KERR-McGEE CORPORATION
1001 EAST DEEP ROCK • CUSHING, OKLAHOMA 74023

April 25, 2005

Mr. Derek Widmayer
Low-Level Waste & Decommissioning Projects Branch
Division of Waste Management
Office of Nuclear Materials Safety & Safeguards
US Nuclear Regulatory Commission
Washington, DC 20555

Re: Kerr-McGee Cushing Site, Sector 9 FSSR
Docket No. 70-3073
License No. SNM-1999

Dear Mr. Widmayer:
Kerr-McGee (KM) is decommissioning the Cushing Site located in Cushing (Payne County) Oklahoma under Nuclear Regulatory Commission (NRC) license number SNM-1999. KM submits herein two copies of Sector 9 Final Status Survey Report for NRC review. KM has completed decommissioning of this sector. This report demonstrates that it complies with the NRC-approved decommissioning criteria for the Cushing site.

KM is not at this time requesting release of this sector; a license amendment request for release for unrestricted use will be submitted for all unreleased sectors along with the submittal of the last final status survey report.

If you have questions or comments, please call me at (918) 225-8624 or you may call Jeff Lux at (405) 270-2694.

Sincerely,

Karen Morgan

Karen Morgan
Radiation Safety Officer

Cc: NRC Public Document Room
Cushing Public Repository
Blair Spitzberg, NRC Region IV
Mike Broderick, DEQ Radiation Management Division

NMSS01

NEXTEP Environmental

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April 25, 2005

Mr. Jeff Lux
Kerr-McGee Corporation
Cushing Remediation Site
1001 E. Deep Rock Road
Cushing, Oklahoma 74023

Re: Submittal of Sector 9 Final Status Survey Report

Dear Mr. Lux:

The Sector 9 Final Status Survey Report Revision 0 has been distributed to the following individuals:

1. USNRC Document Control Desk
2. Derek Widmayer, USNRC Washington
3. Blair Spitzberg, USNRC Region IV
4. Michael Broderick, ODEQ
5. Terry Keane, NEXTEP Environmental, Cushing
6. NEXTEP Environmental Corporate Office
7. NEXTEP Environmental, Cushing

Sincerely,

Treva Pearce
NEXTEP Environmental

FINAL STATUS SURVEY REPORT
SECTOR 9

KERR MCGEE CUSHING FACILITY
DECOMMISSIONING PROJECT

APRIL 2005
Revision 0

Kerr-McGee Corporation
Oklahoma City, Oklahoma

NEXTEP ENVIRONMENTAL

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KERR-McGEE
CUSHING REFINERY SITE
DECOMMISSIONING PROJECT

SECTOR 9
FINAL STATUS SURVEY REPORT

PREPARED BY:

NEXTEP Environmental, Inc.

April 2005
Revision 0

SUBMITTED BY:
KERR-McGEE

APPROVAL PAGE

Approved by: _____ Date: 4/19/2005
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Approved by: _____ Date: 4-12-05
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Approved by: _____ Date: 4/12/05
J. Fox, Kerr-McGee Cushing Project Manager

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Kerr-McGee

CUSHING REFINERY SITE DECOMMISSIONING PROJECT

FINAL STATUS SURVEY REPORT SECTOR 9

1 INTRODUCTION

1.1 PURPOSE

1.1.1 This Final Status Survey Report (FSSR) is being submitted by Kerr-McGee (KM) to the Nuclear Regulatory Commission (NRC) for the area on the KM Cushing Refinery Decommissioning Site (Cushing Site) designated as Sector 9. The location of Sector 9 on the Cushing Site is depicted in Appendix A, Figure 1.1. This FSSR demonstrates that the residual radioactivity in the sector complies with decommissioning criteria stipulated in License SNM-1999, the Site Decommissioning Plan (SDP), and NUREG/CR-5849.[1]

1.1.2 Kerr-McGee will request a license amendment from NRC releasing Sector 9 from License SNM-1999, along with the remainder of the property when the FSSR's for all sectors have been submitted to the NRC.

1.2 BACKGROUND

1.2.1 The Cushing Site operated from approximately 1915 until 1972, when the oil refinery was closed and subsequently dismantled. KM operated the refinery at this site from 1956 to 1972 and processed nuclear fuel materials at the Cushing site from 1963 to 1966 under two AEC[2] licenses, both terminated in 1966. A detailed description of the history of operations at the Cushing Site is presented in Section 2 of the SDP.

1.2.2 During operations at the Cushing Site, KM converted pure feed materials, primarily uranium and thorium concentrates and uranium hexafluoride (UF_6), into usable chemical and physical forms of nuclear fuel materials for use by customers.

1.2.3 As stated in Section 3 of the SDP, the radiological contaminants on the Cushing Site consist of natural thorium and isotopes of uranium (Th-228, Th-232, U-234, U-235,

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[1] NRC Publication, *Manual for Conducting Radiological Surveys in Support of License Termination* (NUREG/CR-5849).

[2] Atomic Energy Commission.

U-238). Since almost 40 years have passed since thorium process operations ceased at the site, the thorium series radionuclides have by now established equilibrium with Th-232.

1.2.4 Additional sources of contamination in Sector 9 are associated with subsequent decommissioning activities which took place at the Cushing site in 1966 (original license termination with the AEC), 1972 (refinery closure), 1979-1982, and 1991-1993 (Oklahoma Department of Environmental Quality consent order activities).

1.2.5 Characterization of Sector 9 was completed in 2003 and the results were published in the Radiological Characterization Report (RCR).[3] There were no excavations performed in Sector 9. The Final Status Survey (FSS) was performed from November thru December 2004 to demonstrate that Sector 9 complies with the release criteria.

1.2.6 The groundwater for the Cushing Site has been addressed separately in the *Radiological Groundwater Assessment Report*[4] and is not dealt with in this FSSR.

[3] *Sectors 9 & 11 Radiological Characterization Report, Kerr-McGee Cushing Remediation Site,* NEXTEP and Burns & McDonnell, August 2003.

[4] *Radiological Groundwater Assessment Report,* Kerr-McGee Cushing Refinery Site, Enercon Services, Inc., March 2003.

2 SCOPE OF THE FINAL STATUS SURVEY

2.1 SURVEY UNIT DESCRIPTION

2.1.1 Sector 9 consists of approximately 3.0 acres located toward the geographical center of the Cushing Refinery Site as depicted in Appendix A, Figure 1.1. Sector 9 contains Building A-9, and the HP Lab trailer.

2.1.2 The areas to be surveyed have been divided into 2 soil survey units and 9 structural surface survey units. The size of each soil survey unit has been limited to less than 10,000 m^2 and the area of each affected building survey unit has been limited to 100 m^2 floor area as prescribed by NUREG/CR-5849[5]. They are depicted on the map in Appendix A, Figure 2.1. Appendix A, Figure 2.1 also shows the location of the two building structures[6] to be surveyed as part of this FSS. Appendix A, Figures 2.2 and 2.3 show the structural survey units and the layouts of Building A-9 and the HP Lab facility. The survey units are also listed in Table 2.1 below.

Table 2.1
Defined FSS Survey Units for Sector 9

Survey Unit	Physical Description	Area Classification	Area (Sq. Meters)
Soil Survey Units			
901	UDA[a]	UDA	9,782.5
902	UDA	UDA	2,308.5
Structural Surface Survey Units[d]			
903	A-9 Interior (Offices)	Unaffected	440
904	A-9 Interior (Basement)	Unaffected	173
905	A-9 Exterior	Unaffected	459
906	A-9 Sidewalk	UDA	50
907	A-9 Former Lab	Affected	19
908	A-9 Former Source Storage	Affected	11
909	HP Lab Interior (Admin Area)	Unaffected	197
910	HP Lab Exterior[b]	Unaffected	282
911	HP Lab Interior (Counting Area)[c]	Affected	85

a Undesignated Area
b Includes the exterior of the sample storage shed located behind the HP Lab.
c Includes the interior of the sample storage shed.
d Area covers floor space covered in m^2

2.2 PRE-EXISTING DATA

2.2.1 Characterization of Sector 9 was performed from 1992 through 2003. During characterization, soil samples were collected on 10x10m grids since, with the exception of three areas inside the buildings, the entire sector is an Undesignated Area (UDA). Exposure rate measurements were taken at the location of each soil sample. 100% of

[5] Ibid.
[6] The sample storage shed was surveyed together with the HP Lab as one structure.

the sector was scanned for gamma radiation with a 3x1/2" NaI instrument. All samples and measurements were taken in accordance with the SDP, and the results of characterization were summarized in the RCR for Sector 9.[7]

2.2.2 All soil sample and μR characterization data are suitable for use in the FSS and were used in preparation of this report.

2.2.3 Deep Rock Road runs through Sector 9, and there exists an extensive gravel parking lot which services Building A-9 and the HP Lab trailer. Because surface samples on top of the gravel road and parking lot were impracticable and would serve no purpose,[8] no FSS surface grid samples are reported in the areas covered by the road or parking lot. Pre-existing soil data, however, do exist for areas underneath these gravel covered surfaces and are reported separately in this report to confirm that the soil beneath them meets the release criteria.

2.3 REPRESENTATIVE BACKGROUND REFERENCE AREAS

2.3.1 A summary of the background levels of radioactivity in soil and background exposure rate measurements is presented in Section 6 of the SDP.

2.4 RESIDUAL RADIOACTIVITY LIMITS

2.4.1 Release Criteria for Radionuclides in Soil

2.4.1.1 The release criteria for uranium and thorium contamination in soil are stipulated in license condition 11.N.

2.4.1.2 All nuclide activities are expressed in pCi/g. The limit for total uranium is 30 pCi/g and the limit for natural thorium is 10 pCi/g. These limits are net of background activity.

2.4.1.3 In order to compare soil sample activities with the criteria, the average of the background radioactivity for each nuclide was subtracted and a Fractional Maximum Permissible Concentration (FMPC) was calculated according to the following equation:

Equation 1

$$FMPC = \frac{[U^{235} + U^{238} + U^{234} - 2.77]}{30} + \frac{[2*(Th^{232} - 0.96)]}{10}$$

2.4.1.4 For this FSS, Kerr-McGee's established practice of setting the value for U-234 equal to U-238 whenever U-235 or U-238 concentrations are below the Minimum Detectable Activity (MDA) level for the soil counter was followed. When concentrations of both U-235 and U-238 exceeded the MDA for the soil counter, the value for U-234 generated by the counter software was used. The software employs an algorithm interpreted from uranium isotopic ratios in uranium enriched by the gaseous diffusion process during the early 1960's. These methods produce results in

[7] Ibid.

[8] Gravel used for the roads and parking lots was purchased and brought in from off site. These areas subsequently were 100% scan surveyed for release as part of the FSS.

statistical agreement with the NRC split samples analyzed by ORISE[9] by both alpha and gamma spectroscopy.

2.4.1.5 All materials with concentrations less than 1.0 FMPC meet the soil release limit.

2.4.1.6 Materials with concentrations greater than 1.0 FMPC but less than 3.0 FMPC may be accepted if they meet the averaging criteria contained in License SNM-1999.

2.4.2 Release Criteria for Gamma Exposure Rate

2.4.2.1 The gamma exposure rate may not exceed 20 μR/hr above background at one meter above the ground as measured by a Pressurized Ion Chamber (PIC) instrument. The exposure rate may not exceed 10 μR/hr above background when averaged over $100m^2$.

2.4.2.2 Exposure rates taken in the field were compared with an adjusted exposure rate limit in order to compensate for the variance observed between field instruments and the PIC. Using the ratio of average background readings,[10] the exposure rate limit of 10μR/hr was adjusted by the following factor:

Equation 2

$$\frac{7.5}{8.4} = 0.89$$

2.4.2.3 Using an average background of 7.5 μR/hr, the gross exposure rate thresholds for field measurements have been computed and are presented in Table 2.2.

Table 2.2
Maximum Exposure Rate

Measurement	Max Value
Averaged over 100 m^2	16.4 μR/hr[a]
Maximum Exposure Rate	25.3 μR/hr

[a] For field μR instruments. Includes background.

2.4.2.4 Exposure rate data taken over structural surfaces were converted to PIC- equivalent values and recorded net of background. Therefore they should be compared with the basic limits (par 2.4.2.1) and not those listed in Table 2.2.

2.4.3 Release Criteria for Building Surfaces

2.4.3.1 The buildings in the sector were surveyed for alpha and beta-gamma surface emissions using a Ludlum 43-89 detector (direct readings and scans) and a Tennelec LB5100-W Gas Flow Proportional Counter (swipes).

2.4.3.2 Criteria for release of these surfaces are given in Section 3 of the SDP and are summarized in Table 2.3. The most conservative release criteria (thorium) were used exclusively for the FSS.

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[9] Oak Ridge Institute of Science and Education.

[10] Exposure rate was measured at the center node of the sample locations for soil background samples using both a Ludlum Model 19 μR meter and a Reuter Stokes Model RSS 112 PIC. Source of the data is *HP Technical Evaluation 02-002, Background Exposure Rate*, Enercon Services, Inc., April 2002.

2.4.3.3 Removable contamination was not measured for the Building A-9 sidewalk. (See Section 3.7.)

Table 2.3
Alpha and Beta-Gamma Surface Release Criteria For Scans, Direct Measurements, and Swipes

Nuclide	Average (dpm/100 cm^2)	Maximum (dpm/100 cm^2)	Removable (dpm/100 cm^2)
Uranium	5,000	15,000	1,000
Thorium	1,000	3,000	200

2.5 MINIMUM DETECTABLE CONCENTRATIONS (MDC)

2.5.1 Soil radioactivity was measured by collecting soil samples for HP laboratory analysis and by taking Exposure Rate (μR) and Sodium Iodide (NaI) gamma scan readings in the field. The MDC for all the instrumentation used should, if practical, be less than 25% of the release limit.[11]

2.5.2 Soil Spectroscopy

2.5.2.1 Calculated MDC values for HP Lab equipment are compared to the desired MDC in Table 2.4.

Table 2.4
Minimum Detectable Concentrations for Lab Gamma Spectroscopy (pCi/g)

	Natural Thorium	Total Uranium (U-238, U-235, U-234)	Count time (min.)
Desired MDC (pCi/g)	**2.5**	**7.5**	
HP Lab Soil Counters (typical)	0.3	4.8[a]	7.5

[a] The reported value represents the summation of the MDC for the three isotopes

2.5.3 Soil Gamma Scans

2.5.3.1 The Minimum Detectable Count Rate (MDCR) for NaI scans should be less than 100% of the corresponding soil release limit translated into counts per minute. Where practical, the MDCR should be less than 25% of the release limit.[12] The scan thresholds are dependent upon the mix of nuclides in the soil. Table 2.5 shows the conversion factors[13] used to convert the soil release limits for thorium and uranium into counts per minute (cpm) and the release limit in cpm, for both configurations of

[11] *Cushing SDP* Section 6.4.2.

[12] The term "limit" as used in this section refers to the expected scan reading of the NaI detector when passed over soil contaminated at 1.0 FMPC levels. This "limit" is used only for purposes of calculating MDCR to determine if the detector is sensitive enough to identify soil contamination at or above the release limits expressed in the license.

[13] NEXTEP TM 03-11, *NaI Scan Survey Thresholds for Uranium and Thorium in Soil at the KM Cushing Site*, N. Zhang.

the 3"x1/2" NaI detector. The calculated MDCR[14] for each detector configuration is also given in Table 2.5.

Table 2.5
NaI Scan Detector Release Limits[a] and MDCR (cpm)

Nuclide	Conversion Factor (cpm/pCi/g)	Release Limit (cpm)
6" Shielded	MDCR = 1,260 cpm	
Thorium	1,000	10,000
Uranium	49	1,470
24" Unshielded	MDCR = 1,020 cpm	
Thorium	430	4,300
Uranium	20	600

[a] net of background

2.5.3.2 Comparison of the data in Table 2.5 reveals that, for the unshielded scan cart,[15] the MDCR is less than 25% of the release limit for thorium but is considerably above the release limit for uranium.

2.5.3.3 To ensure that elevated concentrations of uranium coupled with low levels of thorium can be detected with the gamma detector, soil samples were screened for areas where the uranium component dominates the sample. Wherever a soil sample analysis indicates a net total uranium concentration above 20 pCi/g and a net natural thorium concentration below 1.5 pCi/g,[16] the area surrounding that soil sample was scanned manually with the shielded detector at 6" height above ground using a lower threshold as specified in Appendix C. Table 2.5 shows that the shielded detector is capable of detecting uranium at the release limit.

2.5.4 Exposure Rate Measurements

2.5.4.1 The MDC for field μR instruments should be less than 2.2 μR/hr (25% of the averaged limit for the Ludlum 19). The MDC of the Ludlum 19 may be calculated from Equation 3 using a value of 0.5 μR/hr for the standard deviation term (σ).[17]

Equation 3

$$MDC = 2.71 + 3.29\sigma = 4.4 \mu R / hr$$

2.5.4.2 The MDC for the field exposure rate instruments is less than 50% of the averaged release limit and is adequate to detect exposure rates in excess of the SDP limits.

