excavation Topography."

MAP REFERENCES:

1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01-144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities – Database Record" Drawing: Y-Y-13301 sheets 3, 8, 9, 10 – 28dec03; REV-1 – 19July06.

LEGEND

EXCAVATION LIMITS

SCALE IN FEET
30 0 15 30 60

JAMES F. COOK
P.L.S. 49260

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
5/27/10	1	ADDED SOIL SAMPLE LOCATIONS	MMB	JFC	
6/1/10	2	REVISED SOIL SAMPLE LOCATIONS	MMB	JFC	
07/02/10	3	ADDRESSED CLIENT COMMENTS	MMB	JFC	
	4				
	5				
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	7				
	8				
	9				

DESIGNED :
DRAFTED : MMB
CHECKED : JFC
PROJ. NO: 08.8078
SCALE :
DATE : MAR. 31, 2010

FSS-12 AREA
POST-EXCAVATION TOPOGRAPHY

KAPL SPRU LAND AREAS REMEDIATION PROJECT

TOWN OF NISKAYUNA — SCHENECTADY COUNTY, NEW YORK

C.T. MALE ASSOCIATES, P.C.
50 CENTURY HILL DRIVE, LATHAM, NY 12110
518.786.7400 • FAX 518.786.7299
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SHEET 2 OF 2
DWG. NO: 10-375

CAD DWG. FILE NAME:FSS-12.DWG

XREFS: BASE.DWG

PROJECT NUMBER: 08.8078

CAD DWG. FILE NAME:FSS-13-UPDT.DWG

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted during February 2010.
2. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
3. Vertical datum established from KAPL Rubinski Control drawings.
4. Total bank soil volume removed from FSS-13 was computed as 2,338 cu. yds. based on this, drawing and the associated drawing titled "FSS-13 Area Pre-Excavation Topography."

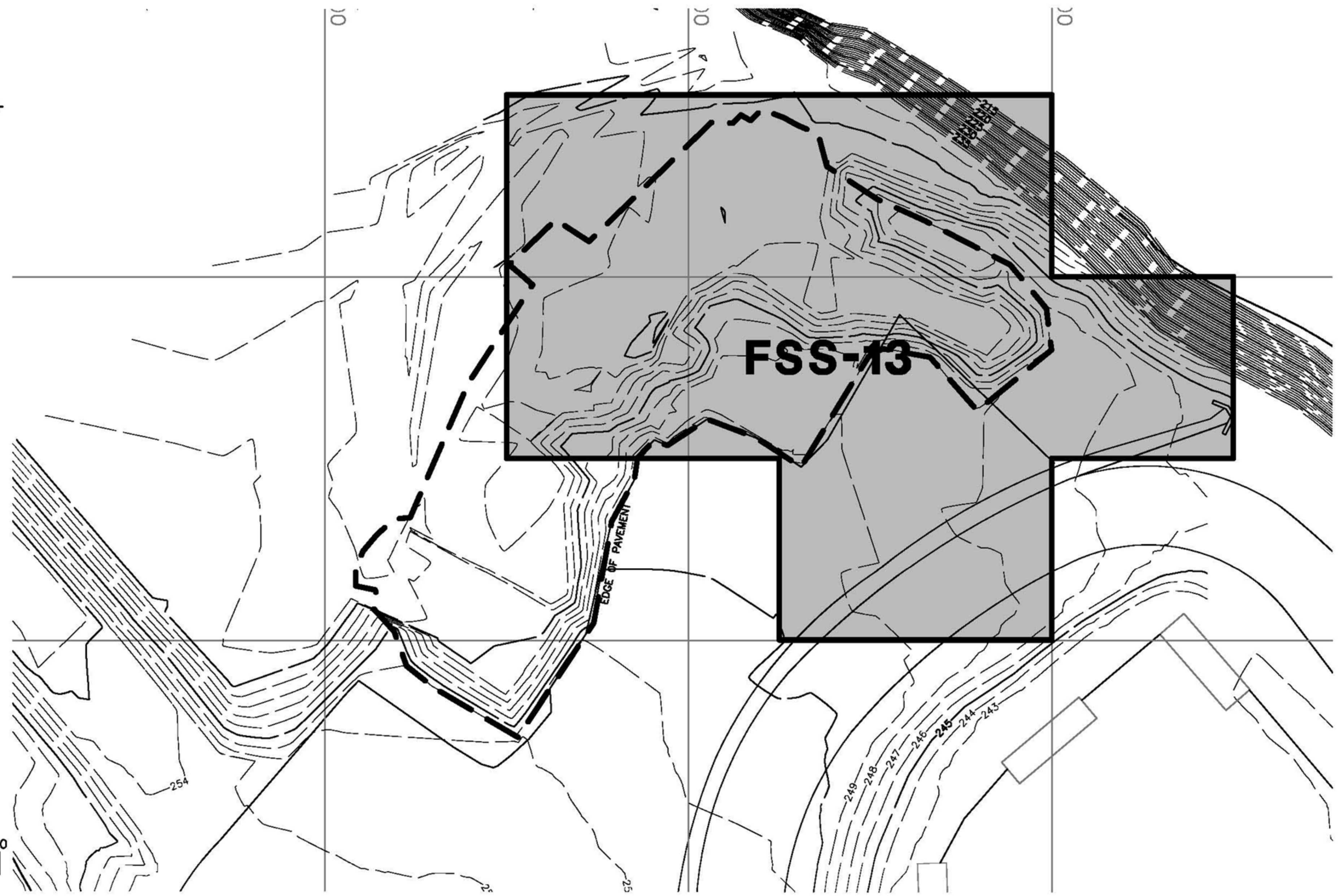
MAP REFERENCES:

1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01-144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities – Database Record" Drawing: Y-Y-13301 sheets 3, 8, 9, 10 – 28dec03; REV-1 – 19July06.

LEGEND

EXCAVATION LIMITS

SCALE IN FEET
30 0 15 30 60



JAMES F. COOK
P.L.S. 49260

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
03/10/10	1	REVISED TOPO AND VOLUME PER FIELD UPDATE	MMB	JFC	
07/02/10	2	ADDRESSED CLIENT COMMENTS	MMB	JFC	
	3				
	4				
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DESIGNED :
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CHECKED : JFC
PROJ. NO: 08.8078
SCALE :
DATE : FEB. 19, 2010

FSS-13 AREA POST-EXCAVATION TOPOGRAPHY

KAPL SPRU LAND AREAS REMEDIATION PROJECT

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SHEET 2 OF 2
DWG. NO: 10-376

aRc Accelerated Remediation Company
A Portage-Shaw Joint Venture

XREFS: BASE.DWG

PROJECT NUMBER: 08.8078

CAD DWG. FILE NAME:FSS-14.DWG

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted during February 2010.
2. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
3. Vertical datum established from KAPL Rubinski Control drawings.
4. Total bank soil volume removed from FSS-14 was computed as 888 cu. yds. based on this, drawing and the associated drawing titled "FSS-14 Area Pre-Excavation Topography."

MAP REFERENCES:

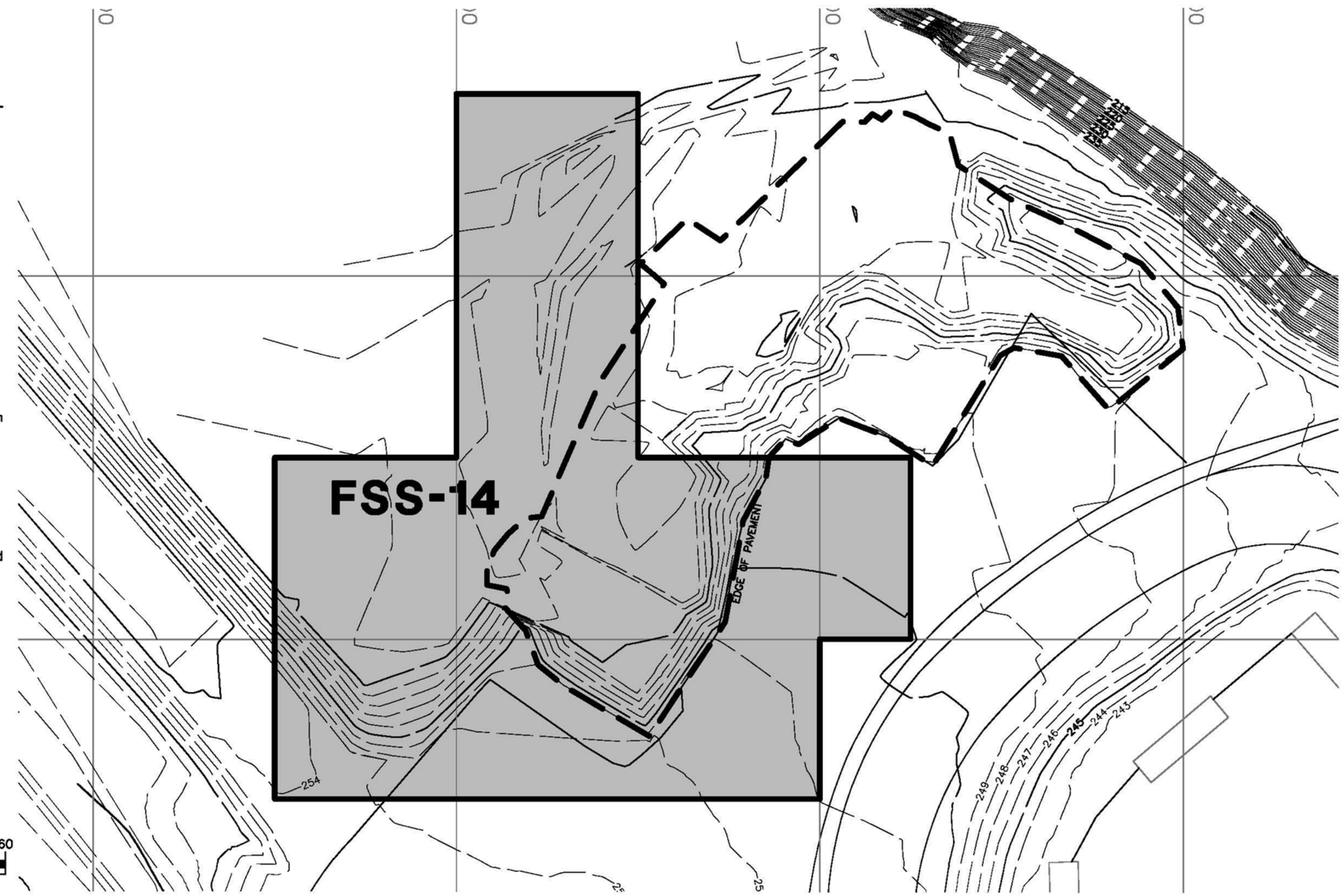
1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01-144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities – Database Record" Drawing: Y-Y-13301 sheets 3, 8, 9, 10 – 28dec03; REV-1 – 19July06.

LEGEND

EXCAVATION LIMITS

SCALE IN FEET

30 0 15 30 60



JAMES F. COOK
P.L.S. 49260

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
07/02/10	1	ADDRESSED CLIENT COMMENTS	MMB	JFC	
07/07/10	2	REVISED EXCAVATION LIMITS	MMB	JFC	
	3				
	4				
	5				
	6				
	7				
	8				
	9				

DESIGNED :
DRAFTED : MMB
CHECKED : JFC
PROJ. NO: 08.8078
SCALE :
DATE : FEB. 19, 2010

FSS-14 AREA
POST-EXCAVATION TOPOGRAPHY

KAPL SPRU LAND AREAS REMEDIATION PROJECT

TOWN OF NISKAYUNA SCHENECTADY COUNTY, NEW YORK

C.T. MALE ASSOCIATES, P.C.
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SHEET 2 OF 2
DWG. NO: 10-377

CAD DWG. FILE NAME:FSS-14.DWG

XREFS: NONE

PROJECT NUMBER: 08.8078

CAD DWG. FILE NAME:RAD_REPORT.DWG

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted during March 2010.
2. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
3. Vertical datum established from KAPL Rubinski Control drawings.
4. Total bank soil volume removed from FSS–15 was computed as 62 cu. yds. based on this, drawing and the associated drawing titled "FSS–15 Area Pre–Excavation Topography." And an additional 2 cu. yds. on May 13, 2010.

MAP REFERENCES:

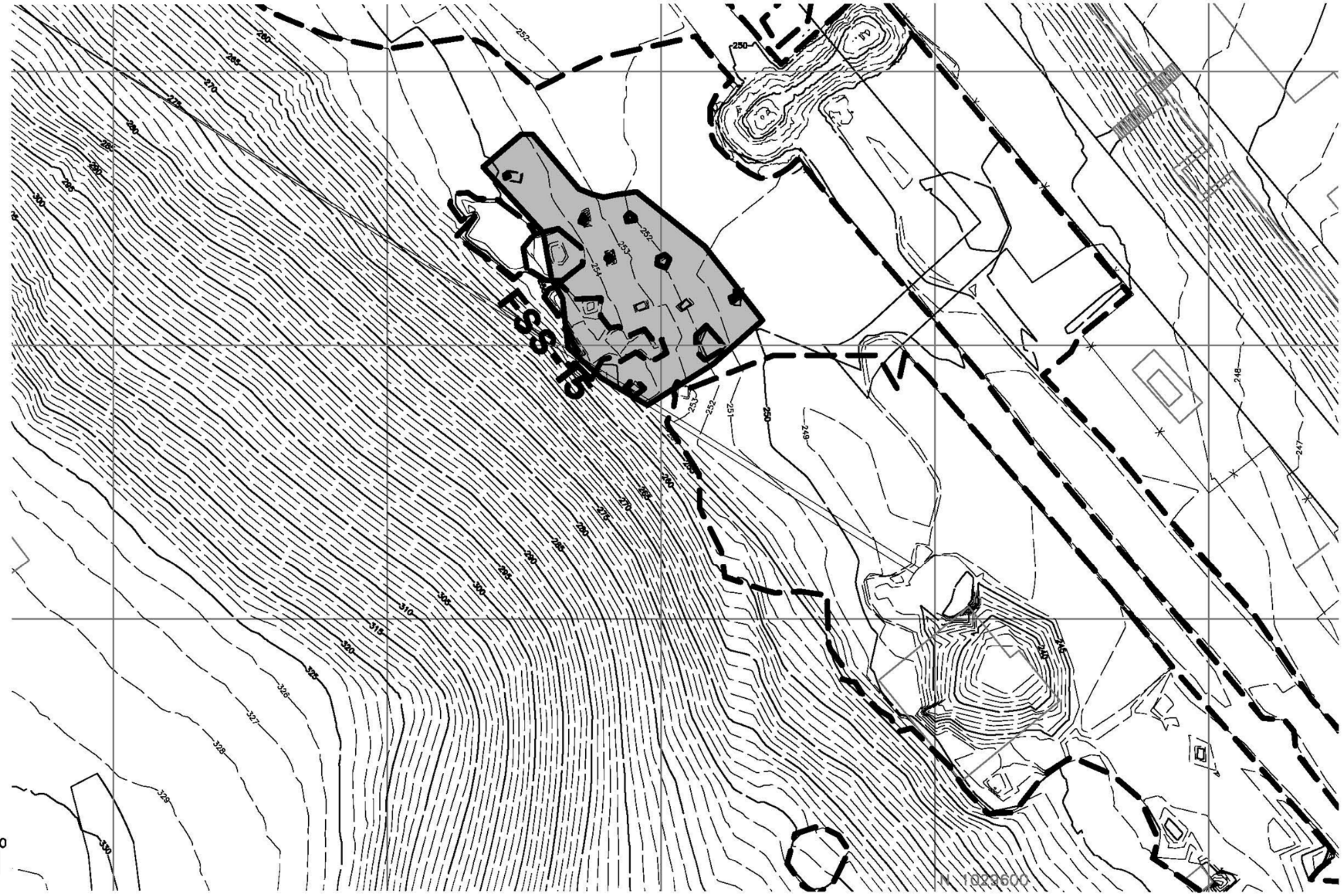
1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01–144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities – Database Record" Drawing: Y–Y–13301 sheets 3, 8, 9, 10 – 28dec03; REV–1 – 19July06.

LEGEND

EXCAVATION LIMITS

SCALE IN FEET

30 0 15 30 60



JAMES F. COOK
P.L.S. 49260

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
4/5/10	1	ADDED SOIL SAMPLE LOCATIONS	MMB	JFC	
5/13/10	2	ADDED ADDTIONAL EXCAVATION INFORMATION	MMB		
	3				
	4				
	5				
	6				
	7				
	8				
	9				

DESIGNED :
DRAFTED : MMB
CHECKED : JFC
PROJ. NO: 08.8078
SCALE :
DATE : MAR. 31, 2010

FSS-15 AREA POST-EXCAVATION TOPOGRAPHY

KAPL SPRU LAND AREAS REMEDIATION PROJECT

TOWN OF NISKAYUNA — SCHENECTADY COUNTY, NEW YORK

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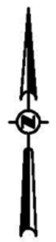
SHEET 2 OF 2
DWG. NO: 10–239

CAD DWG. FILE NAME:RAD_REPORT.DWG

XREFS: NONE

PROJECT NUMBER: 08.8078

CAD DWG. FILE NAME:FSS-16.DWG



MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted during May 2010.
2. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
3. Vertical datum established from KAPL Rubinski Control drawings.
4. Total bank soil volume removed from FSS-16 was computed as 530 cu. yds. based on this, drawing and the associated drawing titled "FSS-16 Area Pre-Excavation Topography."

MAP REFERENCES:

1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01-144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities – Database Record" Drawing: Y-Y-13301 sheets 3, 8, 9, 10 – 28dec03; REV-1 – 19July06.

