Separations Process Research Unit
Radiological Completion Report for North Field Land Area

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A Portage-Shaw Joint Venture

Separations Process Research Unit
Radiological Completion Report for North Field Land Area

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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
GPS	global positioning system
KAPL	Knolls Atomic Power Laboratory
LBGR	lower bound of the gray region
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
UA	unreleased area
VSP	Visual Sample Plan

1.0 Executive Summary

This report documents the completion of the Separations Process Research Unit (SPRU) North Field land area (hereinafter called North Field) excavations performed by the Accelerated Remediation Company (aRc) in accordance with requirements specified in the *Radiological Confirmation Sampling and Analysis Plan/Final Status Survey for the North Field Land Area* (ARC-PLN-6516). 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-AM09-05SR22399, Task Order DE-AT30-07CC60013/SP15, was to safely remediate the North Field to allow for industrial reuse. This included the excavation and offsite disposal of wastes consistent with established cleanup criteria.

Soils remediation activities took place from the fall of 2009 through the summer of 2010. During remediation of the North Field, the area was divided into 17 units where a total of 335 samples were collected for radiological analyses to support final status survey (FSS) work. Evaluation of the validated laboratory data for each unit was conducted, and the results were reported in completion reports for each FSS unit. These reports concluded that the radiological release criteria had been met; thus, further excavation was unnecessary and radiological cleanup requirements for the North Field 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 radiological contamination to develop remedial action objectives for the North Field. The objectives of the overall remedial effort are to remove radiological contamination left in soils impacted by former SPRU operations. These objectives include (1) restoring the North Field 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 releases from SPRU land areas.

Cleanup goals for radiological contamination are based on DOE O 5400.5, "Radiation Protection of the Public and the Environment." To meet these objectives in the North Field, aRc has removed radiological contamination left in the soils impacted by 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 (Figure 1). 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 2). Along the northern margin of the KAPL site, the land surface slopes steeply to a natural bench approximately 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.

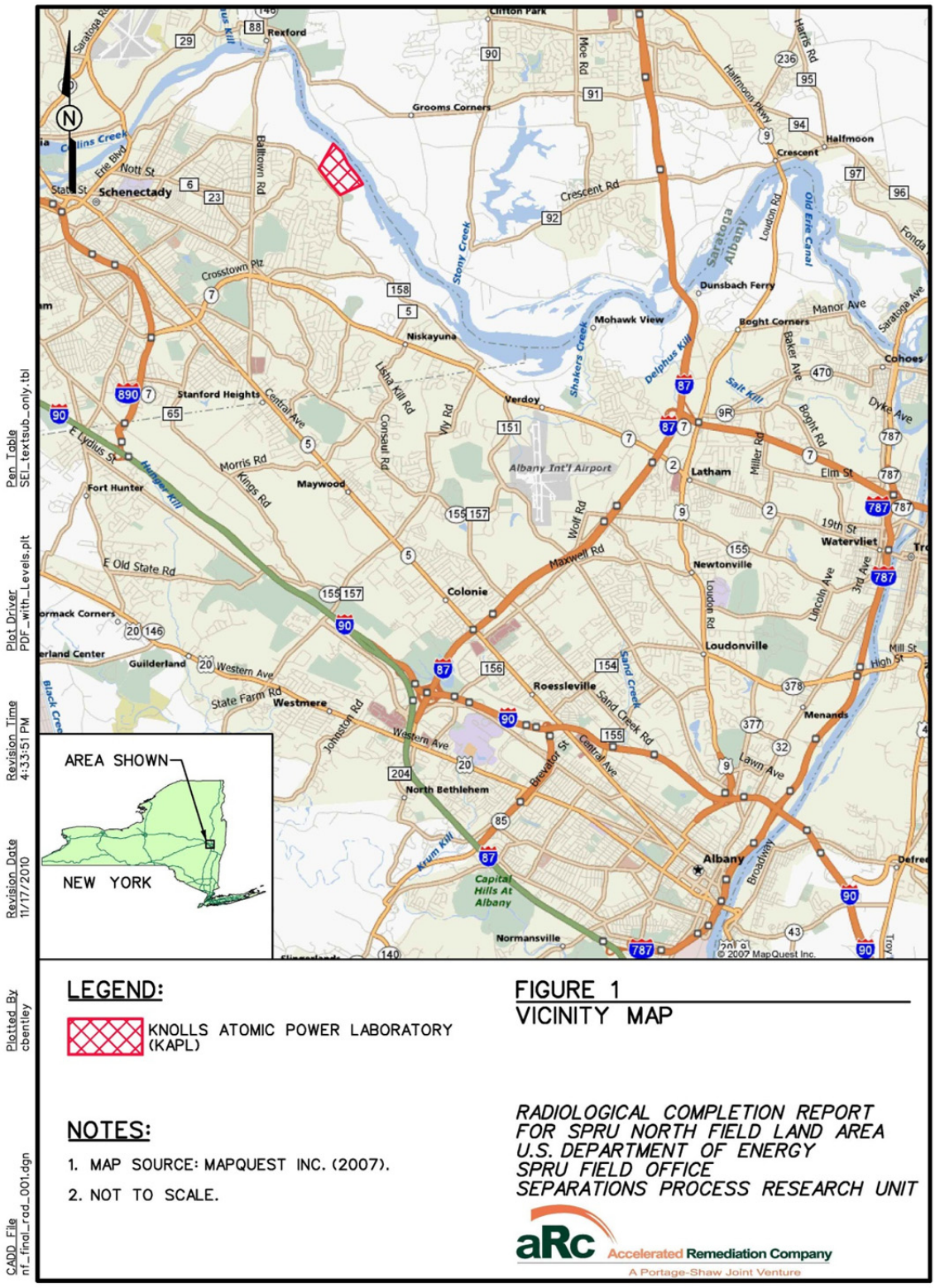


Figure 1 Vicinity map

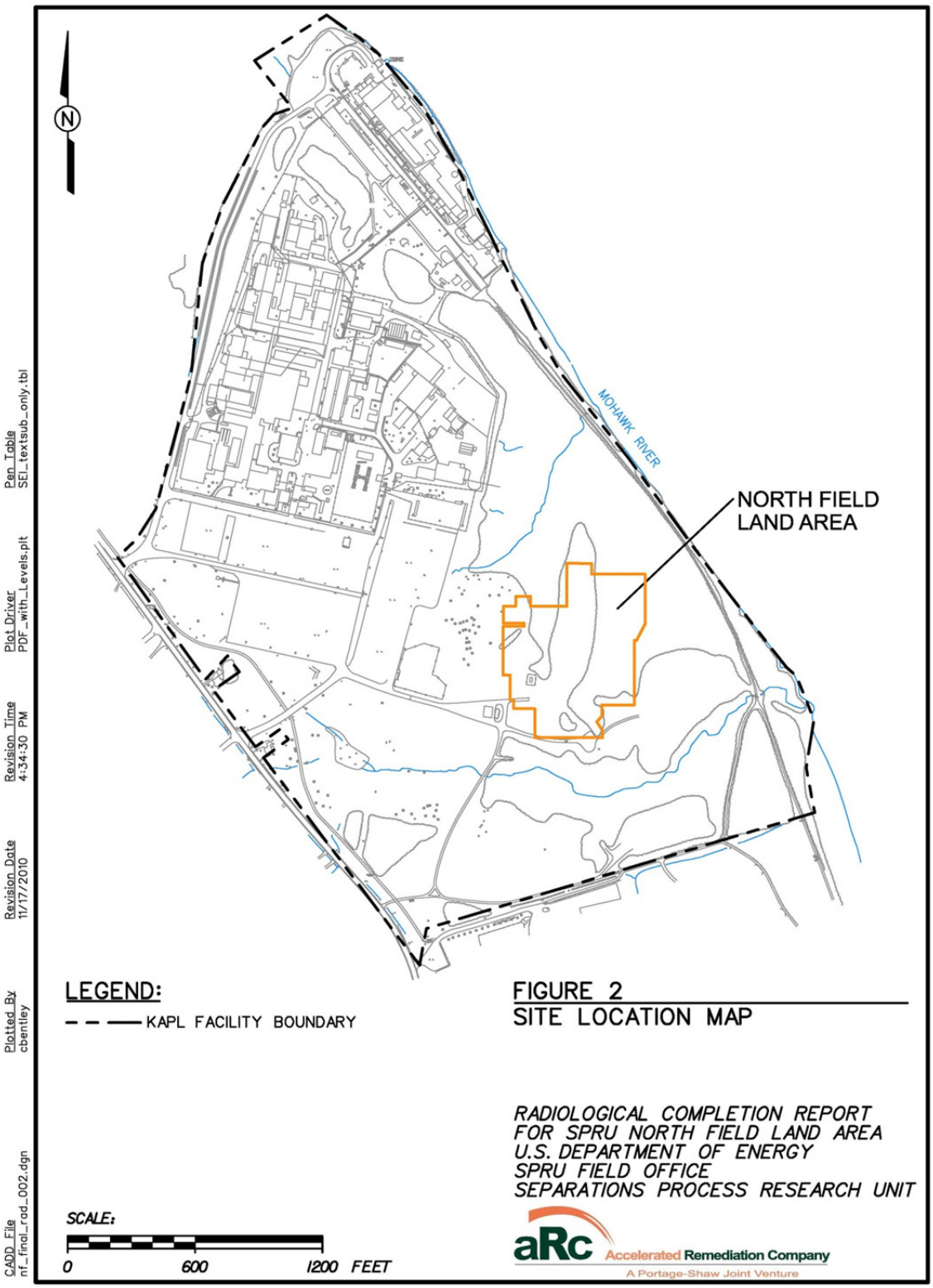


Figure 2 Site location map

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 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. After discontinuing operations in October 1953, SPRU was maintained in a caretaking status until decommissioning began in 2000.

The North Field associated with this project is located on approximately 6.5 acres in the southeast corner of the KAPL site. The North Field is bounded by the east boundary and midline stream drainages. The outer perimeter of the North Field is partially wooded along the eastern, northern, and western perimeter, with grass and brush in the non-wooded areas. The North Field is shown in Figure 2.

4.0 Scope of Work

The aRc scope of work as defined in the DOE Environmental Management Contract No. DE-AM09-05SR22399, Task Order DE-AT30-07CC60013/SP15, was to safely remediate the SPRU land area to allow for industrial reuse of each site.

The objectives of the overall remedial effort in the North Field are to remove radiological contamination left in soils impacted by former SPRU operations. These objectives include (1) restoring the North Field 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 releases from SPRU land areas.

5.0 Final Status Survey Program

5.1 General

Final status surveys of the North Field were performed in accordance with the *Radiological Confirmation Sampling and Analysis Plan/Final Status Survey for the North Field Land Area* (ARC-PLN-6516). This plan followed guidance in MARSSIM (EPA et al. 2000). Detailed implementation of the FSS is presented in survey unit design packages developed for survey units in the North Field. 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.

In Units FSS-107, -108, -110, -111, -112 and -113 aRc deviated from ARC-PLN-6516 by collecting the confirmation samples prior to completing the final walkover survey. aRc Radiological Controls utilized remedial action support scans (e.g., daily unit and excavation 2 × 2 survey scans) of the areas to determine that the unit was ready for sampling. This was performed to expedite the sampling, analyses, and validation of samples. A complete walkover scan was conducted on each unit. This issue was discussed with DOE-SPRU, and it was determined that the change in the order of tasks did not affect the final determination of the FSS units.

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 nonimpacted classification.

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 the maximum sizes of the land area survey units:

Class 1	Up to 2,000 m^2
Class 2	Up 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 object 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 North Field footprint.

5.2.2 Delineation of Survey Units

The extent and nature of contamination at the North Field 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 through 3.2.3 of the confirmation sampling and analysis plan (CSAP) (ARC-PLN-6516).

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 North Field.

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 North Field 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 North Field 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 Lower Level 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 (SPRU 10-047) to eliminate the use of the probe. Details are available in Appendix C.

5.4 Samples

Soil sampling in support of the FSS consists of judgmental, systematic, and compliance samples. 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 for the North Field was performed in accordance with the requirements listed in the CSAP (ARC-PLN-6516) (refer to Section 3.0 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:

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

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-6516) describes the post-excavation confirmation sampling for the North Field. 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).

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.

5.4.3 Compliance Sampling FSS-117

Unlike all other FSS units in the North Field, FSS-117 is a Class 3 MARSSIM unit, which does not require systematic sampling. Instead, compliance samples were collected for FSS-117. Sixteen compliance sample locations were selected in locations where project activities had the greatest potential for impacting soils (e.g., soil bag storage areas, travel corridors, and run-off areas outside FSS excavations) based on the professional judgment of the radiological controls manager. The sample design method for the Class 3 unit was performed in accordance with the requirements listed in the CSAP (ARC-PLN-6516).

5.5 Radiological Contaminants

The *Radiological Characterization Report for SPRU Outside Areas* (CH2M HILL 2006) describes the nature and extent of radiological contaminants in the North Field land area. Multiple radioactive materials, including source material, special nuclear material, fission products, and activation products, have been identified as potential constituents of concern. The *Final Derived Concentration Guideline Levels Technical Basis* (CH2M HILL 2005) describes potential future exposure pathways for residual radiological contaminants and develops dose-based cleanup levels for soil (i.e., DCGLs) for several future site-use scenarios. The *Request for Proposal Task Order DE-RT30-07CC60013/SP15, Statement of Work* (DOE 2006) specifies the industrial land use scenario as appropriate for future site use and provides the applicable DCGLs for this project. Table 1 contains a list of the North Field potential radionuclide constituents of concern and their DCGLs for industrial land use.

Operational history and characterization surveys have identified 11 radionuclides, listed in Table 1, as potential contaminants or ROCs in North Field soils. The *Radiological Characterization Report for SPRU Outside Areas* (CH2M HILL 2006) identified Cs-137 as the only ROC in the North Field soils that exceeded its radiological cleanup goal (i.e., the DCGL). The other three ROCs detected in the North Field 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.

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

When possible, 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. However, because of issues with the on-site instrument, on-site radiological sample analysis (gamma spectroscopy) was not performed on samples for Units FSS-107, -110, -111, -114, -116, and -117. This led to a more conservative analytical test regime, with all samples analyzed for all ROCs or gamma spectroscopy by the offsite laboratory.

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.

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.

6.0 Final Status Survey Units and Survey Results

As the FSS units were completed, interim reports documenting the activities and sampling results were produced. The reports were submitted to DOE-SPRU for approval prior to the final completion report and were written in the tense appropriate for when the activities were conducted. These reports are provided with this document as Attachments 1 through 5.

6.1 North Field Survey Unit Descriptions

The following sections describe the condition of each of the North Field survey units at the time they were surveyed. The area has since been brought to final grade and hydro-seeded or left as found, as appropriate. As noted on Figure 3, the pyrophoric building, which is a small rectangular area partially in Grid 1016 and surrounded by FSS-111 and FSS-112, was not included in the North Field remediation. All grid references refer to the grids in Figure 3. Topographic maps of the as-left excavations in the North Field are provided in Appendix A.

6.1.1 Final Status Survey Unit 101

Final Status Survey Unit 101 has a surface area of 20,935 ft^2 (1,945 m^2). It is bounded on the south by FSS-102 and on the north, east, and west by FSS-117. Parts of Grids 1021 and 1022 lie within FSS-101. The area excavated in FSS-101 is approximately 30% of the unit's total area to a maximum depth of approximately 1 ft. The portions of Grids 1021 and 1022 that lie within FSS-101 were relatively flat prior to excavation, and there was steeply sloping terrain at the northeast corner of the unit. Additional information can be found in the *Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 101–106 and 115* (ARC-RPT-6036), included in Attachment 1.

6.1.2 Final Status Survey Unit 102

Final Status Survey Unit 102 has a surface area of 21,423 ft^2 (1,990 m^2). It is bounded on the north by FSS-101, on the east and west FSS-117, and on the south by FSS-103. Parts of Grids 1018, 1019, 1021, and 1022 lie within FSS-102. The area excavated in FSS-102 is approximately 75% of the unit's total area to a maximum depth of approximately 2 ft. The portions of Grids 1018, 1019, 1021, and 1022 that lie within FSS-102 were relatively flat prior to excavation. Additional information can be found in the *Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 101–106 and 115* (ARC RPT 6036), included in Attachment 1.

6.1.3 Final Status Survey Unit 103

Final Status Survey Unit 103 has a surface area of 20,791 ft^2 (1,932 m^2). It is bounded on the north by FSS-102 and FSS-117, on the east by FSS-117 and FSS-104, on the west by FSS-117 and FSS-105, and on the south by FSS-104 and FSS-105. Parts of Grids 1015, 1018, and 1019 lie within FSS-103. The area excavated in FSS-103 is approximately 60% of the unit's total area to a maximum depth of approximately 6 ft. Grid 1015 has relatively steep terrain that forms a draw running downhill to the southeast. There is also considerable vegetation (trees and heavy brush) in some areas of Grid 1015 on the southeast side. Additional information can be found in the *Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 101–106 and 115* (ARC-RPT-6036), included in Attachment 1.

6.1.4 Final Status Survey Unit 104

Final Status Survey Unit 104 has a surface area of 21,305 ft^2 (1,954 m^2). It is bounded on the north by FSS-103, on the south and east by FSS-117, and on the west by FSS-105. Grid 1017 and parts of Grids 1006 and 1015 lie within FSS-104. The area excavated in FSS-104 is approximately 50 to 60% of the unit's total area to a maximum depth of approximately 2 ft. Grids 1006, 1015, and 1017 have

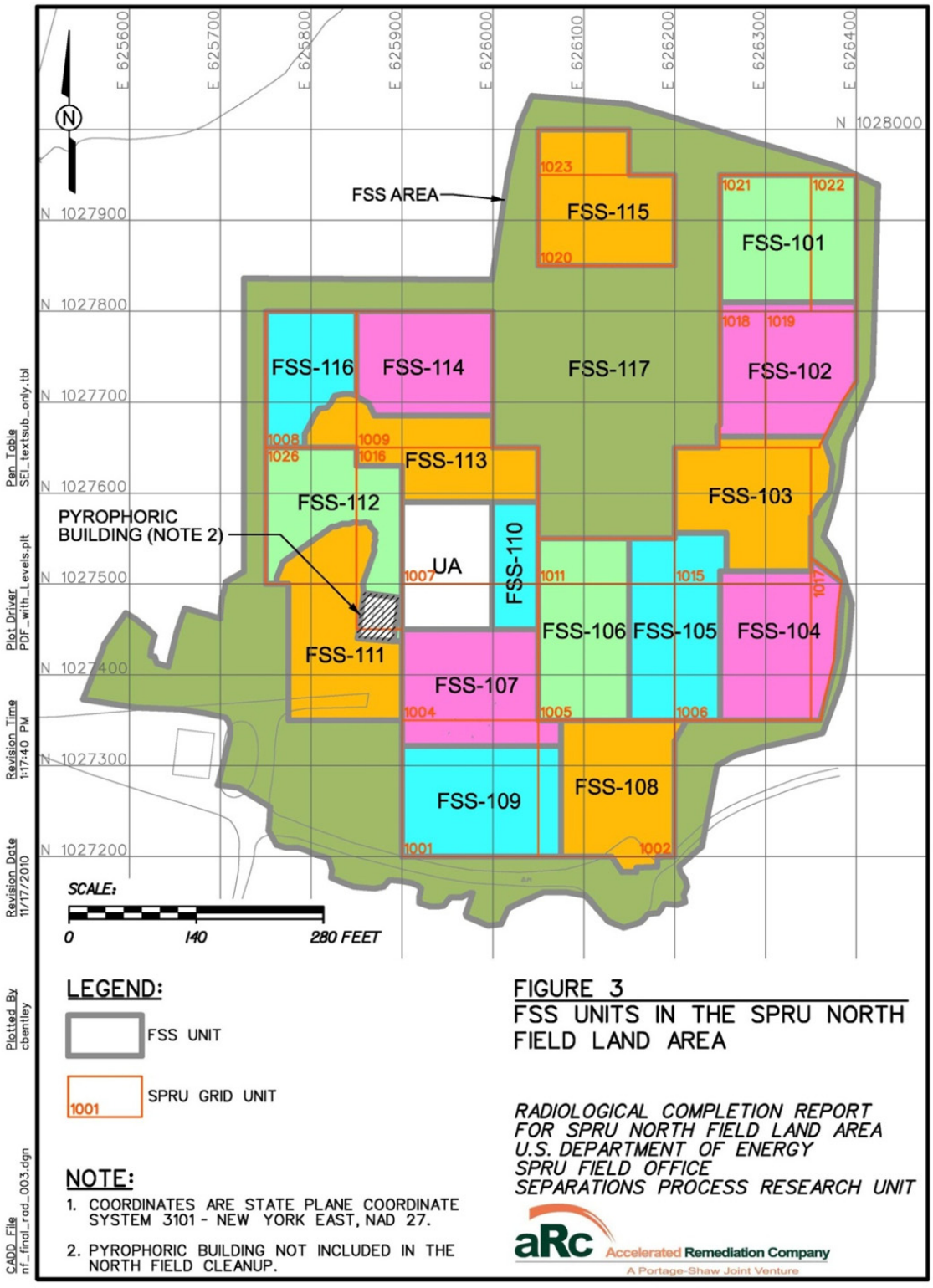


Figure 3 Map showing North Field FSS units

relatively steep terrain that drops to the east. There is considerable vegetation (trees and heavy brush) on this hillside. Additional information can be found in the *Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 101–106 and 115* (ARC-RPT-6036), included in Attachment 1

6.1.5 Final Status Survey Unit 105

Final Status Survey Unit 105 has a surface area of 20,598 ft^2 (1,914 m^2). It is bounded on the north by FSS-103 and FSS-117; on the east by FSS-103 and FSS-104; on the south by FSS-108 and FSS-117; and on the west by FSS-106. Parts of Grids 1005, 1006, 1011, and 1015 lie within FSS-105. The area excavated in FSS-105 is approximately 85% of the unit's total area to a maximum depth of approximately 2 ft. There is a sloping hillside on the southeast side of the unit in Grids 1005 and 1006. At this end of FSS-105, vegetation is present (trees and heavy brush). Additional information can be found in the *Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 101–106 and 115* (ARC-RPT-6036), included in Attachment 1.