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[14] NEXTEP TM 03-11, Ibid.
[15] 24 inches above ground level (see Section 3.2.2).
[16] (20 pCi/g U)*(20 cpm/pCi/g) + (1.5 pCi/g Th)*(430 cpm/pCi/g) = 1,045 cpm at the unshielded detector 24" above ground.
[17] *Final Radiation Survey of Four Unaffected Areas of the Cushing Refinery Site*, Morton Associates, April 1995, Table 12.

2.5.5 Alpha/Beta-Gamma Surface Measurements

2.5.5.1 Structural surfaces were surveyed and released using the Ludlum 43-89 (L43-89) alpha/beta scintillation detector. The MDC for this detector is calculated in accordance with NX-RO-340.[18] For direct readings, the MDC should, if practicable, be less than 25% of the average limit for thorium listed in Table 2.3. For scan readings, the MDC should be less than 100% of the release limit. A comparison of the calculated MDC values for the L43-89 detector with the requirements is given in Table 2.6.

Table 2.6
MDC Comparison for Alpha/Beta Detectors

Measurement Type	Instrument	MDC (dpm/100 cm^2)		Desired MDC (dpm/100 cm^2)
		Alpha	Beta	
Scan	L43-89	240	620	1,000
Direct	L43-89	46	430	250
Removable*	LB5100-W	3	7	50

* If required

2.5.5.2 All MDC values calculated for the L43-89 were less than the desired MDC except for direct beta which is less than 50% of the release limit. Since both alpha and beta measurements were gathered on concrete and structural surfaces, the L43-89 detector was adequate to detect surface radioactivity above the release limits.

2.5.5.3 Removable contamination measurements were collected using smears counted in a Tennelec LB5100-W Gas Flow Proportional Counter. The most conservative limit (thorium) for removable contamination listed in Table 2.3 is 200 dpm/100 cm^2. A comparison of typical MDC values for the Tennelec counter with 25% of the thorium release limit is presented in Table 2.6 and shows that the Tennelec LB5100-W counter is adequate to measure removable alpha and beta-gamma radioactivity at the release limits called for in the SDP.

[18] NX-RO-340, *Sample Activity Determination.*

2.6 ACTION THRESHOLDS FOR NaI SCANS

2.6.1 Action levels for each configuration of the NaI detector have been calculated[19] and are presented in Table 2.7.

Table 2.7
NaI Scan Thresholds[a]

Configuration	Threshold (cpm)
Unshielded, 24"	12,500
Shielded, 6"	10,000

[a] Gross cpm including background.

2.7 SURFACE AVERAGING CRITERIA

2.7.1 Surface Averaging

2.7.1.1 No surface averaging was required for Sector 9.

2.8 QUALITY CONTROL

2.8.1 Soil Sample Duplicates

2.8.1.1 In addition to the routine monitoring of the soil counters using in-process standards and calibration standards, the duplicate data pairs from the Sector 9 FSS were also analyzed using criteria described in TM 03-16.[20] The results are published in TM 04-20[21] and show that the data set for Sector 9 meets all the established quality control criteria of TM 03-16.

2.8.2 Statistical Test Calculations

2.8.2.1 After the data set for each survey unit was evaluated against the release criteria, further statistical calculations were performed in accordance with Section 6.5 of the SDP to ensure that survey units, or groups of data with the same classification of contamination potential, provide a 95% confidence level that the true mean activity level meets the release criteria.

2.8.2.2 The following equation, from NUREG/CR-5849 for testing data relative to a guideline value at a desired level of confidence, was applied to the soil sample, exposure rate, and surface activity data used for the FSS.

[19] NEXTEP TM 03-11, Ibid.

[20] NEXTEP TM 03-16, *Criteria for Soil Duplicate Sample Comparison Kerr-McGee - Cushing, Oklahoma Decommissioning Project*, H. Newman & S. Shelton.

[21] NEXTEP TM 04-20, *Evaluation of Cushing FSS Sector 9 Duplicate Samples*, N. Zhang.

Equation 4

$$\mu_\alpha = \bar{x} + t_{1-\alpha,df}\left(\frac{\sigma}{\sqrt{n}}\right)$$

Where:

μ_α = 95% confidence level mean of the data set.

$t_{1-\alpha,df}$ = 95% confidence level, $t_{95\%}$, obtained from Appendix B, Table B-1 of NUREG/CR-5849 for df, the degrees of freedom = n-1.

n = number of individual data points in the data set used to determine the average and standard deviation.

σ = standard deviation of the data set.

$\bar{x}$ = calculated mean for the data set.

2.8.2.3 If μ_α is less than the release criterion, the area being tested meets the guideline at a 95% confidence level. This means that the probability is less than 5% that μ_α will pass the test, when the true mean activity level exceeds the guideline value.

3 FINAL STATUS SURVEY METHODS

3.1 PROCEDURES

3.1.1 The Sector 9 Final Status Survey was implemented in conformance with all KM plans, procedures and other requirements.

3.2 INSTRUMENTATION

3.2.1 **Soil Sample Laboratory Analysis.** Analyses for the uranium and thorium series were performed using the gamma spectroscopy soil counters at the Cushing facility. Laboratory count time was sufficient to achieve the desired MDC as listed in Table 2.4.

3.2.2 **Soil Scanning Instrumentation.** Initial gamma scans were performed in accordance with NX-RO-370[22] using a 3" x ½" NaI detector operating in a gross counting mode in the unshielded configuration. The detector was mounted 24 inches above the ground on a vehicle equipped with a Global Positioning System (GPS) navigation system and a data logger and the vehicle was operated at speeds at or below 1 ft/sec. Measurements were recorded every two seconds. Where the terrain was too rough for the vehicle, a man-portable pack with the same equipment was used or manual scans were performed. When the scan threshold for unshielded scans was exceeded the local area was re-scanned by hand using the same type of detector in the shielded configuration elevated to approximately six inches above the ground.

3.2.3 **Alpha/Beta-Gamma Instrumentation.** Building and concrete surfaces were surveyed using a Ludlum 43-89 scintillation alpha/beta detector. It was paired with a Ludlum 2224 scaler/ratemeter for both alpha and beta/gamma measurements. Both integrated and scan measurements were taken in accordance with NX-RO-342.[23] Removable contamination was collected on swipes and counted in a Tennelec LB5100-W low background gas flow proportional counter in accordance with NX-RL-220.[24]

3.2.4 **Exposure Rate (μR/hr) Instrumentation.** All μR data were taken using Ludlum Model 19 (L19) field instruments. The release limits were adjusted to calibrate the field instrument to the PIC standard as described in Section 2.4.2.

3.3 GEOGRAPHICAL REFERENCE

3.3.1 Building surfaces were surveyed as described in Section 3.7. Locations were laid out manually and are documented on the original data sheets on file at the Cushing Site.

3.3.2 Soil Sample, μR, and scan locations were surveyed using GPS equipment. Outdoor scan locations were recorded using a Trimble PRO XRS Submeter GPS survey system either carried by the operator or mounted on a vehicle. Soil samples and μR readings were located using a Trimble Model 4800 differential GPS surveying system consisting of a field unit coupled with a surveyed ground station to provide the needed accuracy. According to manufacturer's specifications outdoor scan locations are accurate to

[22] NX-RO-370, *Performing Radiological Soil Surveys.*
[23] NX-RO-342, *Contamination Surveys.*
[24] NX-RL-220, *Operation of the LB5100-W Automatic Gas Proportional Counter.*

within one meter in X and Y (East and North), and soil sample locations are accurate to within two inches in three dimensions: X,Y and height above mean sea level (MSL).

3.3.3 **Reference Coordinate System.** The Cushing Site has an established block grid coordinate system with numbered blocks beginning at the NW corner of the property. Within each 100m by 100m block, locations are referenced in meters east and south starting at the northwest corner of the block (BES Format). In the process of developing the Radiation Database System (RDS) additional block numbers were added to the array to provide reference to off-site locations. The block numbers which are recognized within the data collection system are presented in Appendix B and are labeled in the figures in Appendix A.

3.3.4 The Cushing Site grid system is not aligned precisely with the Oklahoma State Plane (SP) Coordinate System but is rotated by a small angle. Since grid points were defined in the Cushing block grid system and the GPS equipment and mapping software used SP coordinates it is often necessary to transform one type of reference into the other. This transformation has been automated within the database software.

3.3.5 Each sample location is normally referenced by a locator ID (LocID) which conforms to the following standard format:

BmmmEnnSnn

where m is the block number and n is the distance to the nearest meter (East and South) from the NW corner of the block. To assist in differentiating survey data from other count records, the LocID always begins with "B".

3.3.6 When a sample location is surveyed, the GPS coordinates, LocID and μR reading are all stored within the data logger and later downloaded to a file. GPS coordinates are expressed as X&Y in feet East and North of the State Plane origin plus Z in feet MSL. When sample locations have been surveyed and logged, the data logger file is uploaded into the database and checked for correlation between the LocID and the GPS coordinates. If a record for this location already exists, the samples are referenced to the existing location record. If not, one is created for it.

3.3.7 If a sample is offset relative to a certain grid location for some reason, the LocID is modified by adding a single letter at the end. In this case the system recognizes the LocID as a special location and records a separate locator record for it with the exact coordinates.[25] Other non-standard LocID's entered into the database[26] are treated in the same way.

3.3.8 Soil samples collected as the result of elevated scan readings use the following standard LocID convention and are recorded as special locations:

BmmmSCnnn

where nnn is a sequential number used to track the number of such locations in a block.

[25] Offsets due to obstacles and some expansion patterns are examples of this kind of LocID.

[26] For example, bore holes in burial trenches in Sector 4 were designated "BT-nn" and were recorded as special LocID's so they could be sorted out separately.

3.3.9 Sample identifiers (SIDs) normally consist of the LocID plus the depth in feet multiplied by ten and are normally of the form:

BmmmEnnSnnx-jjj DUP

where x is the optional offset suffix and jjj consists of the depth in feet times ten. DUP, when present, denotes a QC duplicate sample and is applied automatically by the database software when the labels are produced. These are considered in the analysis data set along with the regular measurements.

3.3.10 Depth of the sample is expressed in feet and tenths from the local surface to the top of the composite sample. Thickness refers to the length of the core, proceeding down from the top of the sample, which has been mixed together to form a homogeneous sample, a portion of which is bottled and sent to the lab for analysis.

3.4 SOIL SAMPLE SURVEYS

3.4.1 Surface soil samples were obtained to complete the required grids in Sector 9. Characterization soil samples were used as described in Section 2.2. A 10 meter grid was completed in the UDA.

3.5 SOIL SCANS

3.5.1 NaI gamma scans were completed to cover 100% of all survey units in Sector 9. As with soil sample data, the old characterization scan data remain in the database but are coded to exclude them from the FSS data set of record.

3.5.2 Data logger files from the scanning equipment were uploaded into the RDS and processed using a utility which records the maximum and average values for each 10m x 10m square in order to provide a high level summary of the results. The raw scan data files were stored in a protected directory and indexed to the summary information in the database.

3.5.3 Data logger scan files presented for processing were in .dbf file format and the filenames conform to the following convention:

AnnnpppB.dbf

where A is the sector number (using the letters T and E for Sectors 10 and 11); nnn is the block number that contains most of the scan data; ppp is the julian day on which the scans were performed; and B is a letter designating the detector used for the scan. The filename always contains exactly eight characters.

3.5.4 Manual scan information was entered into the database as the maximum value in the area scanned.[27] For data analysis, manual scan data normally supersede the unshielded

[27] The maximum area covered by a single manual scan was $100m^2$.

cart scan values since it is considered to be more exhaustive and thorough for exact pin-pointing of elevated measurement locations[28].

3.6 EXPOSURE RATE MEASUREMENTS

3.6.1 Exposure rate measurements were taken 1 meter above the surface of the ground at every systematic grid sample location as a minimum. Exposure rate measurements over soil were uploaded into the database as part of the GPS location survey files.

3.6.2 Exposure rate measurements were also collected 1m above the floor surfaces (where accessible) in each survey unit. In affected survey units these data were collected at each grid point. Where the floor grid point was less than 1m from the wall, the reading was taken at 1m above the floor and 1m away from the wall surface. In the unaffected survey units, one μR reading was taken over the floor in each room. These data were manually recorded and were not uploaded into the RDS.

3.7 ALPHA/BETA-GAMMA SURFACE MEASUREMENTS

3.7.1 The interior and exterior building surfaces were surveyed for release in accordance with the Cushing SDP.

3.7.2 The affected building areas were scanned over 100% of their surfaces and the unaffected areas were scanned over a minimum of 10% of their surfaces.

3.7.3 On the building surfaces[29] and the Building A-9 sidewalk direct data measurements were collected to achieve a 95% confidence level result as described in Section 2.8. On affected structures, the floor, walls and ceiling were surveyed with alpha/beta-gamma direct measurements on a systematic 1m grid.

3.7.4 On unaffected structural surfaces at least one direct data point was surveyed on each 20 m^2 of surface area. A minimum of 30 direct measurements were taken in each unaffected survey unit identified in Table 2.1. The direct measurements were focused on high traffic areas and areas more likely to have accumulated contamination.

3.7.5 Smear samples for removable contamination were collected on all surfaces where direct readings were collected with the exception of the sidewalk outside of Building A-9.[30]

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[28] Manual scans were performed by an alert operator scanning a small portion of ground where the cart scans delivered a reading in excess of the threshold. Manual scans were used to thoroughly investigate the area using a shielded detector held only six inches from the ground. Table 2.5 shows that the Th-232 MDCR of the detector used for manual scans was 13% of the release limit while the unshielded cart scan MDCR for Th-232 was 25% of the release limit. If a manual scan investigation of an elevated cart scan reading showed no contamination in excess of threshold, the cart scan reading was attributed to random noise which was due to the statistical nature of the detector.

[29] In Sector 9 this included Building A-9 and the HP Lab Trailer.

[30] Since the Building A-9 sidewalk is exposed to the weathering effects of wind and rain, no removable contamination measurements were made pursuant to release of these surfaces. (See NUREG/CR-5849 Section 6.5.4).

3.8 RESPONSE TO ELEVATED READINGS

3.8.1 When elevated readings above the limits for soils discussed in the preceding paragraphs were encountered either in the field or after analysis of soil sample results, action was taken in accordance with the Hot Spot Evaluation Protocol, Appendix C. No hot spots on the building surfaces were identified.

3.9 AVERAGING ELEVATED LOCATIONS

3.9.1 No averaging was required in Sector 9.

3.10 DATA COLLECTION FORMS

3.10.1 The forms used for the FSS are listed in Table 3.1. Sample collection locations were filled out in accordance with the applicable procedures.

3.10.2 Surveys of building surfaces were documented in accordance with NX-RO-304.[31] These data were not recorded in the RDS.

Table 3.1
Data Collection Forms

Form Number	Title	Purpose
235-1 (NX-RL-235)	Label Package Request	Controls GPS survey and collection of soil samples
Computer Equivalent (KM-SAP-113)	Chain of Custody	Generated by the database software. Controls receipt, transfer and custody of samples
0309-SP-007	Manual Scan Form	Manual scans are recorded on this form or its equivalent.

3.10.3 Since practically all of the soil activity, gamma scan and μR data were recorded and downloaded automatically, no survey data forms outside of the logs and records called for in the procedures were required.

3.10.4 The RDS data tables are maintained on the main Cushing server as a POSTGRES SQL database named HPL Data. The files containing the primary scan and GPS/μR data are maintained in directories as shown in Table 3.2.

[31] NX-RO-304, *Survey Identification and Control.*

Table 3.2
Data Locations

Data Files	Location[a]
Database Data Tables	DSN:CUDBSVR_PGSQL Database: HPL_Data
GPS Logger Files (after upload)	Q: \Barcode \GPSDone
Scan Logger Files (after upload)	Q: \Barcode \ScanDone

[a] DSN is the name of the database server. Q: refers to the server directory reserved for the RDS source Data File

3.11 ELECTRONIC DATA TABLES

3.11.1 All of the soil samples, μR, and alpha/beta surface measurement data have been included in tables in Appendix D. Soil data in these tables has been limited to total uranium and natural thorium concentrations for the purpose of conserving space. These tables are also reproduced electronically in a Microsoft Excel file on the enclosed data CD. Soil sample data on the CD includes specific nuclide values and the system uncertainties (sigma values) in addition to the values reported in the tables of Appendix D.

4 FINAL STATUS SURVEY RESULTS AND DISCUSSION

4.1 SECTOR 9 SOIL SAMPLES

4.1.1 Analysis of the soil sample data is presented in this section beginning with the FSS surface grid soil samples to show that the current surface grid samples meet the release criteria. Samples underneath the gravel roads and the parking lot which serviced the trailers are also documented to confirm that the ground surfaces prior to gravel placement meet the release criteria.

4.1.2 Final Decommissioning Excavations

4.1.2.1 No excavations were performed in Sector 9.

4.1.3 FSS Surface Grid Samples

4.1.3.1 Soil samples were collected on the surface of the sector wherever a soil sample was missing from the characterization data to complete a Final Status Survey data set of 82 grid samples. These samples are shown on a map of the sector in Figure 4.1.[32] A detailed listing of all the FSS surface grid samples is provided in Appendix D, Table 1.