LEGEND

EXCAVATION LIMITS

SCALE IN FEET

30 0 15 30 60

JAMES F. COOK
P.L.S. 49260

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
5/28/10	1	ADDED SOIL SAMPLE LOCATIONS	MMB	JFC	
6/21/10	2	ADDED ADDITONAL EXCAVATION INFORMATION	MMB	JFC	
07/02/10	3	ADDRESSED CLIENT COMMENTS	MMB	JFC	
	4				
	5				
	6				
	7				
	8				
	9				

DESIGNED :
DRAFTED : MMB
CHECKED : JFC
PROJ. NO: 08.8078
SCALE :
DATE : MAY 13, 2010

FSS-16 AREA POST-EXCAVATION TOPOGRAPHY

KAPL SPRU LAND AREAS REMEDIATION PROJECT

TOWN OF NISKAYUNA SCHENECTADY COUNTY, NEW YORK

C.T. MALE ASSOCIATES, P.C.

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SHEET 2 OF 2
DWG. NO: 10-378

CAD DWG. FILE NAME:FSS-16.DWG

XREFS: NONE

PROJECT NUMBER: 08.8078

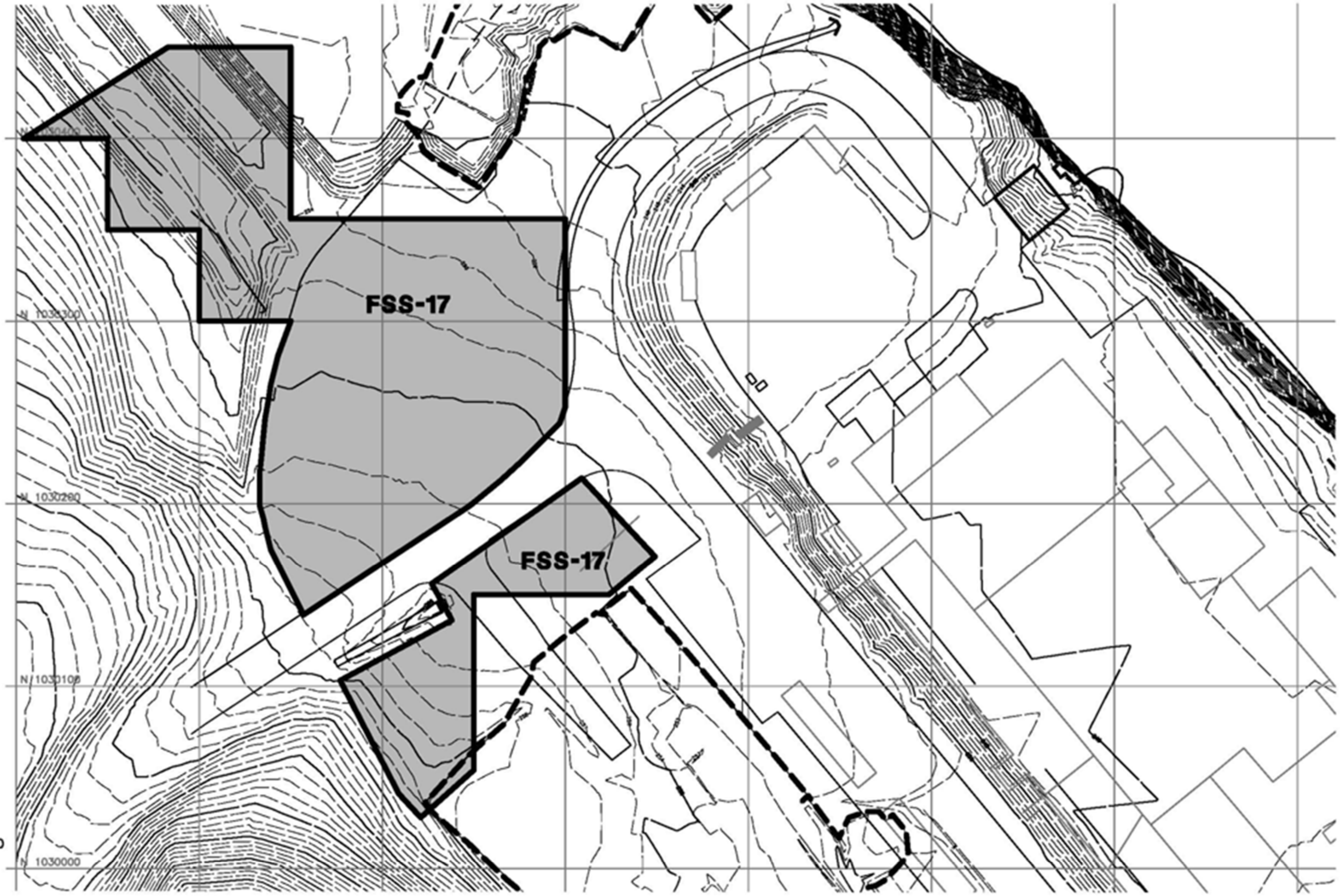
CAD DWG. FILE NAME:FSS-COMBINED-TOPO

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted during May 2010.
2. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
3. Vertical datum established from KAPL Rubinski Control drawings.

MAP REFERENCES:

1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01-144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities – Database Record" Drawing: Y-Y-13301 sheets 3, 8, 9, 10 – 28dec03; REV-1 – 19July06.



LEGEND

— — — EXCAVATION LIMITS

SCALE IN FEET
60 0 30 60 120

JAMES F. COOK P.L.S. 49260	DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
		1				
		2				
		3				
		4				
		5				
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		8				
		9				

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DESIGNED :
DRAFTED : MMB
CHECKED : JFC
PROJ. NO: 08.8078
SCALE :
DATE : NOV. 22, 2010

FSS-17 AREA POST-EXCAVATION TOPOGRAPHY

KAPL SPRU LAND AREAS REMEDIATION PROJECT

TOWN OF NISKAYUNA — SCHENECTADY COUNTY, NEW YORK

C.T. MALE ASSOCIATES, P.C.

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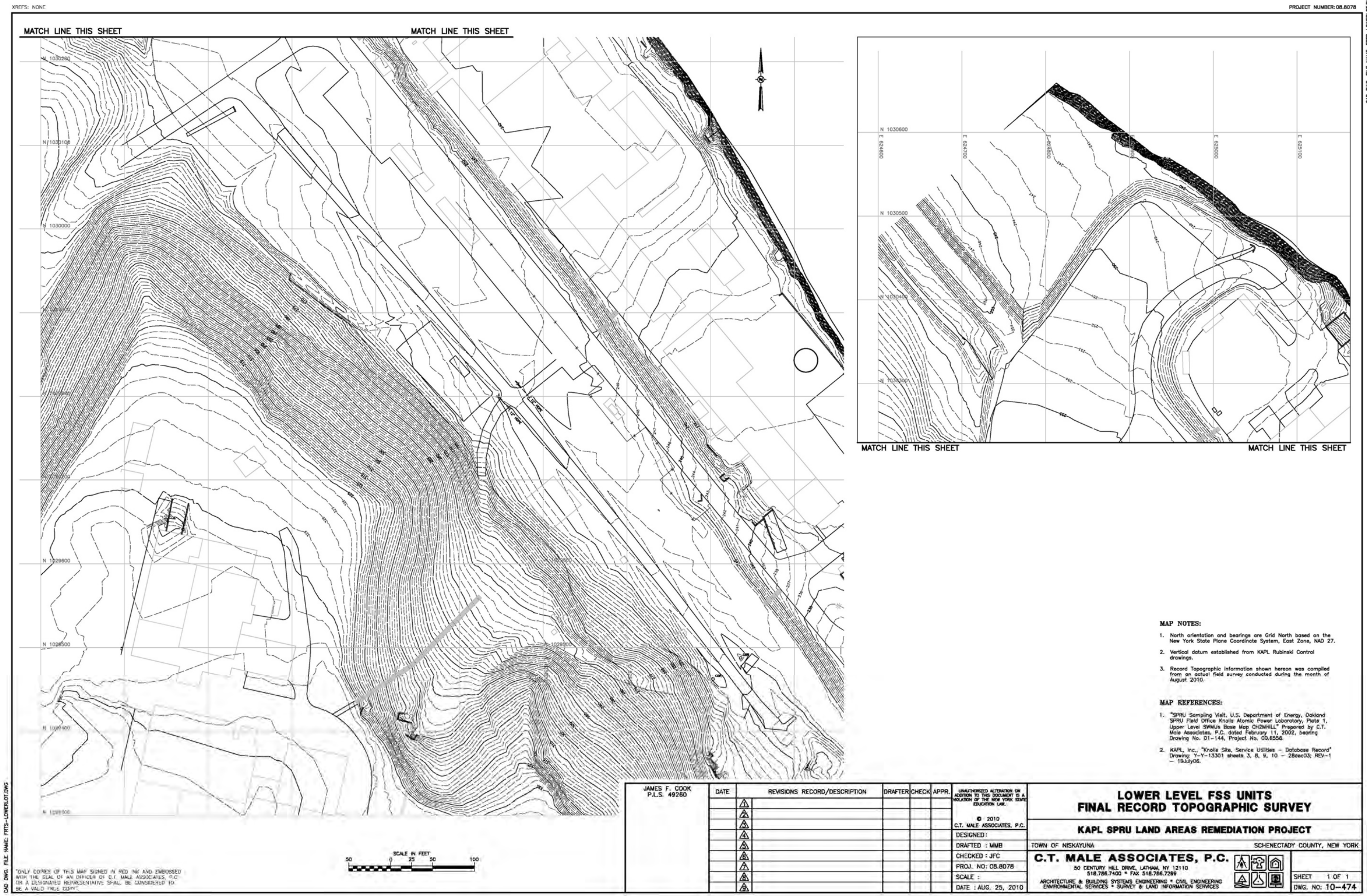
SHEET 1 OF 1
DWG. NO: 10-670

CAD DWG. FILE NAME:FSS-COMBINED-TOPO-RCRA.DWG


XREFS: NONE
PROJECT NUMBER: 08.8078
CAD DWG. FILE NAME: FRTS-LOWERLOT.DWG
MATCH LINE THIS SHEET
MATCH LINE THIS SHEET
MATCH LINE THIS SHEET
MATCH LINE THIS SHEET
N 1030600
N 1030500
MAP NOTES:
1. North orientation and bearings are Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
2. Vertical datum established from KAPL Rubinski Control drawings.
3. Record Topographic information shown hereon was compiled from an actual field survey conducted during the month of August 2010.
MAP REFERENCES:
1. "SPRU Sampling Visit, U.S. Department of Energy, Oakland SPRU Field Office Knolls Atomic Power Laboratory, Plate 1, Upper Level SWMUs Base Map CH2MHILL" Prepared by C.T. Male Associates, P.C. dated February 11, 2002, bearing Drawing No. 01-144, Project No. 00.6556.
2. KAPL, Inc., "Knolls Site, Service Utilities – Database Record" Drawing: Y-Y-13301 sheets 3, 8, 9, 10 – 28dec03; REV-1 – 19July06.
"ONLY COPIES OF THIS MAP SIGNED IN RED INK AND EMBOSSED WITH THE SEAL OF AN OFFICER OF C.T. MALE ASSOCIATES, P.C. OR A DESIGNATED REPRESENTATIVE SHALL BE CONSIDERED TO BE A VALID TRUE COPY."
SCALE IN FEET
50 0 25 50 100
JAMES F. COOK
P.L.S. 49260
DATE
REVISIONS RECORD/DESCRIPTION
DRAFTER
CHECK
APPR.
UNAUTHORIZED ALTERATION OR ADDITION TO THIS DOCUMENT IS A VIOLATION OF THE NEW YORK STATE EDUCATION LAW.
© 2010
C.T. MALE ASSOCIATES, P.C.
DESIGNED:
DRAFTED : MMB
CHECKED : JFC
PROJ. NO: 08.8078
SCALE :
DATE : AUG. 25, 2010
LOWER LEVEL FSS UNITS
FINAL RECORD TOPOGRAPHIC SURVEY
KAPL SPRU LAND AREAS REMEDIATION PROJECT
TOWN OF NISKAYUNA
SCHENECTADY COUNTY, NEW YORK
C.T. MALE ASSOCIATES, P.C.
50 CENTURY HILL DRIVE, LATHAM, NY 12110
518.786.7400 * FAX 518.786.7299
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SHEET 1 OF 1
DWG. NO: 10-474

Appendix B
Investigation of Soil beneath Plastic Found in the Vicinity of the Drainline Excavation

Accelerated Remediation Company
A Portage-Shaw Joint Venture

Accelerated Remediation Company
A Portage-Shaw Joint Venture
SPRU Field Office SP-26
2425 River Road
Niskayuna, NY 12309

May 13, 2010

LAR-10-042

Matt Zullo, Federal Project Director
U.S. Department of Energy
SPRU Field Office, SP-23
2425 River Road
Niskayuna, New York 12309

Subject: CONTRACT NO. DE-AM09-05SR22399/Task Order: DE-AT30 7CC60013/SP15.
U.S Department of Energy, Separations Process Unit (DOE-SPRU) Field Office Request for Accelerated Remediation Company (aRc) to Investigate Soil Encountered under a Sheet of plastic in the Lower Level Rail Bed (SPRU-10-049)

Dear Mr. Zullo:

This communication is in response to a request for additional information in reference to correspondence SPRU 10-049. As stated in SPRU 10-049, "during excavation to remove an inactive storm drain line in the Lower Level Rail Bed, aRc identified an area of radioactivity above the clean-up criteria (~52 picoCuries/gram) just south of Final Status Survey-08 under some plastic sheeting material (plastic) that was found buried in the soil." It is further explained that the area was remediated locally but "did not explore beyond the immediate excavation work.

SPRU-10-049 goes on to indicate that the suspected origins of the plastic, according to Naval Reactors, is that in the 1990's it was laid down as a barrier to stage soil for other activities and that the clean soil above the plastic may provide shielding for walkover surveys, preventing the detection and sampling of potentially contaminated soil lying beneath.

As a result, aRc was requested to "excavate the clean soil above the plastic and determine if any of the soil under the plastic contains radioactivity above the clean-up criteria. The characterization should include walk-over surveys of the areas and, if aRc encounters elevated counts, judgmental samples need to be taken in accordance with the approved project plans and procedures. If contamination above the clean-up criteria is encountered, please provide DOE a map of the proposed excavation area and quantities prior to removal and dispose of it in accordance with approved plans and procedures. Also, confirmation samples need to be taken in the same Global Positioning System coordinate locations where a confirmation sample was taken for the final status survey for the soil above the plastic,"

On March 24, 2010, aRc started investigation activities to locate the piece of plastic discovered during the storm drain removal, and to determine the areal extent of the plastic. The initial step in the investigation was to dig "pot-holes" in all direction from the original location to find the edges of the plastic. aRc found two pieces of plastic in the vicinity, one was the plastic encountered during removal of the storm drain, and a second section was found to the northwest of the original piece. aRc cleared the soils from both sections of plastic and on April 15, 2010, the aRc project manager and DOE Deputy Federal Project Director walked down the two areas cleared and concurred that the areas met the intent of the requested investigation described in SPRU-10-049.

After both buried sections of plastic had been located and uncovered, a 2" x 2" sodium iodide detector "walkover" scan was conducted in this area. The count rates encountered were consistent with the background for this area and no elevated locations were discernable. This indicates that there was no material in excess of the clean-up criteria present within the area scanned; therefore no judgmental samples were required. Also, the plastic did not cover any confirmation sample locations so no additional confirmation samples were required. Once radiologically cleared, the soil material cover was re-graded back to its as found configuration.

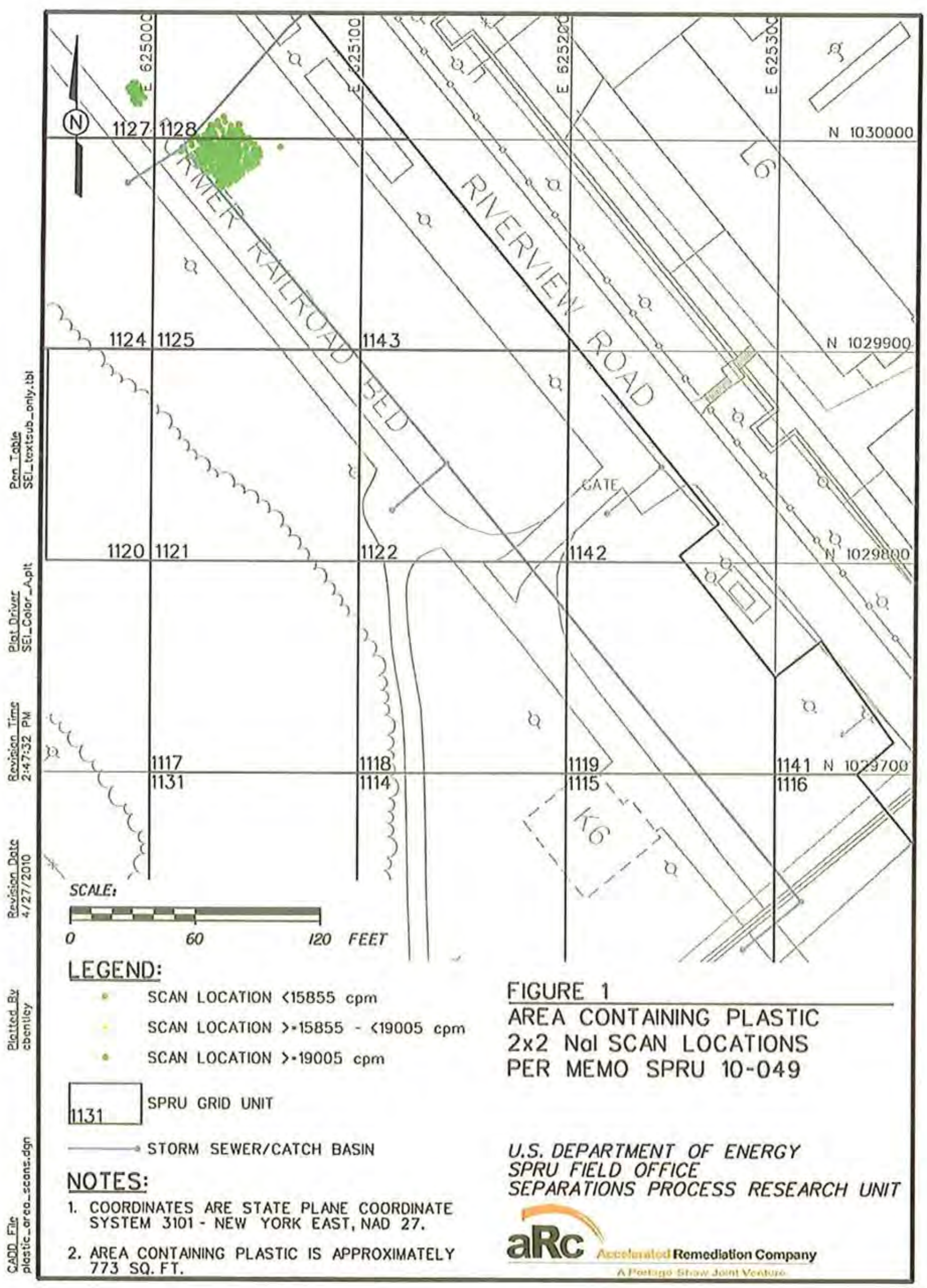
Attached please find the associated Radiological Survey Record and Figure 1 which is a color plot of the scan data.