6.1.6 Final Status Survey Unit 106

Final Status Survey Unit 106 has a surface area of 20,030 ft^2 (1,861 m^2). It is bounded on the east by FSS-105, on the south by FSS-107 and FSS-108, on the west by FSS-107 and FSS-110, and on the north by FSS-117. Parts of Grids 1005 and 1011 lie within FSS-106. The area excavated in FSS-106 is approximately 50% of the unit's total area to a maximum depth of approximately 2 ft. A sloping hillside/drainage runs through the unit in Grid 1005. Additional information can be found in the *Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 101–106 and 115* (ARC-RPT-6036), included in Attachment 1.

6.1.7 Final Status Survey Unit 107

Final Status Survey Unit 107 has a surface area of 20,285 ft^2 (1,885 m^2). It is bounded on the north by FSS-113 and an unreleased area (UA), on the east by FSS-106 and FSS-108, on the south by FSS-109, and on the west by FSS-111, FSS-112, and FSS-117. Parts of Grids 1001, 1002, and 1004 lie within FSS-107. The area excavated in FSS-107 is approximately 50% of the unit's total area to a maximum depth of approximately 8 ft. The parts of Grids 1001, 1002, and 1004 in FSS-107 had small hills and little more than grasses for ground cover. Additional information can be found in the *Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 107, and 110* (ARC-RPT-6043), included in Attachment 4.

6.1.8 Final Status Survey Unit 108

Final Status Survey Unit 108 has a surface area of 19,291 ft^2 (1,792 m^2). It is bounded on the north by FSS-105 and FSS-106, on the east and south by FSS-117, and on the west by FSS-107 and FSS-109. Part of Grid 1002 lies within FSS-108. The area excavated in FSS-108 is < 5% of the unit's total area to a maximum depth of approximately 1 ft. FSS-108 contained mounds of earthen material and vegetation (trees and heavy brush). Additional information can be found in the *Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 108, 109, 114 and 116* (ARC-RPT-6039), included in Attachment 2.

6.1.9 Final Status Survey Unit 109

Final Status Survey Unit 109 has a surface area of 21,338 ft^2 (1,982 m^2). It is bounded on the north by FSS-107, on the east by FSS-108, and on the south and west by FSS-117. Parts of Grids 1001 and 1002 lie within FSS-109. The area excavated in FSS-109 is approximately 20% of the unit's total area to a maximum depth of approximately 8 ft. Sloping hillsides and drainages in Grid 1001 are features of FSS-109, and across FSS-109 vegetation is present (trees and heavy brush). Additional information can be found in the *Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 108, 109, 114 and 116* (ARC-RPT-6039), included in Attachment 2.

6.1.10 Final Status Survey Unit 110

Final Status Survey Unit 110 has a surface area of 6,804 ft^2 (632 m^2). It is bounded on the north by FSS-113, on the east by FSS-106 and FSS-117, on the south FSS-107, and on the west by an area previously part of FSS-110 that will not be surveyed for final status. Parts of Grids 1004 and 1007 lie within FSS-110. The area excavated in FSS-110 is approximately 30% of the unit's total area to a maximum depth of approximately 2 ft. The parts of Grids 1004 and 1007 that lie within FSS-110 slope gently down to the north and west. There was little ground cover except for some grasses. Additional information can be found in the *Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 107, and 110* (ARC-RPT-6043), included in Attachment 4.

During FSS-110 soil removal action, aRc-SPRU encountered several items and wastes that were unanticipated. Because the items and wastes were determined to be outside of the SPRU land areas scope of work, DOE-SPRU directed aRc-SPRU to discontinue excavation of the area, and the area was not released. See Appendix B for more details about the unreleased area (UA).

6.1.11 Final Status Survey Unit 111

Final Status Survey Unit 111 has a surface area of 21,092 ft^2 (1,960 m^2). It is bounded on the north by FSS-112, on the east by FSS-107 and FSS-112, on the south by FSS-117 and on the west by FSS-112 and FSS-117. Parts of Grids 1016 and 1026 lie within FSS-111. The excavated area in FSS-111 removed the affected areas, including a decontamination pad, the contaminated soil batching areas, and the contaminated soil bag load-out structure, which were part of the remediation and separate from the original SPRU contamination. The parts of Grids 1016 and 1026 in FSS-111 and the remainder of the unit were relatively flat and had either scraped dirt or grass cover. Additional information can be found in the *Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 111 and 117* (ARC-RPT-6044), included in Attachment 5.

6.1.12 Final Status Survey Unit 112

Final Status Survey Unit 112 has a surface area of 17,021 ft^2 (1,581 m^2). It is bounded on the north by FSS-113 and FSS-116; on the east by FSS-113, the UA, and FSS-107; on the south by FSS-111 and FSS-117; and on the west by FSS-117. Parts of Grids 1016 and 1026 lie within FSS-112. The area excavated in FSS-112 is approximately 10% of the unit's total area to a maximum depth of approximately 7 ft. A gently sloping hillside/drainage runs northward through the unit in Grids 1026 and 1016. FSS-112 has considerable vegetation (trees and heavy brush) across the northwest portion and southeast end. Additional information can be found in the *Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 112, and 113* (ARC-RPT-6042), included in Attachment 3.

6.1.13 Final Status Survey Unit 113

Final Status Survey Unit 113 has a surface area of 18,549 ft^2 (1,723 m^2). It is bounded on the north by FSS-114, FSS-116, and FSS-117; on the east by FSS-117; on the south by FSS-110, FSS-112, and an area that is contaminated and will not be surveyed for final status; and on the west by FSS-112 and FSS-116. Parts of Grids 1007, 1008, 1009, and 1016 lie within FSS-113. The area excavated in FSS-113 is approximately 80% of the unit's total area to a maximum depth of approximately 10 ft. A sloping hillside/drainage runs through the unit toward the northwest. Additional information can be found in the *Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 112, and 113* (ARC-RPT-6042), included in Attachment 3.

6.1.14 Final Status Survey Unit 114

Final Status Survey Unit 114 has a surface area of 16,914 ft^2 (1,571 m^2). It is bounded on the north and east by FSS-117, on the south by FSS-113, and on the west by FSS-116. Part of Grid 1009 lies within FSS-114. The area excavated in FSS-114 is approximately 5% of the unit's total area to a maximum depth of approximately 1 ft. A sloping hillside/drainage in Grid 1009 is a feature of FSS-114. FSS-114 had vegetation (trees, heavy brush) present in the center. Additional information can be found in the *Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 108, 109, 114 and 116* (ARC-RPT-6039), included in Attachment 2.

6.1.15 Final Status Survey Unit 115

Final Status Survey Unit 115 has a surface area of 20,030 ft^2 (1,861 m^2). It is bounded on all sides by FSS-117. Grids 1020 and 1023 are relatively level areas that lie within FSS-115. Only one area was excavated in FSS-115. The excavation was less than 1% of the unit's total area to a depth of approximately 1 ft. Additional information can be found in the *Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 101–106 and 115* (ARC RPT 6036), included in Attachment 1.

6.1.16 Final Status Survey Unit 116

Final Status Survey Unit 116 has a surface area of 12,350 ft^2 (1,147 m^2). It is bounded on the north and west by FSS-117, on the east by FSS-114, and on the south by FSS-112 and FSS-113. Part of Grid 1008 lies within FSS-116. The area excavated in FSS-116 is approximately 10% of the unit's total area to a maximum depth of approximately 1 ft. A sloping hillside/drainage in Grid 1008 is a feature of FSS-116, and FSS-116 had vegetation (trees and heavy brush) present in the eastern and southern portion. Additional information can be found in the *Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 108, 109, 114 and 116* (ARC-RPT-6039), included in Attachment 2.

6.1.17 Final Status Survey Unit 117

Final Status Survey Unit 117 has a surface area of 192,844 ft^2 (17,916 m^2). Previous surveys did not identify radiological contamination in excess of project criteria on the footprint of FSS-117; therefore, no soils were removed from this area for cleanup purposes. FSS-117 surrounds all 16 of the affected units and 19 characterization grids. FSS-117 has a variety of surface features that run from relatively flat, grass-covered areas; dirt roads; gentle to steep sloping terrain; and drainage. Ground cover includes grass, deep weeds, and thicket (including trees). Additional information can be found in the *Separations Process*

Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 111 and 117 (ARC-RPT-6044), included in Attachment 5.

6.2 Results Summary

The results are presented by isotope and 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. Of the 335 samples, 277 were systematic samples collected from the 16 Class 1 final status survey units (including 16 duplicate samples), 17 were compliance samples collected from one Class 3 unit (including one duplicate sample), and 41 represent judgmental samples. The maximum SOR for any systematic or compliance sample was 0.435. The average SOR for all North Field systematic and compliance samples was 0.123 or 12.3% of the criteria limit. Figure 4 shows the sampling locations for all systematic and compliance samples taken in the North Field.

Figure 5 presents the aggregated GPS-correlated scan data for the 2 × 2 NaI(Tl) probe for the North Field. 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 confirmed to be acceptable by judgmental sampling. As evident in Figure 5, there were areas where GPS-logged data were not available. This was 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 were retained as survey records.

Table 2 Systematic and compliance sample results summary for the survey units of the North Field

Survey Unit	Interim Report	Area (m^2)	Class	Systematic Samples	Judgmental Samples	Maximum SOR	Mean	Standard Deviation
FSS-101	ARC-RPT-6036	1,945	1	16	1	0.131	0.108	0.0121
FSS-102	ARC-RPT-6036	1,990	1	16	1	0.152	0.116	0.020
FSS-103	ARC-RPT-6036	1,932	1	16	1	0.158	0.121	0.021
FSS-104	ARC-RPT-6036	1,954	1	16	1	0.191	0.119	0.025
FSS-105	ARC-RPT-6036	1,914	1	16	1	0.200	0.133	0.026
FSS-106	ARC-RPT-6036	1,861	1	18	1	0.165	0.130	0.018
FSS-107	ARC-RPT-6043	1,885	1	16	8	0.156	0.118	0.019
FSS-108	ARC-RPT-6039	1,792	1	16	1	0.176	0.112	0.029
FSS-109	ARC-RPT-6039	1,982	1	16	9	0.266	0.139	0.045
FSS-110	ARC-RPT-6043	632	1	17	2	0.435	0.154	0.073
FSS-111	ARC-RPT-6044	1,960	1	16	5	0.123	0.093	0.013
FSS-112	ARC-RPT-6042	1,581	1	16	3	0.179	0.131	0.023
FSS-113	ARC-RPT-6042	1,723	1	16	4	0.389	0.150	0.073
FSS-114	ARC-RPT-6039	1,571	1	16	1	0.213	0.127	0.034
FSS-115	ARC-RPT-6036	1,861	1	16	1	0.157	0.119	0.017
FSS-116	ARC-RPT-6039	1,147	1	18	1	0.305	0.126	0.049
FSS-117	ARC-RPT-6044	17,916	3	16	0	0.147	0.105	0.022

NOTES:
1. All statistics presented are in SOR values.
2. The standard deviation values presented are based on SOR values.
3. FSS-117 sample locations were not systematically located.

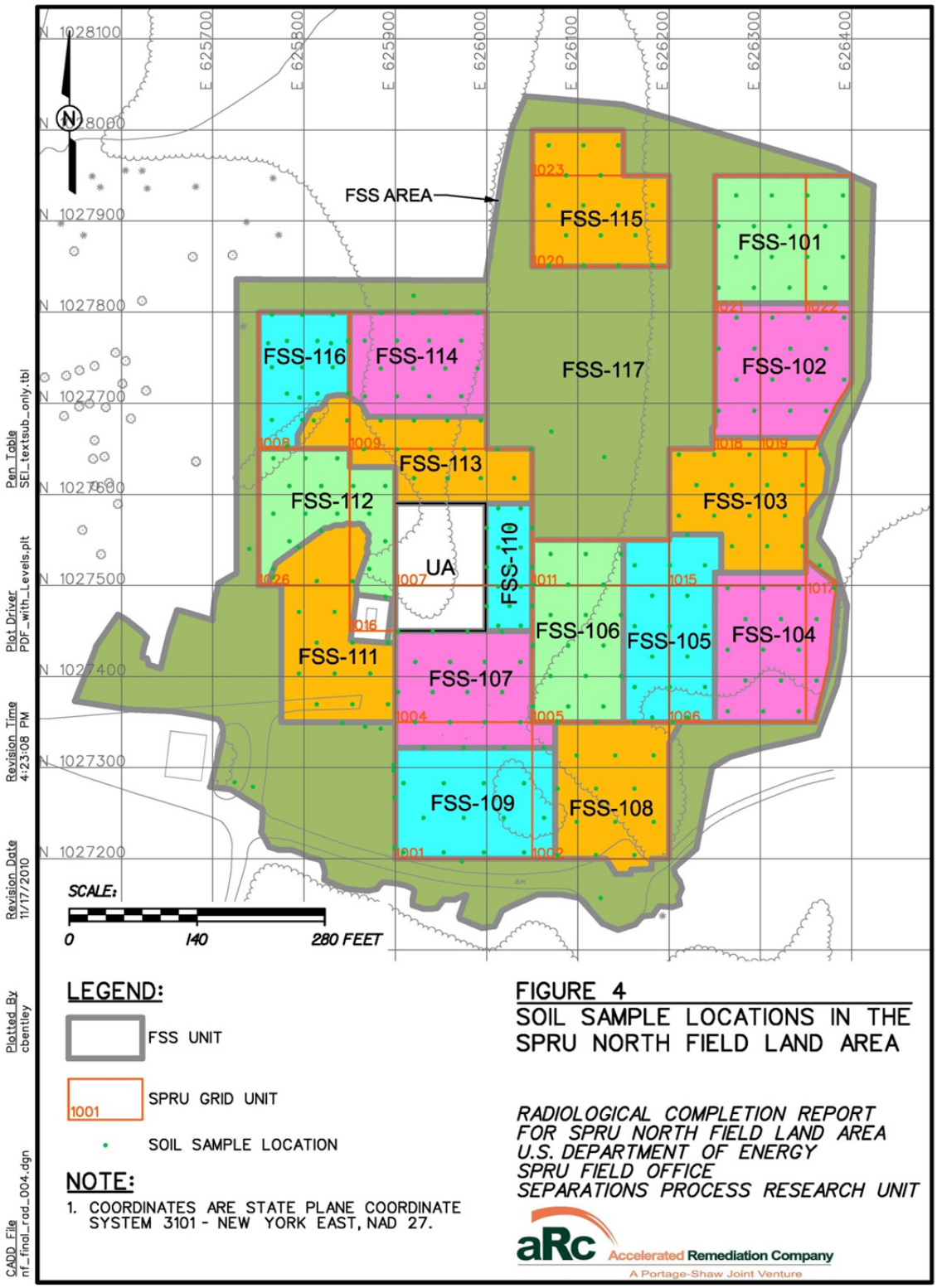


Figure 4 Sampling locations for all North Field FSS units

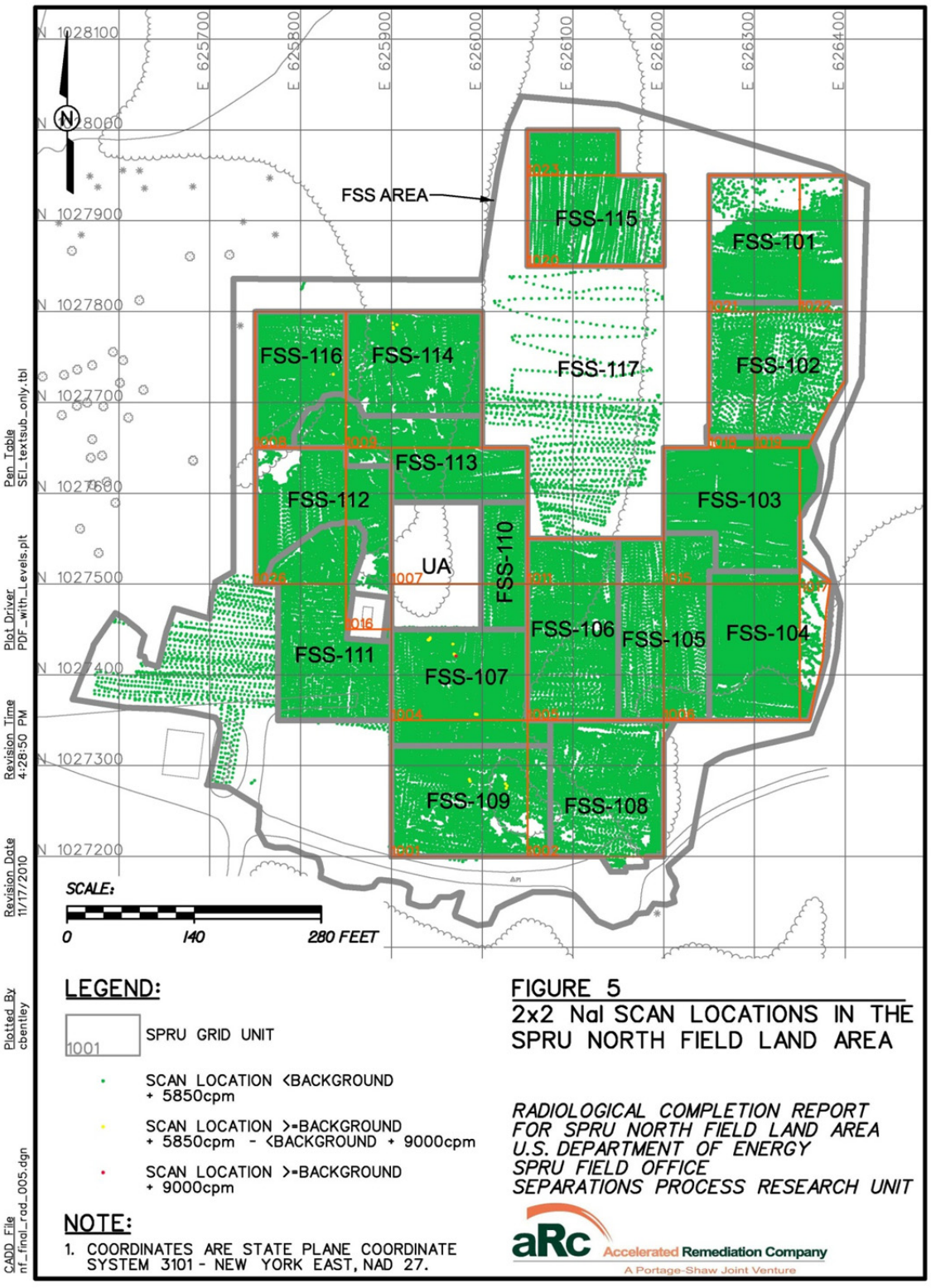


Figure 5 Aggregated GPS scan data

7.0 Conclusions

During remediation of the North Field, 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 North Field is contaminated; therefore, in accordance with the acceptance criteria, the North Field survey units each individually satisfied the project radiological criteria.