4.1.3.2 Detailed maps of the survey units showing the location of each grid point and the values for FMPC, net total uranium, and net natural thorium are presented in Figure 4.2.

4.1.3.3 A summary of the FSS surface grid samples for each survey unit in Sector 9 is presented in Table 4.1. All samples on the surface of Sector 9 measured less than 1.0 FMPC and the 95% confidence level for all the survey units was less than -0.02 FMPC.

Table 4.1
Sector 9 Final Surface Soil Samples Summary

Survey Unit	# Samples	FMPC 95% Conf. (μ_α)	FMPC		Net U_{tot} (pCi/g)		Net Th_{nat} (pCi/g)	
			Max	Avg	Max	Avg	Max	Avg
SU-901	71	-0.02	0.17	-0.03	2.74	-0.92	1.39	-0.04
SU-902	11	-0.07	0.06	-0.12	2.01	-0.36	0.58	-1.11

4.1.3.4 Since the surface grid samples were less than 1.0 FMPC, all of the surface grid soil samples meet the criteria of the SDP for unconditional release.

4.1.3.5 Surface samples on the gravel roads and the parking lot are not displayed in Figure 4.1 since these areas are covered with up to a foot of gravel, brought in subsequent to the cessation of nuclear operations. Characterization soil samples obtained by drilling through the gravel to the soil underneath are available from historical records. These samples are shown on a map of the sector in Figure 4.3 and are summarized in Table 4.2. No samples under the gravel road and parking lot exist

[32] Since all figures have been included in Appendix A, only the figure number will be referenced for the remainder of this report.

which exceed 0.20 FMPC. A list of these data points is presented in Appendix D, Table 2.

4.1.3.6 Although these samples are not part of the final surface of the survey sector, they demonstrate that no indication exists of elevated radioactivity underneath the gravel roads or the parking lot and are included in this report for completeness.

Table 4.2
Soil Samples Summary
Beneath the Gravel and Parking Lot

# Samples	FMPC 95% Conf. (μ_α)	FMPC		Net U_{tot} (pCi/g)		Net Th_{nat} (pCi/g)	
		Max	Avg	Max	Avg	Max	Avg
46	0.03	0.20	0.01	2.91	-0.37	1.78	0.20

4.2 GAMMA SCAN MEASUREMENTS ON SOIL SURFACES

4.2.1 Gamma scans were performed on 100% of the accessible areas of the sector as described in Section 3. The scan thresholds used for these surveys are presented in Table 2.7.

4.2.2 No soil sample data in Sector 9 met the criterion of Paragraph 2.5.3.3 for uranium dominance. Therefore no special scans for uranium contamination were conducted in Sector 9.

4.2.3 Obstacles such as trees, overgrowth, and hazardous conditions such as extremely steep slopes prevented the scanning of some areas of the sector. Where trees and overgrowth prevented scanning with the cart-mounted detectors, manual scans were taken wherever possible within and around the obstacle. 100% coverage of the base of each steep slope was scanned as well. The unscannable hazards and obstacles account for about 15% of the surface area of Sector 9. Most of these areas were unscannable due to extremely steep slopes and vegetation with a portion unscannable due to the building footprints.

4.2.4 No scans exceeded the scan threshold.

4.2.5 A drawing of the areas scanned is presented in Figure 4.4 showing the average and maximum observed values summarized by $100m^2$ blocks. Since the entire sector was scanned manually, no average scan value is recorded in the database. The maximum scan reading observed was 9,300 cpm, which is below the manual scan threshold of 10,000 cpm. The scan data that were observed in Sector 9 revealed no areas of contamination in excess of the release limits.

4.3 SECTOR 9 EXPOSURE RATE MEASUREMENTS

4.3.1 Exposure rate measurements over soil were collected at 100% of the accessible grid locations in the sector. A summary of the exposure rate measurements by survey unit is presented in Table 4.3. The maximum gross exposure rate measurement (12μR/hr) is less than the $100m^2$ average limit given in Table 2.2. A drawing of the exposure rate measurements taken in the sector is presented in Figure 4.5. No exposure rate measurement data were observed in Sector 9 above the release criteria.

Table 4.3
Sector 9 Exposure Rate Measurements Summary[a]

Survey Unit	# Measurements[33]	Maximum (μR/hr)	Average (μR/hr)	95% Conf. (μ_α)
SU-901	100	12	10.0	10.2
SU-902	30	9	7.4	7.7

[a] Includes background.

4.4 SECTOR 9 BUILDING STRUCTURE SURFACES

4.4.1 Building A-9, and the HP Lab trailer and Sample Storage Shed were surveyed for μR and alpha/beta-gamma contamination as described in Sections 3.6 and 3.7. These structures were divided into three affected survey units and six unaffected survey units as listed in Table 2.1. Drawings which show the locations of these survey units within the buildings are presented in Figures 2.2 and 2.3.

4.4.2 The surface and μR data points taken in connection with the buildings in Sector 9 are presented in Appendix D, Table 3. A summary of the measurements obtained on the building surfaces is also presented in Table 4.4. The table shows that all the surface and μR measurements obtained were below the release criteria listed in Table 2.3 and paragraph 2.4.2.1.

4.4.3 Surveys of removable contamination were also conducted as described in Section 3.7, and the summarized results in Table 4.4 show that all surfaces surveyed yielded measurements less than 20 dpm/100cm^2, well below the release criteria specified in Table 2.3.

4.4.4 All surfaces were scanned as described in Section 3.7 for beta-gamma and no hot spots in excess of the release criteria were identified.

4.4.5 The data summary and statistical test results demonstrate that all the building surfaces in Sector 9 meet the criteria stipulated in the license and SDP for unconditional release.

[33] Although an exposure rate reading was taken with every soil sample, the number of measurements in Table 4.4 will not always agree with the number in Table 4.2. Some older soil samples do not have a μR reading on record and trees, brush or standing water make it impossible to take a reading now. Also, soil samples under the haul road do not appear in Table 4.2 but μR readings taken on the haul road do appear in Table 4.4.

Table 4.4
Sector 9 Buildings
Alpha/Beta-Gamma and Exposure Rate Measurements Summary

Survey Unit ID	Area Surveyed (ID)	Points	Contamination Component	Net Activity (dpm/100cm²) Min	Max	Avg	Max Net Exp Rate (uR/hr)[a]
903	Building A-9 Interior (Offices)	100	Direct α	-9	31	4	1
			Direct β	-412	551	28	
			Removable α	0	12	1	
			Removable β	0	10	2	
904	Building A-9 Interior (Basement)	30	Direct α	-7	40	14	1
			Direct β	-189	579	196	
			Removable α	0	6	0	
			Removable β	0	14	2	
905	Building A-9 Exterior	40	Direct α	-18	49	6	4
			Direct β	-368	647	157	
			Removable α	0	12	1	
			Removable β	0	14	2	
906	Building A-9 Sidewalk	50	Direct α	-27	80	2	2
			Direct β	-358	405	3	
907	Building A-9 Former Lab	94	Direct α	17	44	19	0
			Direct β	194	247	195	
			Removable α	5	15	5	
			Removable β	6	19	6	
908	Building A-9 Former Sample Storage	76	Direct α	-7	20	3	0
			Direct β	-353	380	53	
			Removable α	0	13	1	
			Removable β	0	14	2	
909	HP Lab Interior (Admin)	55	Direct α	-2	33	7	0
			Direct β	-258	274	14	
			Removable α	5	15	5	
			Removable β	6	19	6	
910	HP Lab & Sample Storage Shed Exterior	50	Direct α	-4	89	20	4
			Direct β	-216	305	-33	
			Removable α	0	4	0	
			Removable β	0	7	1	
911	HP Lab Interior (Counting Area & Sample Storage Shed)	486	Direct α	-11	56	7	3
			Direct β	-341	319	8	
			Removable α	0	13	1	
			Removable β	0	14	2	

[a] Expressed in PIC-equivalent μR/hr net of background.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

5.1.1 The soil samples in Sector 9 passed all the quality control requirements for duplicates. (Par. 2.8.1)

5.1.2 The Sector 9 soil samples and exposure rate data met the statistical requirements for a 95% confidence level. (Par. 4.1.3.3, 4.3.1)

5.1.3 All of the exposed soil surfaces meet the release criteria of the SDP. (Par. 4.1.3.4)

5.1.4 All of the soil samples on the surface of the ground underneath the gravel roads and the parking lot in Sector 9 were less than or equal to 0.16 FMPC. (Par. 4.1.3.5)

5.1.5 The scan data that were observed revealed no areas of contamination in excess of the release criteria in Sector 9. (Par. 4.2.5)

5.1.6 No exposure rate measurement data were observed in Sector 9 above the release limits. (Par. 4.3.1)

5.1.7 None of the scan data measurements collected on building surfaces or on the Building A-9 sidewalk revealed contamination, and no direct measurement or exposure rate data on these surfaces were observed in Sector 9 above the release limits. (Par. 4.4.2 - 4.4.5)

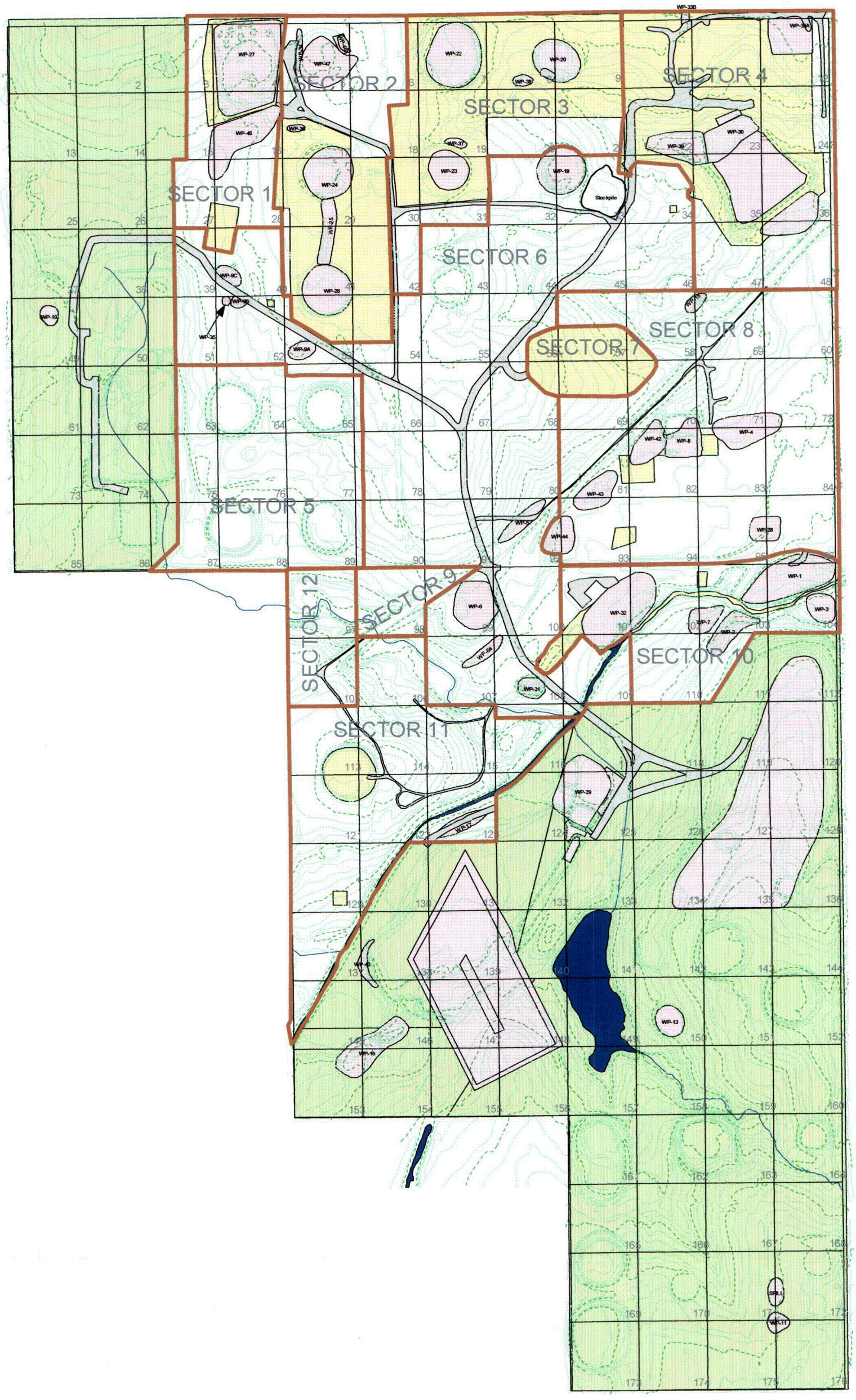
5.1.8 No removable contamination was observed greater than 20 dpm/100cm^2. (Par. 4.4.3)