Should you have any questions on these attachments or require further information. Please contact the undersigned or Dale Randall at 207-458-1389.

Sincerely

J P O'Hearn

Jack O'Hearn, Project Manager
Accelerated Remediation Company


E 625000
E 625100
E 625200
E 625300
N 1030000
N 1029900
N 1029800
N 1029700
1127 1128
1124 1125
1143
1120 1121
1122
1142
1117
1131
1118
1114
1119
1115
1141
1116
RIVERVIEW ROAD
FORMER RAILROAD BED
GATE
L6
K6
SCALE:
0 60 120 FEET
LEGEND:
SCAN LOCATION <15855 cpm
SCAN LOCATION >=15855 - <19005 cpm
SCAN LOCATION >=19005 cpm
SPRU GRID UNIT
1131
STORM SEWER/CATCH BASIN
NOTES:
1. COORDINATES ARE STATE PLANE COORDINATE SYSTEM 3101 - NEW YORK EAST, NAD 27.
2. AREA CONTAINING PLASTIC IS APPROXIMATELY 773 SQ. FT.
FIGURE 1
AREA CONTAINING PLASTIC
2x2 NaI SCAN LOCATIONS
PER MEMO SPRU 10-049
U.S. DEPARTMENT OF ENERGY
SPRU FIELD OFFICE
SEPARATIONS PROCESS RESEARCH UNIT
Accelerated Remediation Company
A Portage-Shaw Joint Venture
Pen Table SEI_textsub_only.tbl
Plot Driver SEI_Color_A.plt
Revision Time 2:47:32 PM
Revision Date 4/27/2010
Plotted By cbentley
CADD File plastic_area_scans.dgn

1/5

aRc Accelerated Remediation Company

RADIOLOGICAL SURVEY RECORD

aRc-FRM- 6533
Revision: 1
Effective 4/13/2009

Applicability: SPRU-LA
Type: Rad-Con
Owner: Rad Manager
For most recent revision or additional information:
https://extranet.shawgrp.com

Survey # : SPRUaRc-RadSurv- 10 - 0267
Survey Time / Date : 1520 / 040610
Surveyor : Bryan Carr
Print
Sign
Reviewer :
Print
Sign 04/29/2010

SURVEY METERS:

Meter Model #	2221	Meter Model #	
Meter Serial #	102029	Meter Serial #	
Probe Model	44-10	Probe Model	
Probe Serial #	PR 152104	Probe Serial #	
Cal Due Date	9/30/2010	Cal Due Date	
Meter Efficiency	N/A	Meter Efficiency	
Type (βγ,α)	γ scint	Type (βγ,α)	
Sample Time	N/A	Sample Time	
Background Time	1 min	Background Time	
BKG	10,000 cpm	BKG	
MDA	N/A	MDA	
Guideline	N/A	Guideline	
Action Level	N/A	Action Level	

SMEAR #	DPM / 100CM²		SMEAR #	DPM / 100CM²	
	βγ	α		βγ	α
N/A			N/A		

Location / RWP #: LLRB FSS - 012 / RWP - 10 - 007
Reason for Survey: Final Status Survey

F100406A

Survey of uncovered plastic sheeting in FSS-012, 008, and 002

Survey performed directly above plastic.
No further remedial action required.

aRc Accelerated Remediation Company
A Portage-Shaw Joint Venture

2/5
10-267
TAD
04/29/2010

Attachment 1
Trimble GPS Unit QC Check Form

Trimble GPS Unit QC Check Form

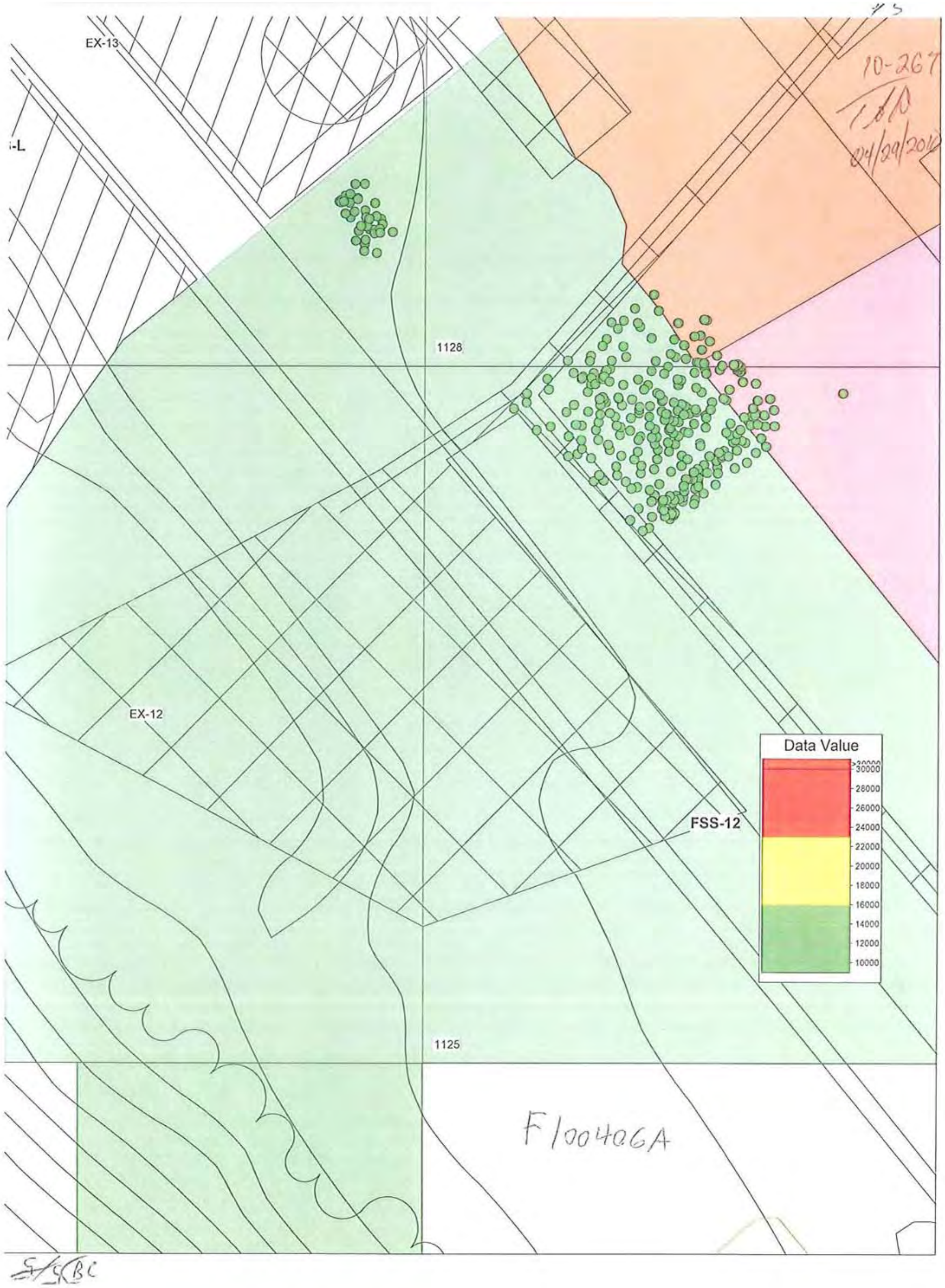
Project Name:	S. PRU-LA	QC Checkpoint		
SPCS:	☑ 1927 ☐ 1983	Northing*:	1030200	+/- 3 USft
Zone*:	E NY 3101			
Altitude Units:	USft	Easting*:	624900	+/- 3 USft
Coordinate Units:	USft			
Altitued Reference:	MSL	* Zone, QC Check Point Coordinates, and Ranges to be provided by the Survey Lead.		
Geoid Model:	DMA 10x10 (Global)			

Geo XH
S/N 4825400080

w/ Hurricane Ant.

Date	Time	Easting	Northing	# of SVs	PDOP	Real-Time Correction Y/N	Satisfactory Y/N	Initial	
4-1-10	0715	624899	1030200	6	2.13	Y	Y	BC	yes
4-5-10	0735	624900	1030201	7	2.23	Y	Y	BC	yes
4-6-10	0710	624897	1030200	7	2.11	Y	Y	BC	yes
4-7-10	0720	624898	1030200	6	3.36	Y	Y	BC	yes
4-8-10	0805	624900	1030200	7	2.08	Y	Y	BC	yes

Reviewed By: B Soral Date: 4-29-10


EX-13
1128
EX-12
FSS-12
1125
Data Value
>30000
30000
28000
26000
24000
22000
20000
18000
16000
14000
12000
10000
10-267
04/29/2010
F100406A

4/5

10-267
TSR 01/29/2010

Mean	10004.11
Standard Deviation	473.8563
Count	356
Min	8561
Max	11201
Bkg Determination	9995.983
30 pCi Cs-137 cpm	9000
Green Upper	18095.98
Yellow Upper	18995.98

Mean + (sigma*-6)	7161	-6	0	0	0	#NUM!

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Easting	Northing	Sensor	GPS Date	GPS Time	Point_ID	Rank	Percentile	Green Dot	Yellow Dot	Red Dot
624993.458	1030019.251	11201	4/6/2010	3:23:30 PM	39	1	0.002809	11201		
625033.595	1029988.883	11128	4/6/2010	3:28:14 PM	165	2	0.005618	11128		
625045.11	1030000.257	11095	4/6/2010	3:29:16 PM	196	3	0.008427	11095		
625035.649	1029992.442	11094	4/6/2010	3:29:30 PM	203	4	0.011236	11094		
625031.378	1029994.2	11077	4/6/2010	3:30:54 PM	245	5	0.014045	11077		
625049.02	1029989.719	11066	4/6/2010	3:25:12 PM	77	6	0.016854	11066		
624991.387	1030021.468	11050	4/6/2010	3:22:50 PM	19	7	0.019663	11050		
625035.424	1029993.13	11039	4/6/2010	3:34:14 PM	345	8	0.022472	11039		
625034.684	1029979.543	10986	4/6/2010	3:25:02 PM	72	9	0.025281	10986		
625034.588	1029993.563	10958	4/6/2010	3:34:12 PM	344	10	0.02809	10958		
625045.974	1029990.923	10946	4/6/2010	3:26:50 PM	125	11	0.030899	10946		
625043.947	1029990.533	10908	4/6/2010	3:27:00 PM	129	12	0.033708	10908		
625045.063	1030000.106	10893	4/6/2010	3:29:18 PM	197	13	0.036517	10893		
625036.113	1029979.093	10887	4/6/2010	3:24:34 PM	58	14	0.039326	10887		
624990.757	1030020.093	10870	4/6/2010	3:22:52 PM	20	15	0.042135	10870		
625048.473	1029991.68	10846	4/6/2010	3:25:44 PM	93	16	0.044944	10846		
625038.461	1029990.503	10829	4/6/2010	3:27:50 PM	153	17	0.047753	10829		
625047.446	1029991.582	10823	4/6/2010	3:25:16 PM	79	18	0.050562	10823		
625035.014	1029992.342	10821	4/6/2010	3:34:20 PM	348	19	0.053371	10821		
625037.393	1029998.03	10810	4/6/2010	3:30:28 PM	232	20	0.05618	10810		
624993.584	1030021.226	10808	4/6/2010	3:23:00 PM	24	21	0.058989	10808		
624992.98	1030016.328	10799	4/6/2010	3:23:16 PM	32	22	0.061798	10799		
625046.687	1029989.064	10799	4/6/2010	3:24:24 PM	53	22	0.061798	10799		
625050.848	1029993.741	10776	4/6/2010	3:26:24 PM	113	24	0.067416	10776		
625023.846	1029993.502	10756	4/6/2010	3:32:02 PM	279	25	0.070225	10756		
624989.906	1030018.095	10751	4/6/2010	3:23:04 PM	26	26	0.073034	10751		
625035.603	1029992.475	10723	4/6/2010	3:34:36 PM	356	27	0.075843	10723		
625041.67	1029993.813	10708	4/6/2010	3:34:32 PM	354	28	0.078652	10708		
625028.318	1029995.383	10701	4/6/2010	3:31:40 PM	268	29	0.081461	10701		
625035.747	1029991.152	10697	4/6/2010	3:28:20 PM	168	30	0.08427	10697		
625045.338	1029999.976	10681	4/6/2010	3:29:00 PM	188	31	0.087079	10681		
625033.613	1029981.53	10680	4/6/2010	3:26:42 PM	122	32	0.089888	10680		
625036.272	1029990.429	10648	4/6/2010	3:28:16 PM	166	33	0.092697	10648		

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Accelerated Remediation Company
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Appendix C
Post Groundwater Discharge
Radiological Survey in FSS-01

Accelerated Remediation Company

A Portage-Shaw Joint Venture

aRc Accelerated Remediation Company
A Portage-Shaw Joint Venture
SPRU Field Office SP-26
2425 River Road
Niskayuna, NY 12309

May 12, 2010 LAR-10-041

Matthew Zullo, Federal Project Director
U.S. Department of Energy
SPRU Field Office, SP-23
2425 River Road
Niskayuna, New York 12309

Subject: CONTRACT NO. DE-AM09-05SR22399/Task Order: DE-AT30 7CC60013/SP15.
Response to SPRU Field Office Acceptance of Final Status Survey Unit 2, 3, 4, 5, and 6 Radiological and Chemical Reports and Request for aRc Action (SPRU 10-011).

Mr. Zullo:

On January 19, 2010 the U.S. Department of Energy, Separations Process Research Unit (DOE-SPRU) Field Office accepted the revised chemical and radiological Final Status Survey (FSS) unit 2 through 6 report subject to aRc resolution of comments enclosed with SPRU 10-011. aRc's resolutions to the DOE's comments were submitted on January 27, 2010 (LAR-10-005).

DOE also requested, based on aRc's discharging of groundwater from excavations in the Lower Level Rail Bed and the Lower Level Parking Lot, a sample strategy to resample FSS 1 and report any findings. Additionally, DOE requested a summary of the groundwater discharges to FSS 1. Attached are a summary of groundwater discharges to FSS 1(Attachment 1), the FSS 1 sampling strategy (Attachment 2), and the findings from the requested additional sampling in FSS-01 (Attachment 3).

Should you have any questions or require further information please contact the undersigned at 518-344-2860.