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 North Field remediation. No further excavation is recommended at the North Field. Upon completion of the remediation in the North Field, it was backfilled, graded, and seeded to restore area conditions to initial pre-remediation status. (See topographical map, Appendix A page A-21).

8.0 References

ARC-RPT-6036, *Separations Process Research Unit North Field Land Areas Radiological Completion Report for Final Status Survey Units 101–106 and 115*, Accelerated Remediation Company, current revision.

ARC-RPT-6039, *Separations Process Research Unit North Field Land Areas Radiological Completion Report for Final Status Survey Units 108, 109, 114 and 116*, Accelerated Remediation Company, current revision.

ARC-PLN-6042, *Separations Process Research Unit North Field Land Area Radiological Completions Report for Final Status Survey Units 112 and 113*, Accelerated Remediation Company, current revision.

ARC-RPT-6043, *Separations Process Research Unit North Field Land Areas Radiological Completion Report for Final Status Survey Units 107 and 110* , Accelerated Remediation Company, current revision.

ARC-RPT-6044, *Separations Process Research Unit North Field Land Areas Radiological Completion Report for Final Status Survey Units 111 and 117*, Accelerated Remediation Company, current revision.

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-6516, *Radiological Confirmation Sampling and Analysis Plan/Final Status Survey for the North Field Land Area*, 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.

CH2M HILL, 2005, *Final Derived Concentration Guideline Levels Technical Basis*, TBD-03, U.S. Department of Energy, CH2M HILL, February 2005.

CH2M HILL, 2006, *Radiological Characterization Report for SPRU Outside Areas,* CH2M HILL, June 2006.

EPA, NRC, DOD, and DOE, 2000, *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, EPA 402-R-97-016, Rev. 1, U.S. Environmental Protection Agency, U.S. Nuclear Regulatory Commission, U.S. Department of Defense, and U.S. Department of Energy, August 2000.

DOE, 2006, *Request for Proposal Task Order DE-RT30-07CC60013/SP15, Statement of Work*, U.S. Department of Energy, 2006.

DOE O 5400.5, 1993, "Radiation Protection of the Public and the Environment," U.S. Department of Energy, January 1, 1993.

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.

SPRU 10-047, "Discontinuance of FIDLER Scans in the SPRU Lower Level," Correspondence from Steven Fienberg, Federal Project Director, U.S. DOE, SPRU Field Office, to J. O'Hearn, Project Manager, aRc, January 6, 2010.

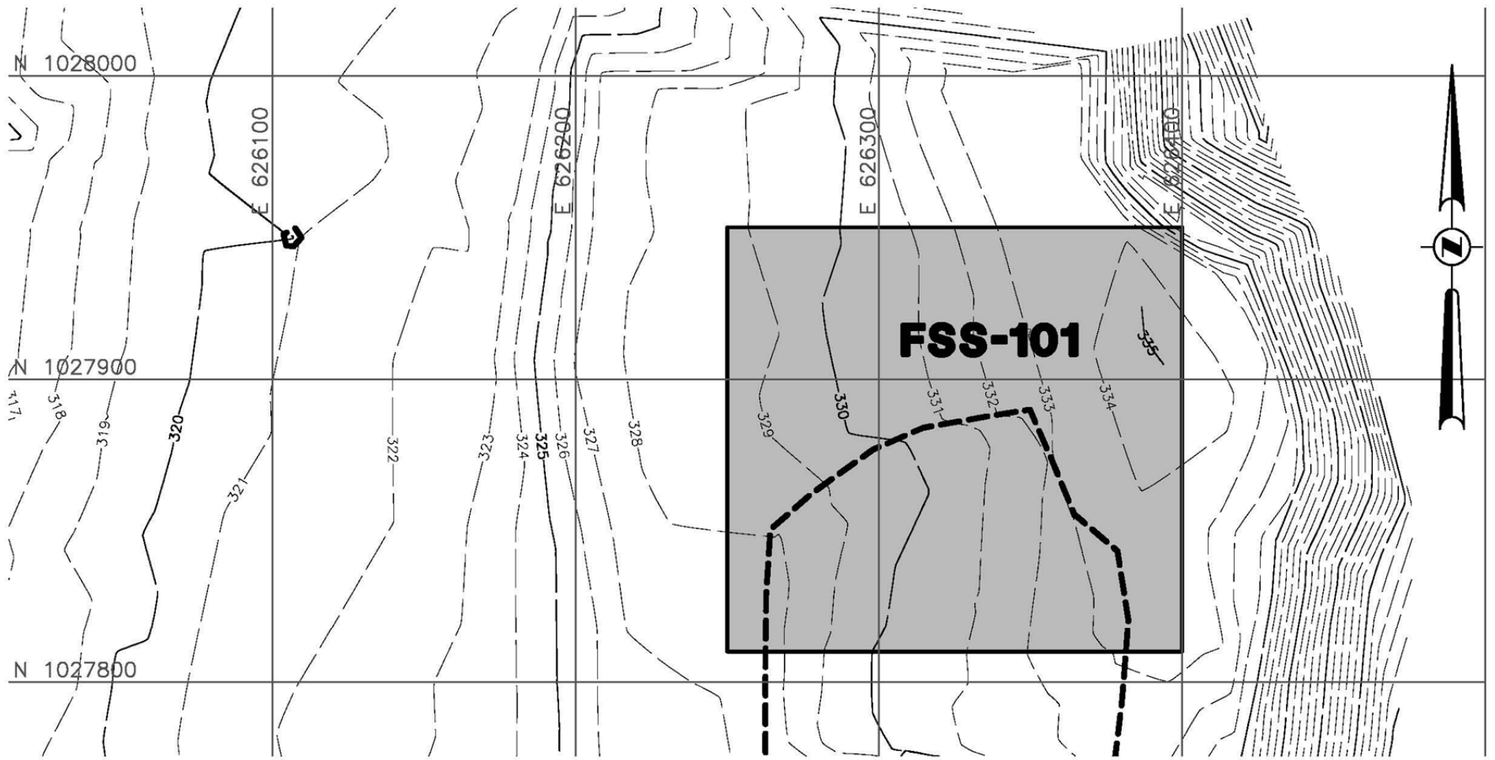
Appendix A
Post Excavation Figures

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted on February 18, 2010.
2. North orientation is 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–101 was computed as 109 cu. yds. based on this drawing and the associated drawing titled "FSS–101 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.
3. "Topographic Survey Knolls Atomic Power Laboratory Northfield Land Remediation Project" prepared by C.T. Male Associates, P.C., dated October 22, 2009, dwg. no. 09–622.



LEGEND

EXCAVATION LIMITS

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P.L.S. 49260

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FSS-101 AREA POST-EXCAVATION TOPOGRAPHY

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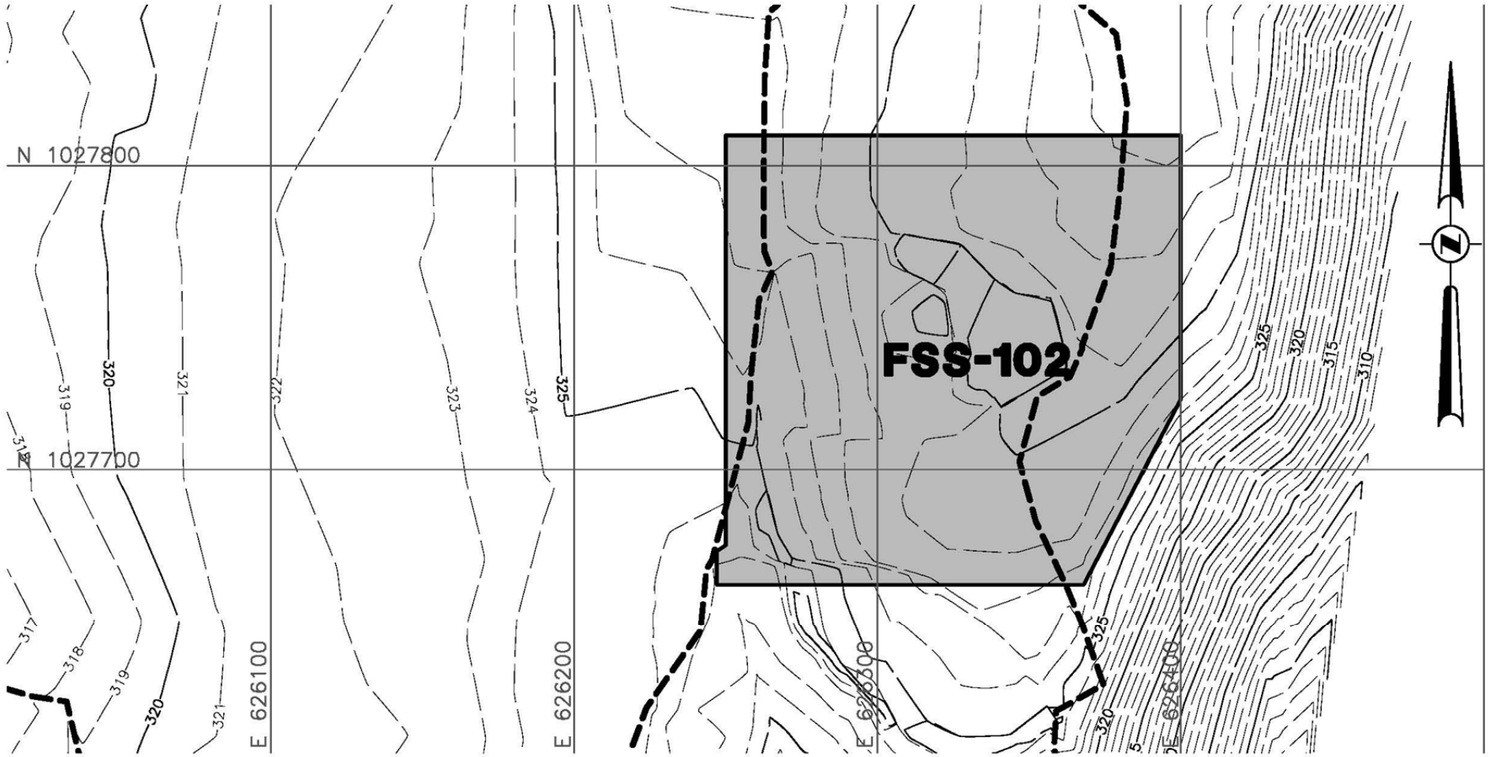
MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted on February 18, 2010.
2. North orientation is 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–102 was computed as 521 cu. yds. based on this drawing and the associated drawing titled "FSS–102 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.
3. "Topographic Survey Knolls Atomic Power Laboratory Northfield Land Remediation Project" prepared by C.T. Male Associates, P.C., dated October 22, 2009, dwg. no. 09–622.



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FSS-102 AREA POST-EXCAVATION TOPOGRAPHY

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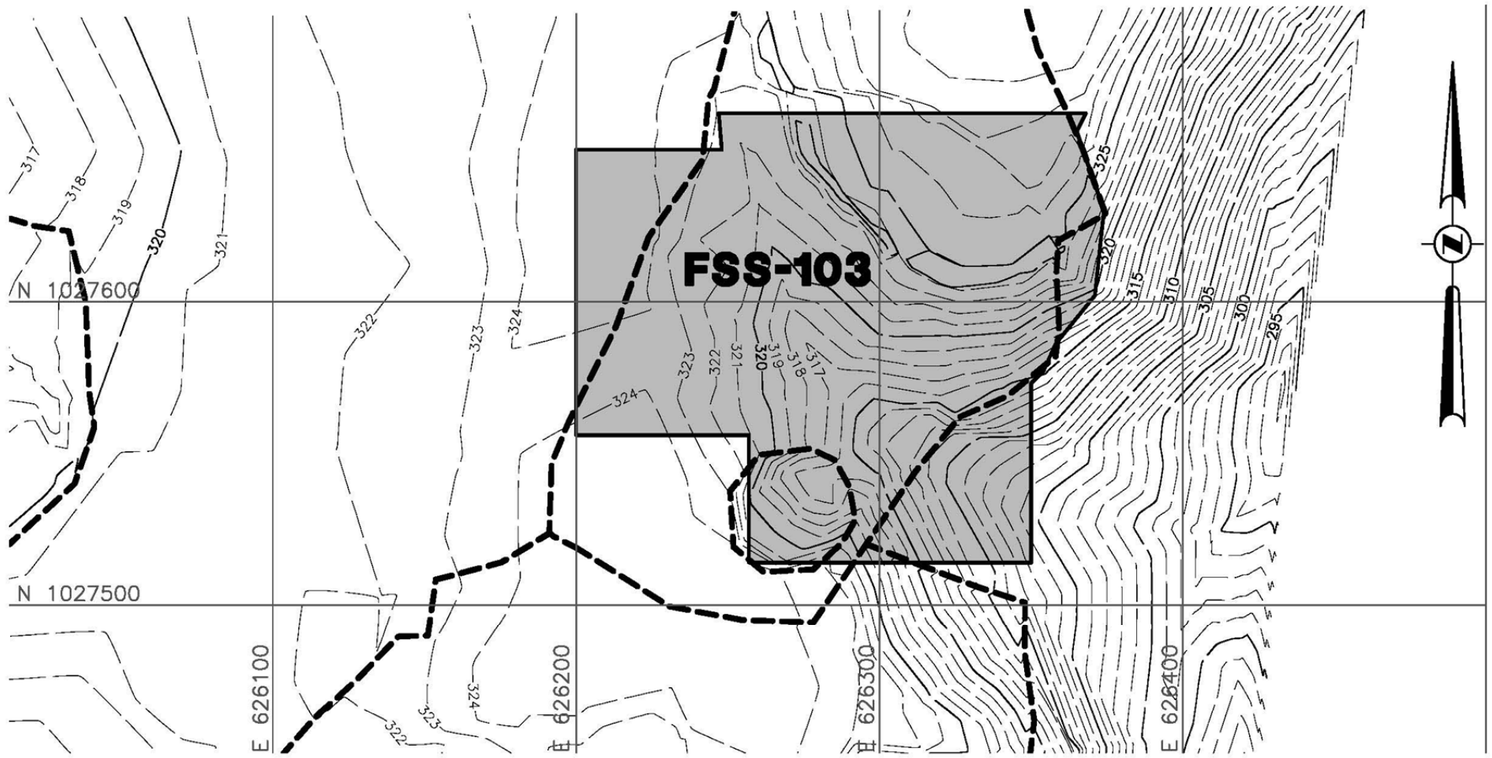
MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted on February 18, 2010.
2. North orientation is 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–103 was computed as 696 cu. yds. based on this drawing and the associated drawing titled "FSS–103 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.
3. "Topographic Survey Knolls Atomic Power Laboratory Northfield Land Remediation Project" prepared by C.T. Male Associates, P.C., dated October 22, 2009, dwg. no. 09–622.



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FSS-103 AREA POST-EXCAVATION TOPOGRAPHY

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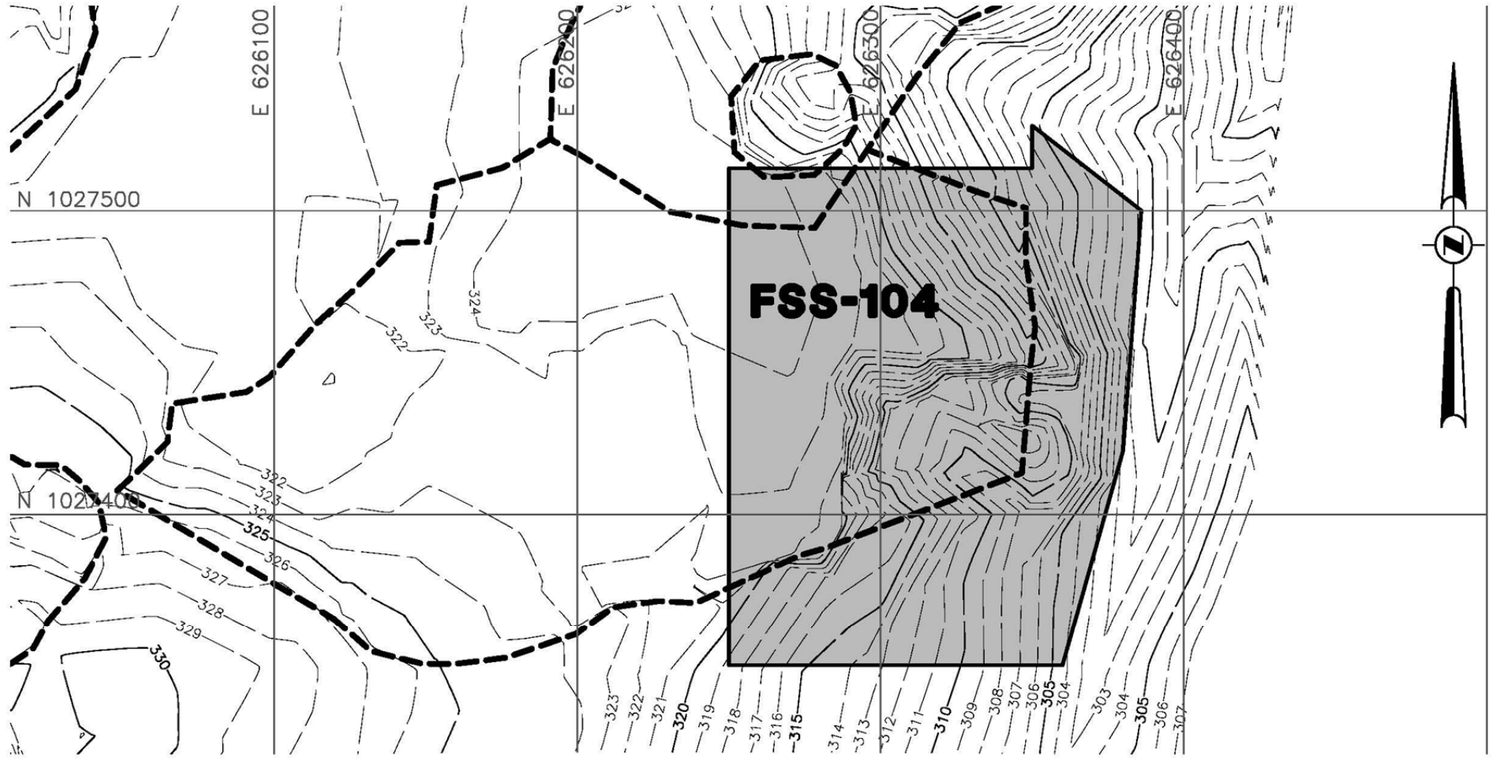
MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted on February 18, 2010.
2. North orientation is 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–104 was computed as 511 cu. yds. based on this drawing and the associated drawing titled "FSS–104 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.
3. "Topographic Survey Knolls Atomic Power Laboratory Northfield Land Remediation Project" prepared by C.T. Male Associates, P.C., dated October 22, 2009, dwg. no. 09–622.