5.1.9 Sector 9 meets all conditions for release from license SNM-1999.

5.2 RECOMMENDATIONS

5.2.1 Sector 9 should be released from license SNM-1999.

APPENDIX A
FIGURES

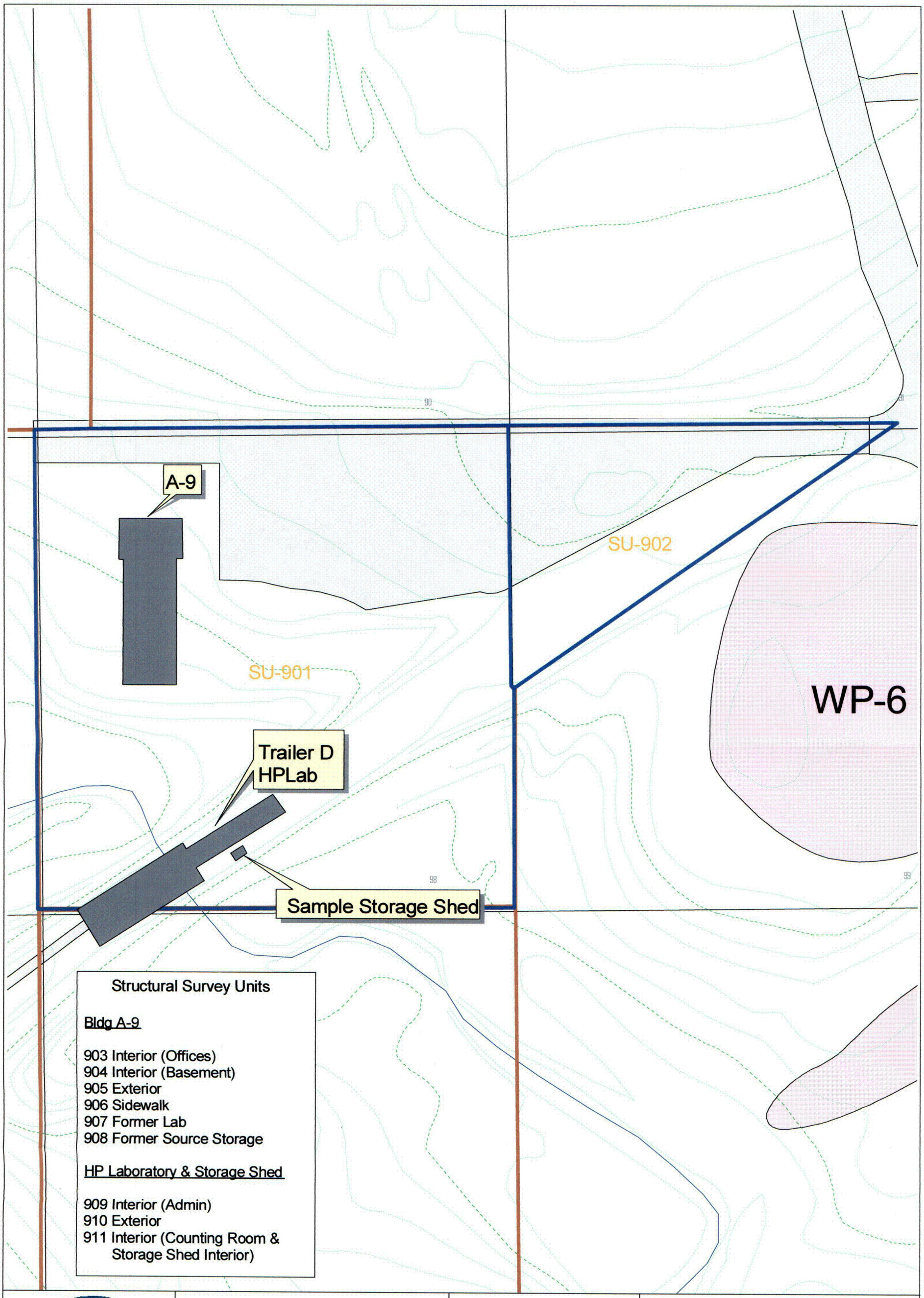


Cushing Site Decommissioning Project Sector 9 Final Status Survey

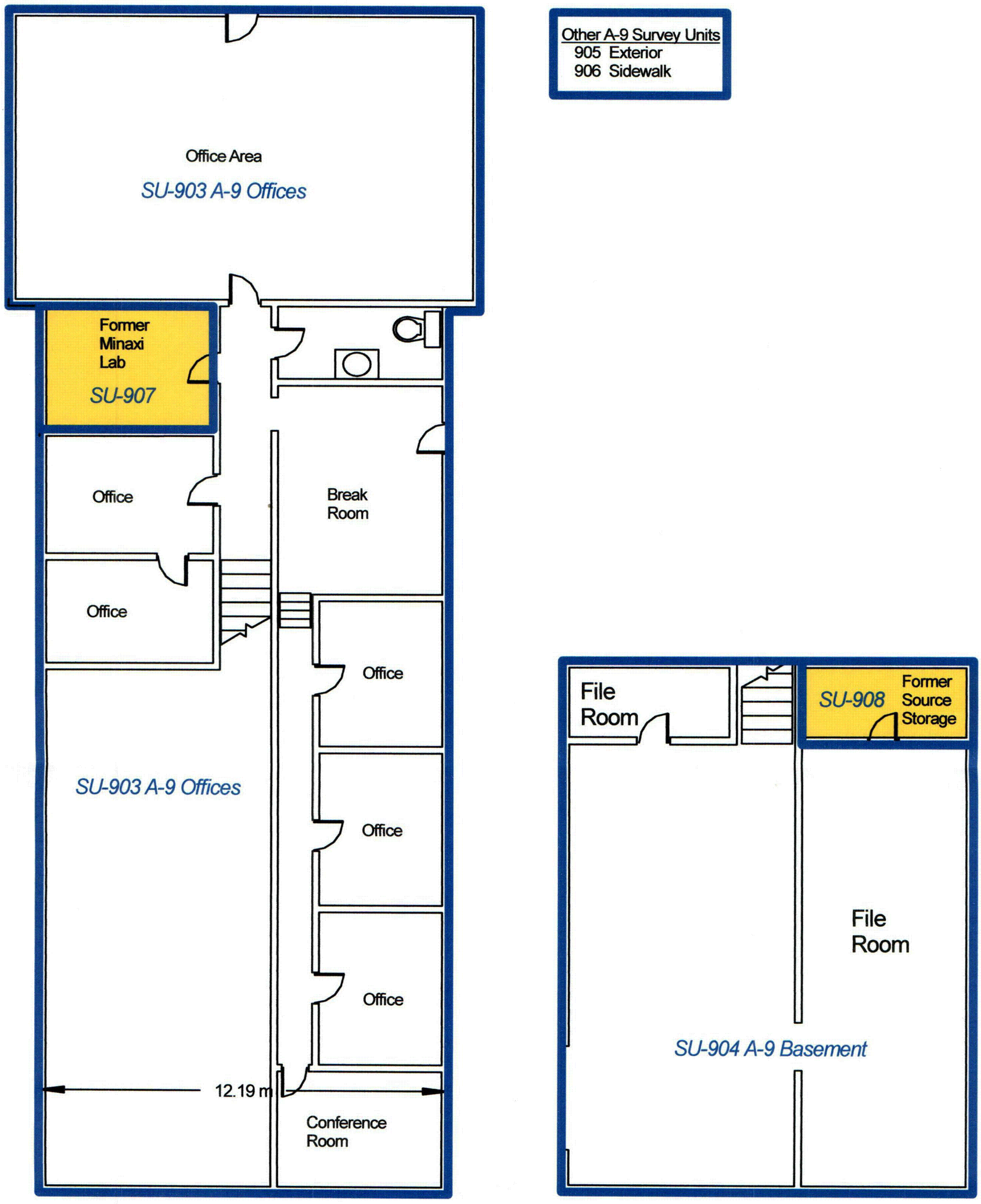
Figure 1.1
Site Sector Map

Cushing Site	Drawn by: DCW
Revision: 0	Date: 2/9/2005

C01


A-9
SU-902
SU-901
WP-6
Trailer D
HPLab
Sample Storage Shed
Structural Survey Units
Bldg A-9
903 Interior (Offices)
904 Interior (Basement)
905 Exterior
906 Sidewalk
907 Former Lab
908 Former Source Storage
HP Laboratory & Storage Shed
909 Interior (Admin)
910 Exterior
911 Interior (Counting Room & Storage Shed Interior)
FSS Survey Units
Buildings Remaining on Site
Roads / Parking Lots
N
W
E
S
7 0 7 14 Meters
Cushing Site Decommissioning
Project Sector 9 Final Status Survey
Figure 2.1
Sector 9 Survey Units
Cushing Site
Drawn by: DCW
Revision: 0
Date: 2/9/2005

C02



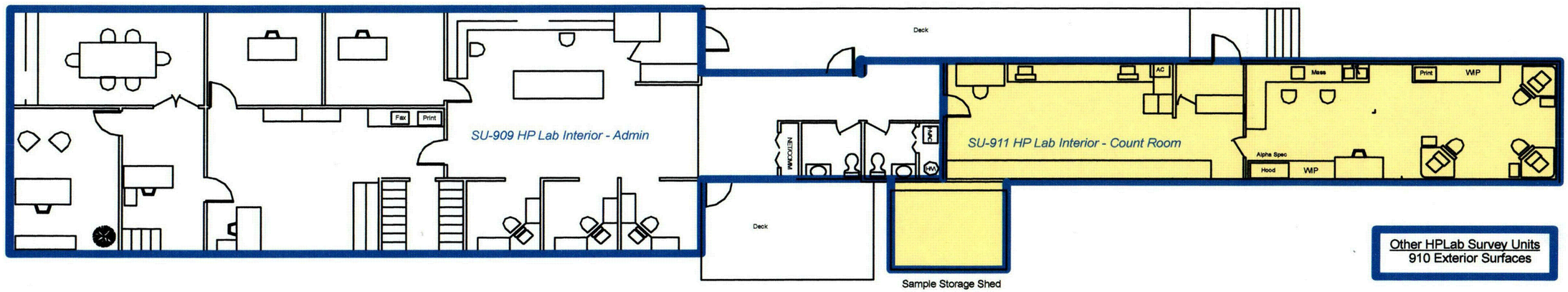
NEXTEP ENVIRONMENTAL

Cushing Site Decommissioning Project
Sector 9 Final Status Survey

Figure 2.2
Building A-9 Survey Units

Cushing Site	Drawn by: BPA
Revision 0	Date: 3/21/2005

C03



Affected Survey Unit

Unaffected Survey Unit

N

W E

S

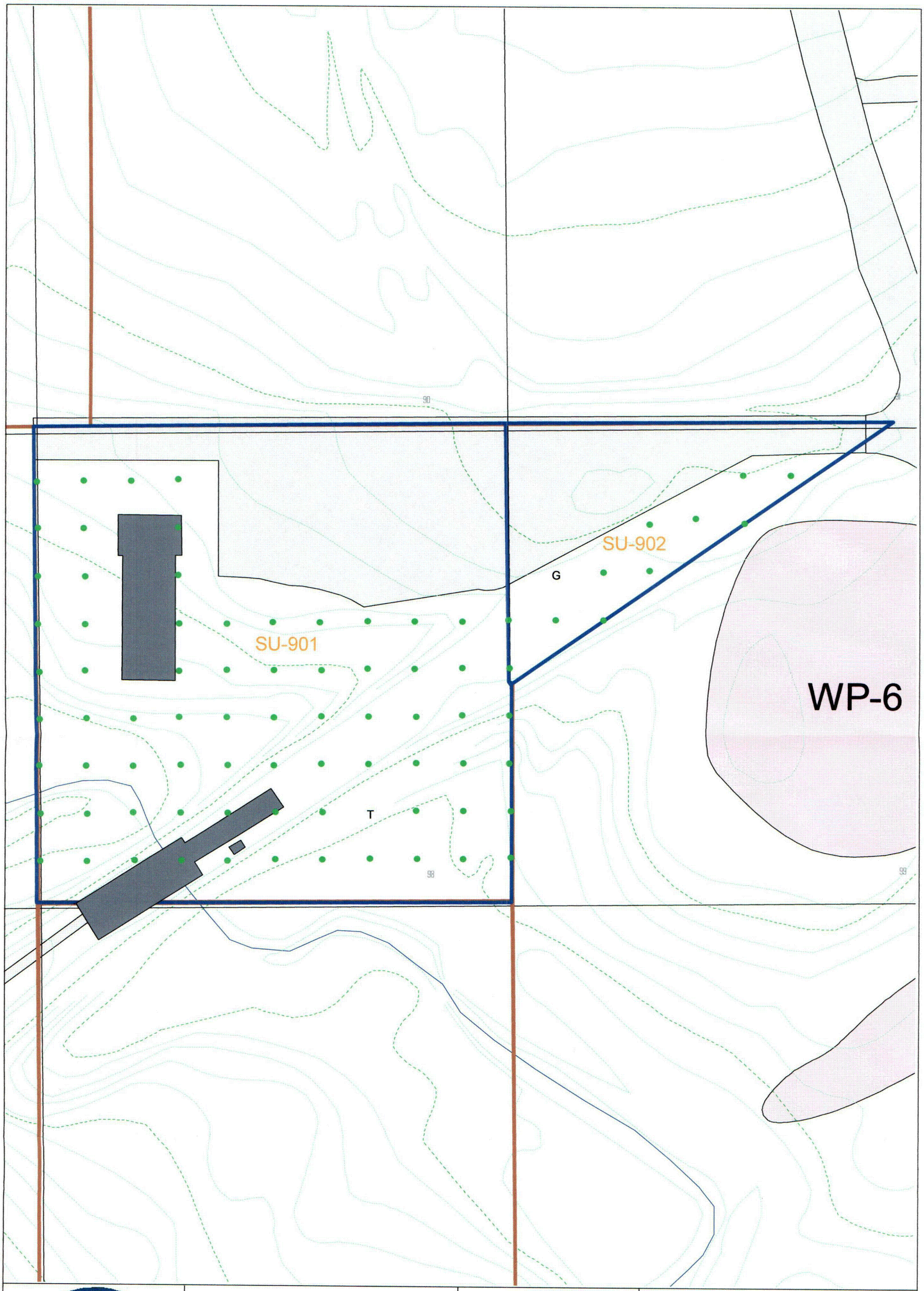
Scale: 0 5 10 Feet

Cushing Site Decommissioning Project
Sector 9 Final Status Survey

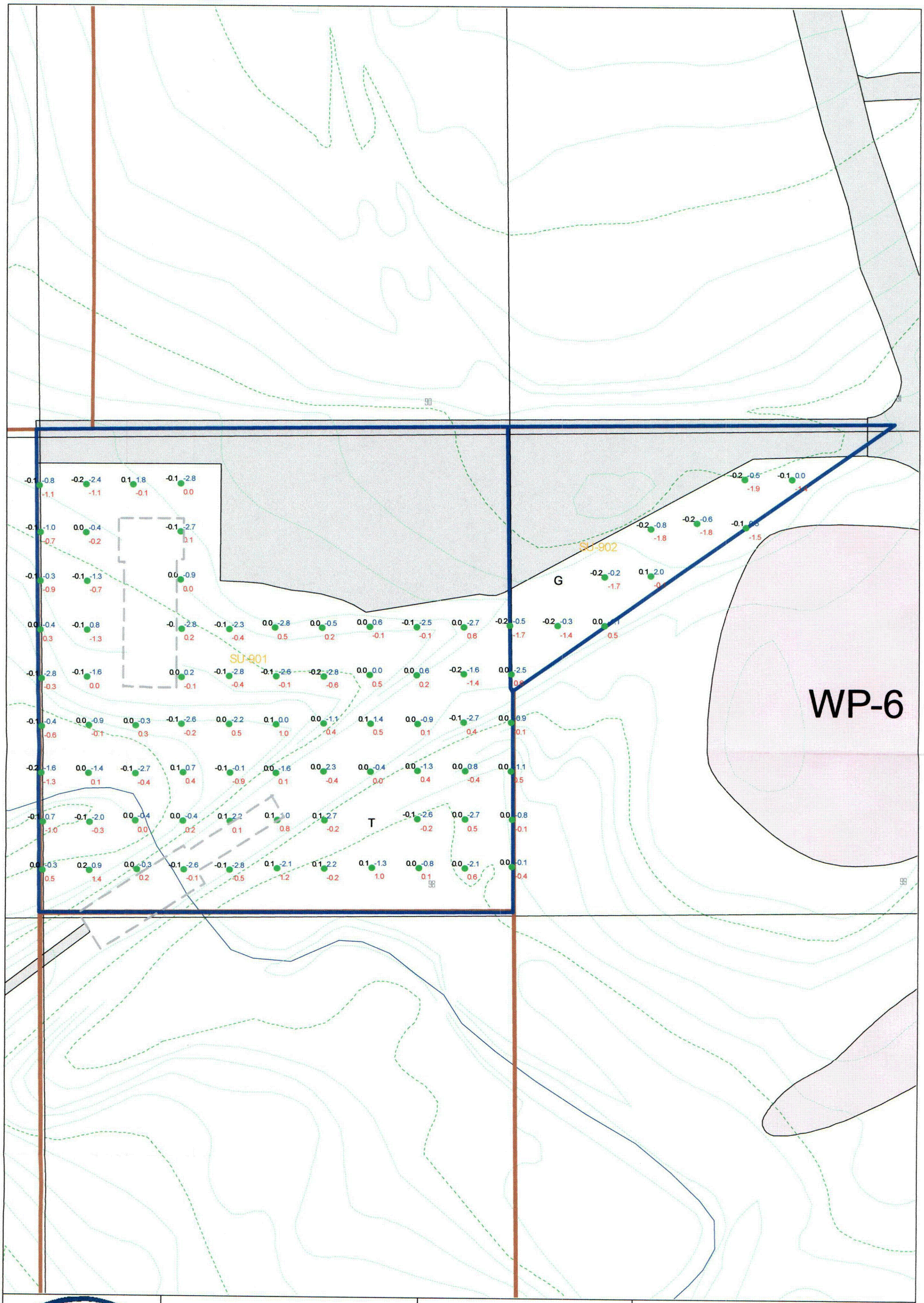
Figure 2.3
HP Lab Trailer Survey Units

Cushing Site	Drawn by: BPA
Revision 0	Date: 3/21/2005

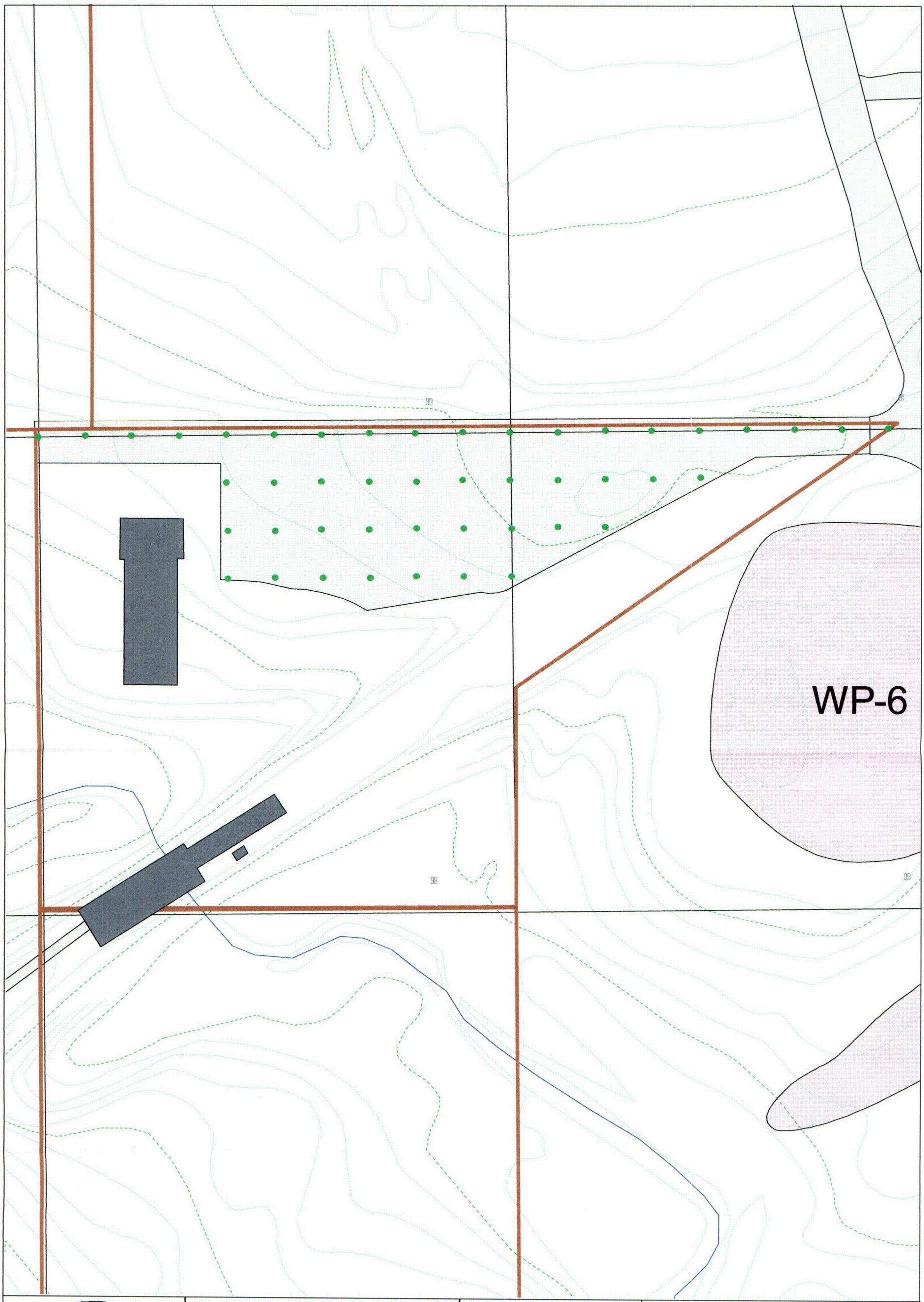
COY


90
91
SU-902
G
SU-901
WP-6
T
98
99
Survey Units
Soil Samples (FMPC)
< 0.75
0.75 - 1.00
1.00 - 3.00
> 3.00
G - Gravel
T - Trees or Brush
N
W
E
S
7 0 7 14 Meters
Cushing Site Decommissioning
Project Sector 9 Final Status Survey
Figure 4.1
Sector 9 Surface Grid Samples
Cushing Site
Drawn by: DCW
Revision: 0
Date: 2/8/2005