Sincerely,

Doug Collins, Deputy Project Manager
Accelerated Remediation Company

Attachment: As stated

Date	Volume (gal) EX-10	LLPL
27-Jul-09	1,900	
28-Jul-09	9,818	
29-Jul-09	4,909	
29-Jul-09	23,450	
30-Jul-09	16,162	
31-Jul-09	22,863	
31-Jul-09	28,096	
1-Aug-09	11,285	
1-Aug-09	7,428	
2-Aug-09	11,959	
3-Aug-09	10,161	
4-Aug-09	8,206	
4-Aug-09	7,050	
6-Aug-09	4,909	
10-Aug-09	10,552	
10-Aug-09	10,552	
17-Aug-09	15,244	
25-Aug-09	19,454	
31-Aug-09	18,372	
8-Sep-09	16,809	
10-Sep-09	15,244	
26-Oct-10		4,000
29-Oct-09		2,500
30-Oct-09		3,000
3-Nov-09		3,000
4-Nov-09	5,435	
5-Nov-09	18,827	
6-Nov-09	7,815	
9-Nov-09	8,206	
11-Nov-09	12,898	
12-Nov-09	10,552	
1-Dec-09		6,000
3-Dec-09		1,700
4-Dec-10		2,500
7-Dec-09		4,750
16-Dec-09		2,850
5-Jan-10	7,000	
6-Jan-10	8,206	
7-Jan-10	20,266	
8-Jan-10	30,266	
Subtotals	403,894	30,300
total volume	434,194	gallons

SummaryTables for Ground Water Discharges from Excavation #10 and the Lower Level Parking Lot to FSS-01

		Excavation #10 Data Summary			LLPL Data Summary			
	ARC-PLN-6404 Dishcarge Limits	5/29/2009 SSW-001-001	7/7/2009 SWW-EX1-001	7/7/2009 SWW-EX1-001 dissolved	11/3/2009 SSW-002-001	11/3/2009 SSW-EX15-001	11/3/2009 SSW-EX15-001 dissolved	12/18/2009** SSW-004-001-R
Parameter	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
Antimony	6		7 B	ND	ND	ND	ND	
Arsenic	50	2.3 B	2.6	ND	4.2 B	10.5	4.0 B	
Cadmium	10	ND	1.7	ND	ND	1.3 B	ND	
Trivalent chromium	100	ND	ND	ND	ND	10.9	ND	
Cobalt	Monitor	ND	ND	ND	ND	6.6 B	ND	
Copper	400	5.2 B	5.6 B	4.7 B	7.0 B	88.1	8.8 B	
Lead	50	2.4 B	ND	ND	ND	29	ND	
Silver	100	ND	ND	ND	ND	ND	ND	
Thallium	Monitor	ND	ND	ND	ND	ND	3.3 B	
Vanadium	Monitor	ND	4.1 B	ND	53.7	211	147	157
Zinc	5000	29 E	10 B	18	29.2	134	7.9 B	< PQL
Mercury	1.4	ND	0.071	.067 B	0.13 B	3.5	0.2	< PQL
Acetone	50	6.4	ND	na	14	9.5	na	
Trichloroethylene (TCE)	5	ND	ND	na		ND	na	
PAHs 8270c		ND						
624 TAL VOCs	100				ND or <RL	ND or <RL*		< PQL
625 TAL SVOCs	100				ND			< PQL
Total suspended solids	< 500mg/l	3.0 B			14			
Oil and grease	15 mg/l	1.7 B,J			7.2			< PQL
pH	6.5-8.5		7.9					
Radionuclide	DL pCi/l	pCi/l	pCi/l		pCi/l	pCi/l		
Gross alpha	15	3.1	3.2 U		11 U	15 U		
Gross beta	1000	10.7	8.5		13	26		
Am-241	30	0.022 U	-0.027 U		-0.017U	0.042 U		
Cs-137	3000	3 U	2.8 U		-0.9 U	-1 U		
H-3	2.0 E+6	20 U			-7 U			
Pu-238	40	0.073 U	0.06 U		-0.008 U	-0.066 U		
Pu-239/240	30	0.019 U	-0.045 U		-0.049 U	-0.017 U		
Pu-241	2000	-0.6 U			0.6 U	-0.6 U		
Sr-90	1000	5.07			2.18	1.66		
Th-232	400	-0.020 U	0.031 U		0.005 U	0.2		
U (total)	500	3.26	2.25		2.67	7.95		

* Sample results less non detect or below reporting limit except Butyl benzyl phthalate at 8.0 ug/l.
** Sample collected by aRc, transferred to KAPL for radiological analysis for release to Adirondack Labs for chemical analysis. No definition for PQL provided.
B flag indicates estimated results. Result is less than reporting limit (RL).
U flag indicates result is less than the instrument detection liimit.
E flag indicates matrix interference.
ND = Non detect, RL = Reporting Limit

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Sampling Strategy for FSS 1 Receiving LLPL and LLRB Excavation Groundwater Discharges

To assess the impacts to FSS-01 from the non-routine water discharge, two locations will be sampled for chemical and two locations for radiological analyses following procedures in ARC-WP-07, *Work Package for Sampling and Analysis Tasks Associated with the SPRU- LA Lower Level Remediation,* Section 12.1 with a few minor variations.

1. One biased location will be chosen for the chemical sample location at the point where the discharge of the water occurred (near the end of the hose); the second location will be chosen based on guidance from NYSDEC DER-10 down gradient of the biased sample point.
2. Sample location will be screened by the XRF.
3. Soil samples will be collected for TAL Total Metals, VOCs, SVOCs and and Gamma Spec analyses.

The radiological surveys/sampling will be conducted using the following approach:

1. The area down gradient of the FSS 1 groundwater discharge point will be scanned using a Ludlum Model 44-10 2" x 2" detector, coupled with a Ludlum Model 2221 scaler/ratemeter. Based on observations during groundwater discharges, the visible flow of groundwater discharged was confined to an area approximately twenty feet wide by sixty feet wide down gradient of the FSS 1 discharge location.
2. One biased location will be chosen at the point where the discharge of the water occurred (near the end of the hose) 1x 500 mL plastic Marenilli, the second location will be selected based on the most elevated scan readings within the area of general discharge. The samples collected will be analyzed in the on-site laboratory by gamma spectroscopy to ensure that concentrations of gamma emitters are less than their respective DCGLs (< 30 pCi/gm) and that their SORs are less than half of unity (< 0.50). In addition, the two samples will be sent to an off-site laboratory to be analyzed for Strontium-90.
3. ROC's that are not quantifiable by on-site analysis will be assumed to be at or near background levels for the SOR calculation. In addition, if the on-site analysis exceeds the SOR of 0.50, the sample will be analyzed at an off-site commercial laboratory (Test America) for the 11 radionuclides of concern.

Upon completion of the radiological screening of the area, the soil sampling will occur as follows:

1. Conduct pre-job briefing to work package ARC-WP-007.
2. Locate sampling location at water discharge location in FSS-01.
3. Collect VOC sample using disposable scoop and place directly in sample container.
4. Collect soil using disposable scoop from approximately 6-in. diameter by 6-12 in. deep plug into an aluminum pan.
5. Composite the soil using the cone and quarter method described in ARC-WP-007.
6. Transfer composited sample material to appropriate container defined in ARC-PLN-6402, *RCRA Quality Assurance Project Plan for the Separations Process Research Unit Lower Level Land Areas Remediation*, and summarized in table below.
7. Record sampling information on sample container and in field sampling logbook.
8. Prepare and ship sample to offsite laboratory for analyses.

Parameter	Analytical Method	Matrix Sample	Containers	Preservation	Hold Times
TAL total metals	6010B and 7471A for Hg	Soil	1 × 250-mL widemouth glass container with PTFE-lined cap	<6°C	6 months/ 28 days Hg
VOCs	8260B	Soil	1 x 125 mL glass jar with PTFE-lined lid	<6°C	14 days
VOCs	8260B	Water (Trip Blank)	3 × 40 mL glass vial with PTFE-lined septum cap	<6°C HCL	14 days
SVOCs	8270C	Soil	1 × 250-mL widemouth glass container with PTFE-lined cap	<6°C	14/40 days
Gamma Spec	EML-GA-01-R	Soil	1x 500 mL plastic Marenilli	NA	6 months
Sr-90(total)	DOE-SR-02-RC-Mod	Soil	1x 500 mL plastic Marenilli	NA	6 months

If additional off-site radiological analysis is required additional sample analysis methods and collection will be provided.

Soil Sampling Results for Area FSS-01, Post Water Discharges

Sampling to assess the impacts to FSS-01 from the aRc non-routine water discharges, were conducted at two locations. Each location was sampled for chemical and for radiological analyses following procedures in ARC-WP-07, *Work Package for Sampling and Analysis Tasks Associated with the SPRU- LA Lower Level Remediation,* Section 12.1. One biased location was chosen at the point where the discharge of the water occurred (near the end of the hose); the second location was chosen based on guidance from NYSDEC DER-10 down gradient of the biased sample point (see figure 1 for sample locations).

Samples were collected for Total Metals, SVOCs, VOCs, Total Strontium and Gamma Spec. All but the Gamma Spec samples were sent to Test America, St Louis for analyses. Gamma spec was analyzed at the on-site laboratory. All off-site laboratory data was validated by Portage Inc. Table 1 provides the analytical results and data validation flagging for the two samples.

All metal COCs subject to RCRA requirements analyzed in the FSS-01 discharge area had concentrations below the corresponding SCOs, with the exception of arsenic and antimony. Validated analytical data for arsenic and antimony in both samples exceed the project's SCO of 16 mg/kg for arsenic and 1 mg/kg for antimony. All of FSS-01 is located within the railbed voluntary clean up area where arsenic and antimony presence is associated with historic railroad activities and those constituents were not required to meet project SCOs. The RCRA interim report for FSS-01 (ARC-RPT-6005) reported concentration of arsenic and antimony above SCO similar to the concentration report with this sampling.

Similar to metals, low levels of SVOC were found in both samples however all results were below SCOs. SVOC in these samples would be expected because sample results from PAH sampling in FSS-01 reported in Interim report ARC-RPT-6005 indicated SVOCs above SCO were left in this area because they were associated with historical railroad activities and were not required to be removed from the voluntary cleanup area of FSS-01.

VOC data for the two samples had hits for acetone and methylene chloride in both samples and trichloroethene in one sample. All VOC concentrations are below SCOs.

Tables 1 and 2 provide radiological analytic results for the two samples. Walkover scans were also performed in the area using a 2" x2" Sodium iodide detector probe. These results found no elevated locations and are plotted on Figure 1.

Review of the chemical and radiological data from the FSS-01 post water discharge samples indicate there was no impact in chemical or radiological concentration in FSS-01 due to non-routine water discharges in this area.

Table 1 FSS-01 Post Groundwater Discharge Sampling (4-1-10)

CLIENT ID	METHOD	COMPOUND NAME	RESULT	UNITS	RPT LIMIT	Lab Flag	Val Flag	DIL
SGD-001-001-V	8260B	1,1,1-Trichloroethane	0.012	mg/kg	0.012	U		1
SGD-001-001-V	8260B	1,1-Dichloroethane	0.012	mg/kg	0.012	U		1
SGD-001-001-V	8260B	1,1-Dichloroethene	0.012	mg/kg	0.012	U		1
SGD-001-001-V	8260B	1,2,4-Trimethylbenzene	0.012	mg/kg	0.012	U	R	1
SGD-001-001-V	8260B	1,2-Dichlorobenzene	0.012	mg/kg	0.012	U	R	1
SGD-001-001-V	8260B	1,2-Dichloroethane	0.0058	mg/kg	0.0058	U		1
SGD-001-001-V	8260B	1,3,5-Trimethylbenzene	0.012	mg/kg	0.012	U	R	1
SGD-001-001-V	8260B	1,3-Dichlorobenzene	0.012	mg/kg	0.012	U	R	1
SGD-001-001-V	8260B	1,4-Dichlorobenzene	0.012	mg/kg	0.012	U	R	1
SGD-001-001-V	8260B	1,4-Dioxane	0.093	mg/kg	0.093	U	R	1
SGD-001-001-V	8260B	Acetone	0.012	mg/kg	0.023	J	J	1
SGD-001-001-V	8260B	Benzene	0.012	mg/kg	0.012	U		1
SGD-001-001-V	8260B	Carbon tetrachloride	0.012	mg/kg	0.012	U		1
SGD-001-001-V	8260B	Chlorobenzene	0.012	mg/kg	0.012	U		1
SGD-001-001-V	8260B	Chloroform	0.012	mg/kg	0.012	U		1
SGD-001-001-V	8260B	cis-1,2-Dichloroethene	0.012	mg/kg	0.012	U		1
SGD-001-001-V	8260B	Ethylbenzene	0.012	mg/kg	0.012	U		1
SGD-001-001-V	8260B	Methyl ethyl ketone	0.023	mg/kg	0.023	U		1
SGD-001-001-V	8260B	Methyl tert-butyl ether	0.012	mg/kg	0.012	U		1
SGD-001-001-V	8260B	Methylene chloride	0.012	mg/kg	0.0082		J	1
SGD-001-001-V	8260B	n-Butylbenzene	0.012	mg/kg	0.012	U	R	1
SGD-001-001-V	8260B	n-Propylbenzene	0.012	mg/kg	0.012	U	R	1
SGD-001-001-V	8260B	sec-Butylbenzene	0.012	mg/kg	0.012	U	R	1
SGD-001-001-V	8260B	tert-Butylbenzene	0.012	mg/kg	0.012	U	R	1
SGD-001-001-V	8260B	Tetrachloroethene	0.012	mg/kg	0.012	U		1
SGD-001-001-V	8260B	Toluene	0.012	mg/kg	0.012	U		1
SGD-001-001-V	8260B	trans-1,2-Dichloroethene	0.0058	mg/kg	0.0058	U		1
SGD-001-001-V	8260B	Trichloroethene	0.012	mg/kg	0.012	U		1
SGD-001-001-V	8260B	Vinyl chloride	0.0058	mg/kg	0.0058	U		1
SGD-001-001-V	8260B	Xylenes (total)	0.012	mg/kg	0.012	U		1
SGD-001-002-V	8260B	1,1,1-Trichloroethane	0.012	mg/kg	0.012	U		1
SGD-001-002-V	8260B	1,1-Dichloroethane	0.012	mg/kg	0.012	U		1
SGD-001-002-V	8260B	1,1-Dichloroethene	0.012	mg/kg	0.012	U		1
SGD-001-002-V	8260B	1,2,4-Trimethylbenzene	0.012	mg/kg	0.012	U	R	1
SGD-001-002-V	8260B	1,2-Dichlorobenzene	0.012	mg/kg	0.012	U	R	1
SGD-001-002-V	8260B	1,2-Dichloroethane	0.0058	mg/kg	0.0058	U		1
SGD-001-002-V	8260B	1,3,5-Trimethylbenzene	0.012	mg/kg	0.012	U	R	1
SGD-001-002-V	8260B	1,3-Dichlorobenzene	0.012	mg/kg	0.012	U	R	1
SGD-001-002-V	8260B	1,4-Dichlorobenzene	0.012	mg/kg	0.012	U	R	1
SGD-001-002-V	8260B	1,4-Dioxane	0.093	mg/kg	0.093	U	R	1
SGD-001-002-V	8260B	Acetone	0.0096	mg/kg	0.023	J	J	1
SGD-001-002-V	8260B	Benzene	0.012	mg/kg	0.012	U		1
SGD-001-002-V	8260B	Carbon tetrachloride	0.012	mg/kg	0.012	U		1
SGD-001-002-V	8260B	Chlorobenzene	0.012	mg/kg	0.012	U	UJ	1
SGD-001-002-V	8260B	Chloroform	0.012	mg/kg	0.012	U		1
SGD-001-002-V	8260B	cis-1,2-Dichloroethene	0.012	mg/kg	0.012	U		1
SGD-001-002-V	8260B	Ethylbenzene	0.012	mg/kg	0.012	U	UJ	1
SGD-001-002-V	8260B	Methyl ethyl ketone	0.023	mg/kg	0.023	U		1
SGD-001-002-V	8260B	Methyl tert-butyl ether	0.012	mg/kg	0.012	U		1
SGD-001-002-V	8260B	Methylene chloride	0.0085	mg/kg	0.0081		J	1
SGD-001-002-V	8260B	n-Butylbenzene	0.012	mg/kg	0.012	U	R	1

Table 1 FSS-01 Post Groundwater Discharge Sampling (cont.)(4-1-10)

CLIENT ID	METHOD	COMPOUND NAME	RESULT	UNITS	RPT LIMIT	Lab Flag	Val Flag	DIL
SGD-001-002-V	8260B	n-Propylbenzene	0.012	mg/kg	0.012	U	R	1
SGD-001-002-V	8260B	sec-Butylbenzene	0.012	mg/kg	0.012	U	R	1
SGD-001-002-V	8260B	tert-Butylbenzene	0.012	mg/kg	0.012	U	R	1
SGD-001-002-V	8260B	Tetrachloroethene	0.012	mg/kg	0.012	U	UJ	1
SGD-001-002-V	8260B	Toluene	0.012	mg/kg	0.012	U	UJ	1
SGD-001-002-V	8260B	trans-1,2-Dichloroethene	0.0058	mg/kg	0.0058	U		1
SGD-001-002-V	8260B	Trichloroethene	0.0016	mg/kg	0.012	J	J	1
SGD-001-002-V	8260B	Vinyl chloride	0.0058	mg/kg	0.0058	U		1
SGD-001-002-V	8260B	Xylenes (total)	0.012	mg/kg	0.012	U	UJ	1

CLIENT ID	METHOD	COMPOUND NAME	RESULT	UNITS	MDC	Lab Flag	Val Flag	DILUTION
SGD-001-001-R	SR-03-RC MOD	Strontium Total	0.04	pCi/g	0.32	U	U	1
SGD-001-002-R	SR-03-RC MOD	Strontium Total	0.17	pCi/g	0.3	U	U	1