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FSS-104 AREA POST-EXCAVATION TOPOGRAPHY

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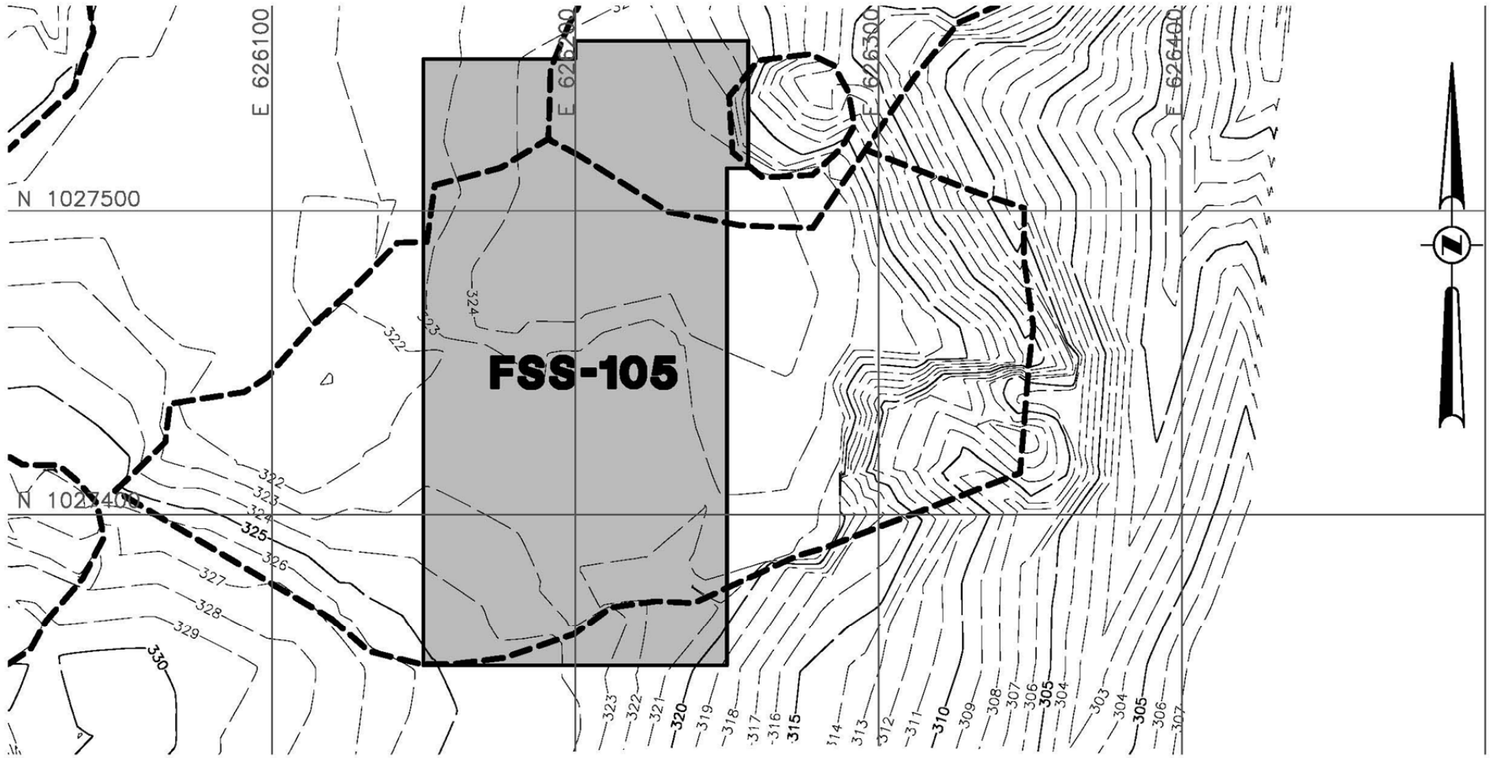
MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted on May 3, 2010.
2. North orientation is 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–105 was computed as 705 cu. yds. based on this drawing and the associated drawing titled "FSS–105 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.
3. "Topographic Survey Knolls Atomic Power Laboratory Northfield Land Remediation Project" prepared by C.T. Male Associates, P.C., dated October 22, 2009, dwg. no. 09–622.



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P.L.S. 49260

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PROJ. NO: 09.9453
SCALE :
DATE : OCT. 6, 2010

FSS-105 AREA POST-EXCAVATION TOPOGRAPHY

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SHEET 2 OF 2
DWG. NO: 10–574

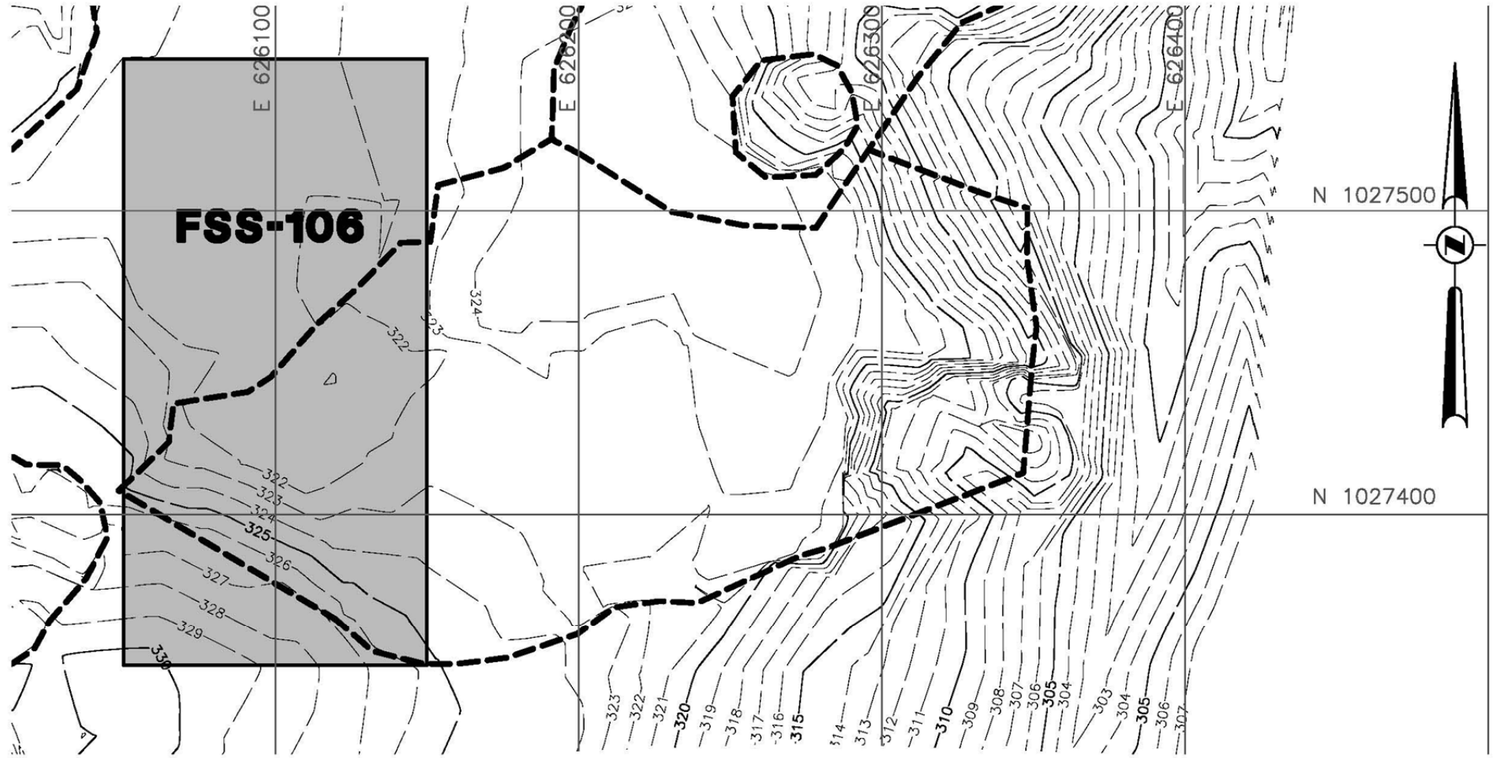
CAD DWG. FILE NAME:COMBINED_INDIV..DWG

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted on May 3, 2010.
2. North orientation is 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–106 was computed as 338 cu. yds. based on this drawing and the associated drawing titled "FSS–106 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.
3. "Topographic Survey Knolls Atomic Power Laboratory Northfield Land Remediation Project" prepared by C.T. Male Associates, P.C., dated October 22, 2009, dwg. no. 09–622.



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P.L.S. 49260

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PROJ. NO: 09.9453
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DATE : OCT. 6, 2010

FSS-106 AREA POST-EXCAVATION TOPOGRAPHY

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SHEET 2 OF 2
DWG. NO: 10–575

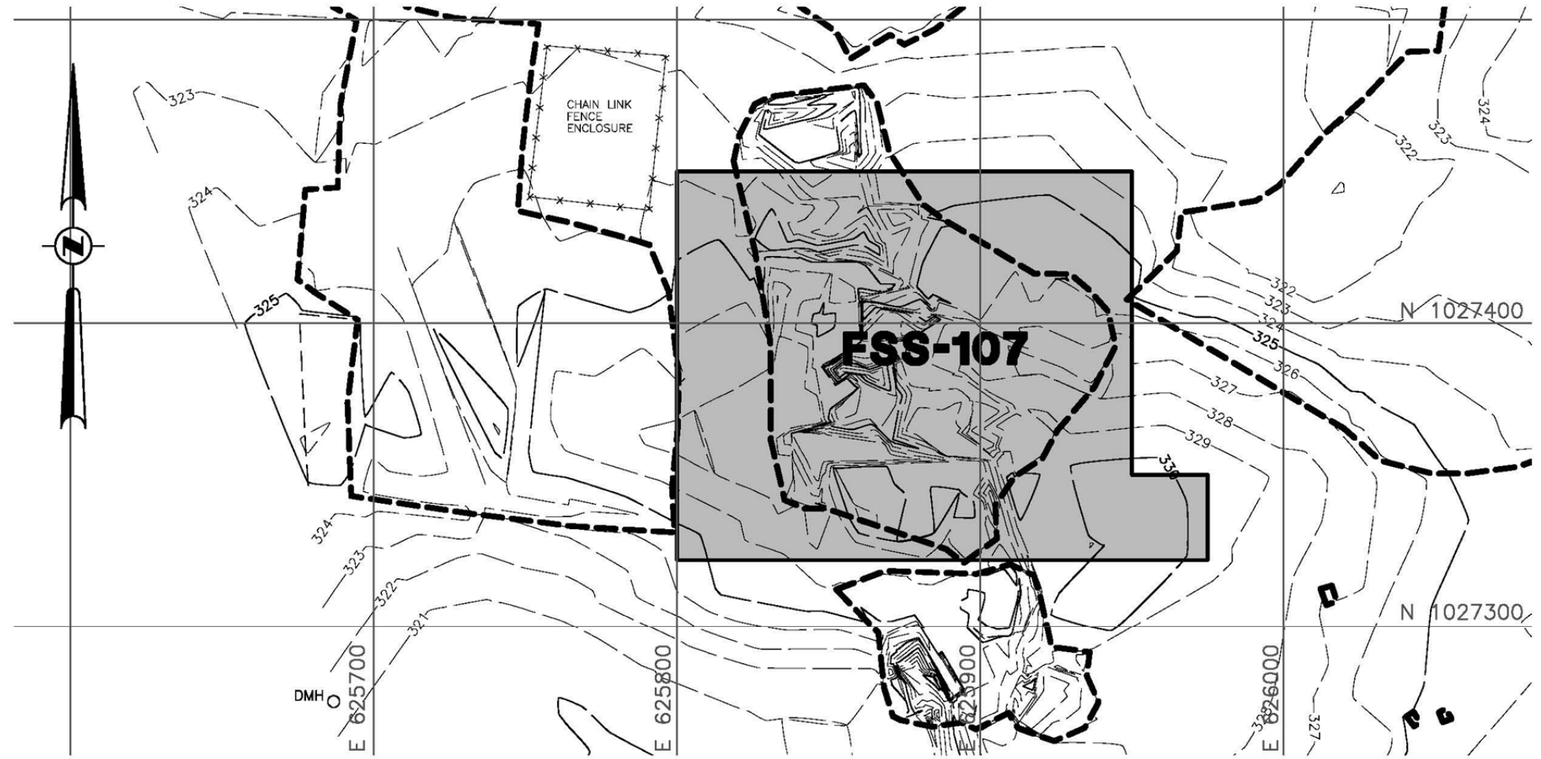
CAD DWG. FILE NAME:COMBINED_INDIV..DWG

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted on August 12, 2010.
2. North orientation is 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–107 was computed as 400 cu. yds. based on this drawing and the associated drawing titled "FSS–107 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.
3. "Topographic Survey Knolls Atomic Power Laboratory Northfield Land Remediation Project" prepared by C.T. Male Associates, P.C., dated October 22, 2009, dwg. no. 09–622.



LEGEND

EXCAVATION LIMITS

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CHECKED : JFC
PROJ. NO: 09.9453
SCALE :
DATE : OCT. 6, 2010

FSS-107 AREA POST-EXCAVATION TOPOGRAPHY

KAPL SPRU LAND AREAS REMEDIATION PROJECT

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SHEET 2 OF 2
DWG. NO: 10–576

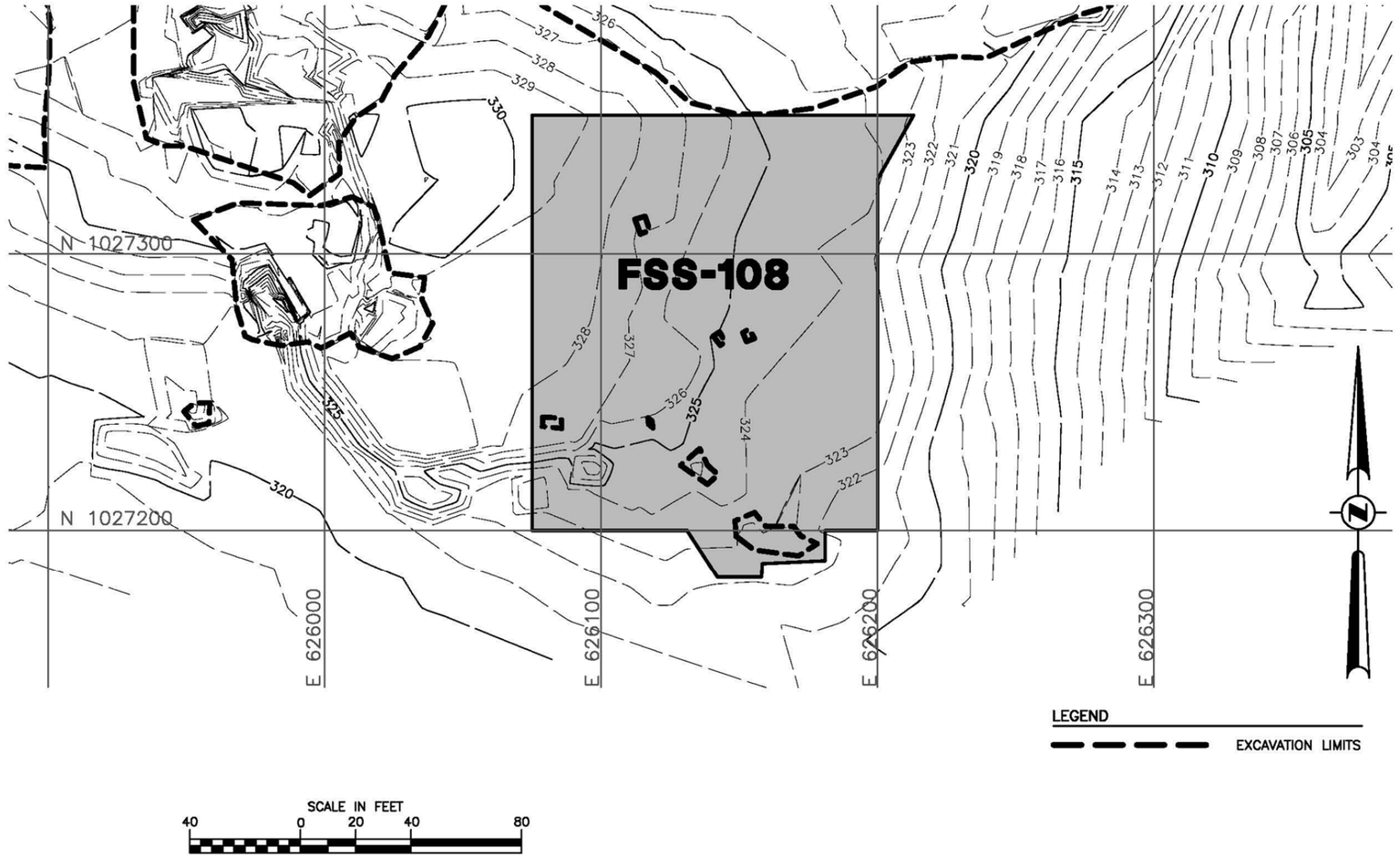
CAD DWG. FILE NAME:COMBINED_INDW.DWG

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted on June 11, 2010.
2. North orientation is 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–108 was computed as 9 cu. yds. based on this drawing and the associated drawing titled "FSS–108 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.
3. "Topographic Survey Knolls Atomic Power Laboratory Northfield Land Remediation Project" prepared by C.T. Male Associates, P.C., dated October 22, 2009, dwg. no. 09–622.