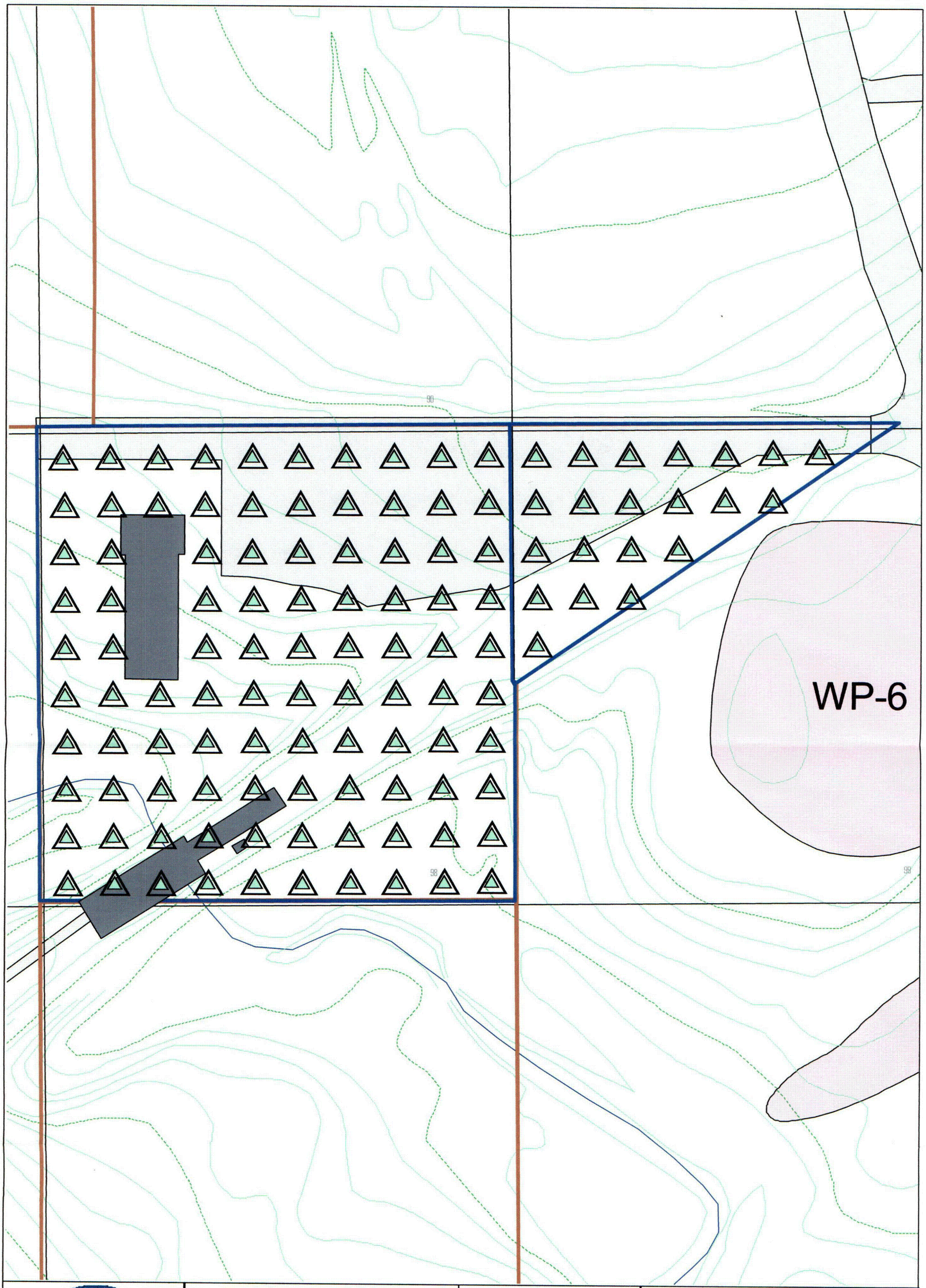
E05


SU-902
SU-901
G
T
WP-6
N
W
E
S
Survey Units
Gravel Roads, Parking Lot
Soil Samples (FMPC)
< 0.75
0.75 - 1.00
1.00 - 3.00
> 3.00
FMPC
Net U(tot)
Net Th(nat)
(pCi/g)
G - Gravel
T - Trees or Brush
10 0 10 20 Meters
Cushing Site Decommissioning Project
Sector 9 Final Status Survey
Figure 4.2
Survey Unit 901, 902 Grid Samples
Cushing Site
Drawn by: DCW
Revision: 0
Date: 1/10/2005

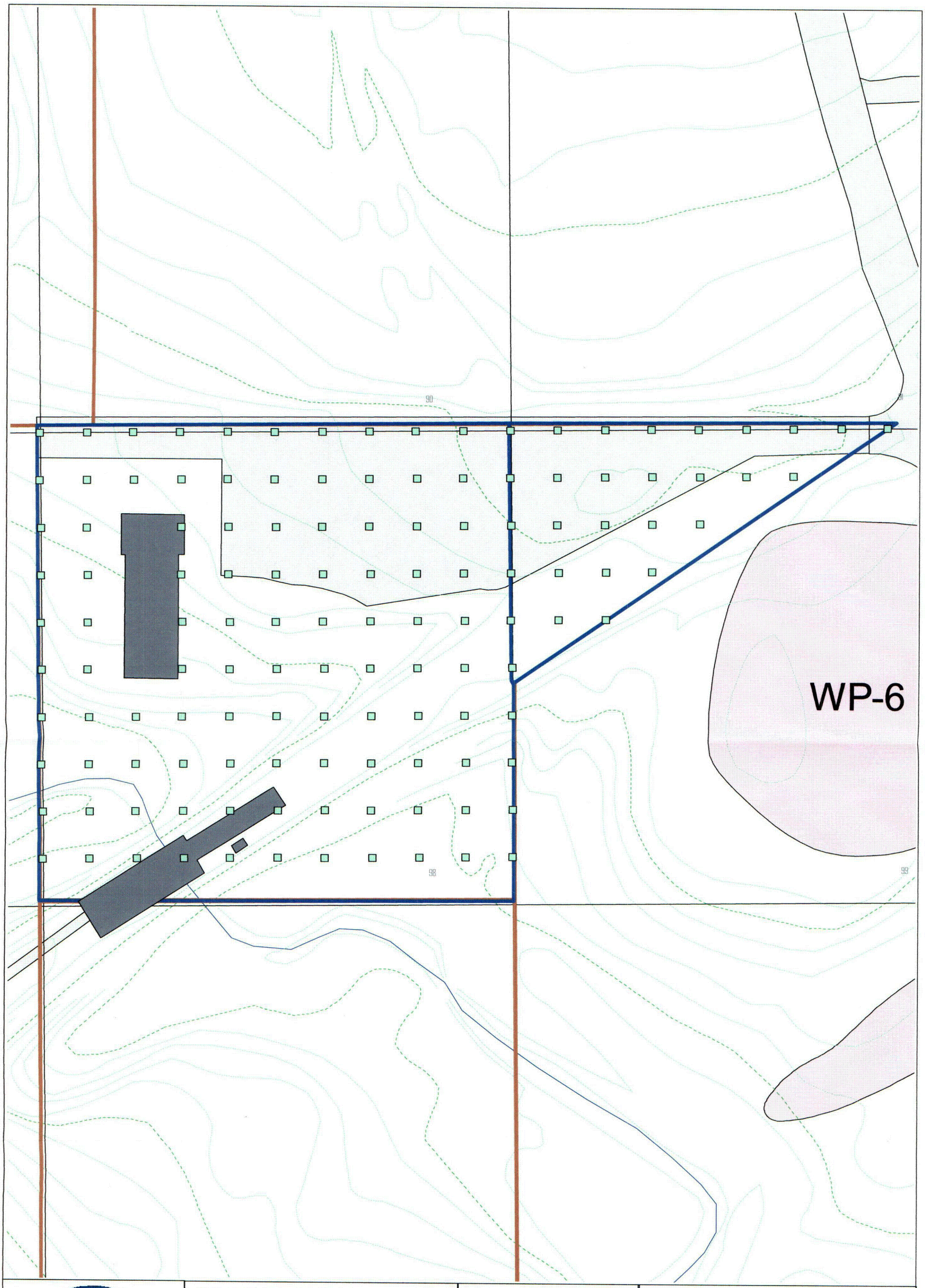
C06


90
91
WP-6
98
99
Gravel Roads / Parking Lots
Soil Samples (FMPC)
< 0.75
0.75 - 1.00
1.00 - 3.00
> 3.00
N
W
E
S
7 0 7 14 Meters
Cushing Site Decommissioning
Project Sector 9 Final Status Survey
Figure 4.3
Sector 9 Existing Soil Samples
Under Roadways and Parking Lots
Cushing Site
Drawn by: DCW
Revision: 0
Date: 2/8/2005

C07


WP-6
Nal Scans (cpm)
Avg
Max
< 12,500
12.5k - 15k
15k - 20k
> 20,000
Manual Scan
(All values include background)
Existing Buildings
N
W
E
S
8 0 8 16 Meters
Cushing Site Decommissioning
Project Sector 9 Final Status Survey
Figure 4.4
Sector 9 Nal Summarized Scan Measurements
Cushing Site
Drawn by: DCW
Revision: 0
Date: 2/9/2005

C096



KM / NEXTEP	Gross Exposure Rate Measurements (μR/hr) < 16 > 25 16 - 25 (All values include background)	N W E S 8 0 8 16 Meters	Cushing Site Decommissioning Project Sector 9 Final Status Survey Figure 4.5 Sector 9 Exposure Rate Measurements Cushing Site / Drawn by: DCW Revision: 0 / Date: 2/9/2005

APPENDIX B
CUSHING SITE GRID NUMBERING SYSTEM

CUSHING SITE BLOCK COORDINATES

239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256
219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236
199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216
421	401	1	2	3	4	5	6	7	8	9	10	11	12	301	321	341	361
422	402	13	14	15	16	17	18	19	20	21	22	23	24	302	322	342	362
423	403	25	26	27	28	29	30	31	32	33	34	35	36	303	323	343	363
424	404	37	38	39	40	41	42	43	44	45	46	47	48	304	324	344	364
425	405	49	50	51	52	53	54	55	56	57	58	59	60	305	325	345	365
426	406	61	62	63	64	65	66	67	68	69	70	71	72	306	326	346	366
427	407	73	74	75	76	77	78	79	80	81	82	83	84	307	327	347	367
428	408	85	86	87	88	89	90	91	92	93	94	95	96	308	328	348	368
429	409	569	549	529	509	97	98	99	100	101	102	103	104	309	329	349	369
430	410	570	550	530	510	105	106	107	108	109	110	111	112	310	330	350	370
431	411	571	551	531	511	113	114	115	116	117	118	119	120	311	331	351	371
432	412	572	552	532	512	121	122	123	124	125	126	127	128	312	332	352	372
433	413	573	553	533	513	129	130	131	132	133	134	135	136	313	333	353	373
434	414	574	554	534	514	137	138	139	140	141	142	143	144	314	334	354	374
435	415	575	555	535	515	145	146	147	148	149	150	151	152	315	335	355	375
436	416	576	556	536	516	153	154	155	156	157	158	159	160	316	336	356	376
437	417	577	557	537	517	677	657	637	617	161	162	163	164	317	337	357	377
438	418	578	558	538	518	678	658	638	618	165	166	167	168	318	338	358	378
439	419	579	559	539	519	679	659	639	619	169	170	171	172	319	339	359	379
440	420	580	560	540	520	680	660	640	620	173	174	175	176	320	340	360	380
699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716
719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736
739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756

Note: The blocks shaded in yellow represent the original Cushing Site Block Grid numbers. The blocks in white represent the off-site blocks which have been added.

APPENDIX C
HOT SPOT EVALUATION PROTOCOL

HOT SPOT EVALUATION PROTOCOL

1 Scans

1.1 Scan information will be taken in the field using a cart-mounted, 3' x ½" unshielded NaI detector scanning at less that 1 ft. per sec. in accordance with NX-RO-370.[34] Cpm readings will be taken approximately every two seconds and will be recorded automatically in the data logger along with GPS location information. Raw data files will be examined by the HP analyst and areas containing readings in excess of the threshold will be rescanned manually using a shielded NaI detector to locate potential hot spots.

1.2 When manual scans are required to confirm an unshielded reading above the threshold, collect a soil sample at local maxima within each scanned region and survey its location using GPS. LocID and SID conventions will be as outlined in Section 3.3 of this FSSR.

2 Soil Samples Exceeding the Limit

2.1 When soil measurements exceed 1.0 FMPC, the analyst evaluating the data will issue a Supplemental Data Request to decrease the local grid spacing to 3.5 m or less and to further characterize the depth and lateral extent of elevated radioactivity. Consideration will be given to the requirements of surface averaging in requesting supplemental grid measurements.

2.2 Samples taken as part of any expansion pattern which does not fall on standard BES locations (even meters) will be identified with the LocID of the nearest hot spot with a single letter character at the end. These locations will be entered as offset location records in the database and their exact GPS coordinates will be recorded.

3 Soil Samples Indicating Predominantly Uranium Presence

3.1 Wherever a soil sample indicates a uranium concentration above 20 pCi/g and thorium less than 1.5 pCi/g, the entire area surrounding the sample will be manually scanned with a shielded 3"x1/2" NaI detector at 6" height above ground, and a scan threshold of 8,500 cpm will be used to determine where bias soil samples will be taken.

4 µR Measurement above the Release Criteria.

4.1 Any µR measurements that exceed the release criteria will be compared with surface soil sample results and surrounding scan data. Any failure of these values to correlate will be flagged and additional soil samples, scans, or µR measurements will be collected as is required to resolve the discrepancy.

[34] NX-RO-370, ibid.