CLIENT ID	METHOD	COMPOUND NAME	RESULT	UNITS	RPT LIMIT	Lab Flag	Val Flag	DILUTION
SGD-001-001-S	8270C	Acenaphthene	380	ug/kg	380	U		1
SGD-001-001-S	8270C	Acenaphthylene	380	ug/kg	380	U		1
SGD-001-001-S	8270C	Anthracene	380	ug/kg	380	U		1
SGD-001-001-S	8270C	Benzo(a)anthracene	140	ug/kg	380	J	J	1
SGD-001-001-S	8270C	Benzo(a)pyrene	130	ug/kg	380	J	J	1
SGD-001-001-S	8270C	Benzo(b)fluoranthene	180	ug/kg	380	J	J	1
SGD-001-001-S	8270C	Benzo(ghi)perylene	66	ug/kg	380	J	J	1
SGD-001-001-S	8270C	Benzo(k)fluoranthene	190	ug/kg	380	J	J	1
SGD-001-001-S	8270C	Chrysene	180	ug/kg	380	J	J	1
SGD-001-001-S	8270C	Dibenz(a,h)anthracene	380	ug/kg	380	U		1
SGD-001-001-S	8270C	Fluoranthene	270	ug/kg	380	J	J	1
SGD-001-001-S	8270C	Fluorene	380	ug/kg	380	U		1
SGD-001-001-S	8270C	Indeno(1,2,3-cd)pyrene	51	ug/kg	380	J	J	1
SGD-001-001-S	8270C	Naphthalene	380	ug/kg	380	U		1
SGD-001-001-S	8270C	Phenanthrene	100	ug/kg	380	J	J	1
SGD-001-001-S	8270C	Pyrene	220	ug/kg	380	J	J	1
SGD-001-002-S	8270C	Acenaphthene	380	ug/kg	380	U		1
SGD-001-002-S	8270C	Acenaphthylene	380	ug/kg	380	U		1
SGD-001-002-S	8270C	Anthracene	380	ug/kg	380	U		1
SGD-001-002-S	8270C	Benzo(a)anthracene	42	ug/kg	380	J	J	1
SGD-001-002-S	8270C	Benzo(a)pyrene	39	ug/kg	380	J	J	1
SGD-001-002-S	8270C	Benzo(b)fluoranthene	48	ug/kg	380	J	J	1
SGD-001-002-S	8270C	Benzo(ghi)perylene	380	ug/kg	380	U		1
SGD-001-002-S	8270C	Benzo(k)fluoranthene	55	ug/kg	380	J	J	1
SGD-001-002-S	8270C	Chrysene	53	ug/kg	380	J	J	1
SGD-001-002-S	8270C	Dibenz(a,h)anthracene	380	ug/kg	380	U		1
SGD-001-002-S	8270C	Fluoranthene	95	ug/kg	380	J	J	1
SGD-001-002-S	8270C	Fluorene	380	ug/kg	380	U		1
SGD-001-002-S	8270C	Indeno(1,2,3-cd)pyrene	380	ug/kg	380	U		1
SGD-001-002-S	8270C	Naphthalene	380	ug/kg	380	U		1
SGD-001-002-S	8270C	Phenanthrene	380	ug/kg	380	U		1
SGD-001-002-S	8270C	Pyrene	76	ug/kg	380	J	J	1

Table 1 FSS-01 Post Groundwater Discharge Sampling (cont.)(4-1-10)

CLIENT ID	METHOD	COMPOUND NAME	RESULT	UNITS	RPT LIMIT	Lab Flag	Val Flag	DIL
CLIENT ID	METHOD	COMPOUND NAME	RESULT	UNITS	MDL	Lab Flag	Val Flag	DILUTION
SGD-001-001-M	6010B	Aluminum	6910	mg/kg	163	NE		10
SGD-001-001-M	6020	Antimony	1.4	mg/kg	0.076	E		1
SGD-001-001-M	6010B	Arsenic	40	mg/kg	0.37	E		1
SGD-001-001-M	6010B	Barium	61.6	mg/kg	0.29			1
SGD-001-001-M	6010B	Beryllium	0.59	mg/kg	0.2			1
SGD-001-001-M	6010B	Cadmium	0.58	mg/kg	0.58	U		10
SGD-001-001-M	6010B	Calcium	8230	mg/kg	155	NE*	J	10
SGD-001-001-M	6010B	Chromium	14.1	mg/kg	0.36			1
SGD-001-001-M	6010B	Cobalt	9.8	mg/kg	1.1			1
SGD-001-001-M	6010B	Copper	83.1	mg/kg	0.85	E		1
SGD-001-001-M	6010B	Iron	22900	mg/kg	34.6	NE	J	10
SGD-001-001-M	6010B	Lead	58.4	mg/kg	0.2	E	J	1
SGD-001-001-M	6010B	Magnesium	4200	mg/kg	96.8	NE*	J	10
SGD-001-001-M	6010B	Manganese	358	mg/kg	0.18	N		1
SGD-001-001-M	7471A	Mercury	0.11	mg/kg	0.007	E		1
SGD-001-001-M	6010B	Nickel	24.5	mg/kg	0.26			1
SGD-001-001-M	6010B	Potassium	848	mg/kg	393	N	J	1
SGD-001-001-M	6010B	Selenium	3.4	mg/kg	3.4	U		10
SGD-001-001-M	6010B	Silver	0.27	mg/kg	0.27	U		1
SGD-001-001-M	6010B	Sodium	61	mg/kg	54.9	B		1
SGD-001-001-M	6020	Thallium	0.14	mg/kg	0.14	U		2
SGD-001-001-M	6010B	Vanadium	33.5	mg/kg	1.5			1
SGD-001-001-M	6010B	Zinc	363	mg/kg	2.3			1
SGD-001-002-M	6010B	Aluminum	11700	mg/kg	163	NE		10
SGD-001-002-M	6020	Antimony	1.2	mg/kg	0.076	E		1
SGD-001-002-M	6010B	Arsenic	22.7	mg/kg	0.37	E		1
SGD-001-002-M	6010B	Barium	86.8	mg/kg	0.29			1
SGD-001-002-M	6010B	Beryllium	0.82	mg/kg	0.2			1
SGD-001-002-M	6010B	Cadmium	0.58	mg/kg	0.58	U		10
SGD-001-002-M	6010B	Calcium	15200	mg/kg	155	NE*	J	10
SGD-001-002-M	6010B	Chromium	20.4	mg/kg	0.36			1
SGD-001-002-M	6010B	Cobalt	15.6	mg/kg	1.1			1
SGD-001-002-M	6010B	Copper	49.5	mg/kg	0.84	E		1
SGD-001-002-M	6010B	Iron	32300	mg/kg	34.5	NE	J	10
SGD-001-002-M	6010B	Lead	24	mg/kg	0.2	E	J	1
SGD-001-002-M	6010B	Magnesium	8630	mg/kg	96.6	NE*	J	10
SGD-001-002-M	6010B	Manganese	573	mg/kg	0.18	N		1
SGD-001-002-M	7471A	Mercury	0.038	mg/kg	0.007	BE		1
SGD-001-002-M	6010B	Nickel	35.1	mg/kg	0.26			1
SGD-001-002-M	6010B	Potassium	1510	mg/kg	392	N	J	1
SGD-001-002-M	6010B	Selenium	3.4	mg/kg	3.4	U		10
SGD-001-002-M	6010B	Silver	0.27	mg/kg	0.27	U		1
SGD-001-002-M	6010B	Sodium	55.8	mg/kg	54.7	B		1
SGD-001-002-M	6020	Thallium	0.13	mg/kg	0.13	U		2
SGD-001-002-M	6010B	Vanadium	29.9	mg/kg	1.5			1
SGD-001-002-M	6010B	Zinc	143	mg/kg	2.3			1

Laboratory Flags

* = Relative Percent Difference is outside stated control limits

U = The analyte was analyzed for but was not detected. The reported concentration is the method detection limit.

B = Result is between the MDL and the Reporting limit. (metals)

N = Spike analyte recovery outside stated control limits

E = Reported value an estimate because of the presence of interferance

J =Estimated value. The analyte was positively identified in the sample, but the reported value may not be an accurate representation of the concentration actually present in the sample.

Validation Flags

J =Estimated value. The analyte was positively identified in the sample, but the reported value may not be an accurate representation of the concentration actually present in the sample.

U = The analyte was analyzed for but was not detected. The reported concentration is the method detection limit.

R: Rejected

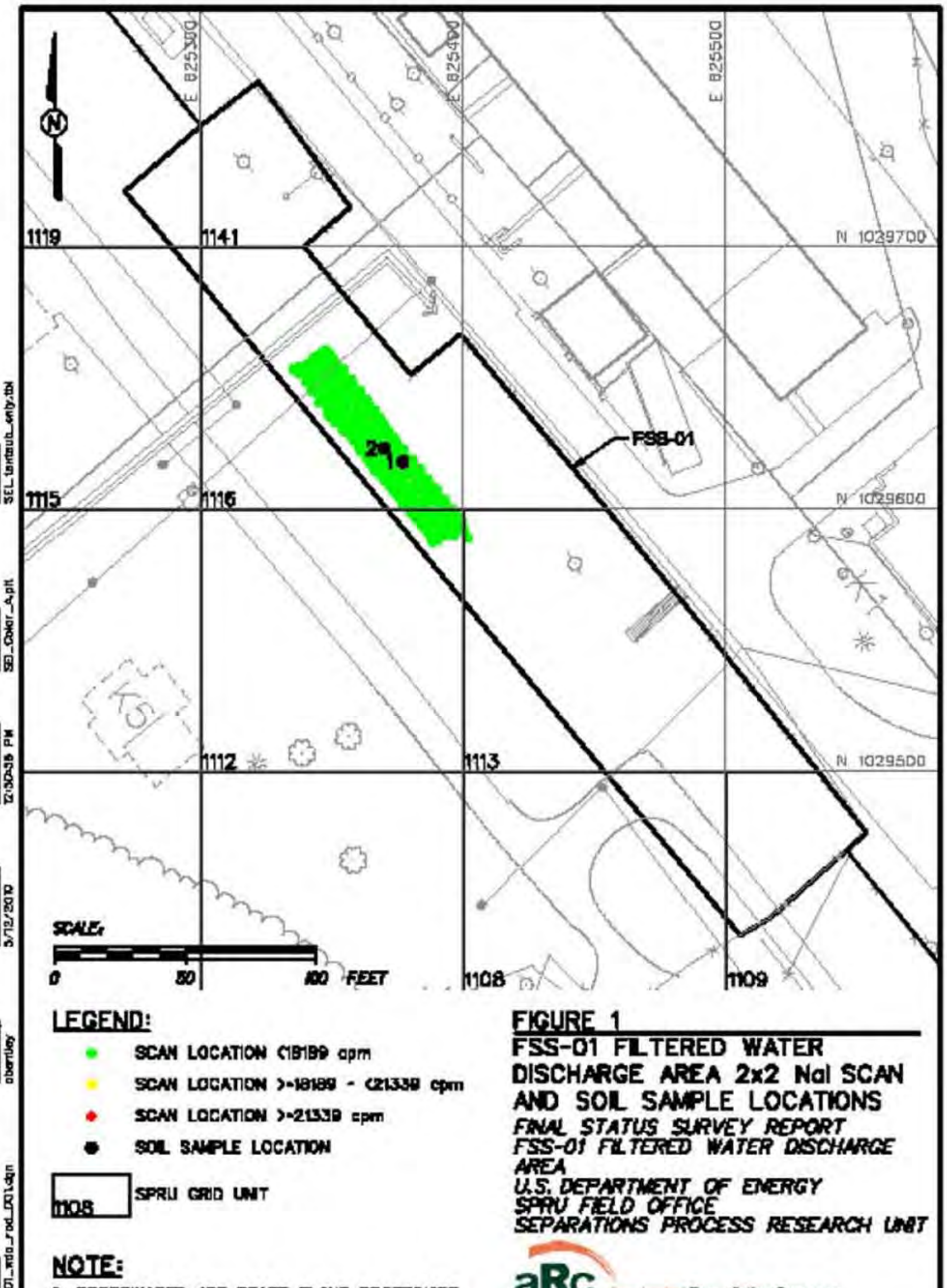
UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample

Table 2 Judgmental sample results summary for FSS-01 water discharge area

	Nuclide	Co-60	Sr-90[5]	Cs-137	Th-232	U-234	U-235	U-238	Pu-238	Pu-239/240	Pu-241	Am-241	SOR
	DCGL	9.78	4654	30	9.05	1162	188	851	792	714	19120	574	1.00
Sample ID	SGD-001-001-R	*0.101*	*0.32*	0.392	*0.654*	NA	*0.15*	*0.313*	*113*	*109*	NA	*1.23*	0.394
	SGD-001-002-R	*0.105*	*0.30*	*0.098*	*0.55*	NA	*0.115*	*0.267*	*91.1*	*88.3*	NA	*0.913*	0.316

NOTES:

1. All DCGLs and numerical results are reported in units of pCi/g.
2. All samples were analyzed by onsite gamma spectroscopy.
3. Values in *italics* are qualified as "U" and represent the minimum detectable activity.
4. NA = not analyzed. Because the analyses are performed only by gamma spectroscopy, the analysis for Sr-90, U-234, and Pu-241 is not possible.
5. Sr-90 was analyzed by the offsite laboratory. These results underwent validation.


E 825300
E 825400
E 825500
N 1029700
N 1029600
N 1029500
1119
1141
1115
1116
1112
1113
1108
1109
FSS-01
2
1
SCALE:
0
50
100 FEET
LEGEND:
SCAN LOCATION <18189 cpm
SCAN LOCATION >=18189 - <21339 cpm
SCAN LOCATION >=21339 cpm
SOIL SAMPLE LOCATION
1108
SPRU GRID UNIT
NOTE:
1. COORDINATES ARE STATE PLANE COORDINATE SYSTEM 3101 - NEW YORK EAST, NAD 27.
FIGURE 1
FSS-01 FILTERED WATER DISCHARGE AREA 2x2 NaI SCAN AND SOIL SAMPLE LOCATIONS
FINAL STATUS SURVEY REPORT
FSS-01 FILTERED WATER DISCHARGE AREA
U.S. DEPARTMENT OF ENERGY
SPRU FIELD OFFICE
SEPARATIONS PROCESS RESEARCH UNIT
Accelerated Remediation Company

Appendix D
Report for the Post-Excavation Soil Surfaces at the
Drain Pipe Excavation Separations Process Research Unit-Lower Level
(ARC-RPT-6032)

Accelerated Remediation Company
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Report for the Post-Excavation Soil Surfaces at the Drain Pipe Excavation Separations Process Research Unit-Lower Level

ARC-RPT-6032
October 5, 2010
Revision 2

DOE Contract No. DE-AM09-05SR22399
Task Order No. DE-AT30-07CC60013/SP15

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TEM-6000 (05/13/2008, Rev. 0)

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A Portage-Shaw Joint Venture

Report for the Post-Excavation Soil Surfaces at the Drain Pipe Excavation Separations Process Research Unit-Lower Level

Approval for Use

Doug Collins Deputy Project Manager	10/05/10 Date
Dale Randall Final Status Survey Engineer	10/05/10 Date
Todd Davidson, Certified Health Physicist Radiological Controls Manager	10/05/10 Date
Berta Oates Project Quality Assurance Manager	10/05/10 Date

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Accelerated Remediation Company
A Portage-Shaw Joint Venture

Acronyms

aRc	Accelerated Remediation Company, LLC
DCGL	derived concentration guideline level
lcy	loose cubic yards
MDA	minimum detectable activity
RER	replicate error ratio
SOR	sum of ratios
SPRU	Separations Process Research Unit

Executive Summary

Accelerated Remediation Company, LLC, removed a buried stormwater drain line from the Separations Process Research Unit (SPRU) Lower Level land area and conducted a radiological survey of the soils below the drain line. The drain line was located approximately 4-16 ft below ground surface in the SPRU Lower Level land area Final Status Survey (FSS) Units FSS-08, FSS-09, FSS-10, FSS-11, and FSS-12. Each of these FSS units had been radiologically cleared prior to excavation of the drain line. Soils from the ground surface to 6 in. above the drain line were excavated, set aside, and scanned for reuse as backfill material for the trench after the drain line had been removed.

The operation of removing the drain line as well as performing the survey of the residual soil was performed in accordance with the guidance provided by the U.S. Department of Energy (specific instruction was provided in SPRU 09-066).

As described in the associated survey plan, 16 statistically based samples evenly spaced along the drain line excavation from a random starting point were collected. In addition, one biased sample from each of the six catch basins was collected. The measured cesium activity in each of the statistical and biased samples was well below the derived concentration guideline level (DCGL) for cesium-137 (30 pCi/g), resulting in an average sum of the ratios value of 0.296. The samples indicate that the soils remaining after removal of the drain line meet the DCGLs for the SPRU Lower Level.

During removal of the soils to be used as backfill, the majority of the material scanned was found to be well below the DCGLs; however, over the course of the drain line excavation, four small areas that either were confirmed to have, or had indications of, contamination in excess of the cleanup criteria were encountered. In all cases, areas found to exceed the DCGLs were at higher elevations than the drainage line placement within the excavation; thus, any contamination found was not related to a leak or other release associated with the drainage system.

Each of the encountered areas of elevated levels of radioactivity were excavated until the soil indicated that residual contamination was below the DCGLs as measured by walkover scan and sampling

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1.0 Introduction and Background

Accelerated Remediation Company, LLC, (aRc) removed a buried stormwater drain line from the Separations Process Research Unit (SPRU) Lower Level land area. The drain system originated in the Lower Level land area at an open catch basin (CB-42) between the areas where the K5 and K6 buildings were formerly located (see Figure 1). From CB-42, this system continues on to CB-25 and then heads north, where it discharges into the Mohawk River. The storm drain system includes CB-9, CB-18, CB-25, CB-32, CB-41, and CB-42. The tops of each catch basin are covered with earth, with the exception of CB-42, which is an exposed, open-gate catch basin located east of the former K6 Waste Storage Pad.

The exposed excavation surfaces below the drain line were to be surveyed in accordance with the direction given by the U.S. Department of Energy in correspondence SPRU 09-066. A survey plan, *Survey Unit Design for Post-Excavation Soil Surfaces at the Drain Pipe Excavation Separations Process Research Unit-Lower Level* (ARC-PLN-6570), was written to detail the actions that were to be taken for this task. The surface area above this drain line had been previously remediated and released under aRc protocols and procedures delineated in the *Radiological Confirmation Sampling and Analysis Plan/Final Status Survey (CSAP/FSS) Plan/Final Status Survey (CSAP/FSS) for the Separations Process Research Unit Lower Level Land Areas* (ARC-PLN-6511).

Based on operating history and existing characterization data, this drain line and the associated soils were not expected to contain radioactive materials at levels above project release criteria. Additional characterization and historical use information concerning the removed storm drain system is presented in Appendix G and Section 6 of the *Radiological Characterization Report for SPRU Outside Areas* (CH2M Hill 2006).