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FSS-108 AREA POST-EXCAVATION TOPOGRAPHY

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DWG. NO: 10–577

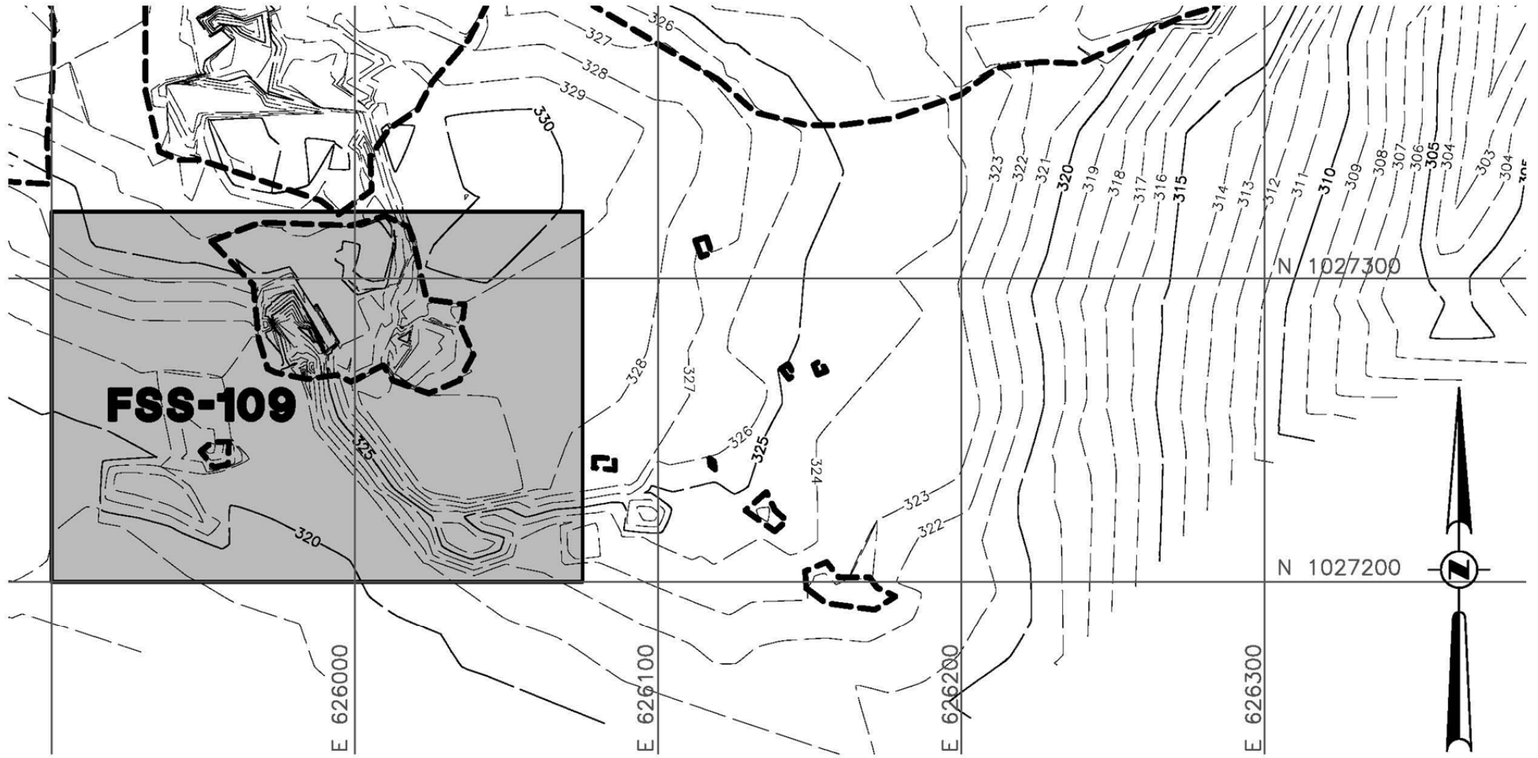
CAD DWG. FILE NAME:COMBINED_INDX.DWG

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted on August 5, 2010.
2. North orientation is 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–109 was computed as 136 cu. yds. based on this drawing and the associated drawing titled "FSS–109 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.
3. "Topographic Survey Knolls Atomic Power Laboratory Northfield Land Remediation Project" prepared by C.T. Male Associates, P.C., dated October 22, 2009, dwg. no. 09–622.



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FSS-109 AREA POST-EXCAVATION TOPOGRAPHY

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SHEET 2 OF 2
DWG. NO: 10–578

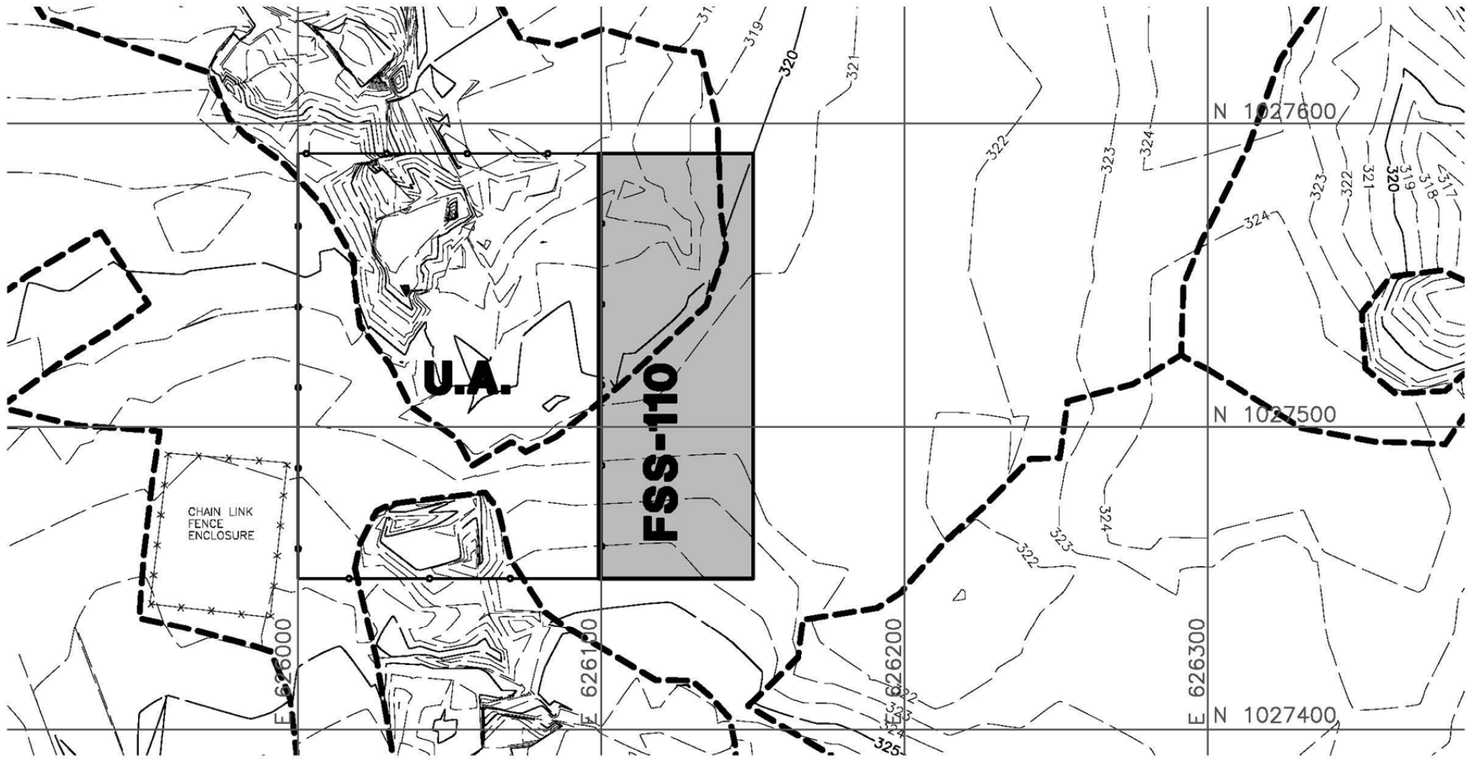
CAD DWG. FILE NAME:COMBINED_INDIV..DWG

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted on August 12, 2010.
2. North orientation is 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–110 was computed as 649 cu. yds. based on this drawing and the associated drawing titled "FSS–110 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.
3. "Topographic Survey Knolls Atomic Power Laboratory Northfield Land Remediation Project" prepared by C.T. Male Associates, P.C., dated October 22, 2009, dwg. no. 09–622.



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DATE : OCT. 6, 2010

FSS-110 AREA POST-EXCAVATION TOPOGRAPHY

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SHEET 2 OF 2
DWG. NO: 10–579

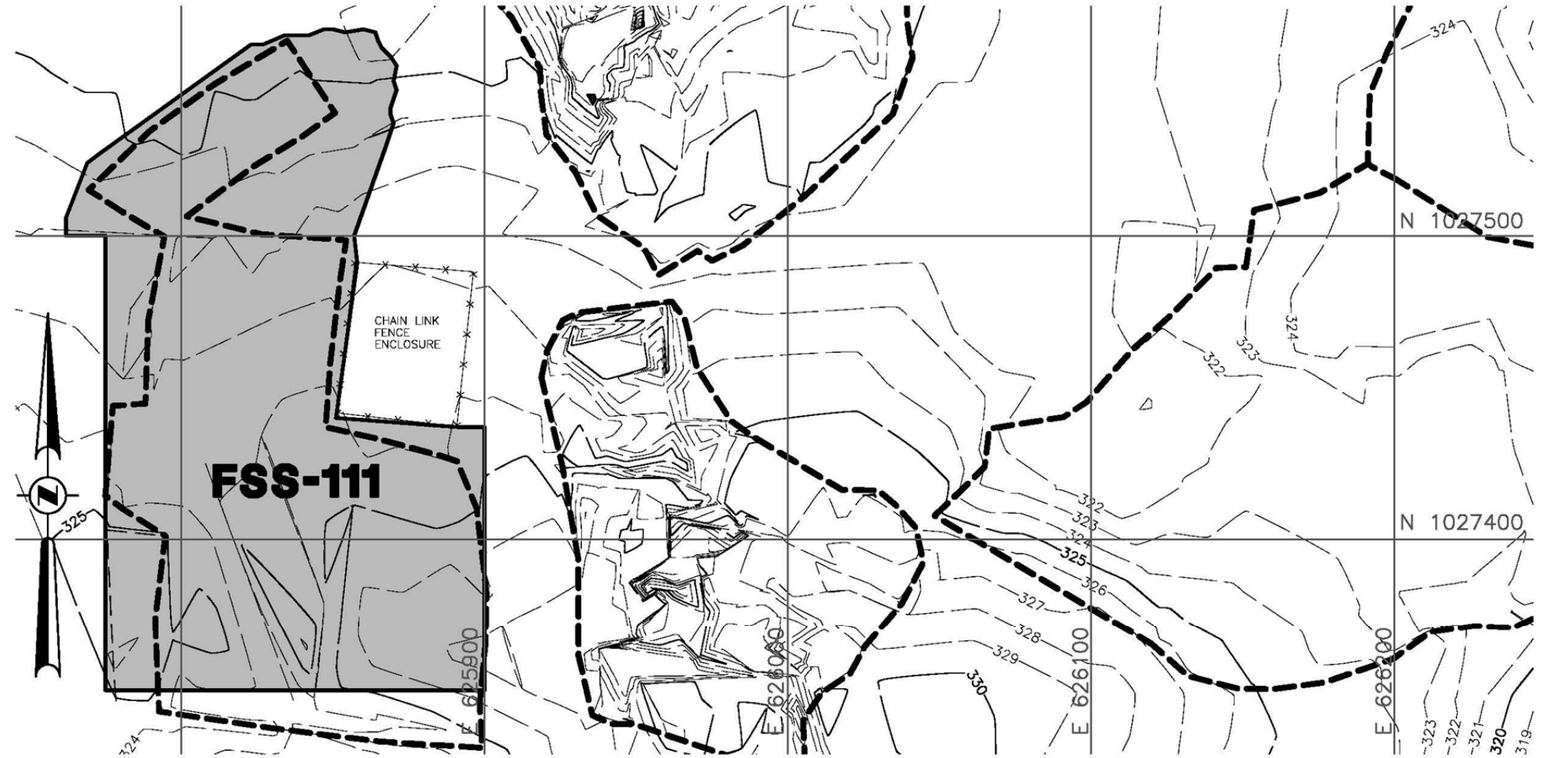
CAD DWG. FILE NAME:COMBINED_INDIV..DWG

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted on September 28, 2010.
2. North orientation is 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–111 was computed as 10 cu. yds. based on this drawing and the associated drawing titled "FSS–111 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.
3. "Topographic Survey Knolls Atomic Power Laboratory Northfield Land Remediation Project" prepared by C.T. Male Associates, P.C., dated October 22, 2009, dwg. no. 09–622.



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P.L.S. 49260

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FSS-111 AREA POST-EXCAVATION TOPOGRAPHY

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SHEET 2 OF 2
DWG. NO: 10–580

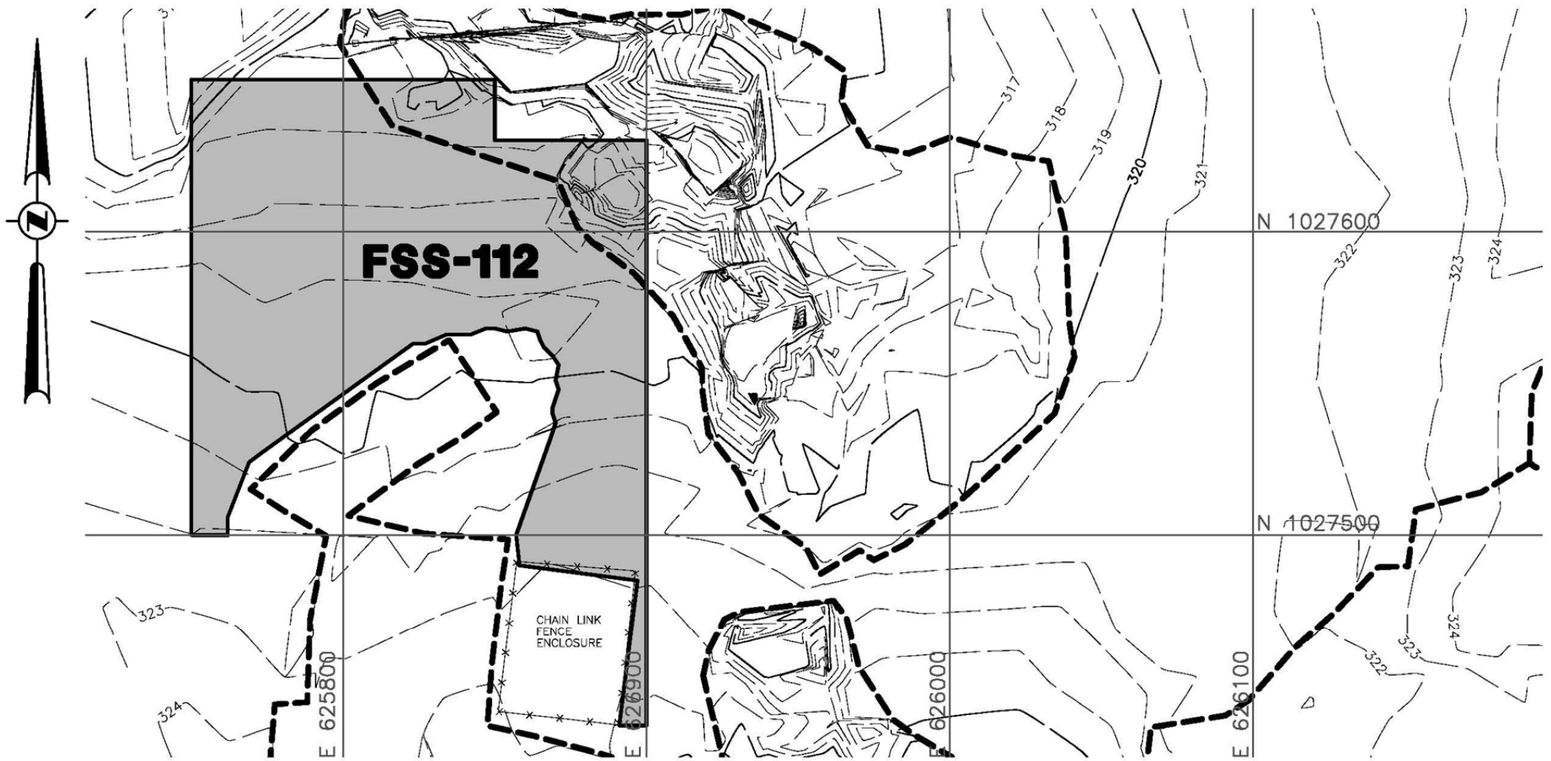
CAD DWG. FILE NAME:COMBINED_INDX.DWG

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted on August 12, 2010.
2. North orientation is 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–112 was computed as 177 cu. yds. based on this drawing and the associated drawing titled "FSS–112 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.
3. "Topographic Survey Knolls Atomic Power Laboratory Northfield Land Remediation Project" prepared by C.T. Male Associates, P.C., dated October 22, 2009, dwg. no. 09–622.



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P.L.S. 49260

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PROJ. NO: 09.9453
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DATE : OCT. 6, 2010

FSS-112 AREA POST-EXCAVATION TOPOGRAPHY

KAPL SPRU LAND AREAS REMEDIATION PROJECT

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SHEET 2 OF 2
DWG. NO: 10–581

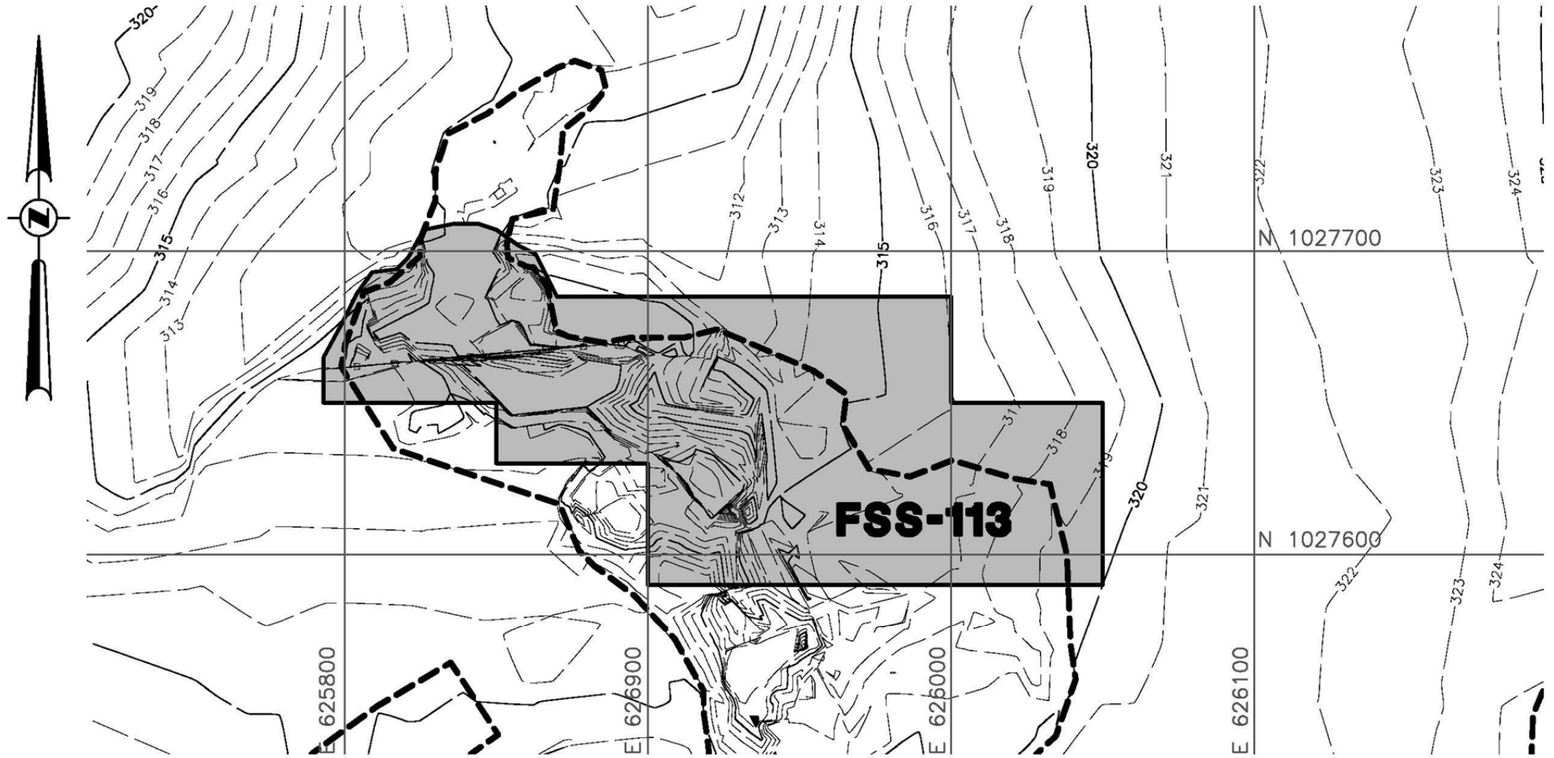
CAD DWG. FILE NAME:COMBINED_INDIV..DWG

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted on June 11, 2010.
2. North orientation is 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–113 was computed as 1,204 cu. yds. based on this drawing and the associated drawing titled "FSS–113 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.
3. "Topographic Survey Knolls Atomic Power Laboratory Northfield Land Remediation Project" prepared by C.T. Male Associates, P.C., dated October 22, 2009, dwg. no. 09–622.