APPENDIX D
DATA TABLES

Table 1
FSS Surface Grid Samples

LocID	Net Utot (pCi/g)	Net Thnat (pCi/g)	FMPC	ExposureRate (µR/hr)
SU-901				
B098E00S10	-0.78	-1.06	-0.13	10
B098E00S20	-1.01	-0.69	-0.10	9
B098E00S30	-0.35	-0.89	-0.10	9
B098E00S40	-0.45	0.35	0.02	9
B098E00S50	-2.77	-0.27	-0.12	10
B098E00S60	-0.41	-0.55	-0.07	9
B098E00S70	-1.57	-1.28	-0.18	9
B098E00S80	0.75	-1.04	-0.08	10
B098E00S90	-0.31	0.52	0.04	10
B098E10S10	-2.36	-1.08	-0.19	9
B098E10S20	-0.37	-0.19	-0.03	10
B098E10S30	-1.32	-0.70	-0.11	9
B098E10S40	0.81	-1.26	-0.10	9
B098E10S50	-1.63	0.01	-0.05	8
B098E10S60	-0.91	-0.11	-0.04	10
B098E10S70	-1.35	0.14	-0.03	9
B098E10S80	-2.01	-0.26	-0.09	10
B098E10S90	0.87	1.39	0.17	12
B098E20S10	1.76	-0.07	0.05	9
B098E20S60	-0.32	0.32	0.02	11
B098E20S70	-2.68	-0.42	-0.13	11
B098E20S80	-0.36	0.03	-0.01	9
B098E20S90	-0.26	0.18	0.01	9
B098E30S10	-2.77	-0.02	-0.09	10
B098E30S20	-2.73	0.08	-0.08	11
B098E30S30	-0.94	-0.02	-0.03	11
B098E30S40	-2.76	0.24	-0.07	11
B098E30S50	0.16	-0.08	0.00	11
B098E30S60	-2.65	-0.24	-0.11	11
B098E30S70	0.73	0.44	0.07	7
B098E30S80	-0.41	0.19	0.00	12
B098E30S90	-2.59	-0.06	-0.09	10
B098E40S40	-2.26	-0.37	-0.11	10
B098E40S50	-2.77	-0.40	-0.13	11
B098E40S60	-2.17	0.54	-0.02	12
B098E40S70	-0.06	-0.85	-0.09	11
B098E40S80	2.21	0.07	0.08	10
B098E40S90	-2.77	-0.46	-0.14	12
B098E50S40	-2.77	0.53	-0.04	11
B098E50S50	-2.59	-0.08	-0.09	12
B098E50S60	0.01	1.00	0.10	10
B098E50S70	-1.64	0.06	-0.05	11
B098E50S80	0.98	0.83	0.12	11
B098E50S90	-2.10	1.25	0.05	12
B098E60S40	-0.51	0.19	0.00	10
B098E60S50	-2.77	-0.63	-0.16	11
B098E60S60	-1.10	0.45	0.01	12
B098E60S70	2.27	-0.36	0.04	8
B098E60S80	2.74	-0.23	0.07	11
B098E60S90	2.18	-0.20	0.05	10
B098E70S40	0.57	-0.13	0.01	11
B098E70S50	-0.01	0.48	0.05	11
B098E70S60	1.39	0.48	0.09	7
B098E70S70	-0.37	-0.01	-0.01	11
B098E70S80				10
B098E70S90	-1.33	1.00	0.06	12
B098E80S40	-2.49	-0.14	-0.10	12
B098E80S50	0.58	0.16	0.04	12
B098E80S60	-0.93	0.11	-0.02	8
B098E80S70	-1.28	0.39	0.00	11
B098E80S80	-2.59	-0.22	-0.11	12
B098E80S90	-0.79	0.14	-0.01	12
B098E90S40	-2.66	0.62	-0.03	12
B098E90S50	-1.61	-1.45	-0.20	8
B098E90S60	-2.74	0.38	-0.05	11
B098E90S70	0.77	-0.38	-0.01	11
B098E90S80	-2.71	0.50	-0.04	12
B098E90S90	-2.12	0.55	-0.02	12
B099E00S60	-0.92	-0.05	-0.04	8
B099E00S70	-1.14	0.52	0.01	10
B099E00S80	-0.83	-0.05	-0.03	8
B099E00S90	-0.13	-0.37	-0.04	8
SU-902				
B099E00S40	-0.47	-1.65	-0.18	7
B099E00S50	-2.54	0.58	-0.03	9
B099E10S30				7
B099E10S40	-0.28	-1.43	-0.15	7
B099E20S30	-0.25	-1.69	-0.18	6
B099E20S40	-1.06	0.49	0.01	7
B099E30S20	-0.75	-1.80	-0.21	6
B099E30S30	2.01	-0.06	0.06	7
B099E40S20	-0.56	-1.78	-0.20	6
B099E50S10	-0.54	-1.92	-0.21	6
B099E50S20	0.51	-1.49	-0.13	8
B099E60S10	0.02	-1.43	-0.14	6

[a] field µR data including background.

Table 2
Samples Under the Road/Parking Lot

LocID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	FMPC	Exposure Rate (μR/hr)
B098E00S00	-1.87	-0.05	-0.07	7
B098E10S00	-0.34	-1.24	-0.14	8
B098E20S00	-1.71	-0.47	-0.10	8
B098E30S00	-2.08	0.18	-0.05	9
B098E40S00	1.52	-0.10	0.04	9
B098E40S10	0.54	0.04	0.02	8
B098E40S20	2.36	0.13	0.09	8
B098E40S30	0.84	-0.58	-0.03	8
B098E50S00	0.64	-1.11	-0.09	8
B098E50S10	-2.52	-1.34	-0.22	8
B098E50S20	0.63	-0.89	-0.07	9
B098E50S30	-0.77	-0.13	-0.04	10
B098E60S00	-1.90	0.49	-0.01	8
B098E60S10	-0.99	-0.50	-0.08	10
B098E60S20	-1.38	0.21	-0.03	11
B098E60S30	-1.46	0.19	-0.03	11
B098E70S00	-0.33	-0.53	-0.06	8
B098E70S10	-2.73	-0.67	-0.16	10
B098E70S20	0.22	-0.10	0.00	11
B098E70S30	0.93	0.12	0.04	11
B098E80S00	1.48	-0.91	-0.04	7
B098E80S10	2.91	0.52	0.15	10
B098E80S20	0.44	-0.12	0.00	11
B098E80S30	2.12	-0.25	0.05	10

LocID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	FMPC	Exposure Rate (μR/hr)
B098E90S00	-0.67	-0.56	-0.08	8
B098E90S10	1.02	0.47	0.08	11
B098E90S20	-0.89	1.06	0.08	12
B098E90S30	0.23	0.56	0.06	12
B099E00S00	-2.71	0.42	-0.05	7
B099E00S10	-2.61	1.56	0.07	8
B099E00S20	-2.61	0.96	0.01	7
B099E00S30	1.29	1.21	0.16	8
B099E10S00	0.91	0.43	0.07	8
B099E10S10	-2.69	0.95	0.01	8
B099E10S20	-0.52	0.34	0.02	8
B099E20S00	-2.68	-0.12	-0.10	8
B099E20S10	-0.50	0.54	0.04	8
B099E20S20	-1.54	1.37	0.09	8
B099E30S00	-0.42	0.05	-0.01	8
B099E30S10	-0.59	1.78	0.16	9
B099E40S00	0.23	0.68	0.08	8
B099E40S10	0.42	0.48	0.06	7
B099E50S00	0.45	0.35	0.05	7
B099E60S00	0.06	1.15	0.12	8
B099E70S00	-0.80	0.92	0.07	8
B099E80S00	1.17	1.63	0.20	8

Table 3
Alpha/Beta-Gamma Surface and Exposure Rate Measurements

Grid Point	Direct (dpm/100 cm²)		Removable (dpm/100 cm²)		Net Exposure Rate	ID
	Alpha	Beta	Alpha	Beta	μR/hr	
Building A-9 Main Office Interior						SU-903
Rm A-1 1	-7	219	6	5	N/A	
Rm A-1 2	7	182	0	5	N/A	
Rm A-1 3	0	214	0	1	N/A	
Rm A-1 4	-7	93	0	1	N/A	
Rm A-1 5	-7	135	0	0	0.0	
Rm A-2 1	-7	435	0	1	N/A	
Rm A-2 2	-7	209	0	1	N/A	
Rm A-2 3	13	251	0	1	N/A	
Rm A-2 4	7	251	0	0	N/A	
Rm A-2 5	0	104	0	1	0.0	
Rm A-3 1	0	-60	0	1	N/A	
Rm A-3 2	0	-123	0	0	N/A	
Rm A-3 3	-7	-107	0	0	N/A	
Rm A-3 4	0	-65	0	0	N/A	
Rm A-3 5	0	198	0	5	0.0	
Rm A-4 1	7	230	0	1	N/A	
Rm A-4 2	0	161	0	1	N/A	
Rm A-4 3	-7	119	6	0	N/A	
Rm A-4 4	-7	9	6	0	N/A	
Rm A-4 5	0	114	0	0	0.0	
Rm A-5 1	0	135	6	5	N/A	
Rm A-5 2	13	77	0	0	N/A	
Rm A-5 3	-7	61	0	1	N/A	
Rm A-5 4	0	77	0	5	N/A	
Rm A-5 5	7	209	12	10	0.0	
Rm A-6 1	0	88	0	5	N/A	
Rm A-6 2	0	61	0	10	N/A	
Rm A-6 3	-7	-165	0	0	N/A	
Rm A-6 4	7	125	0	5	N/A	
Rm A-6 5	0	172	6	0	1.0	
Rm A-7 1	13	505	0	1	N/A	
Rm A-7 2	20	53	0	1	N/A	
Rm A-7 3	13	105	0	1	N/A	
Rm A-7 4	27	105	0	1	N/A	
Rm A-7 5	13	274	0	5	0.0	
Rm A-8 1	13	167	6	0	N/A	
Rm A-8 2	7	109	6	1	N/A	
Rm A-8 3	-7	277	0	1	N/A	
Rm A-8 4	0	-196	0	1	N/A	
Rm A-8 5	0	177	0	0	0.0	
Rm A-9 1	-7	398	0	1	N/A	
Rm A-9 2	-7	309	0	1	N/A	

Grid Point	Direct (dpm/100 cm²)		Removable (dpm/100 cm²)		Net Exposure Rate	ID
	Alpha	Beta	Alpha	Beta	μR/hr	
Rm A-9 3	7	393	6	1	N/A	
Rm A-9 4	7	372	0	0	N/A	
Rm A-9 5	0	-11	0	0	0.0	
Rm A-10 1	20	451	0	0	N/A	
Rm A-10 2	7	551	0	5	N/A	
Rm A-10 3	-7	367	0	0	N/A	
Rm A-10 4	0	147	0	10	N/A	
Rm A-10 5	0	261	0	0	0.0	
Rm A-11 1	-2	-286	0	1	N/A	
Rm A-11 2	-2	-112	0	0	N/A	
Rm A-11 3	4	-96	0	6	N/A	
Rm A-11 4	-9	-160	0	1	N/A	
Rm A-11 5	4	177	0	0	1.0	
Rm A-12 1	-2	-160	0	0	N/A	
Rm A-12 2	31	-254	0	1	N/A	
Rm A-12 3	4	-23	0	6	N/A	
Rm A-12 4	4	-239	0	6	N/A	
Rm A-12 5	18	-228	0	6	N/A	
Rm A-12 6	-2	-228	0	1	N/A	
Rm A-12 7	-2	-312	0	0	N/A	
Rm A-12 8	4	-218	6	1	N/A	
Rm A-12 9	-2	-60	0	0	0.0	
Rm A-12 10	4	19	0	6	0.0	
Rm A-13 1	4	-412	0	0	N/A	
Rm A-13 2	-9	-375	0	1	N/A	
Rm A-13 3	4	-128	0	0	N/A	
Rm A-13 4	-2	-207	0	1	N/A	
Rm A-13 5	24	4	0	0	0.0	
Rm A-14 1	-9	-333	0	1	N/A	
Rm A-14 2	-2	-286	0	1	N/A	
Rm A-14 3	-2	-275	0	0	N/A	
Rm A-14 4	-9	-349	0	0	N/A	
Rm A-14 5	4	-107	0	10	0.0	
Rm A-15 1	-2	-128	6	6	N/A	
Rm A-15 2	-9	-144	0	1	N/A	
Rm A-15 3	-2	-307	0	6	N/A	
Rm A-15 4	4	-44	0	6	N/A	
Rm A-15 5	11	-123	0	1	1.0	
Rm A-16 1	11	-9	0	6	N/A	
Rm A-16 2	24	274	0	1	N/A	
Rm A-16 3	11	-172	0	1	N/A	
Rm A-16 4	31	-88	0	0	N/A	
Rm A-16 5	4	165	0	1	0.0	

Table 3
Alpha/Beta-Gamma Surface and Exposure Rate Measurements

Grid Point	Direct (dpm/100 cm²)		Removable (dpm/100 cm²)		Net Exposure Rate	ID
	Alpha	Beta	Alpha	Beta	μR/hr	
Rm A-17 1	-2	-135	0	0	N/A	
Rm A-17 2	24	-93	0	0	N/A	
Rm A-17 3	4	460	6	1	N/A	
Rm A-17 4	31	84	0	1	N/A	
Rm A-17 5	4	-109	0	0	0.0	
Rm A-18 1	-2	-140	0	6	N/A	
Rm A-18 2	11	-88	0	0	N/A	
Rm A-18 3	-2	-140	0	6	N/A	
Rm A-18 4	11	-204	0	6	N/A	
Rm A-18 5	-2	44	0	1	0.0	
Rm A-19 1	18	233	0	0	N/A	
Rm A-19 2	4	-56	0	0	N/A	
Rm A-19 3	18	7	0	1	N/A	
Rm A-19 4	4	-98	0	1	N/A	
Rm A-19 5	11	2	6	0	0.0	
Building A-9 Basement						SU-904
Rm B-1 1	0	126	0	1	0.0	
Rm B-1 2	13	37	6	1	N/A	
Rm B-1 3	0	121	0	0	N/A	
Rm B-2 1	20	468	0	6	N/A	
Rm B-2 2	13	579	0	0	1.0	
Rm B-3 1	27	305	6	1	N/A	
Rm B-3 2	33	84	6	1	N/A	
Rm B-3 3	27	111	0	1	N/A	
Rm B-3 4	13	37	0	0	N/A	
Rm B-3 5	13	37	0	10	N/A	
Rm B-3 6	7	111	0	1	N/A	
Rm B-3 7	40	337	0	14	N/A	
Rm B-3 8	13	232	0	6	N/A	
Rm B-3 9	20	279	0	1	0.0	
Rm B-3 10	-7	363	0	1	0.0	
Rm B-4 1	7	-189	0	6	N/A	
Rm B-4 2	0	16	0	6	N/A	
Rm B-4 3	27	379	0	1	N/A	
Rm B-4 4	7	142	0	6	N/A	
Rm B-4 5	0	211	0	0	0.0	
Rm B-5 1	40	458	0	0	N/A	
Rm B-5 2	20	411	0	0	N/A	
Rm B-5 3	7	347	0	0	N/A	
Rm B-5 4	13	32	0	0	N/A	
Rm B-5 5	7	74	0	0	N/A	
Rm B-5 6	7	-58	0	0	N/A	
Rm B-5 7	33	21	0	1	N/A	
Rm B-5 8	13	221	0	6	N/A	
Rm B-5 9	13	295	0	1	0.0	
Rm B-5 10	0	284	0	1	0.0	
Building A-9 Exterior Walls						SU-905
1	49	305	6	10	2.8	
2	16	342	0	1	3.9	
3	22	647	6	0	1.7	
4	-4	342	0	0	1.7	
5	9	116	0	0	1.7	
6	-11	21	0	1	1.7	
7	2	79	0	6	0.6	
8	9	116	0	0	1.7	
9	-4	284	6	0	0.6	
10	-4	79	0	0	2.8	
11	2	-95	6	1	0.6	
12	22	200	0	10	1.7	
13	-18	-16	6	0	1.7	
14	-11	-26	0	6	0.6	
15	-11	353	6	1	1.7	
16	9	432	0	1	1.7	
17	2	416	0	6	2.8	
18	22	179	6	0	2.8	
19	9	337	0	1	1.7	
20	2	321	0	14	2.8	
21	-4	142	0	1	1.7	
22	-11	53	0	1	0.6	
23	-11	21	0	1	0.6	
24	-18	163	0	0	2.8	
25	-4	274	0	1	1.7	
26	9	247	0	0	0.0	
27	-4	-195	0	0	0.0	
28	2	-368	6	0	0.0	
29	29	142	0	0	0.0	
30	-11	42	0	0	0.0	
31	2	89	0	6	0.0	
32	2	-26	0	1	0.0	
33	2	263	0	0	0.0	
34	29	-32	0	1	0.0	
35	2	111	0	10	0.0	
36	42	253	0	0	0.6	
37	16	211	0	0	0.0	
38	29	305	12	1	0.6	
39	9	189	6	0	0.0	

Table 3
Alpha/Beta-Gamma Surface and Exposure Rate Measurements

Grid Point	Direct (dpm/100 cm²)		Removable (dpm/100 cm²)		Net Exposure Rate	ID
	Alpha	Beta	Alpha	Beta	μR/hr	
40	22	-42	0	1	1.7	
Building A-9 Sidewalk						SU-906
1	13	-89	N/A	N/A	1	
2	27	111	N/A	N/A	1	
3	40	111	N/A	N/A	1	
4	27	-16	N/A	N/A	-1	
5	-27	-42	N/A	N/A	-1	
6	60	-32	N/A	N/A	-1	
7	27	-105	N/A	N/A	-1	
8	-20	-147	N/A	N/A	1	
9	-7	-121	N/A	N/A	-1	
10	7	-84	N/A	N/A	1	
11	7	-63	N/A	N/A	1	
12	-7	-142	N/A	N/A	1	
13	-13	-116	N/A	N/A	1	
14	-20	79	N/A	N/A	1	
15	-7	-63	N/A	N/A	1	
16	7	-116	N/A	N/A	1	
17	0	-74	N/A	N/A	1	
18	0	58	N/A	N/A	1	
19	0	-132	N/A	N/A	1	
20	-13	-358	N/A	N/A	1	
21	33	-179	N/A	N/A	1	
22	0	-258	N/A	N/A	1	
23	13	-84	N/A	N/A	1	
24	13	26	N/A	N/A	1	
25	-27	-84	N/A	N/A	1	
26	-13	-258	N/A	N/A	1	
27	0	121	N/A	N/A	1	
28	-20	63	N/A	N/A	2	
29	13	79	N/A	N/A	2	
30	-7	-37	N/A	N/A	2	
31	-13	126	N/A	N/A	2	
32	-20	221	N/A	N/A	2	
33	-13	116	N/A	N/A	2	
34	-13	405	N/A	N/A	2	
35	47	-68	N/A	N/A	2	
36	-27	205	N/A	N/A	2	
37	-7	100	N/A	N/A	2	
38	-13	295	N/A	N/A	2	
39	-13	305	N/A	N/A	2	
40	13	258	N/A	N/A	2	
41	7	232	N/A	N/A	2	
42	7	-121	N/A	N/A	2	
43	-13	26	N/A	N/A	2	
44	0	-84	N/A	N/A	2	
45	33	-316	N/A	N/A	1	
46	-27	-84	N/A	N/A	1	
47	-7	279	N/A	N/A	1	
48	-27	126	N/A	N/A	1	
49	80	195	N/A	N/A	1	
50	7	-111	N/A	N/A	1	
Building A-9 Former Lab Interior Walls						SU-907
1	17	194	5	6	N/A	
2	17	194	7	8	N/A	
3	17	194	5	6	N/A	
4	17	194	5	6	N/A	
5	17	194	5	6	N/A	
6	17	194	7	8	N/A	
7	17	194	5	6	N/A	
8	17	194	5	6	N/A	
9	17	194	5	6	N/A	
10	17	194	5	13	N/A	
11	17	194	15	6	N/A	
12	17	194	5	6	N/A	
13	17	194	5	6	N/A	
14	17	194	5	6	N/A	
15	17	194	5	6	N/A	
16	23	194	5	8	N/A	
17	23	194	5	6	N/A	
18	17	194	5	6	N/A	
19	23	194	5	6	N/A	
20	30	194	5	6	N/A	
21	17	194	5	6	N/A	
22	17	194	5	6	N/A	
23	17	194	5	6	N/A	
24	23	194	5	6	N/A	
25	23	194	5	6	N/A	
26	44	194	5	8	N/A	
27	37	194	5	8	N/A	
28	17	194	5	6	N/A	
29	17	194	5	6	N/A	
30	17	194	5	6	N/A	
31	17	194	5	6	N/A	
32	17	194	7	6	N/A	
33	17	194	5	6	N/A	
34	17	194	5	6	N/A	