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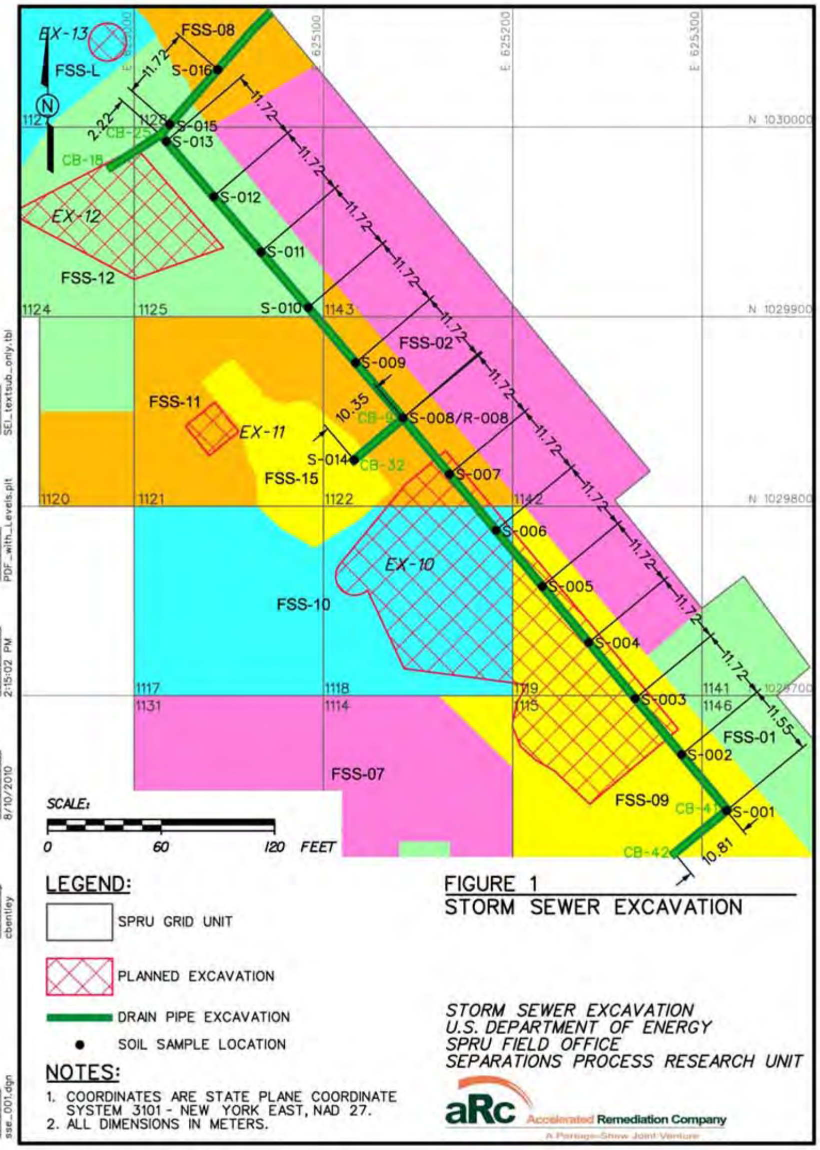

Figure 1 Drain line sample locations

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2.0 Chronology

The following is a chronology of work activities related to the survey presented herein:

12-22-09	Trenching work commences.
12-24-09	Scans indicate elevated location immediately north of CB-25. Associated judgmental sample results are as high as 52 pCi/g Cs-137 (*Sample J-3*). The contaminated region is located approximately 1-2 ft deep and extends approximately 8 ft northward. The area is excavated until the remaining soil is shown to be below derived concentration guideline levels (DCGLs) by 2 × 2 scanning.
12-29-09	Based on slightly elevated count rates, a judgmental sample is collected from an area between Statistical Samples 12 and 13. The onsite analysis result is shown to be 50% of the DCGL for cesium-137 (15.2 pCi/g) and has a sum of ratios (SOR) of 0.976 based on the detected nuclide and onsite minimum detectable activity (MDA) results (Sample *J-4*).
01-4-10	Elevated count rates are found at a scan location on the west trench wall about midway between Statistical Samples 8 and 9. A pre-remediation sample was at 55 pCi/g cesium-137 (Sample *J-5*). Post-remediation scanning indicates that the contamination did not extend under the gravel road that was near the drain line trench in this section. Approximately 5 yd^3 of contaminated soil is removed from this location. Resurveys performed by scanning do not indicate any elevated activity remaining.
01-13-10	Elevated count rates at scan locations near CB-41 and CB-42 prompt minor soil removals at each location (performed with hand tools). Post-remediation scans are confirmed with sampling. Two judgmental samples north of the CB-41(Samples *J-8* and *J-9*) are collected in addition to one judgmental sample from the corner of CB-42 (Sample *J-10*). All results indicate that these are well below the DCGL.
01-19-10	An additional follow-up judgmental sample is taken from the vicinity of CB-41(Sample *J-7*) and determined to be below the DCGL.

3.0 Field Activities

Drain line excavation activities began on December 22, 2009, and were completed on January 14, 2010. During this period, aRc excavated approximately 872 loose cubic yards (lcy) of soil. Of this total, approximately 449 lcy was reused as clean backfill material. Approximately 423 lcy of soil, including the 665 ft of drain line piping and the concrete debris from the six catch basins, was excavated and transferred to the soil bins for offsite disposal. Of the approximately 423 lcy of soil transferred to the soil bins, approximately 10 lcy was soil from the four locations that had indications of contamination in excess of the cleanup criteria.

3.1 Scanning

Excavation was performed in controlled lifts. Marked out areas were excavated in approximately 1/2- to 1-ft lifts. At the completion of each lift within a marked area, a radiological survey instrument (e.g., 2 × 2 NaI detector) was used to determine if the newly exposed surface meets the radiological cleanup criteria.

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For soils associated the drain line removal, the radiological cleanup criteria were met if the 2 × 2 NaI detector readings were less than 20,000 cpm. This process of excavation in approximately 1/2- to 1-ft lifts followed by surveying the new surface was continued for a maximum of four lifts or an excavation depth within a marked area of no more than approximately 3 ft. This maximum depth had been selected for health and safety purposes and to avoid additional efforts required for confined spaces in excavations greater than 4 ft.

Walkover scans in the area were conducted in accordance with aRc procedure ARC-PRC-6570, "SPRU Lower Level Gamma Scintillation Walkover Scans," as modified by ARC-PLN-6122. "Walkover scans" are so named because they consist of walking over the surface area to ensure that significant levels of gamma radiation, which might indicate residual radionuclide concentrations above project criteria, are not present. For Class 2 survey units, 50% of the survey unit surface (defined as the top 6 in. of material) is covered by these scans, as indicated in Table 1.

Table 1 Drain pipe excavation classification and justification

Justification	Class	Scan Coverage Guidelines
Historical information and characterization samples indicate that residual activity levels are less or much less than applicable site derived concentration guideline level values.	2	50%

The excavation depth (from 4 to 16 ft deep) restricted personnel access to approximately 575 linear ft of the total 655 linear ft of the drain line excavation due to fall protection requirements. Therefore, the soils from this section of the excavation were removed from the trench, laid out on the ground in layers less than 1 ft thick, and then scanned. These walkover scans were conducted on (a) soils excavated above the drain pipe to be cleared for reuse as backfill material and for (b) the soils remaining after removal of the drain line and soils 6 in. above and below the pipe. The remaining 80 linear ft of shallow trenching (less than 4 ft) along the southern portions of the drain line system was accessible by aRc personnel to conduct scans.

Once the surveyed soil was determined to be acceptable as fill, the material was returned to the excavation. This approach kept personnel away from the sides of the excavation and out of the unsafe portions of the excavation itself. Figure 2 illustrates the data collected by count rate for the soils beneath the drain line. Note that the elevated count rates indicated at the south end of the excavation are largely due to an increase in background caused by the trench geometry and experienced when probe measurements were made inside the trench. All of the soils with elevated count rates on Figure 2 were rescanned and found to be below the count rate that would indicate levels above the soil cleanup objectives.

3.2 Sampling

As described in ARC-PLN-6122, 16 statistically based samples evenly spaced along the drain line excavation from a random starting point were collected. In addition, one sample from each of the six catch basins was collected, and judgmental samples were collected at locations where elevated count rates were detected during the walkover scans. Tables 2 and 3 summarize the sampling results for statistical and biased sampling, respectively. Table 4 summarizes the results for the judgmental sampling. All of the judgmental samples were taken between 1–3 ft below ground surface and used to determine if the soils

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removed met the criteria for use as backfill material. Figures 1 and 2 indicate the location of the drain line on the Lower Level and sampling locations (ARC-PLN-6122).

As stated previously, soil exhibiting activity of less than 20,000 cpm as determined by field instrumentation was determined to be free from radiological contamination above the DCGLs. This was generally confirmed with discrete soil samples that were analyzed onsite. These are the judgmental samples that are listed in Table 4.

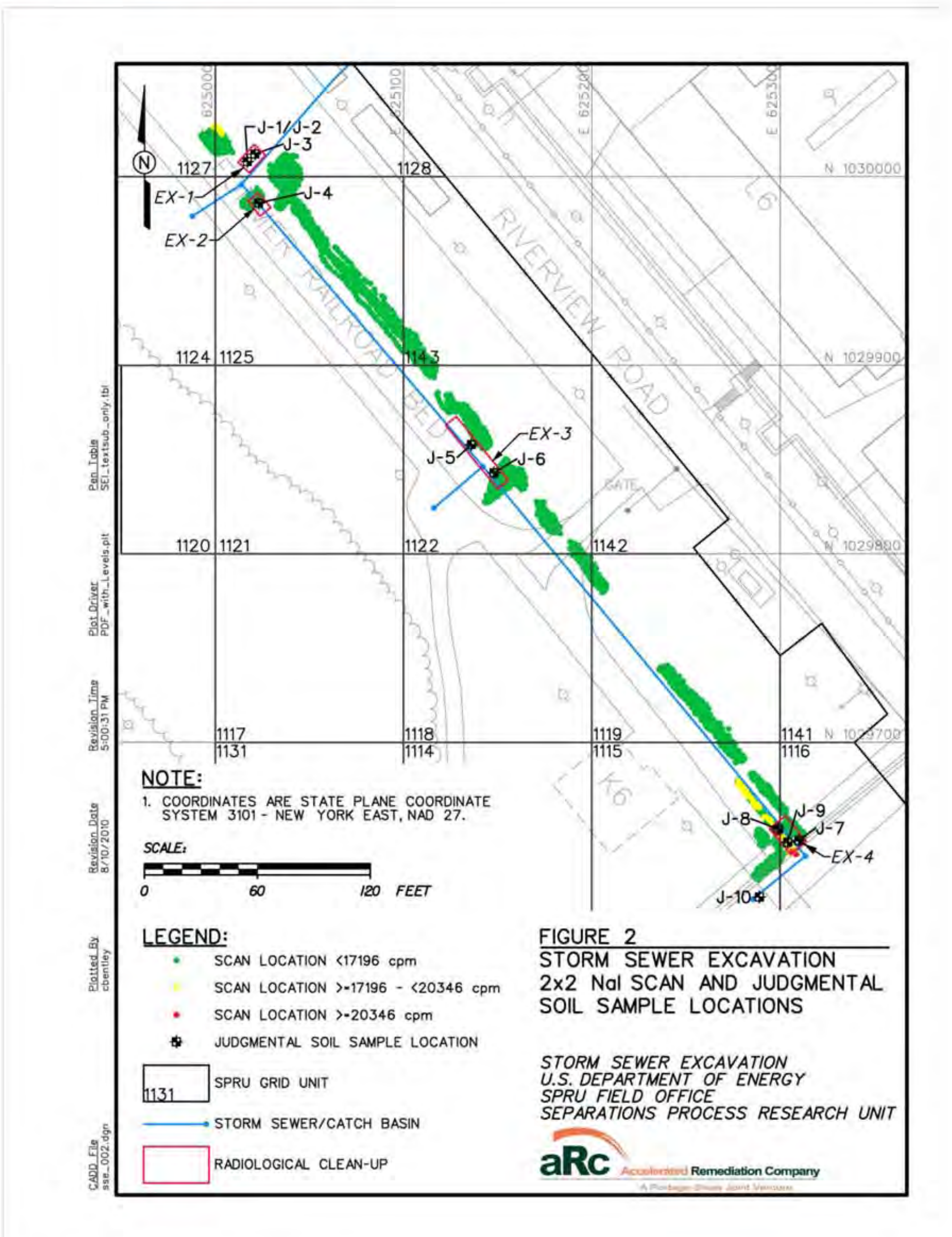

Figure 2 Drain line excavation scans

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Table 2 Statistical sample results summary for the drain line excavation

	Nuclide	Co-60	Cs-137	Th-232	U-235	U-238	Pu-238	Pu-239/240	Am-241	SOR
Sample ID	DCGL	9.78	30	9.05	188	851	792	714	574	1.00
	Drain Pipe S-001	*0.101*	*0.100*	*0.440*	*0.102*	*0.240*	*82*	*83*	*0.85*	0.284
	Drain Pipe S-002	*0.122*	*0.101*	*0.577*	*0.111*	*0.267*	*93*	*93*	*1.03*	0.330
	Drain Pipe S-003	*0.104*	*0.110*	*0.597*	*0.122*	*0.254*	*98*	*93*	*0.98*	0.337
	Drain Pipe S-004	*0.079*	*0.094*	*0.444*	*0.097*	*0.237*	*81*	*81*	*0.81*	0.278
	Drain Pipe S-005	*0.079*	*0.079*	*0.523*	*0.110*	*0.250*	*84*	*82*	*0.89*	0.291
	Drain Pipe S-006	*0.090*	*0.083*	*0.444*	*0.100*	*0.237*	*83*	*79*	*0.84*	0.278
	Drain Pipe S-007	*0.092*	*0.267*	*0.500*	*0.111*	*0.253*	*88*	*88*	*0.87*	0.311
	Drain Pipe S-008	*0.093*	*0.391*	*0.413*	*0.096*	*0.235*	*80*	*80*	*0.81*	0.283
	Drain Pipe S-009	*0.060*	*0.114*	*0.446*	*0.093*	*0.226*	*78*	*75*	*0.78*	0.264
	Drain Pipe S-010	*0.082*	*0.048*	*0.451*	*0.097*	*0.235*	*84*	*81*	*0.82*	0.282
	Drain Pipe S-011	*0.084*	*0.311*	*0.576*	*0.111*	*0.250*	*87*	*90*	*0.89*	0.320
	Drain Pipe S-012	*0.087*	*0.121*	*0.486*	*0.100*	*0.241*	*86*	*80*	*0.83*	0.288
	Drain Pipe S-013	*0.101*	1.056	*0.492*	*0.109*	*0.262*	*92*	*85*	*0.94*	0.338
	Drain Pipe S-014	*0.081*	*0.262*	*0.496*	*0.103*	*0.228*	*84*	*78*	*0.81*	0.289
	Drain Pipe S-015	*0.102*	*0.076*	*0.492*	*0.096*	*0.244*	*85*	*79*	*0.82*	0.288
	Drain Pipe S-016	*0.097*	*0.091*	*0.467*	*0.098*	*0.229*	*77*	76	*0.81*	0.271
	Mean	9.08E-02	2.06E-01	4.90E-01	1.04E-01	2.43E-01	8.51E+01	8.27E+01	8.60E-01	2.96E-01
	Minimum	5.95E-02	4.81E-02	4.13E-01	9.34E-02	2.26E-01	7.74E+01	7.51E+01	7.82E-01	2.64E-01
	Maximum	1.22E-01	1.06E+00	5.97E-01	1.22E-01	2.67E-01	9.79E+01	9.34E+01	1.03E+00	3.38E-01
	Standard Deviation	1.42E-02	2.48E-01	5.44E-02	7.93E-03	1.21E-02	5.56E+00	5.67E+00	6.94E-02	2.37E-02

NOTES:

1. All DCGLs and specific activity values are reported in units of pCi/g.
2. Values in *italics* are qualified as "U" and represent the minimum detectable activity.
3. Because the analyses are performed only by gamma spectroscopy, the analyses for strontium-90, uranium-234, and plutonim-241 are not possible.

Table 3 Biased sample results summary for the drain line excavation[a]

	Nuclide	Co-60	Sr-90	Cs-137	Th-232	U-234	U-235	U-238	Pu-238	Pu-239/240	Pu-241	Am-241	SOR
	DCGL	9.78	4654	30	9.05	1162	188	851	792	714	19120	574	1.00
Sample ID	Drain Pipe CB-09	*0.091*	N/A	0.424	*0.428*	N/A	*0.097*	*0.228*	*82.9*	*75.7*	N/A	*0.820*	0.284
	Drain Pipe CB-18	*0.079*	N/A	*0.087*	*0.419*	N/A	*0.101*	*0.246*	*84.8*	*82.2*	N/A	*0.868*	0.282
	Drain Pipe CB-25	*0.095*	N/A	*0.080*	*0.470*	N/A	*0.094*	*0.225*	*82.0*	*76.9*	N/A	*0.816*	0.278
	Drain Pipe CB-32	*0.092*	N/A	0.243	*0.468*	N/A	*0.098*	*0.230*	*81.6*	*77.2*	N/A	*0.798*	0.283
	Drain Pipe CB-41	*0.114*	N/A	*0.093*	*0.528*	N/A	*0.108*	*0.257*	*88.6*	*85.6*	N/A	*0.871*	0.307
	Drain Pipe CB-42	*0.115*	N/A	0.226	*0.482*	N/A	*0.103*	*0.241*	*84.7*	*83.3*	N/A	*0.847*	0.298

a. Results are pending from the two biased samples (Drain Pipe CB-09 and Drain Pipe CB-25), which were sent for offsite analyses in accordance with ARC-PLN-6122.