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PROJ. NO: 09.9453
SCALE :
DATE : OCT. 6, 2010

CAD DWG. FILE NAME:COMBINED_INDIV.DWG

FSS-113 AREA POST-EXCAVATION TOPOGRAPHY

KAPL SPRU LAND AREAS REMEDIATION PROJECT

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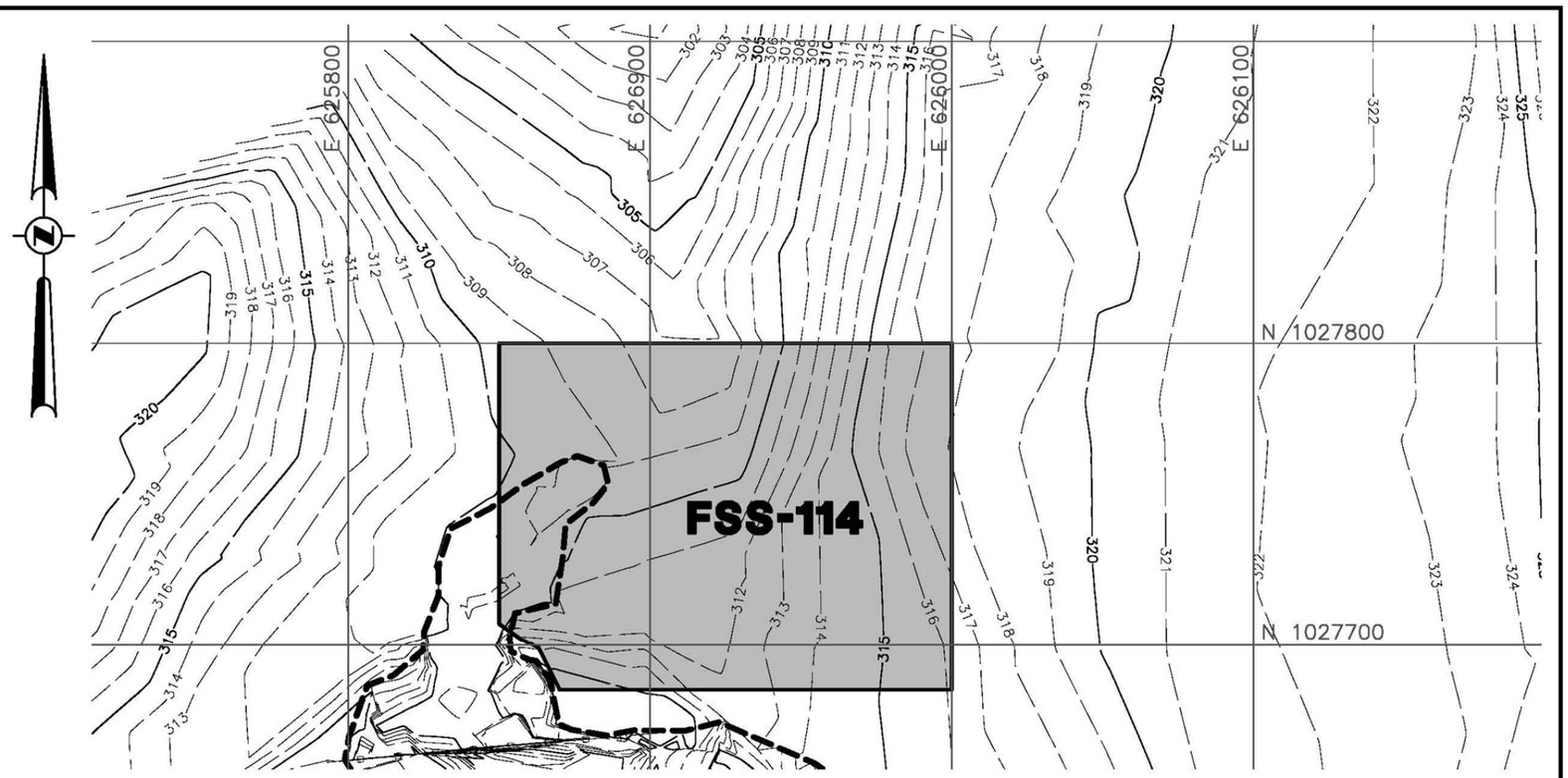
SHEET 2 OF 2
DWG. NO: 10–582

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted on June 11, 2010.
2. North orientation is 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–114 was computed as 41 cu. yds. based on this drawing and the associated drawing titled "FSS–114 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.
3. "Topographic Survey Knolls Atomic Power Laboratory Northfield Land Remediation Project" prepared by C.T. Male Associates, P.C., dated October 22, 2009, dwg. no. 09–622.



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P.L.S. 49260

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PROJ. NO: 09.9453
SCALE :
DATE : OCT. 6, 2010

FSS-114 AREA POST-EXCAVATION TOPOGRAPHY

KAPL SPRU LAND AREAS REMEDIATION PROJECT

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SHEET 2 OF 2
DWG. NO: 10–583

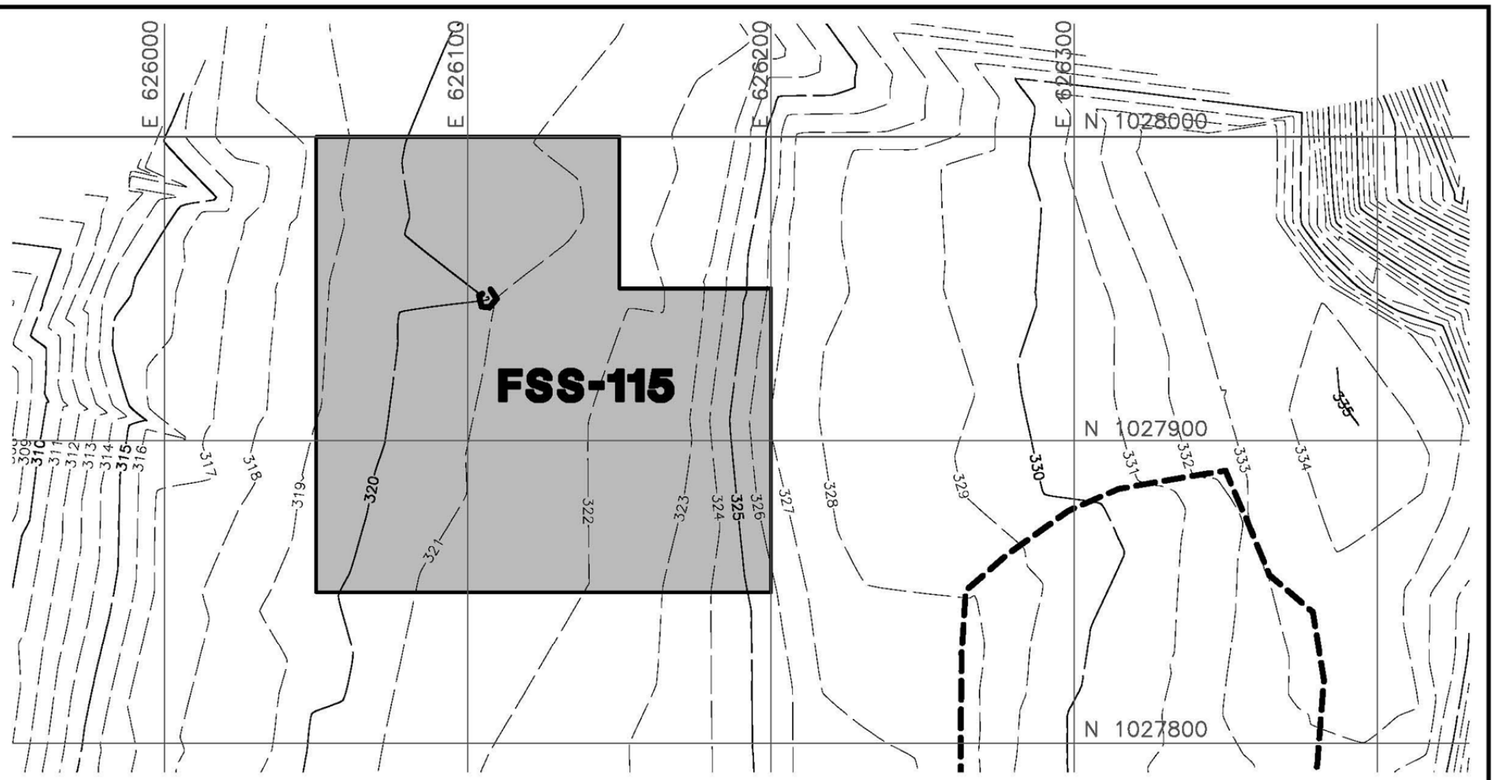
CAD DWG. FILE NAME:COMBINED_INDX.DWG

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted on May 3, 2010.
2. North orientation is 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–115 was computed as 1 cu. yds. based on this drawing and the associated drawing titled "FSS–115 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.
3. "Topographic Survey Knolls Atomic Power Laboratory Northfield Land Remediation Project" prepared by C.T. Male Associates, P.C., dated October 22, 2009, dwg. no. 09–622.



JAMES F. COOK
P.L.S. 49260

DATE	REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
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DESIGNED :
DRAFTED : MMB
CHECKED : JFC
PROJ. NO: 09.9453
SCALE :
DATE : OCT. 6, 2010

FSS-115 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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518.786.7400 * FAX 518.786.7299
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SHEET 2 OF 2
DWG. NO: 10–584

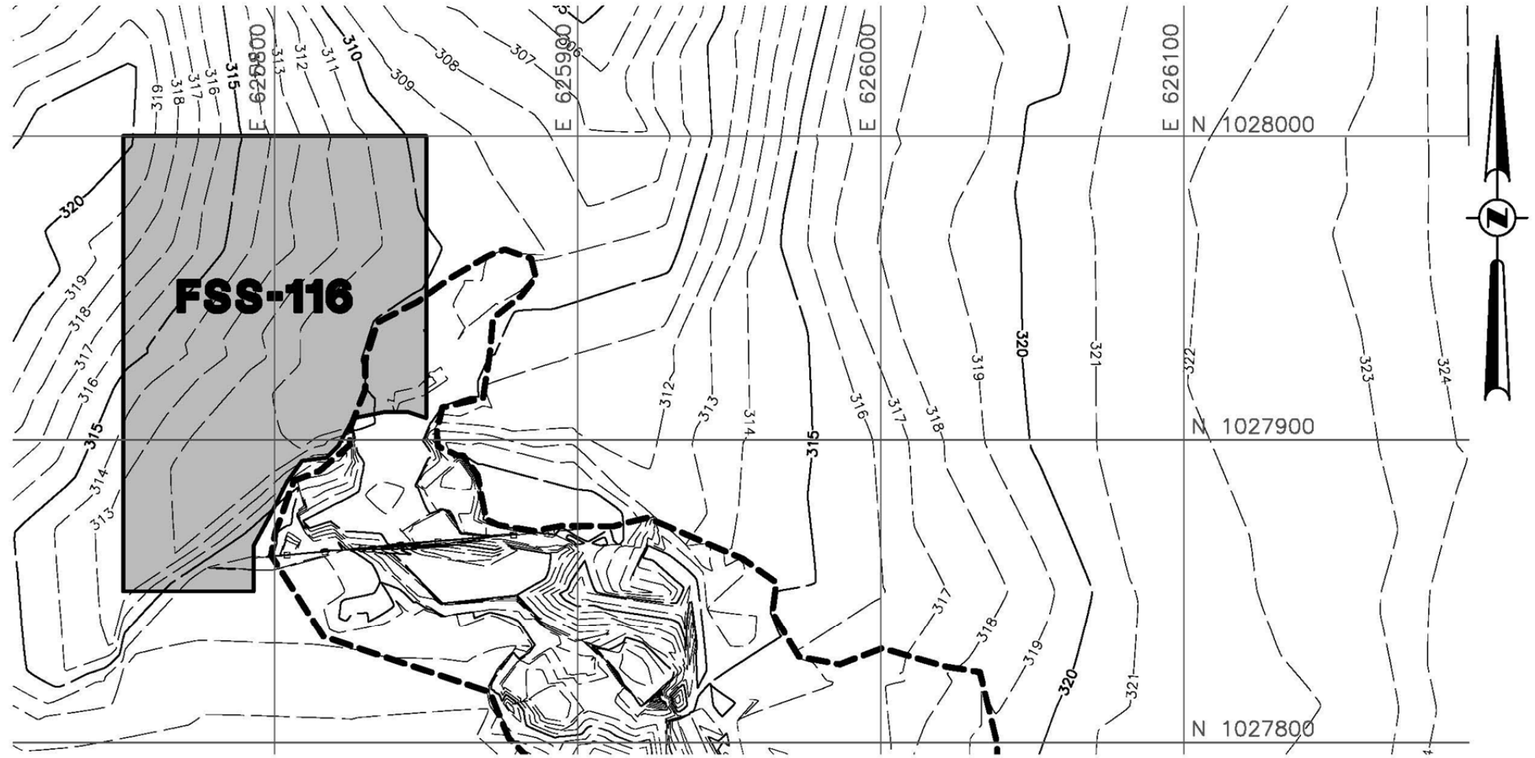
CAD DWG. FILE NAME:COMBINED_INDIV..DWG

MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted on June 11, 2010.
2. North orientation is 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–116 was computed as 23 cu. yds. based on this drawing and the associated drawing titled "FSS–116 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.
3. "Topographic Survey Knolls Atomic Power Laboratory Northfield Land Remediation Project" prepared by C.T. Male Associates, P.C., dated October 22, 2009, dwg. no. 09–622.



SCALE IN FEET
40 0 20 40 80

JAMES F. COOK
P.L.S. 49260

DATE	REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
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DESIGNED :
DRAFTED : MMB
CHECKED : JFC
PROJ. NO: 09.9453
SCALE :
DATE : OCT. 6, 2010

FSS-116 AREA POST-EXCAVATION TOPOGRAPHY

KAPL SPRU LAND AREAS REMEDIATION PROJECT

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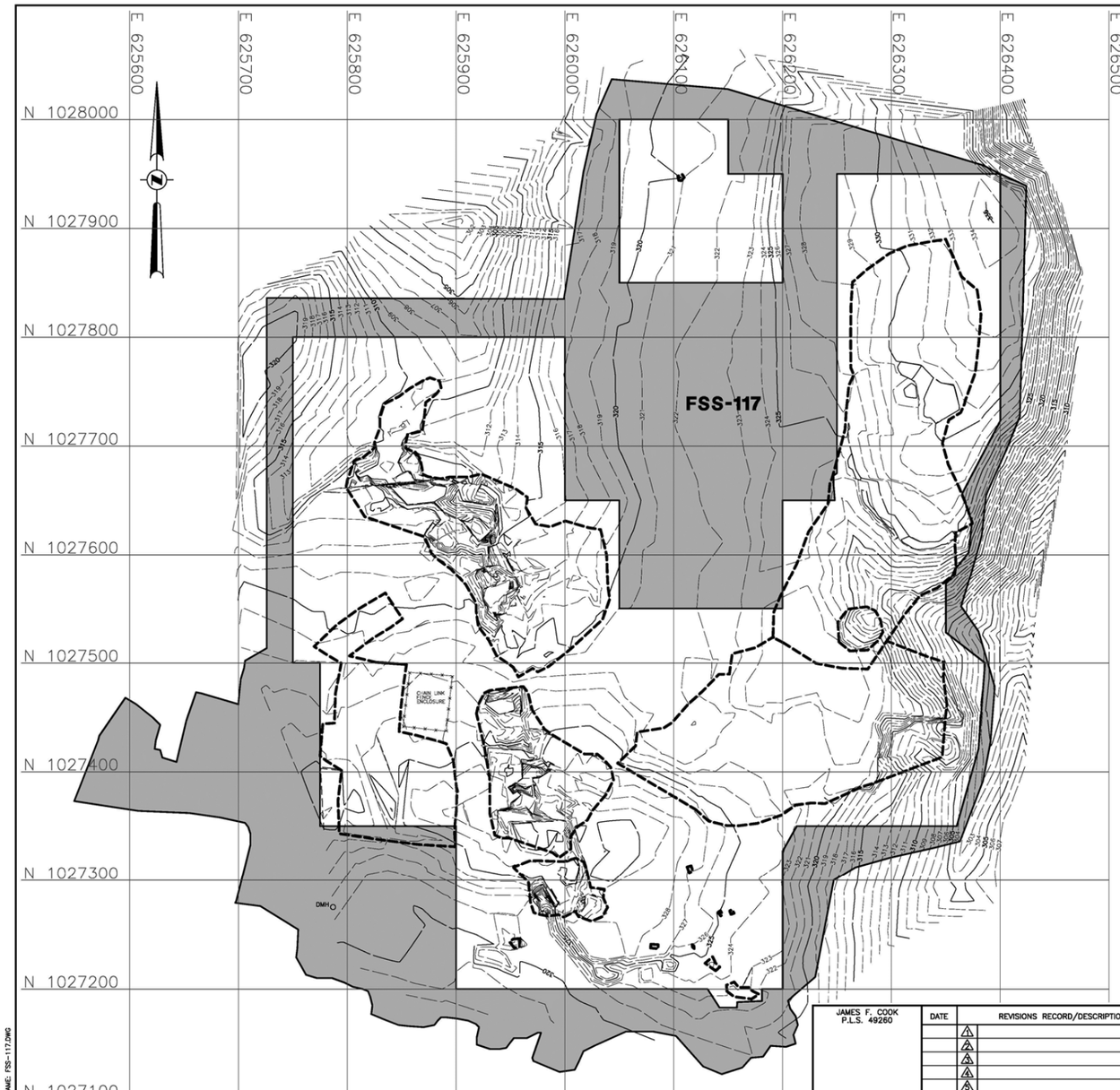
SHEET 2 OF 2
DWG. NO: 10–585

CAD DWG. FILE NAME:COMBINED_INDIV..DWG



MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted during the months of February thru September 2010.
2. North orientation is 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–117 was computed as 5 cu. yds. based on this drawing and the associated drawing titled "FSS–117 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.
3. "Topographic Survey Knolls Atomic Power Laboratory Northfield Land Remediation Project" prepared by C.T. Male Associates, P.C., dated October 22, 2009, dwg. no. 09–622.