Table 3
Alpha/Beta-Gamma Surface and Exposure Rate Measurements

Grid Point	Direct (dpm/100 cm²)		Removable (dpm/100 cm²)		Net Exposure Rate	ID
	Alpha	Beta	Alpha	Beta	μR/hr	
35	17	194	5	6	N/A	
36	23	194	5	6	N/A	
37	17	194	5	6	N/A	
38	17	194	5	8	N/A	
39	17	194	5	6	N/A	
40	17	194	5	6	N/A	
41	30	194	5	6	N/A	
42	17	194	5	6	N/A	
43	17	194	5	6	N/A	
44	17	194	5	6	N/A	
45	23	194	7	6	N/A	
46	17	194	5	6	N/A	
47	17	194	5	6	N/A	
48	17	194	5	6	N/A	
49	17	194	5	6	N/A	
50	17	194	5	6	N/A	
51	17	194	7	6	N/A	
52	37	194	5	6	N/A	
53	17	194	5	6	N/A	
54	17	194	5	6	N/A	
Building A-9 Former Lab Floor						**SU-907**
55	17	194	5	6	0.0	
56	17	194	5	13	0.0	
57	17	194	5	6	0.0	
58	17	194	5	6	0.0	
59	17	194	5	6	0.0	
60	23	194	7	6	0.0	
61	17	194	5	6	0.0	
62	17	194	5	6	0.0	
63	23	194	5	6	0.0	
64	17	194	5	6	0.0	
65	23	194	5	6	0.0	
66	17	194	7	6	0.0	
67	17	194	5	6	0.0	
68	17	194	5	6	0.0	
69	17	194	5	6	0.0	
70	17	194	5	6	N/A	
71	23	194	7	6	N/A	
72	23	194	5	6	N/A	
73	17	194	5	19	N/A	
74	17	194	7	6	N/A	
Building A-9 Former Lab Ceiling						**SU-907**
75	17	194	5	6	N/A	
76	17	194	5	6	N/A	

Grid Point	Direct (dpm/100 cm²)		Removable (dpm/100 cm²)		Net Exposure Rate	ID
	Alpha	Beta	Alpha	Beta	μR/hr	
77	30	194	5	6	N/A	
78	17	194	5	6	N/A	
79	23	194	5	6	N/A	
80	17	194	5	6	N/A	
81	17	194	5	6	N/A	
82	17	195	5	6	N/A	
83	17	194	5	6	N/A	
84	17	194	5	8	N/A	
85	17	211	5	6	N/A	
86	17	194	5	8	N/A	
87	17	237	5	6	N/A	
88	23	194	7	6	N/A	
89	17	194	5	6	N/A	
90	17	216	5	6	N/A	
91	17	194	5	6	N/A	
92	17	194	5	6	N/A	
93	17	247	5	6	N/A	
94	17	194	5	6	N/A	
Building A-9 Source Storage Room Interior Walls						**SU-908**
21	0	-68	0	1	N/A	
22	20	100	0	0	N/A	
23	7	-121	0	0	N/A	
24	-7	-74	0	1	N/A	
25	-7	74	0	0	N/A	
26	20	-153	0	0	N/A	
27	0	-42	0	1	N/A	
28	7	5	0	0	N/A	
29	-7	-79	0	10	N/A	
30	-7	100	0	1	N/A	
31	0	-16	0	1	N/A	
32	0	-32	6	0	N/A	
33	13	-89	0	0	N/A	
34	7	11	0	5	N/A	
35	7	-26	0	0	N/A	
36	-7	-174	0	1	N/A	
37	7	-95	0	1	N/A	
38	7	-205	0	1	N/A	
39	0	-68	0	10	N/A	
40	7	-37	0	0	N/A	
41	0	374	0	0	N/A	
42	-7	16	0	0	N/A	
43	7	-195	0	1	N/A	
44	0	-174	0	0	N/A	

Table 3
Alpha/Beta-Gamma Surface and Exposure Rate Measurements

Grid Point	Direct (dpm/100 cm²)		Removable (dpm/100 cm²)		Net Exposure Rate	ID
	Alpha	Beta	Alpha	Beta	μR/hr	
45	0	-74	6	0	N/A	
46	7	-226	0	1	N/A	
47	7	-95	0	0	N/A	
48	0	-153	0	0	N/A	
49	7	250	0	1	N/A	
50	7	90	0	5	N/A	
51	7	180	0	0	N/A	
52	13	135	0	1	N/A	
53	7	95	0	0	N/A	
54	7	-100	0	1	N/A	
55	7	105	6	10	N/A	
56	7	-135	0	0	N/A	
Building A-9 Source Storage Room Floor						**SU-908**
1	-7	-353	6	5	N/A	
2	-7	-184	0	5	N/A	
3	0	-74	0	5	N/A	
4	-7	-205	13	1	N/A	
5	0	-237	0	0	N/A	
6	-7	21	0	10	N/A	
7	-7	174	0	1	0.0	
8	0	11	6	5	0.0	
9	-7	132	0	1	0.0	
10	-7	21	0	10	N/A	
11	0	189	6	0	N/A	
12	0	63	0	1	0.0	
13	0	216	0	0	0.0	
14	-7	158	0	0	0.0	
15	-7	105	0	1	N/A	
16	7	184	0	14	N/A	
17	-7	289	0	5	N/A	
18	7	189	0	1	N/A	
19	7	342	0	1	N/A	
20	0	63	0	5	N/A	
Building A-9 Source Storage Room Ceiling						**SU-908**
57	13	155	0	1	N/A	
58	13	130	0	5	N/A	
59	0	335	0	1	N/A	
60	0	210	0	0	N/A	
61	20	235	0	1	N/A	
62	20	200	0	0	N/A	
63	7	275	0	0	N/A	
64	0	80	6	1	N/A	
65	20	380	0	1	N/A	

Grid Point	Direct (dpm/100 cm²)		Removable (dpm/100 cm²)		Net Exposure Rate	ID
	Alpha	Beta	Alpha	Beta	μR/hr	
66	0	155	0	1	N/A	
67	13	95	0	1	N/A	
68	7	105	0	0	N/A	
69	0	180	6	0	N/A	
70	0	170	0	0	N/A	
71	0	200	0	1	N/A	
72	0	205	6	1	N/A	
73	20	205	0	0	N/A	
74	20	205	0	5	N/A	
75	0	155	0	1	N/A	
76	7	155	0	1	N/A	
HPLab Offices Interior						**SU-909**
Rm D-1 1	7	-121	6	0	N/A	
Rm D-1 2	0	-89	0	6	N/A	
Rm D-1 3	0	137	0	6	0.00	
Rm D-2 1	0	-16	0	14	N/A	
Rm D-2 2	0	42	0	0	N/A	
Rm D-2 3	7	-168	0	0	N/A	
Rm D-2 4	20	-5	0	1	N/A	
Rm D-2 5	27	-42	0	1	N/A	
Rm D-2 6	0	-126	6	0	N/A	
Rm D-2 7	13	232	0	1	0.00	
Rm D-2 8	13	5	0	1	0.00	
Rm D-2 9	0	84	0	0	0.00	
Rm D-2 10	0	147	0	1	0.00	
Rm D-3 1	27	-137	0	6	N/A	
Rm D-3 2	13	-26	0	0	N/A	
Rm D-3 3	0	68	0	0	0.00	
Rm D-4 1	13	-111	0	1	N/A	
Rm D-4 2	0	-32	0	1	N/A	
Rm D-4 3	20	79	0	1	0.00	
Rm D-5 1	33	-84	0	1	N/A	
Rm D-5 2	7	-174	0	0	N/A	
Rm D-5 3	13	-68	0	0	0.00	
Rm D-6 1	13	-74	0	6	N/A	
Rm D-6 2	7	53	0	0	N/A	
Rm D-6 3	0	-53	0	1	0.00	
Rm D-7 1	27	11	0	1	N/A	
Rm D-7 2	20	26	0	0	N/A	
Rm D-7 3	13	-258	0	1	N/A	
Rm D-7 4	7	-95	0	0	N/A	
Rm D-7 5	13	195	0	0	0.00	
Rm D-8 1	4	89	0	0	N/A	

Table 3
Alpha/Beta-Gamma Surface and Exposure Rate Measurements

Grid Point	Direct (dpm/100 cm²)		Removable (dpm/100 cm²)		Net Exposure Rate	ID
	Alpha	Beta	Alpha	Beta	μR/hr	
Rm D-8 2	4	32	0	0	N/A	
Rm D-8 3	-2	0	0	0	N/A	
Rm D-8 4	-2	-126	0	5	N/A	
Rm D-8 5	-2	158	0	1	0.00	
Rm D-9 1	-2	53	0	1	N/A	
Rm D-9 2	-2	-37	0	0	N/A	
Rm D-9 3	-2	-95	6	5	N/A	
Rm D-9 4	-2	-42	0	1	N/A	
Rm D-9 5	-2	121	0	5	0.00	
Rm D-10 1	4	147	0	1	N/A	
Rm D-10 2	4	74	6	5	N/A	
Rm D-10 3	11	89	0	1	N/A	
Rm D-10 4	-2	-11	0	0	N/A	
Rm D-10 5	4	274	0	5	0.00	
Rm D-11 1	24	179	0	5	N/A	
Rm D-11 2	11	-5	0	1	N/A	
Rm D-11 3	-2	74	0	1	N/A	
Rm D-11 4	4	63	0	14	N/A	
Rm D-11 5	4	221	0	0	0.00	
Rm D-12 1	11	-16	0	1	N/A	
Rm D-12 2	18	0	0	1	N/A	
Rm D-12 3	11	11	0	5	N/A	
Rm D-12 4	-2	-11	0	0	N/A	
Rm D-12 5	-2	116	0	10	0.00	
HPLAB Exterior Walls						SU-910
1	22	-195	0	0	0.6	
2	16	-53	0	0	0.0	
3	2	-21	0	5	0.0	
4	36	-37	0	7	0.0	
5	16	-84	0	1	0.0	
6	36	16	0	1	0.6	
7	16	16	0	3	0.0	
8	49	-100	0	0	0.0	
9	22	-32	0	3	0.6	
10	89	47	0	0	0.0	
21	9	-111	0	1	0.0	
22	16	305	0	3	3.9	
23	36	11	0	3	1.7	
24	22	58	0	1	0.6	
25	2	-137	0	0	0.0	
26	42	58	0	1	0.0	
27	9	-37	0	1	0.0	
28	16	-153	2	0	0.0	
29	22	-111	0	0	0.6	
30	9	-168	2	1	0.6	
31	16	-26	2	3	0.0	
32	2	-163	0	0	0.0	
33	36	-100	2	3	0.0	
34	16	-116	0	0	0.6	
35	-4	-216	0	0	0.0	
36	-4	-53	2	5	0.0	
37	36	32	0	0	0.0	
38	9	-132	2	1	0.0	
39	-4	-105	2	1	0.0	
40	49	-79	2	5	0.0	
41	22	-147	0	1	0.6	
42	76	258	2	3	0.0	
43	9	-195	0	0	0.0	
44	-4	-95	0	1	0.0	
45	16	-63	2	1	0.0	
46	36	-74	0	1	0.0	
47	9	-26	0	3	0.0	
48	22	68	4	1	0.0	
49	16	-5	2	1	0.6	
50	42	53	0	5	0.6	
Source Storage Shed Exterior Walls						SU-910
11	16	-105	0	0	0.0	
12	29	142	0	3	0.0	
13	9	-95	0	1	0.0	
14	9	-42	0	1	1.7	
15	-4	268	0	5	3.9	
16	9	74	0	0	2.8	
17	22	-63	0	3	1.7	
18	22	16	0	1	0.6	
19	9	-5	0	0	0.0	
20	16	47	0	0	0.0	
HPLab Counting Area Interior Walls						SU-911
Grid 185	-2	-178	0	0	N/A	
Grid 186	18	-341	0	10	N/A	
Grid 187	4	-141	0	1	N/A	
Grid 188	4	-99	0	1	N/A	
Grid 189	-2	-215	6	1	N/A	
Grid 190	4	-194	0	1	N/A	
Grid 191	11	-225	0	1	N/A	
Grid 192	11	-46	0	0	N/A	
Grid 193	-2	-294	0	1	N/A	
Grid 194	-2	-189	0	5	N/A	

Table 3
Alpha/Beta-Gamma Surface and Exposure Rate Measurements

Grid Point	Direct (dpm/100 cm²)		Removable (dpm/100 cm²)		Net Exposure Rate	ID
	Alpha	Beta	Alpha	Beta	μR/hr	
Grid 195	4	-241	0	10	N/A	
Grid 196	11	-189	6	1	N/A	
Grid 197	11	-120	0	5	N/A	
Grid 198	4	-152	0	0	N/A	
Grid 199	11	-262	0	0	N/A	
Grid 200	-2	-157	0	5	N/A	
Grid 201	-2	-320	0	0	N/A	
Grid 202	18	-99	0	1	N/A	
Grid 203	-2	-236	0	14	N/A	
Grid 204	4	-68	0	1	N/A	
Grid 205	-2	-94	0	0	N/A	
Grid 206	-2	-104	0	1	N/A	
Grid 207	4	-89	6	14	N/A	
Grid 208	18	-78	0	1	N/A	
Grid 209	4	-169	0	1	N/A	
Grid 210	11	-127	0	0	N/A	
Grid 211	4	-117	0	1	N/A	
Grid 212	11	-159	0	1	N/A	
Grid 213	-2	-111	0	1	N/A	
Grid 214	4	-138	0	1	N/A	
Grid 215	11	-159	0	0	N/A	
Grid 216	4	-96	0	1	N/A	
Grid 217	11	-164	0	0	N/A	
Grid 218	31	-227	0	0	N/A	
Grid 219	11	-96	0	0	N/A	
Grid 220	-2	-180	0	1	N/A	
Grid 221	4	-259	0	5	N/A	
Grid 222	-2	-85	0	0	N/A	
Grid 223	-2	-138	0	0	N/A	
Grid 224	-2	-54	0	14	N/A	
Grid 225	-2	49	0	0	N/A	
Grid 226	11	-138	0	0	N/A	
Grid 227	-2	-106	0	1	N/A	
Grid 228	4	-54	0	0	N/A	
Grid 229	-2	-111	0	0	N/A	
Grid 230	4	-159	0	1	N/A	
Grid 231	-2	-43	0	0	N/A	
Grid 232	4	44	0	1	N/A	
Grid 233	24	-54	0	0	N/A	
Grid 234	18	-6	6	0	N/A	
Grid 235	-2	-64	0	0	N/A	
Grid 236	-2	-243	0	0	N/A	
Grid 237	-2	-227	0	10	N/A	
Grid 238	4	-143	0	1	N/A	