NOTES:

1. All DCGLs and numerical results are reported in units of pCi/g.
2. Values in *italics* are qualified as "U" and represent the minimum detectable activity.
3. NA = not analyzed. Because the analyses are performed only by gamma spectroscopy, the analyses for strontium-90, uranium-234, and plutonium-241 are not possible.

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Table 4 Judgmental sample results summary for the drain line excavation

	Nuclide		Co-60	Cs-137	Th-232	U-235	U-238	Pu-238	Pu-239/240	Am-241	SOR
	DCGL		9.78	30	9.05	188	851	792	714	574	1.00
Sample ID	Depth (ft)	Location (Figure 2)									
5' North CB-25	***1.5***	***EX-1 (J-1)***	***0.123***	**9.372**	***0.579***	***0.184***	***0.391***	***131***	***135***	***1.39***	**0.747**
5' North CB-25	***3***	***EX-1 (J-2)***	***0.110***	**13.161**	***0.643***	***0.203***	***0.455***	***158***	***153***	***1.70***	**0.939**
8' North CB-25	***3***	***EX-1 (J-3)***	***0.100***	**51.788**	***0.426***	***0.317***	***0.634***	***234***	***236***	***2.52***	**2.416**
Drain Pipe Inv Sec 13-12	***2.5***	***EX-2 (J-4)***	***0.113***	**15.183**	***0.498***	***0.200***	***0.431***	***152.0***	***148.0***	***1.55***	**0.976**
Trench 15'E of Pole B-142	***2***	***EX-3 (J-5)***	***0.131***	**55.496**	***0.598***	***0.367***	***0.763***	***263***	***261***	***2.82***	**2.635**
Judg 23 S of CB-S-009	***2***	***EX-3 (J-6)***	***0.100***	**12.228**	***0.584***	***0.192***	***0.423***	***147***	***138***	***1.50***	**0.865**
CB-41 Judgmental	*2.5*	*EX-4 (J-7)*	*0.092*	0.655	*0.409*	*0.094*	*0.239*	*84*	*78*	*0.84*	0.294
DnP J1 12N CB-41	*2.5*	*EX-4 (J-8)*	*0.114*	0.544	*0.629*	*0.125*	*0.298*	*100*	*102*	*1.09*	0.371
DnP J2 5N CB-41	*2.5*	*EX-4 (J-9)*	*0.119*	0.539	*0.662*	*0.132*	*0.315*	*106*	*101*	*1.07*	0.382
HS Inv NE cnr CB-42	*3*	*N/A (J-10)*	*0.190*	0.869	*1.230*	*0.246*	*0.534*	*183*	*177*	*1.91*	0.669

NOTES:

1. All DCGLs and numerical results are reported in units of pCi/g.
2. Values in *italics* are qualified as "U" and represent the minimum detectable activity.
3. All samples in **bold** represent locations that underwent additional excavation.

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4.0 Quality Assurance/Quality Control Results

The field duplicate comparison is listed in Table 5. Sample "Drain Pipe R-008" is a duplicate of sample "Drain Pipe S-008." The comparison between the samples measured the replicate error ratio (RER) for the results of the duplicate sample. This parameter is calculated by the following equation.

$$RER = \frac{|A_{smp} - A_{dup}|}{\sqrt{U_{smp}^{2} + U_{dup}^{2}}} \tag{1}$$

where

A_{smp} = activity of the original sample

A_{dup} = activity of the duplicate sample

U_{smp} = 1 σ uncertainty of the original sample

U_{dup} = 1 σ uncertainty of the duplicate sample.

Table 5 Replicate error ratio drain-line field duplicates

	Original Sample Drain Pipe S-008		Duplicate Sample Drain Pipe R-008		
Radionuclide	Activity	Uncertainty (1 σ)	Activity	Uncertainty (1 σ)	RER
Cs-137	0.391	0.0693	0.658	0.0913	2.329
K-40	14.3	1.61	14.8	1.54	0.224

To enable calculation of the RER, the sample activity and the uncertainty result must be known. The onsite count system does not report these values for nuclide activities less than the MDA. Consequently, only cesium-137 and potassium-40 are compared. Generally, the RERs for the radionuclides of concern show good agreement between the samples. According to guidance provided in "Radioanalytical Data Validation" (GDE-8512), an RER value less than or equal to 3.00 is acceptable for duplicate analyses.

5.0 Conclusion

The surveys indicate that the drain line excavation meets the radiological cleanup criteria for the SPRU Lower Level. No further excavation is necessary.

6.0 References

ARC-PLN-6122, *Survey Unit Design for Post-Excavation Soil Surfaces at the Drain Pipe Excavation Separations Process Research Unit Lower Level,* Rev. 0, Accelerated Remediation Company, March 16, 2010.

ARC-PLN-6511, *Radiological Confirmation Sampling and Analysis Plan/Final Status Survey (CSAP/FSS) Plan/Final Status Survey (CSAP/FSS) for the Separations Process Research Unit Lower Level Land Areas*, Accelerated Remediation Company, current revision.

ARC-PLN-6570, *Survey Unit Design for Post-Excavation Soil Surfaces at the Drain Pipe Excavation Separations Process Research Unit-Lower Level*, Accelerated Remediation Company, current revision.

ARC-PRC-6570, "SPRU Lower Level Gamma Scintillation Walkover Scans," Rev. 0, Accelerated Remediation Company, October 8, 2008.

CH2M Hill, 2006, *Radiological Characterization Report for SPRU Outside Areas,* TSM-26, Rev. 2, June 2006.

GDE-8512, "Radioanalytical Data Validation," Idaho National Laboratory, current revision.

SPRU 09-066, "SPRU Field Office Review and Approval of the Clean Soil Reuse Proposal for Lower Level Inactive Stormwater Drainage System dated March 19, 2009 and Disapproval of the In Situ Abandonment of the Lower Level Stormwater Drainage System Proposal," U.S. Department of Energy memorandum, June 8, 2009.

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Appendix E
Radioactivity near Utility Pole B-211 and Associated Guy Wires

E-1. Introduction

This appendix summarizes the 2 × 2 walkover surveys and soil sampling characteristics of the areas that were associated with Utility Pole B-211 and associated guy wires in the SPRU-LL rail bed. The evidence presented here shows that the as-left surfaces of the soil around the utility pole and guy wires do not exhibit activity that indicates residual contamination above the project DCGLs (e.g., 30 pCi/g for Cs-137).

E-2. Utility Pole B-211 and Associated Guy Wire Sample Characteristics (August 20, 2009 and January 26, 2010)

The following characteristics are noted for the samples taken August 20, 2009, near Utility Pole B-211 and January 26, 2010, near the associated guy wires. These samples are listed in Tables E-1 and E-2, respectively. The 2 × 2 walkover survey locations conducted on January 25, 2010, are shown in Figure E-1.

- For Utility Pole B-211 (Table E-1), samples were taken approximately 1 ft away from the pole. For the associated guy wires (Table E-2), the distances specifically stated are radial distances measured from the guy wires.
- The depths stated in association with the sample are approximate.
- The samples are highlighted in red in Tables E-1 and E-2 because either the SOR is greater than unity or because activity noted on field instruments was greater than an investigation level.
- The activity noted on the field instruments and in the samples was because of Cs-137 or natural nuclides (U-238 plus daughters and/or Th-232 plus daughters) or both.
- The associated areas for these samples had a large amount of what the field crew has termed “Radioactive Material B.” This material has a larger than the natural amount of Th-232 plus daughters.
- Radioactive Material B is apparently the same color and consistency as terra cotta.
- The composition of Radioactive Material B complicated walkovers, because Th-232 is near equilibrium with many of its gamma-emitting daughters.
- Another complication with Radioactive Material B is that Th-232 has a very low DCGL (9.05 pCi/g).

Table E-1 Hot spots around Utility Pole B-211

			Co-60	Cs-137	Th-232	U-235	U-238	Pu-238	Pu-239	Am-241	
	DCGL		9.78	30	9.05	188	851	792	714	574	SOR
Utility Pole B-211	S 0-1'	08/20/09	*0.138*	0.09	3.76	*0.208*	*0.478*	*164*	*166*	*1.69*	0.877
	W 0-1'	08/20/09	*0.105*	1.923	*0.621*	*0.142*	*0.322*	*113*	*106*	*1.17*	0.438
	E 0-1'	08/20/09	*0.153*	*0.178*	*1.05*	*0.189*	*0.439*	*151*	*155*	*1.57*	0.550
	E 1-2'	08/20/09	*0.104*	*0.151*	*0.851*	*0.161*	*0.386*	*127*	*126*	*1.28*	0.450
	E 2-3'	08/20/09	*0.110*	*0.129*	*0.671*	*0.140*	*0.330*	*113*	*118*	*1.18*	0.401
	E 3-4'	08/20/09	*0.155*	*0.133*	*0.717*	*0.139*	*0.329*	*113*	*108*	*1.09*	0.396
	N 0-1'	08/20/09	*0.113*	0.627	*0.637*	*0.123*	*0.288*	*98.1*	*101*	*1.09*	0.371
	Minimum		0.104	0.092	0.621	0.123	0.288	98.1	101	1.09	0.371
	Maximum		0.155	1.923	3.764	0.208	0.478	164	166	1.69	0.877
	Mean		0.125	0.462	1.187	0.157	0.367	126	126	1.30	0.498
	Standard Deviation		0.023	0.670	1.146	0.031	0.069	23.6	25.3	0.240	0.177

See notes below.

Table E-2 Hot spots around Utility Pole B-211 guy wires

			Co-60	Cs-137	Th-232	U-235	U-238	Pu-238	Pu-239	Am-241	
	DCGL		9.78	30	9.05	188	851	792	714	574	SOR
West guy wire	1' E 10" deep	01/26/10	*0.139*	1.16	*0.677*	*0.146*	*0.34*	*117*	*112*	*1.36*	0.436
	3' W 10" deep	01/26/10	*0.15*	1.77	*0.672*	*0.152*	*0.33*	*113*	*112*	*1.21*	0.451
	3' N 0'-1' deep	01/26/10	*0.142*	14.8	*0.674*	*0.248*	*0.508*	*176*	*174*	*2.01*	1.052
	3' N 1'-2' deep	01/26/10	*0.136*	4.76	*0.645*	*0.165*	*0.368*	*127*	*128*	*1.33*	0.587
	1' S 10" deep	01/26/10	*0.074*	2.93	*0.594*	*0.132*	*0.311*	*117*	*102*	*1.07*	0.464
	6' N 10" deep	01/26/10	*0.129*	0.435	*0.763*	*0.154*	*0.356*	*118*	*121*	*1.29*	0.434
	3' N 2'-3' deep	01/26/10	*0.153*	0.310	*0.67*	*0.143*	*0.306*	*113*	*105*	*1.20*	0.393
North guy wire	4' S 10" deep	01/26/10	*0.125*	0.157	*0.828*	*0.157*	*0.36*	*123*	*134*	*1.30*	0.456
	3' W 10" deep	01/26/10	*0.148*	0.045	1.76	*0.168*	*0.384*	*130*	*136*	*1.41*	0.569
	3' N 10" deep	01/26/10	*0.147*	0.797	*0.738*	*0.15*	*0.346*	*127*	*112*	*1.41*	0.444
	1' E 0'-1' deep	01/26/10	*0.149*	1.87	*0.627*	*0.154*	*0.336*	*112*	*113*	*1.18*	0.450
	Minimum		0.074	0.045	0.594	0.132	0.306	112	102	1.070	0.393
	Maximum		0.153	14.8	1.758	0.248	0.508	176	174	2.010	1.052
	Mean		0.136	2.636	0.786	0.161	0.359	125	123	1.343	0.522
	Standard Deviation		0.022	4.262	0.329	0.031	0.055	18.1	20.4	0.245	0.185

NOTES FOR TABLES E-1 AND E-2:

1. All DCGLs and numerical results are reported in units of pCi/g.
2. Reported results are either the activity value or the value for nuclide minimum detectable activity if no activity was reported.
3. If the reported result is the minimum detectable activity, the value is italicized and in gray.
4. The reported value is generated by the ARC-SPRU gamma spectroscope.

5 Samples highlighted red indicate either where the SOR is greater than unity or where activity noted on field instruments was greater than an investigation level..

E-3. Sample Characteristics (July 8, 2010)

The following characteristics are noted about the samples near Utility Pole B-211 and associated guy wires. These samples were taken on July 8, 2010. They are listed on Tables E-3.

- The samples were taken approximately 2 ft away from Utility Pole B-211 and associated guy wires.
- The samples consist of soil, except for pumice-like objects. The pumice-like objects appear to be the by-product or waste of a calcinations process.
- The depths stated in association with the samples are approximate and listed as below ground surface:
  - Sample 167, Pole B-211 west guy wire – 1.5 ft
  - Sample 168, Pole B-211 north guy wire – 2 ft
  - Sample 169, pumice-like objects – 2 ft
  - Sample 170, Pole B-211 – 2 ft.
- All of the other characteristics listed for the samples in Section E-2 apply to these samples as well.

Table E-3 Hot spots around Utility Pole B-211 and associated guy wires

		Co-60	Cs-137	Th-232	U-235	U-238	Pu-238	Pu-239	Am-241	
Sample ID	DCGL	9.78	30	9.05	188	851	792	714	574	SOR
167	West guy wire 7/08/2010	*0.178*	0.663	3.574	*0.210*	0.461	*39.8*	*57.1*	*0.356*	0.568
168	North guy wire 7/08/2010	*0.199*	1.48	3.127	*0.159*	0.444	*41.2*	*58.7*	*0.364*	0.551
169	Pumice-like objects 7/08/2010	*0.332*	*0.516*	4.146	0.494	0.825	*91.7*	*113*	*0.701*	0.788
170	Pole B-211 7/08/2010	*0.197*	0.126	3.292	0.464	0.460	*42.5*	*61.6*	*0.376*	0.532
	Minimum	*0.18*	*0.13*	*3.13*	*0.16*	*0.44*	*39.80*	*57.1*	*0.36*	0.532
	Maximum	0.332	1.48	4.146	0.494	0.825	91.7	113	0.70	0.788
	Mean	0.227	0.696	3.54	0.332	0.548	53.8	72.6	0.45	0.610
	Standard Deviation	0.0710	0.568	0.447	0.172	0.185	25.3	27.0	0.17	0.120

NOTES:

1. All DCGLs and numerical results are reported in units of pCi/g.
2. Reported results are either the activity value or the value for nuclide MDA if no activity was reported.
3. If the reported result is the minimum detectable activity, the value is italicized and in gray.
4. The reported value is generated by the ARC-SPRU gamma spectroscope.

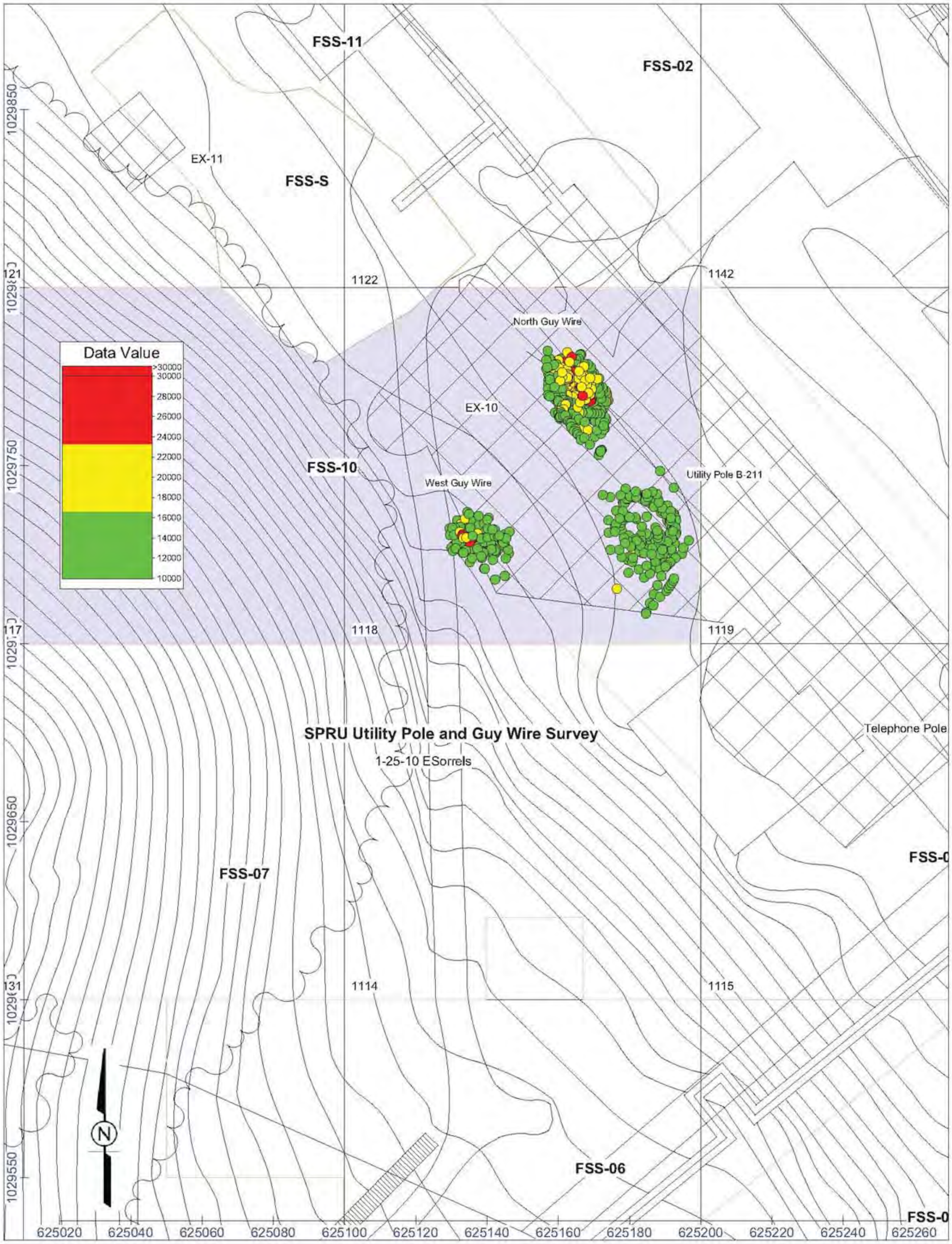

Figure E-1 SPRU utility pole and guy wire 2 × 2 walkover survey locations

Appendix F
Documentation for Discontinuing Use of the FIDLER Probe

US Department of Energy
SPRU Field Office, SP-23
2425 River Road
Niskayuna, New York 12309

SPRU 10-004

January 6, 2010

Mr. Jack O'Hearn
Accelerated Remediation Company
c/o Portage Environmental
2425 River Rd, SP-26
Niskayuna, NY 12309

Subject: Contract DE-AM09-05SR22399
Task Order DE-AT30-07CC60013, SP15
Discontinuance of FIDLER Scans in the SPRU Lower Level

Dear Mr. O'Hearn,

The U.S. Department of Energy, Separations Process Research Unit (DOE-SPRU) Field Office, has reviewed the Accelerated Remediation Company (aRc) *Proposed Cost Saving Initiative Regarding a Discontinuance of FIDLER Scans in the Lower Level,* dated October 7, 2009. aRc recommends in this document that the "Field Instrument for Detection of Low-Energy Radiation" (FIDLER) scans be discontinued for technical reasons.