SCALE IN FEET
60 0 30 60 120

LEGEND
EXCAVATION LIMITS

JAMES F. COOK
P.L.S. 49260

DATE	REVISIONS RECORD/DESCRIPTION	DRAFTER	CHECK	APPR.
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DESIGNED :
DRAFTED : MMB
CHECKED : JFC
PROJ. NO: 09.9453
SCALE :
DATE : OCT. 6, 2010

FSS-117 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: 10–586

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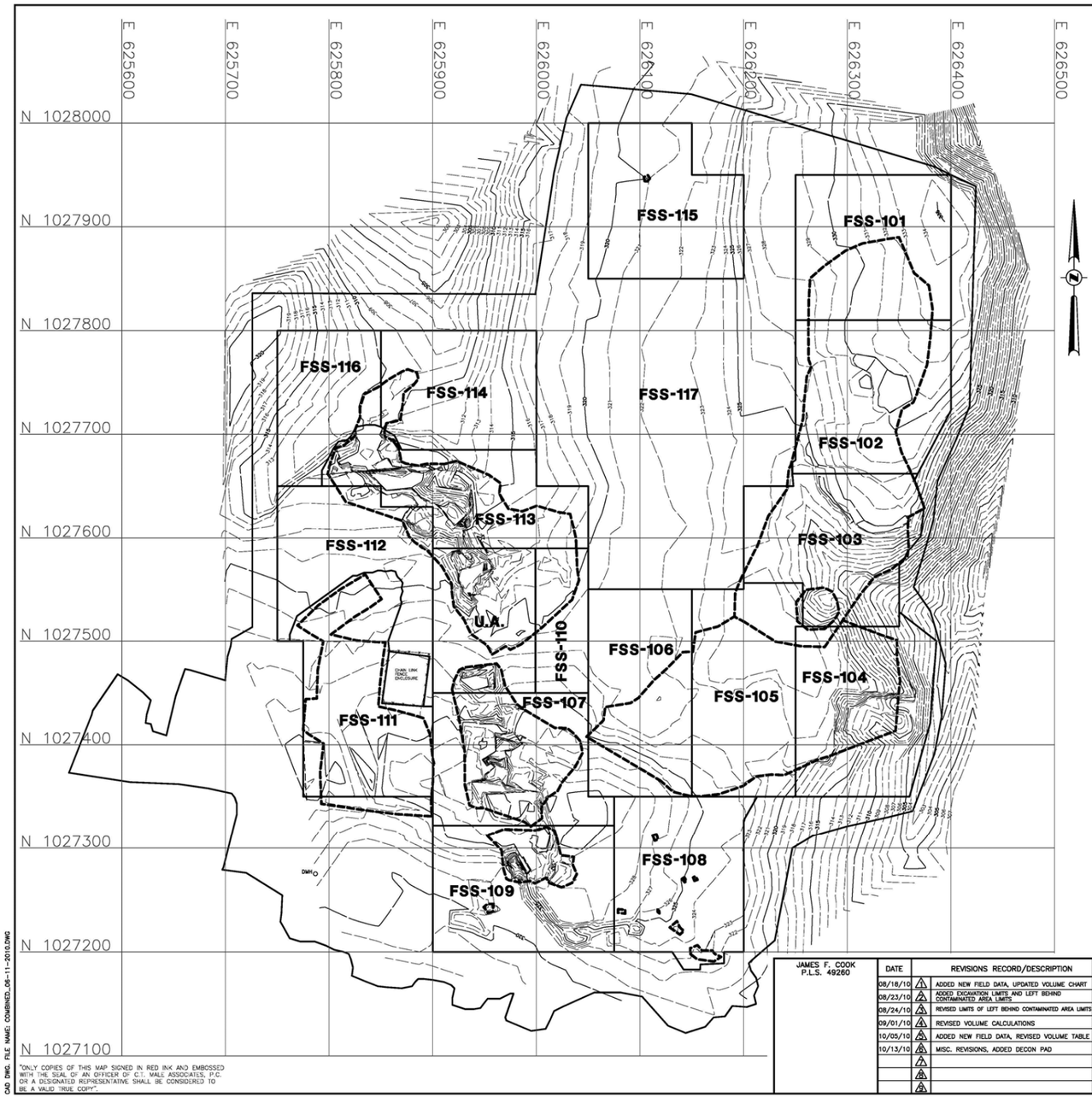
CAD DWG. FILE NAME: FSS–117.DWG



MAP NOTES:

1. Excavations shown hereon were compiled from an actual field survey conducted during the months of February thru September 2010.
2. North orientation is 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.

SCALE IN FEET
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LEGEND
EXCAVATION LIMITS

JAMES F. COOK
P.L.S. 49260

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTER	CHECK	APPR.
08/18/10	1	ADDED NEW FIELD DATA, UPDATED VOLUME CHART	MMB	JFC	
08/23/10	2	ADDED EXCAVATION LIMITS AND LEFT BEHIND CONTAMINATED AREA LIMITS	MMB	JFC	
08/24/10	3	REVISED LIMITS OF LEFT BEHIND CONTAMINATED AREA LIMITS	MMB	JFC	
09/01/10	4	REVISED VOLUME CALCULATIONS	MMB	JFC	
10/05/10	5	ADDED NEW FIELD DATA, REVISED VOLUME TABLE	MMB		
10/13/10	6	MISC. REVISIONS, ADDED DECON PAD	MMB		
	7				
	8				
	9				

DESIGNED:
DRAFTED : MMB
CHECKED : JFC
PROJ. NO: 09.9453
SCALE :
DATE : AUG. 10, 2010

'NORTHFIELD' 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: 10–459

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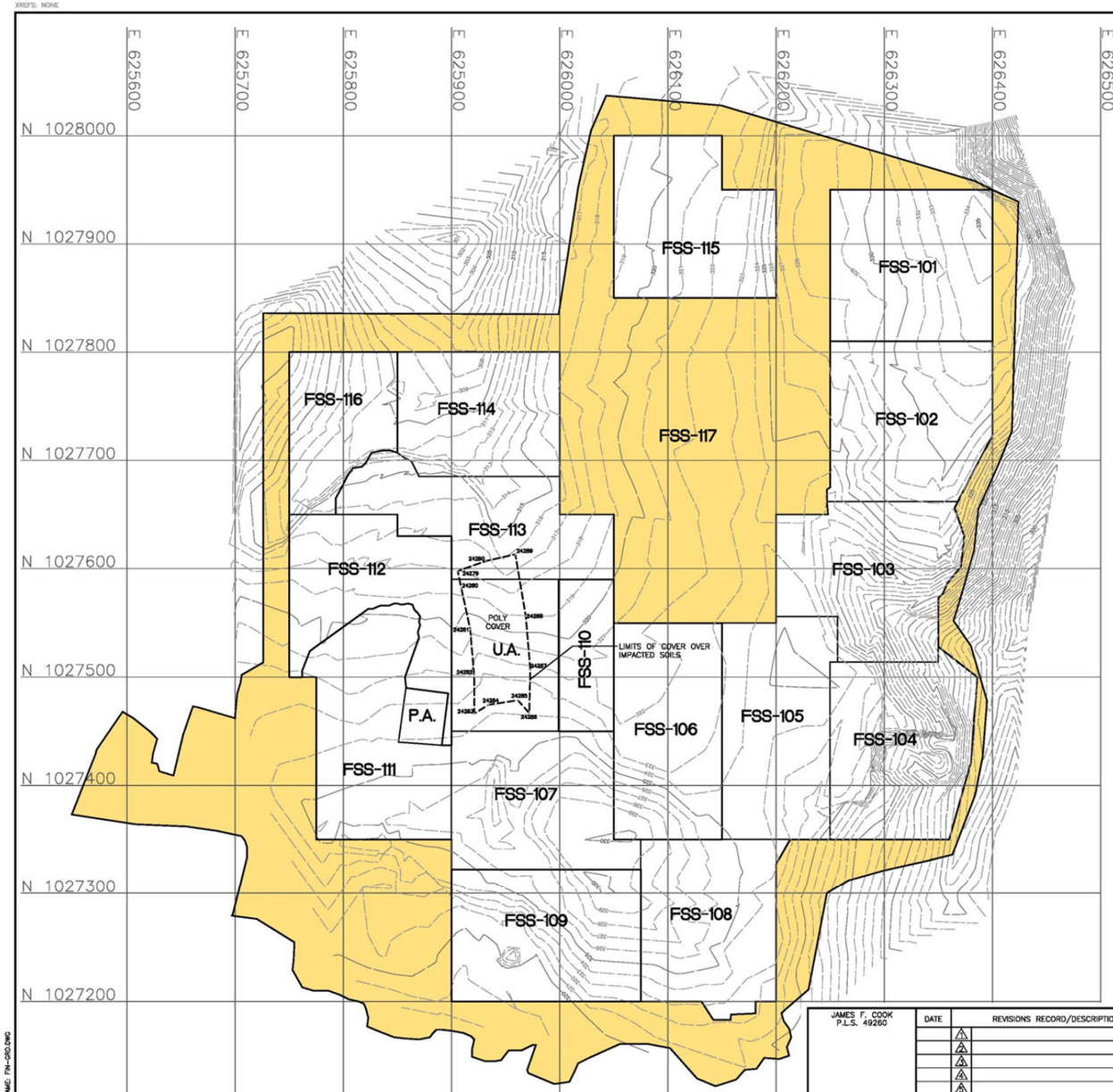
CAD DWG. FILE NAME: COMBINED_08-11-2010.DWG

XREFS: NONE

PROJECT NUMBER: 09.9453



MAP NOTES:

1. Topographic information shown hereon was compiled from an actual field survey conducted on May 20 and June 27, 2011.
2. North orientation is 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. U.A. = Unreleased Area.
5. P.A. = Pyrophoric 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.

POLYLINER/COVER			
POINT NO.	NORTHING	EASTING	ELEVATION
24279	1027597.6834	625905.7320	318.12
24280	1027582.0068	625909.0905	318.5
24281	1027544.2034	625917.3020	320.75
24282	1027502.2008	625920.8675	321.59
24283	1027466.3625	625921.1580	322.77
24284	1027474.3568	625934.0384	319.28
24285	1027478.6432	625961.3038	322.54
24286	1027466.8533	625971.8311	323.34
24287	1027507.0149	625972.8550	320.31
24288	1027556.4885	625968.6431	317.69
24289	1027613.1815	625958.9747	316.19
24290	1027606.8900	625931.5479	317.67

SCALE IN FEET
50 0 25 50 100

JAMES F. COOK
P.L.S. 49260

DATE	REVISIONS RECORD/DESCRIPTION	DRAFTER	CHECK	APPR.

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PROJ. NO: 09.9453
SCALE :
DATE : JUNE 27, 2011

TOPOGRAPHIC SURVEY "NORTHFIELD" AREA – AS LEFT

KAPL SPRU LAND AREAS REMEDIATION PROJECT

TOWN OF NISKAYUNA — SCHENECTADY COUNTY, NEW YORK

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SHEET 1 OF 1
DWG. NO: 11–320

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Appendix B
Unreleased Area in FSS-110

FSS-110 Unreleased Area (UA)

During soil removal action of FSS-110, aRc-SPRU encountered several unanticipated wastes, and removal of these wastes were determined by DOE-SPRU to be outside the aRc scope of work. aRc was then directed to (a) cease remedial actions in the area and, once the final boundaries of the area that was not to be released via the FSS process were determined, (b) provide information on the radiological as left condition of the unreleased area (UA). The following provides a summary of the final radiological activities and information collected for the UA.

The white paper entitled *Unreleased Area in FSS Unit 110*, dated September 08, 2010, is included with this appendix and outlines the final operational actions taken for the UA in FSS-110.

The following items and wastes were encountered during remediation activities in the unreleased/FSS-110 areas:

- Ashy material with activity concentrations of natural uranium far exceeding the average and maximum amounts from the CH2M HILL (2006) characterization report.
- Asbestos containing materials.
- Discarded metal drums, pieces of concrete and lumber, and miscellaneous garbage (e.g., paper, metal scraps, miscellaneous piping, pieces of ceramic).
- Soils with volatile organic compounds (VOCs) reading up to 375 ppm on contact using a photo ionization gas detector. (Note: The soils with VOC contact readings were remediated prior to the direction to cease activities in the area).
- Evidence of laboratory waste (e.g., intact glass chemical containers).

The following paragraphs provide detailed information and dates specific to radiological sampling.

During excavation of Grid 1007, work was being performed in the area known as Excavation 17 (EX17), on the SPRU North Field. On April 5, 2010, radioactive material was encountered that was atypical of the soils previously encountered on the project. The material was noted to contain a mixture of uranium and decay daughters within a sandy ash that was dull gray in color. These characteristics are indicative of oxidized metals. It is possible that the material was natural uranium metal, or uranium-contaminated metals, that were burned to reduce their pyrophoric hazard. The location where these materials were found is within the Pyrophoric Area Solid Waste Management Unit. Analyses results are provided in Table B-1 (Note that Samples 1–3 were analyzed onsite, while Sample 4 was sent for offsite analysis [Test America]. Following sample collection, the area was covered with a tarp, a stop work was initiated while the radioactive material was characterized, and the safety basis to continue work was determined.

Work was resumed in late June in the northern portion of Grid 1007, working north-to-south. Table B-1 provides results from onsite analysis of samples representative of the material in the UA that were collected on June 28, 2010 (Samples 5–7).

Excavation work being performed from the north (working southward) in Grid 1007 was stopped on July 12, 2010, after discarded laboratory chemical bottles were uncovered during excavation. The onsite radiological results for soil samples from these locations (Samples 8–10) are shown in Table B-1. Excavation was then resumed from the south (working northward) in Grid 1004 with instruction from the customer to stop once the area within FSS-107 was remediated to below the release criteria. The last day of this excavation occurred on August 8, 2010, and soil samples of remaining radiologically contaminated

soils were obtained on the vertical face of the excavation and analyzed onsite. The results are Samples 11–13, shown in Table B-1.

The as-left surfaces of the UA were scan surveyed using GPS-recorded 2 × 2 instruments. The survey map of the UA is attached (Figure B-1). Figure B-2 contains a map showing only the elevated 2 × 2 scans and the judgmental sample locations. All judgmental samples were collected based on field scans, and sample locations depicted on Figure B-2 have been approximated.

Table B-1 UA region in FSS-110

			Co-60	Sr-90	Cs-137	Th-232	U-234	U-235	U-238	Pu-238	Pu-239	Pu-241	Am-241	
		DCGL	9.78	4654	30	9.05	1162	188	851	792	714	19100	574	SOR
Sample ID	01	NF Grd1007 Material Investigation	*0.104*		6.83	*0.105*		*0.609*	*0.342*	*120.0*	*119.0*		*1.21*	0.574
	02	NF Grd1007 Soil HS adj Mat Invest	*0.122*		126.3	*0.532*		*0.500*	*0.680*	*371.0*	*364.0*		*3.95*	5.271
	03	NF Grd1007 Material Invest 8hr cnt	*0.017*		6.7	*0.559*		*0.646*	*0.069*	*23.7*	*22.9*		*0.24*	0.352
	04	SNF-EX17-ASH	*0.054*	*0.290*	13.20		51.100	2.410	47.700	0.097	0.560	*1.4*	*0.50*	0.560
	05	Excavation 17 S' Bank Face #1	*0.137*		5.31	*0.947*		*0.265*	*0.403*	*39.5*	*57.2*		*0.34*	0.428
	06	Excavation 17 S' Bank Face #2	*0.146*		49.8	*0.719*		*0.450*	*0.623*	*57.2*	*86.6*		*0.47*	1.952
	07	Excavation 17 S' Bank Face #3	*0.116*		14.1	*0.647*		*0.260*	*0.404*	*38.9*	*54.2*		*0.32*	0.680
	08	EX17 Bank Face #1	*0.143*		118.6	*0.703*		*0.662*	*0.911*	*84.70*	*124.0*		*0.68*	4.333
	09	EX17 Bank Face #2	*0.147*		120.3	*0.727*		*0.694*	*0.943*	*88.90*	*131.0*		*0.72*	4.409
	10	EX17 Bank Face #3	*0.130*		34.7	*0.596*		*0.372*	*0.540*	*50.20*	*72.3*		*0.41*	1.404
	11	Ex17 E' Bank Face #1	*0.135*		49.5	*0.717*		*0.590*	*0.571*	*13.80*	*36.4*		*0.28*	1.815
	12	Ex17 E' Bank Face #2	*0.141*		25.2	*0.643*		*0.492*	*0.517*	*7.89*	*24.9*		*0.19*	0.975
	13	Ex17 E' Bank Face #3	*0.126*		46.3	*0.704*		*0.536*	*0.641*	*11.90*	*39.1*		*0.29*	1.707
		Min	0.02		5.3	0.105		0.26	0.1	0.1	0.6		0.189	0.352
		Max	0.147		126.3	0.947		2.41	47.7	371.0	364.0		3.950	5.271
		Mean	0.117		47.5	0.633		0.65	4.2	69.8	87.1		0.738	1.882
		SD	0.0388		45.3	0.197		0.55	13.1	97.3	92.9		1.003	1.691

All DCGLs and numerical results are reported in units of pCi/g.
Reported results are either the activity value, or the value for nuclide MDA if no activity was reported.
If the reported result is the MDA, the value is italicized and shaded gray.
The reported value is generated by the ARC-SPRU gamma spectroscope except for sample SNF-EX17-ASH.
SNF-EX17-ASH is the offsite laboratory analysis of NF GRD1007 Material Investigation.

Table B-1. Analyses results for material sampled from within unreleased area in FSS-110

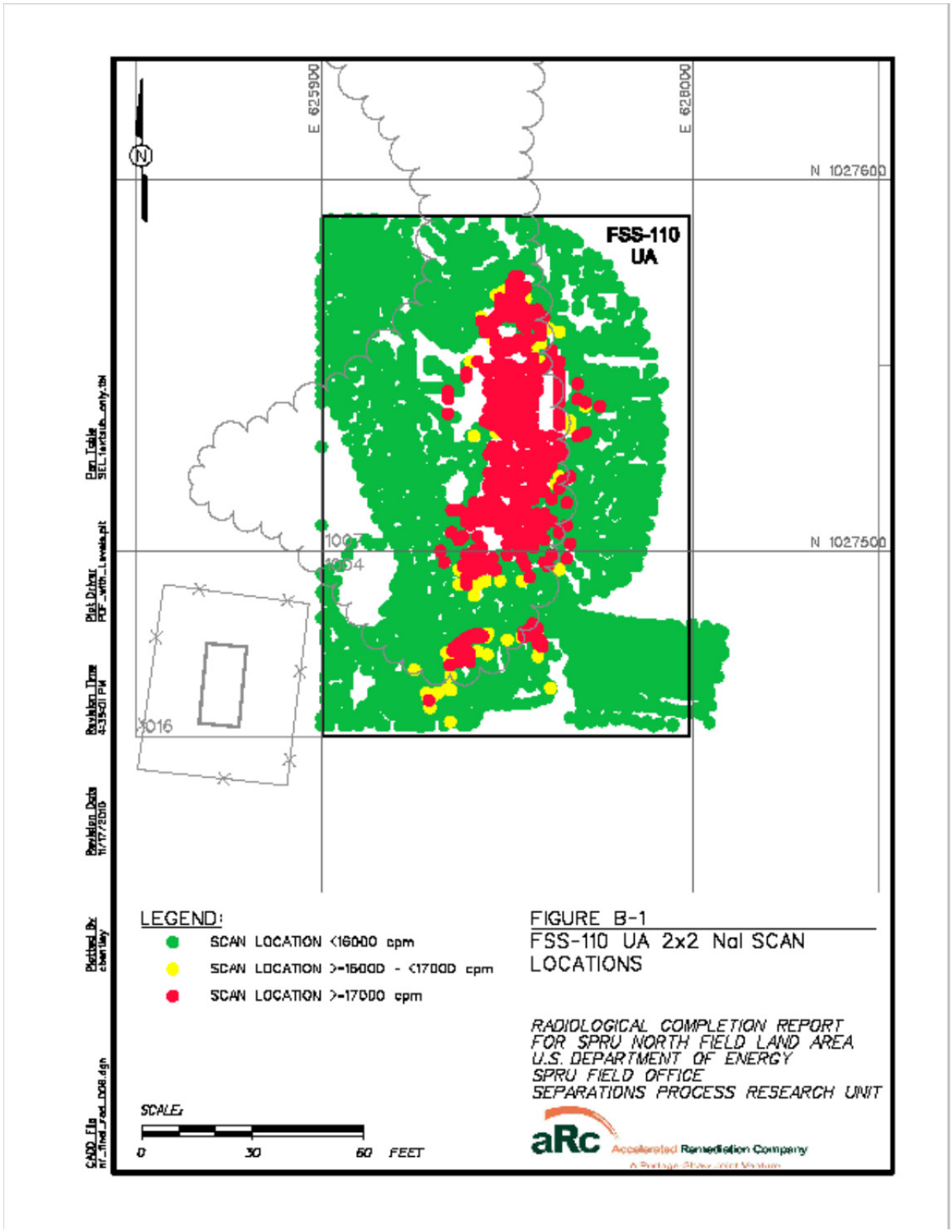


Figure B-1. Survey map of FSS-110 unreleased area 2 × 2 scan locations

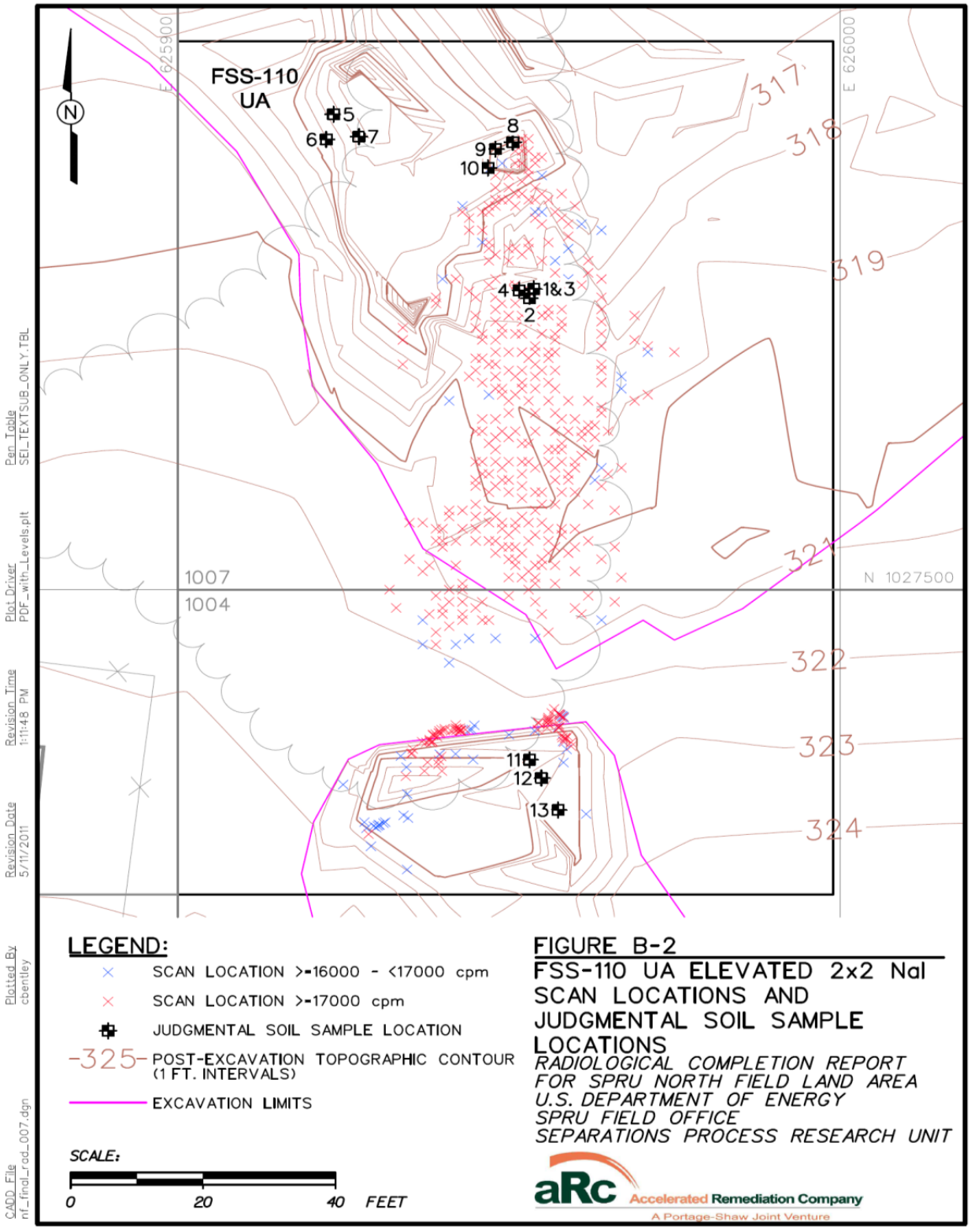


Figure B-2. Survey map of FSS-110 unreleased area showing only elevated 2 × 2 scans and judgmental sample locations.

Unreleased Area in FSS Unit 110

September 08, 2010

This white paper is written to explain the historical background and current plan of action regarding the unreleased area in the North Field, FSS Unit 110, at Knolls Atomic Power Laboratory (KAPL), Separations Process Research Unit Land Areas (SPRU-LA).

Background

Excessive/uncharacterized debris and volatile organic compounds (VOCs) were discovered in July 2010 by Accelerated Remediation Company (aRc) operations during excavation of radiological contamination in FSS-110. This "non-SPRU" or "co-mingled" waste is considered to be outside of the aRc Task Order requirements for removal, transportation, and disposal. Due to the discovery of "co-mingled" waste in this area, excavation activities were stopped and the area was delineated by Radiological Controls (RadCon) as an unreleased area (UA).

The UA was surveyed by RadCon using a Ludlum Model 2221 scaler/ratemeter with a Ludlum 44-10 2 × 2 sodium iodide gamma scintillation probe. The scanning performed on the UA was accompanied by discrete soil sampling. These soil samples were analyzed with aRc's onsite gamma spectrometer as well as by offsite analysis. Radiological contamination in the UA is present above the soil cleanup objective of 30 pCi/g.

The UA is approximately 60 ft wide (east to west) by 150 ft long (north to south). Excavation activities continued in FSS-107 until reaching the southern boundary of the UA on August 4, 2010. This date marks the last day of North Field excavation activities. The UA is shown on Figure B-3.

Current Proposed Action

Based on a KAPL fax transmittal sent to DOE-SPRU Field Office on August 11, 2010 (see Attachment B-1), aRc was instructed by DOE-SPRU to address the UA as follows:

- Install a yellow barrier over the radioactive soil
- Install a non-yellow barrier over the yellow barrier
- Place radioactive placards on the non-yellow barrier stating "radioactivity behind this barrier."

In addition, aRc will take the following actions:

- Perform civil survey to delineate the boundary of the UA in the field and on as-left condition drawings.
- Cover the barriers, as needed, with approved backfill meeting ARC-EDF-6401 specifications. Obtain the backfill from Caver Sand and Gravel.
- Apply topsoil over the barriers with approved topsoil meeting ARC-EDF 6401 specifications. Obtain the topsoil from Carver Sand and Gravel.
- Establish vegetation over the UA.

The proposed manufacturer of the yellow and non-yellow barriers is Cover Tech. The proposed yellow barrier is a 14-ounce per square yard (oz/sy) polyester based impermeable fabric and the non-yellow barrier is a 6-oz/sy woven high density polyethylene fabric. Barrier specifications are shown in Attachment B-2. Barrier placards are proposed to be provided by KAPL and will be placed in a grid-like pattern over the non-yellow barrier. The placards will be fastened to the non-yellow barrier using duct tape and/or an approved adhesive product. Each barrier is proposed to be manufactured as one large cover, approximately 60 × 150 ft. aRc personnel will install the barrier over the UA using manual labor and heavy equipment, as needed, to unfold and place the barrier. A cross-section showing barrier installation is shown on Figure B-3 (lower right). Once the barrier has been installed, a civil survey will be performed to document the horizontal and vertical extents of the cover.

Backfill will be placed and compacted in any excavated areas greater than 3 inches in depth. Backfill will be placed in 1-ft lifts where applicable. Each lift shall undergo compaction testing as described in ARC-EDF-6401, **"**Backfill Sampling and Analysis. Each lift will be compacted to a minimum of 90% of the maximum dry density of the material.

Topsoil will be placed over the entire UA in a single 3–6-in. lift. Topsoil will be required to meet pH, organic content, and gradation specifications as described in ARC-EDF-6401.

The UA will be graded to provide and promote natural drainage. Pre-excavation topology shows general hydrologic conditions of overland flow running south to north. Backfill and topsoil operations will be conducted in order to produce similar natural drainage conditions.

The UA will be hydroseeded to establish grass vegetation. Hydroseed mixture will be an approved seed mix used by the Subcontractor and will be applied at a rate to provide a coverage of 1 gallon of mixture to every 10 ft^2 of ground surface. Hydroseeding requirements will be in accordance with Work Package 010, "Site Restoration" (ARC-WP-010). York raking of the hydroseeded areas will not be permitted in this area to avoid puncture of the covers. The UA will be watered as needed until adequate vegetation is established.

References

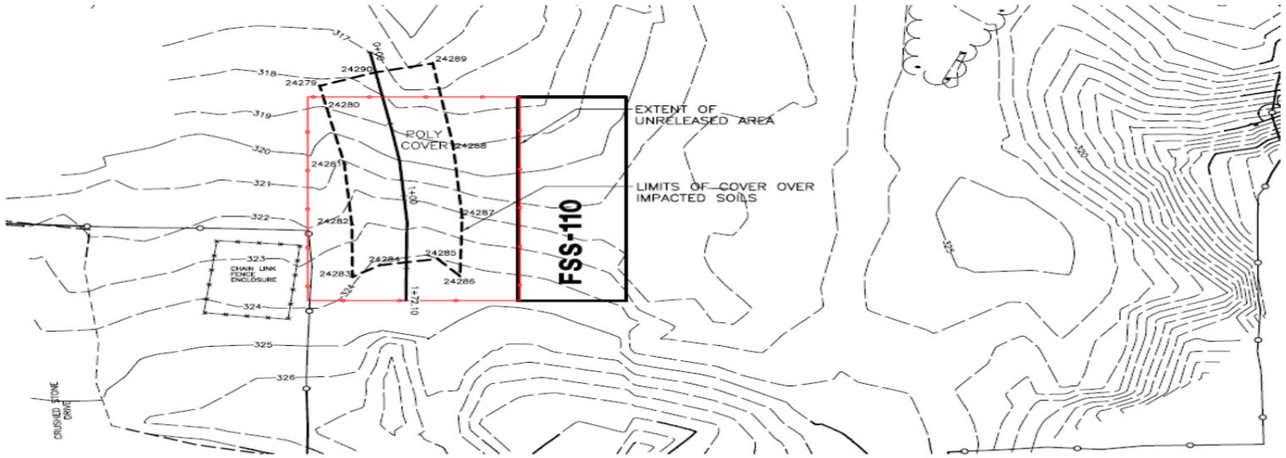
ARC-EDF-6401, "Backfill Sampling and Analysis," Rev. 0, May 27, 2009.

ARC-WP-010, "Site Restoration," Accelerated Remediation Company, Rev. 2, May 11, 2010.

XREFS: NONE

PROJECT NUMBER: 09.9453

CAD DWG FILE NAME: BB CDFEB DWG



PLAN VIEW
CONTOURS SHOWN ARE AS OF OCTOBER 21, 2010

POLYLINER/COVER			
POINT NO.	NORTHING	EASTING	ELEVATION
24279	1027597.6834	625905.7320	318.12
24280	1027582.0068	625909.0905	318.5
24281	1027544.2034	625917.3020	320.75
24282	1027502.2008	625920.8675	321.59
24283	1027466.3625	625921.1580	322.77
24284	1027474.3568	625934.0384	319.28
24285	1027478.6432	625961.3038	322.54
24286	1027466.8533	625971.8311	323.34
24287	1027507.0149	625972.8550	320.31
24288	1027556.4885	625968.6431	317.69
24289	1027613.1815	625958.9747	316.19
24290	1027606.8900	625931.5479	317.67

MAP NOTES:

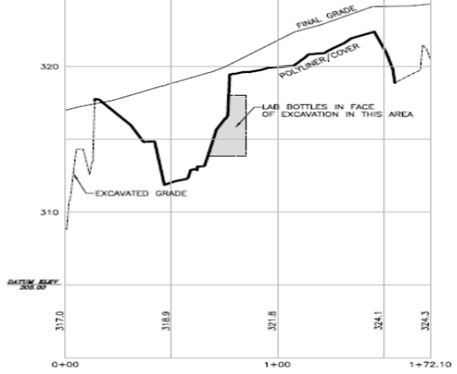
1. Topographic information shown hereon were compiled from an actual field survey conducted on October 21, 2010.
2. North orientation is Grid North based on the New York State Plane Coordinate System, East Zone, NAD 27.
3. Vertical datum established from KAPL Rubinski Control drawings.

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 – 19July08.
3. "Topographic Survey Knolls Atomic Power Laboratory Northfield Land Remediation Project" prepared by C.T. Male Associates, P.C., dated October 22, 2009, dwg. no. 09–622.

SCALE IN FEET
50 0 25 50 100

1 **POLYLINER/COVER AREA PROFILE**
SCALE: HORZ. 1" = 50'
VERT. 1" = 5'
CROSS REFERENCE: NONE



"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".

JAMES F. COOK
P.L.S.49260

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTER	CHECK	APPR.
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				

DESIGNED :
DRAFTED : MMB
CHECKED : JFC
PROJ. NO: 09.9453
SCALE :
DATE : OCT. 21, 2010

UNRELEASED AREA COVER PLAN AND PROFILE

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 1 OF 1
DWG. NO: 10–____

Figure B-3 Unreleased area cover plan and profile

Attachment B-1
KAPL Transmittal to DOE-SPRU

aRc Accelerated Remediation Company
A Portage-Shaw Joint Venture

AUG-11-2010 18:16 P.01/01

August 11, 2010

John,

For the area where radioactivity was not removed in the North Field below the soil cleanup objectives and clean soil will be backfilled around the area, a yellow barrier should be placed over the radioactive soil, and a non-yellow barrier should be placed over the yellow barrier. The non-yellow barrier should be posted "Radioactivity behind this barrier".

This will satisfy the requirements of our Radiological Controls Manual. If you need something more, let me know.

Jeff Hill

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL

To JOHN RAMPE		# of pages ▸ 1	
Dept./Agency DOE SRS		From JEFF HILL	
Fax # 7403		Phone # 7493	
NSN 7540-01-317-7368	5099-101	Fax # 7314	GENERAL SERVICES ADMINISTRATION

For Kevin
Dale
R

Attachment B-2
Barrier Specifications

RB8-6

DATA SHEET

A heavy duty fabric designed for protective covers, haystack covers, pit and pond liners and pool covers.

FABRIC SPECIFICATIONS

WEAVE	Woven black HDPE scrim using 1600 denier tapes
COATING	1.75 mil average, two sides (41 g/m², two sides)
COLOUR	Black or coloured coatings available silver/black available from stock
WEIGHT	6.0 oz/yd² (203 g/m²) +/- 10%

PERFORMANCE

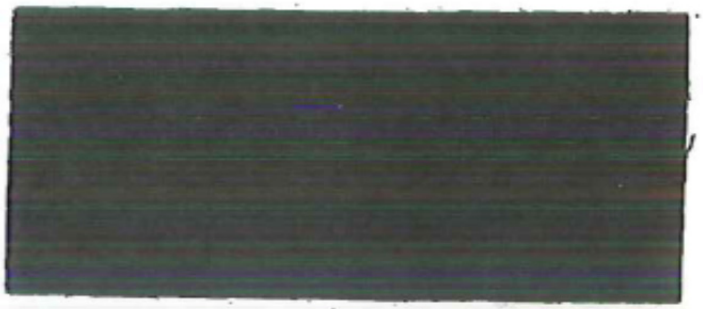
GRAB TENSILE	Warp 210 lb 933 N	Weft 180 lb 801 N	ASTM D5034
TONGUE TEAR	Warp 70 lb 311 N	Weft 70 lb 311 N	ASTM D2261
MULLEN BURST	370 psi 2553 kPa		ASTM D3786
ACCELERATED UV WEATHERING[1]	> 80 % strength after 2000 hrs		ASTM G53

[1] Q.U.V. [A-340 Lamps]: 8 hrs UV @ 60° C. 4 hrs condensation @ 50° C

ROLL SPECIFICATIONS

CORES	4 inch (101.6 mm) or 5 inch (127 mm) I.D.
WIDTH	Up to 150 inches (-0 . +0.5) as ordered. 3.81 m (-0, +12 mm). 144" (3.66 m) available from stock
LENGTH	Minimum 500 yds/roll (457 m): up to 1000 yds/roll (914 m)

These values are typical data and are not intended as limiting specifications.



TARPMASTER 18		
Material Construction* (Also avail. in FR and 16oz) Stock Item		
BASE FABRIC	Polyester	Polyester
FILAMENT SIZE	1000 Denier	1000 Denier
CONSTRUCTION	7 f/cm X 7 f/cm	18 f/in X 18 f/in
BASE FABRIC WEIGHT	170 g/m²	5 oz/yd²
FINISHED WEIGHT	610 g/m²	18 oz/yd²
WIDTH	155 cm	61 inches
Physical Properties*		
Grab Tensile Method 5100	1776 X 1665 N	400 X 375 lb.
Tongue Tear Method 5134	289 X 222 N	65 X 50 lb.
Trapezoid Tear Method 5136	222 X 178 N	50 X 40 lb.
Adhesion** In-House (Force/2cm)	53 N	12 lb.
Cold Crack Method ASTM D2136 @ -45°C	No Cracking or Flaking	

*Property analysis performed according to Federal Test Method Standard 191A except those labeled with **
* For colour refer to chart at the back

Appendix C
Documentation for Discontinuing Use of the FIDLER Probe

aRc 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 10-047

March 18, 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
SPRU Field Office Review of the Proposed Cost Saving Initiative Regarding an Exemption from FIDLER Scans in the North Field

Dear Mr. O'Hearn,

The U.S. Department of Energy, Separations Process Research Unit (DOE-SPRU) Field Office has reviewed the aRc cost savings initiative regarding eliminating the requirement for FIDLER scans in the North Field (aRc letter NFLD-10-005 dated February 17, 2010). DOE-SPRU agrees with the aRc letter and it is hereby approved without comment. If you have any questions, please call Matt Zullo at (518) 395-7201.

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. Fainberg

Steven Feinberg, Federal Project Director
SPRU Field Office

cc: John Rampe, DOE SPRU
Melanie Pearson-Hurley, DOE-HQ
John Moon, DOE-HQ
Derrick Franklin, EMCBC CO
Robert Ribail, EMCBC CO
Ted Christensen, aRc

aRc Accelerated Remediation Company
A Portage-Shaw Joint Venture

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

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

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.

Accelerated Remediation Company
A Portage-Shaw Joint Venture

Attachment 1
Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status *Survey Units 101–106 and 115*
(ARC-RPT-6036)

Accelerated Remediation Company
A Portage-Shaw Joint Venture

Attachment 2
Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 108, 109, 114 and 116
(ARC-RPT-6039)

Accelerated Remediation Company
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Attachment 3
Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 112 and 113
(ARC-RPT-6042)

Accelerated Remediation Company
A Portage-Shaw Joint Venture

Attachment 4
Separations Process Research Unit North Field Land Area Radiological Completion Report for Final Status Survey Units 107 and 110
(ARC-RPT-6043)

Accelerated Remediation Company
A Portage-Shaw Joint Venture

Attachment 5
Separations Process Research Unit North Field Land Area
Radiological Completion Report for Final Status Survey Units 111 and 117
(ARC-RPT-6044)