DOE-SPRU provided aRc's cost saving initiative document to Oak Ridge Institute for Science and Education (ORISE) and to Naval Reactors Laboratory Field Office—Schenectady (NRLFO) for review. NRLFO and ORISE had no objections with the recommendation to cease use of FIDLER scans in the lower level area. DOE-SPRU concurs with aRc's recommendation.

If you have any questions, please call Hugh Davis at (518) 395-4956.

The technical direction contained in this document is not intended to be a change in accordance with FAR 52.243. The contractor must proceed promptly with the performance of technical direction duly issued by the Contracting Officer's Representative (COR) in the manner prescribed by DEAR 952.242-70 "Technical Direction," and within its authority under the provisions of this clause. If, in the opinion of the contractor, any instruction or direction by the COR falls within one of the categories defined in (c) (1) through (c) (5) of this clause, the contractor must not proceed and must notify the Contracting Officer in writing within five (5) working days after receipt of any such instruction or direction and must request the Contracting Officer to modify the contract accordingly.

Sincerely,

S.B. Fein

Steven Feinberg, Federal Project Director
SPRU Field Office

cc:

Melanie Pearson-Hurley, DOE HQ
Jeff Hill, NRLFO
John Rampe, DOE SPRU
Hugh Davis, DOE SPRU
Derrick Franklin, EMCBC CO
Robert Ribail, EMCBC CO
Ted Christensen, aRc

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October 7, 2009 LAR-09-118

Steven Feinberg, Federal Project Director
U.S. Department of Energy
SPRU Field Office, SP-23
2425 River Road
Niskayuna, New York 12309

Subject: CONTRACT NO. DE-AM09-05SR22399/Task Order: DE-AT30 7CC60013/SP15.
Proposed Cost Saving Initiative regarding a discontinuance of FIDLER scans in the Lower Level

Dear Mr. Feinberg:

As has been recommended by aRc technical personnel (attached), a discontinuance of FIDLER scan activities for the SPRU lower level is being requested by this memorandum. We estimate that such action would affect a savings exceeding $50,000 in direct costs by eliminating the work scope.

The direct cost savings generated pertains to the initial walkover, related organizational support and data reviews. The absence of detectable levels the contaminant has led to additional review cycles that consume the resources of each of the involved parties. Consequently, indirect cost savings may also be realized through the avoided need to follow up on false positives. These would include repeat walkover scans, direct sampling and other follow-up data review and analyses

In closing, we feel that a termination of FIDLER scan activities on the lower level is well justified from both a technical and cost savings standpoint. As such, we urge you to support this request.

Should you have any questions on these attachments or require further information. Please contact the undersigned at 518-344-2860.

Sincerely

J P O'Hearn

Jack O'Hearn, Project Manager
Accelerated Remediation Company

Attachment as noted above

EVALUATING THE EFFICACY OF FIDLER DETECTOR SCANNING IN THE SPRU LOWER LEVEL LAND AREAS

OBJECTIVE: To evaluate the value of FIDLER detector scans for final status survey of the SPRU Lower Level Land areas and determine the efficacy of continuing to perform such scans.

BACKGROUND: The CH2MHILL characterization identified Cs-137 as the dominant contaminant in soil of the SPRU Lower Level Land areas. Of the potential radionuclides of concern (ROCs), only Cs-137 was identified at concentrations exceeding authorized project-specific cleanup criteria. In addition to Cs-137, the characterization also identified Th-232, Sr-90, and Pu-239/240 in detectable concentrations, but there were no locations identified where the concentrations of these radionuclides were greater than the project cleanup criteria. The highest concentration of Pu-239/240 was 0.86 pCi/g - well within the project cleanup criterion for this radionuclide of 714 pCi/g. Although these other three ROCs were always collocated with Cs-137, the relative activity fractions were variable and Cs-137 concentrations could therefore not be used as a surrogate for determining the concentrations of other ROCs.

The *Radiological Confirmatory Sampling and Analysis Plan/Final Status Survey* (CSAP/FSS), ARC-PLN-6511, requires gamma scintillation scanning of soil surfaces as part of the final status survey approach (FSS). Gamma scintillation scans provide gross count rates, including response due to background radiation. The purpose of these scans is to identify localized increases in count rate, which could be the result of residual radiological contamination at that location; scans do not identify specific radionuclides or provide an accurate determination of their concentrations. They are therefore a screening tool to identify the potential presence of residual radioactive contamination and guide additional remedial action or further evaluation.
Several ROCs (e.g., Cs-137, Co-60, and members of the Th-232 decay series) emit photon radiations in the mid-energy (i.e., 100 keV to 2000 keV) range and at significant abundances, such that they can be identified at concentrations that are less than their respective cleanup criteria by scanning the surface with a 2"x 2" sodium iodide (NaI) gamma scintillation detector. Although the characterization did not identify concentrations of radiological contaminants other than Cs-137 in excess of the cleanup criteria, the radiological history of the Lower Level Land areas indicates the potential for several ROCs, such as Pu-238, Pu-239/240, and Am-241, which emit only photons of low energy (i.e., <100 keV) and/or abundance. These low-energy photon emitters are not readily detectable at cleanup criteria concentrations, using the same gamma scintillation detectors that are effective for detecting mid-energy photons. Instead, a different design of gamma scintillation detector, having a large, thin scintillation crystal and special detector covering to reduce attenuation of low energy photons is necessary for such potential contaminants. This type of gamma scintillation detector is known as a FIDLER (Field Instrument for Detection of Low-Energy Radiation). The FIDLER is operated with the readout instrument set for an energy region-of-interest. These design and operating parameters optimize detection of low energy photons when mid-energy photons are also present. Because of the potential for ROCs emitting mid-energy and low-energy photons, the CSAP/FSS prescribed gamma scintillation scanning with both 2"x 2" and FIDLER detectors.

DISCUSSION: FIDLER scans of 6 survey unit final status surveys completed thus far have identified multiple small, isolated locations with gross count rates, which are elevated above the ambient background levels. These data were obtained using the instrument in the GPS-logging mode, which integrates detected counts for a 2-second period and then converts these counts to a count rate in counts per minute (cpm). Because the ambient background of the FIDLER instrument is low (in the range of several hundred cpm, there is a large relative uncertainty associated with the count rate data obtained in this manner. In addition, the FIDLER instrument will also record mid-energy photons from other ROCs, although to a smaller degree than recorded by a 2'x2" detector. In all cases of elevated FIDLER count rates, rescans of the locations were performed with FIDLER and 2" x 2" detectors. Instead of using the GPS-logging technique, these rescans were performed at a slower detector movement rate to reduce statistical uncertainties, and the audible output of the instrument was monitored and the result hand recorded on field data forms. In a few cases, where both initial FIDLER and 2" x 2" detector scans identified elevated count rates, the rescans confirmed potential residual contamination and further removal actions were conducted. However, no locations with only elevated initial FIDLER count rates were confirmed as potentially contaminated, based on the rescans. Soil samples sent for off-site analyses demonstrate that concentrations of plutonium isotopes are a small fraction of the cleanup criteria. The maximum concentrations of Pu-238 and Pu-239/240 reported to date in FSS compliance samples are 0.20 pCi/g and 0.76 pCi/g, respectively. For comparison, the cleanup criteria for these ROCs are 792 pCi/g and 715 pCi/g, respectively. These analytical results confirm that the two low-energy photon emitting ROCs are not present at significant concentrations, relative to the cleanup criteria. Furthermore, the presence of Cs-137 concentrations at a fraction of its cleanup criterion is being identified by the 2" x 2" detector scans and, because it is by far the dominant ROC and all other ROCs are co-located with Cs-137, identifying and removing Cs-137 contamination to meet its cleanup criterion level assures that the cleanup criteria for other ROCs are also being satisfied.

CONCLUSION AND RECOMMENDATION:

In conclusion, the results of FSS efforts, conducted to date on SPRU Lower Level Land areas, demonstrate that the 2" x 2" detector gamma scintillation scans are effective in identifying potential residual contamination exceeding the project cleanup criteria for all ROCs. The FIDLER scans are unreliable and do not contribute useful additional data regarding the as-left radiological conditions. We therefore recommend that performance of FIDLER scans for FSS be discontinued and the CSAP/FSS for the Lower Level Land areas be revised accordingly.

Appendix G
Change in Analytical Method for Detection of Strontium

aRc Accelerated Remediation Company
A Portage-Shaw Joint Venture
SPRU Land Areas Remediation Project
DOE SPRU Field Office SP-26
2425 River Road
Niskayuna, NY 12309

May 18, 2009

LAR 09-045

Steven Feinberg, Federal Project Director
U.S. Department of Energy
SPRU Field Office, SP-23
2425 River Road
Niskayuna, New York 12309

Subject: CONTRACT NO. DE-AM09-05SR22399/Task Order: DE-AT30-CC60013/SP15
Change of Analytical Procedure for Strontium.

Dear Mr. Feinberg:

As discussed during the weekly SPRU/aRc interface meeting held on May13, 2009, attached, please find an assessment of the merits of changing the current analytical method from Strontium 90 to total Strontium. As you will see from this assessment, the total Strontium method promises much quicker analytical turnaround time with, in aRc's view, no diminution of resultant associated data utility or quality. Decreased analytical turn-around times would tend to directly benefit the project's schedule.

Of course, aRc desires to keep the SPRU Office apprised of mutually beneficial and appropriate changes. Based on the stated benefits stemming from this change, please consider this letter a notification of aRc's intent to shift to utilization of the total Strontium analysis. aRc does request to be notified in a timely fashion in the unlikely event that the SPRU office objects to this change.

If you have any questions or wish to discuss the attached, please contact the undersigned or aRc's Characterization Lead Mr. David Lodman at 518-344-2860.

Sincerely,

J. P. O'Hearn

Jack O'Hearn Project Manager
Accelerated Remediation Company

Attachment as noted above

Change in Analytical Method for Strontium

aRc request that a change in analytical procedure to switch from Sr-90 to Total Strontium. This requires only a Modification to the method cited in aRc's QAPjP and would require no change in our plans or procedures. The up side to this change is we should be able to get 14 day turn around on final status survey radiological analyses rather than the 28 day turn around. aRc will initiate this change with the sampling of FSS-04 which is scheduled later this week or the beginning of next week.

Please see the write-up below from Test America's Technical Director Terry Romanko. It explains the difference between total Sr and Sr-90 analyses that we have discussed in the past. The specific answers to the questions below are:

1. The method number for total Sr is DOE SR-03-RC MOD.
2. The TAT change to 14 days should be possible. Of course this always depends on current capacity, but we do not see that as a problem right now.
3. The 14 day TAT multiplier for Shaw is 10% in addition to quoted pricing. Note there is also a 5% difficult or non-aqueous surcharge that may be applied depending on the intensity of preparation required for a particular matrix.

Strontium-90 is the most important radioactive isotope in the environment, although strontium-89 can be found around reactors and is used in nuclear medicine, and strontium-85 is used in industry and medicine. Sr-90 (28.6 year half-life) decays via beta emission to Y-90 (64.1 hour half-life). Sr-89 (50.5 day half-life) decays via beta emission to Rb-85 (stable isotope). Sr-85 (64.8 day half-life) decays through electron capture, emitting gamma photons and x-rays.

Total Strontium is separated from the sample (either using a series of precipitations/cleanup steps as the insoluble carbonate or using solid-phase extraction chromatography). As the Total Strontium potentially contains other beta-emitting isotopes of strontium (most notably Sr-89), Sr-90 is reported based upon the Y-90 daughter. The separation process also removes the Y-90 daughter; thus, the Y-90 must be allowed to grow back for a recommended 7-14 days. The longer this ingrowth, the lower the detection limit and total uncertainty achievable. After the ingrowth period, the ingrown Y-90 is isolated (either as yttrium oxalate, or elution from the solid-phase extraction chromatography). The Y-90 fraction is then beta counted (either GFPC or LSC), and the calculated results reported as Sr-90.

For typical environmental samples, Sr-90 is the only isotope of concern. Unless the samples originate from a nuclear reactor site or are associated with a specific nuclear medicine waste (Metastron), Sr-89 would not be expected to be present. And, due to the relatively short half-life of Sr-89 (50.5 days), even samples which originated from such a site/waste stream but were removed more than about 500 days prior would not exhibit Sr-89 activity.

With this in mind for the typical environmental sample, if Sr-90 is the isotope of concern, it is possible to analyze the initially separated Total Strontium via beta count. This Total Strontium result would essentially contain only Sr-90. One major advantage to this Total Strontium analysis as compared to the Sr-90 analysis described above is the ability for expediting results. As there is no need for the Y-90 ingrowth, final results are achievable in 7 days or less as compared to 14 days or more.

Accelerated Remediation Company
A Portage-Shaw Joint Venture

US Department of Energy
SPRU Field Office, SP-23
2425 River Road
Niskayuna, New York 12309

SPRU 09-088

July 13, 2009

Mr. Jack O'Hearn
Accelerated Remediation Company
c/o Portage Environmental
2425 River Rd, SP-26
Niskayuna, NY 12309

Subject: Contract DE-AM09-05SR22399
Task Order DE-AT30-07CC60013, SP15
SPRU Field Office Response to aRc May, 18, 2009, LAR 09-045, *Change of Analytical Procedure for Strontium*

Dear Mr. O'Hearn,

The U.S. Department of Energy, Separations Process Research Unit (DOE-SPRU) Field Office has reviewed aRc's May 18, 2009, letter expressing its intent to change the current analytical method from Strontium 90 to total Strontium as a cost-savings measure. DOE-SPRU agrees that this change is warranted, given the site radionuclide profile, and should result in more rapid analytical turnaround time without diminution of data utility or quality.

If you have any questions, please call Hugh Davis at (518) 395-4956.

The technical direction contained in this document is not intended to be a change in accordance with FAR 52.243. The contractor must proceed promptly with the performance of technical direction duly issued by the Contracting Officer's Representative (COR) in the manner prescribed by DEAR 952.242-70 "Technical Direction," and within its authority under the provisions of this clause. If, in the opinion of the contractor, any instruction or direction by the COR falls within one of the categories defined in (c) (1) through (c) (5) of this clause, the contractor must not proceed and must notify the Contracting Officer in writing within five (5) working days after receipt of any such instruction or direction and must request the Contracting Officer to modify the contract accordingly.

Sincerely,

S. B. Feinberg

Steven Feinberg, Federal Project Director
SPRU Field Office

Enclosure

cc: John Rampe, DOE SPRU
Matt Zullo, DOE SPRU
Hugh Davis, DOE SPRU
Derrick Franklin, EMCBC CO
Marilyn Long, EMCBC CO
Melanie Pearson-Hurley, DOE HQ
Ted Christensen, aRc
Jeff Hill, NRLFO-SCH

Attachment 1

Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 01 (ARC-RPT-6003)

Accelerated Remediation Company

A Portage-Shaw Joint Venture

Attachment 2

Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 02 (ARC-RPT-6004)

Accelerated Remediation Company
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Attachment 3
Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 03 (ARC-RPT-6011)

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Attachment 4
Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 04 (ARC-RPT-6012)

Attachment 5

Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 05 (ARC-RPT-6013)

Attachment 6

Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 06 (ARC-RPT-6014)

Attachment 7

Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 07 (ARC-RPT-6024)

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Attachment 8

Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 08 (ARC-RPT-6022)

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Attachment 9

Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 09

(ARC-RPT-6030)

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Attachment 10

Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Units 10 and 11

(ARC-RPT-6031)

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Attachment 11

Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 12

(ARC-RPT-6033)

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Attachment 12

Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Units 13 and 14

(ARC-RPT-6026)

Accelerated Remediation Company
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Attachment 13
Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Unit 15 (ARC-RPT-6034)

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Attachment 14

Separations Process Research Unit Lower Level Land Areas Radiological Completion Report for Final Status Survey Units 16 and 17

(ARC-RPT-6037)

aRc Accelerated Remediation Company
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