Grid Point	Direct (dpm/100 cm²)		Removable (dpm/100 cm²)		Net Exposure Rate	ID
	Alpha	Beta	Alpha	Beta	μR/hr	
Grid 239	-4	7	0	0	N/A	
Grid 240	16	-75	6	0	N/A	
Grid 241	16	-22	0	0	N/A	
Grid 242	2	4	6	0	N/A	
Grid 243	2	-6	0	1	N/A	
Grid 244	2	7	0	5	N/A	
Grid 245	9	4	0	10	N/A	
Grid 246	2	-190	0	0	N/A	
Grid 247	-4	-122	0	5	N/A	
Grid 248	2	-96	0	5	N/A	
Grid 249	9	-43	0	0	N/A	
Grid 250	16	-101	0	5	N/A	
Grid 251	9	-48	0	5	N/A	
Grid 252	2	10	0	0	N/A	
Grid 253	9	-127	0	1	N/A	
Grid 254	29	-117	0	5	N/A	
Grid 255	2	-85	0	5	N/A	
Grid 256	-4	-122	0	1	N/A	
Grid 257	-4	28	0	0	N/A	
Grid 258	9	-11	6	1	N/A	
Grid 259	9	10	0	0	N/A	
Grid 260	9	-64	0	5	N/A	
Grid 261	-4	-106	0	5	N/A	
Grid 262	2	-22	0	0	N/A	
Grid 263	2	-54	0	0	N/A	
Grid 264	9	-85	0	5	N/A	
Grid 265	9	-159	0	0	N/A	
Grid 266	9	-101	0	1	N/A	
Grid 267	9	-127	6	1	N/A	
Grid 268	9	-54	0	1	N/A	
Grid 269	4	-20	6	1	N/A	
Grid 270	-9	-25	0	1	N/A	
Grid 271	-2	-36	0	1	N/A	
Grid 272	-9	11	0	1	N/A	
Grid 273	24	1	0	5	N/A	
Grid 274	4	6	0	1	N/A	
Grid 275	-2	-46	0	1	N/A	
Grid 276	11	-68	6	0	N/A	
Grid 277	-2	-73	6	1	N/A	
Grid 278	-2	-83	0	5	N/A	
Grid 279	-2	-20	0	14	N/A	
Grid 280	11	19	0	5	N/A	
Grid 281	11	-62	0	1	N/A	
Grid 282	-2	-10	0	1	N/A	

Table 3
Alpha/Beta-Gamma Surface and Exposure Rate Measurements

Grid Point	Direct (dpm/100 cm²)		Removable (dpm/100 cm²)		Net Exposure Rate	ID
	Alpha	Beta	Alpha	Beta	μR/hr	
Grid 283	-2	-57	0	1	N/A	
Grid 284	24	93	0	1	N/A	
Grid 285	-2	-4	0	0	N/A	
Grid 286	4	9	0	1	N/A	
Grid 287	4	1	6	10	N/A	
Grid 288	11	19	0	0	N/A	
Grid 289	4	51	0	1	N/A	
Grid 290	11	40	0	1	N/A	
Grid 291	-9	1	12	1	N/A	
Grid 292	4	-57	0	1	N/A	
Grid 293	11	32	6	10	N/A	
Grid 294	11	1	0	1	N/A	
Grid 295	4	-110	6	0	N/A	
Grid 296	-2	-52	0	1	N/A	
Grid 297	-2	11	6	1	N/A	
Grid 298	4	9	0	1	N/A	
Grid 299	4	-41	6	1	N/A	
Grid 300	4	-68	6	0	N/A	
Grid 301	24	-115	0	5	N/A	
Grid 302	11	-125	0	1	N/A	
Grid 303	11	-25	0	1	N/A	
Grid 304	-9	-83	0	0	N/A	
Grid 305	-2	-62	0	1	N/A	
Grid 306	24	-10	0	0	N/A	
Grid 307	-9	82	0	1	N/A	
Grid 308	11	-52	0	0	N/A	
Grid 309	-9	-57	0	0	N/A	
Grid 310	18	-25	0	0	N/A	
Grid 311	11	-41	6	10	N/A	
Grid 312	-9	-15	0	0	N/A	
Grid 313	18	-83	0	5	N/A	
Grid 314	24	1	0	1	N/A	
Grid 315	4	-41	0	1	N/A	
Grid 316	18	-73	0	5	N/A	
Grid 317	33	149	0	0	N/A	
Grid 318	7	46	0	1	N/A	
Grid 319	33	36	0	1	N/A	
Grid 320	47	18	0	1	N/A	
Grid 321	7	41	0	0	N/A	
Grid 322	13	-75	0	5	N/A	
Grid 323	20	-32	6	5	N/A	
Grid 324	53	96	0	0	N/A	
Grid 325	53	96	0	5	N/A	
Grid 326	20	-75	0	1	N/A	

Grid Point	Direct (dpm/100 cm²)		Removable (dpm/100 cm²)		Net Exposure Rate	ID
	Alpha	Beta	Alpha	Beta	μR/hr	
Grid 327	13	25	0	1	N/A	
Grid 328	20	-59	0	1	N/A	
Grid 329	40	31	0	5	N/A	
Grid 330	7	-6	6	5	N/A	
Grid 331	47	15	0	0	N/A	
Grid 332	7	-69	0	5	N/A	
Grid 333	27	96	0	1	N/A	
Grid 334	7	-11	0	0	N/A	
Grid 335	27	25	0	5	N/A	
Grid 336	27	23	0	1	N/A	
Grid 337	40	15	0	1	N/A	
Grid 338	0	23	0	1	N/A	
Grid 339	33	128	0	0	N/A	
Grid 340	33	-11	6	10	N/A	
Grid 341	20	-27	0	10	N/A	
Grid 342	0	118	0	0	N/A	
Grid 343	7	-27	0	0	N/A	
Grid 344	20	-27	6	0	N/A	
Grid 345	0	28	6	0	N/A	
Grid 346	20	-59	0	0	N/A	
Grid 347	0	-106	0	5	N/A	
Grid 348	20	-59	0	5	N/A	
Grid 349	27	10	0	0	N/A	
Grid 350	13	-96	0	1	N/A	
Grid 351	20	-11	0	1	N/A	
Grid 352	47	-75	6	0	N/A	
Grid 353	27	49	0	1	N/A	
Grid 354	40	-22	0	1	N/A	
Grid 355	13	-75	0	0	N/A	
Grid 356	0	-80	13	10	N/A	
Grid 357	13	-22	0	0	N/A	
Grid 358	7	-143	6	0	N/A	
Grid 359	13	170	13	1	N/A	
Grid 360	7	-96	6	1	N/A	
Grid 361	7	-22	0	14	N/A	
Grid 362	33	-27	0	1	N/A	
Grid 363	20	91	0	0	N/A	
Grid 364	13	46	0	1	N/A	
Grid 365	20	-106	0	1	N/A	
Grid 366	27	-54	0	1	N/A	
Grid 367	20	-69	0	0	N/A	
Grid 368	0	54	0	1	N/A	
Grid 369	20	2	6	0	N/A	
Grid 370	0	118	0	5	N/A	

Table 3
Alpha/Beta-Gamma Surface and Exposure Rate Measurements

Grid Point	Direct (dpm/100 cm²)		Removable (dpm/100 cm²)		Net Exposure Rate	ID
	Alpha	Beta	Alpha	Beta	μR/hr	
Grid 371	0	-75	0	0	N/A	
Grid 372	0	91	0	1	N/A	
Grid 373	47	-75	0	14	N/A	
Grid 374	7	-75	0	1	N/A	
Grid 375	27	39	6	1	N/A	
Grid 376	7	118	0	0	N/A	
Grid 377	13	-78	0	6	N/A	
Grid 378	27	48	0	0	N/A	
Grid 379	27	-57	0	1	N/A	
Grid 380	27	-36	6	1	N/A	
Grid 381	0	-4	0	1	N/A	
Grid 382	27	38	0	6	N/A	
Grid 383	0	-201	6	0	N/A	
Grid 384	40	-22	0	1	N/A	
Grid 385	13	-80	0	5	N/A	
Grid 386	0	-43	6	0	N/A	
Grid 387	13	4	0	0	N/A	
Grid 388	13	15	0	5	N/A	
Grid 389	20	-64	6	9	N/A	
Grid 390	0	-48	0	5	N/A	
Grid 391	20	-111	0	1	N/A	
Grid 392	33	36	12	0	N/A	
Grid 393	13	-11	0	5	N/A	
Grid 394	7	10	0	1	N/A	
Grid 395	13	7	6	1	N/A	
Grid 396	7	-11	0	1	N/A	
Grid 397	7	-32	0	1	N/A	
Grid 398	13	-169	0	5	N/A	
Grid 399	7	-148	0	0	N/A	
Grid 400	7	-122	0	0	N/A	
Grid 401	7	-164	0	0	N/A	
Grid 402	7	-17	0	0	N/A	
Grid 403	40	7	0	0	N/A	
Grid 404	7	46	0	0	N/A	
Grid 405	0	-154	0	0	N/A	
Grid 406	7	36	0	0	N/A	
Grid 407	7	-127	0	1	N/A	
Grid 408	0	-54	0	0	N/A	
Grid 409	20	-22	0	0	N/A	
Grid 410	0	-111	0	0	N/A	
Grid 411	7	75	0	5	N/A	
Grid 412	13	-111	0	0	N/A	
Grid 413	33	-164	0	0	N/A	
Grid 414	13	-11	0	0	N/A	
Grid 415	0	39	6	5	N/A	
Grid 416	7	-22	0	1	N/A	
Grid 417	13	-90	0	0	N/A	
Grid 418	13	-32	0	1	N/A	
HPLab Counting Area Ceiling						SU-911
Grid 001	4	256	0	1	N/A	
Grid 002	-2	204	0	0	N/A	
Grid 003	11	82	0	0	N/A	
Grid 004	11	14	0	0	N/A	
Grid 005	11	272	6	1	N/A	
Grid 006	31	319	0	1	N/A	
Grid 007	9	79	6	10	N/A	
Grid 008	2	68	0	0	N/A	
Grid 009	22	216	0	1	N/A	
Grid 010	42	153	0	0	N/A	
Grid 011	49	253	0	1	N/A	
Grid 012	22	195	0	1	N/A	
Grid 013	16	168	0	1	N/A	
Grid 014	29	158	0	1	N/A	
Grid 015	2	105	0	1	N/A	
Grid 016	29	153	6	5	N/A	
Grid 017	2	105	0	1	N/A	
Grid 018	16	305	13	5	N/A	
Grid 019	22	147	0	1	N/A	
Grid 020	16	0	0	0	N/A	
Grid 021	29	163	0	10	N/A	
Grid 022	36	184	0	0	N/A	
Grid 023	42	274	0	1	N/A	
Grid 024	2	174	0	0	N/A	
Grid 025	9	237	0	0	N/A	
Grid 026	9	63	6	1	N/A	
Grid 027	9	116	0	0	N/A	
Grid 028	56	132	0	1	N/A	
Grid 029	22	263	0	5	N/A	
Grid 030	16	21	0	1	N/A	
Grid 031	16	84	0	0	N/A	
Grid 032	-11	8	0	1	N/A	
Grid 033	9	105	0	0	N/A	
Grid 034	29	26	0	5	N/A	
Grid 035	16	95	6	0	N/A	
Grid 036	16	37	0	0	N/A	
Grid 037	22	111	0	1	N/A	
Grid 038	9	53	6	1	N/A	
Grid 039	29	100	0	1	N/A	

Table 3
Alpha/Beta-Gamma Surface and Exposure Rate Measurements

Grid Point	Direct (dpm/100 cm²)		Removable (dpm/100 cm²)		Net Exposure Rate	ID
	Alpha	Beta	Alpha	Beta	μR/hr	
Grid 040	29	3	0	5	N/A	
Grid 041	36	111	0	1	N/A	
Grid 042	2	16	0	0	N/A	
Grid 043	9	111	0	0	N/A	
Grid 044	9	132	0	5	N/A	
Grid 045	16	84	0	10	N/A	
Grid 046	-4	42	0	1	N/A	
Grid 047	20	96	0	9	N/A	
Grid 048	13	123	0	0	N/A	
Grid 049	7	65	0	1	N/A	
Grid 050	20	133	0	5	N/A	
Grid 051	27	170	0	5	N/A	
Grid 052	7	23	0	1	N/A	
Grid 053	4	63	0	1	N/A	
Grid 054	4	13	0	1	N/A	
Grid 055	-2	13	0	0	N/A	
Grid 056	-2	53	0	0	N/A	
Grid 057	11	-18	0	0	N/A	
Grid 058	4	24	0	1	N/A	
Grid 059	18	-150	0	0	N/A	
Grid 060	11	39	0	1	N/A	
Grid 061	-2	-234	0	5	N/A	
Grid 062	18	18	0	0	N/A	
Grid 063	24	89	0	0	N/A	
Grid 064	4	-124	0	1	N/A	
Grid 065	4	39	0	0	N/A	
Grid 066	18	0	0	0	N/A	
Grid 067	11	-8	0	1	N/A	
Grid 068	4	-18	0	0	N/A	
Grid 069	11	47	0	0	N/A	
Grid 070	4	0	0	14	N/A	
Grid 071	-2	53	0	14	N/A	
Grid 072	4	-3	0	0	N/A	
Grid 073	4	18	0	5	N/A	
Grid 074	18	34	0	0	N/A	
Grid 075	4	8	0	0	N/A	
Grid 076	11	-29	6	10	N/A	
Grid 077	24	29	0	1	N/A	
Grid 078	4	34	0	0	N/A	
Grid 079	4	-39	0	0	N/A	
Grid 080	4	3	0	1	N/A	
Grid 081	4	-66	0	5	N/A	
Grid 082	4	-18	0	0	N/A	
Grid 083	11	45	6	5	N/A	
Grid 084	11	-76	0	1	N/A	
Grid 085	4	142	0	1	N/A	
Grid 086	18	-55	6	5	N/A	
Grid 087	11	-118	0	1	N/A	
Grid 088	11	-76	0	1	N/A	
Grid 089	-2	0	0	5	N/A	
Grid 090	-2	-71	0	1	N/A	
Grid 091	-2	-124	0	1	N/A	
Grid 092	4	18	0	1	N/A	
HPLab Counting Area Floor						SU-911
Grid 093	2	11	0	0	0.0	
Grid 094	-4	79	0	1	0.0	
Grid 095	2	132	0	0	0.0	
Grid 096	-4	300	0	0	2.8	
Grid 097	-4	79	0	1	0.0	
Grid 098	-4	79	6	1	0.0	
Grid 099	-4	-55	0	0	0.0	
Grid 100	-4	100	0	1	0.0	
Grid 101	2	34	0	0	0.0	
Grid 102	16	18	0	5	0.0	
Grid 103	-4	263	0	1	0.0	
Grid 104	-4	0	0	10	0.0	
Grid 105	2	89	0	1	0.0	
Grid 106	-4	105	0	1	0.6	
Grid 107	-4	211	0	0	0.0	
Grid 108	9	295	0	0	0.0	
Grid 109	2	211	12	5	0.0	
Grid 110	2	111	0	0	0.0	
Grid 111	-4	53	0	0	0.0	
Grid 112	-4	37	0	1	0.0	
Grid 113	-4	47	0	0	0.0	
Grid 114	9	84	0	10	0.0	
Grid 115	9	195	0	1	0.0	
Grid 116	2	100	0	5	0.0	
Grid 117	2	29	0	0	0.0	
Grid 118	-4	74	0	0	0.0	
Grid 119	-4	32	0	0	0.0	
Grid 120	2	47	0	1	0.0	
Grid 121	2	68	0	0	0.0	
Grid 122	-4	84	0	0	0.0	
Grid 123	9	95	0	0	0.0	
Grid 124	-4	11	0	0	0.0	
Grid 125	2	37	0	1	0.0	
Grid 126	2	68	0	1	0.0	

Table 3
Alpha/Beta-Gamma Surface and Exposure Rate Measurements

Grid Point	Direct (dpm/100 cm²)		Removable (dpm/100 cm²)		Net Exposure Rate	ID
	Alpha	Beta	Alpha	Beta	μR/hr	
Grid 127	2	95	0	1	0.0	
Grid 128	2	34	6	0	0.0	
Grid 129	2	34	0	1	0.0	
Grid 130	-4	68	0	1	0.0	
Grid 131	-4	18	0	0	0.0	
Grid 132	-4	63	6	1	0.0	
Grid 133	16	84	0	5	0.6	
Grid 134	9	32	0	10	0.0	
Grid 135	2	174	0	0	0.0	
Grid 136	2	100	0	10	0.6	
Grid 137	16	121	0	1	0.0	
Grid 138	-4	21	0	0	0.6	
Grid 139	13	-27	0	1	0.0	
Grid 140	7	139	0	9	0.0	
Grid 141	7	81	0	0	0.0	
Grid 142	7	33	0	0	0.0	
Grid 143	0	112	0	1	0.0	
Grid 144	0	-6	0	1	0.0	
Grid 145	-2	19	6	1	0.0	
Grid 146	-2	46	0	1	0.0	
Grid 147	-2	40	0	0	0.0	
Grid 148	-9	130	0	1	0.0	
Grid 149	-2	82	0	6	0.0	
Grid 150	-9	151	0	1	0.0	
Grid 151	-9	82	0	0	0.0	
Grid 152	-2	104	0	1	0.0	
Grid 153	-9	17	0	1	0.0	
Grid 154	-9	27	0	0	0.0	
Grid 155	-2	46	6	0	0.0	
Grid 156	18	48	0	6	0.0	
Grid 157	4	25	6	1	0.0	
Grid 158	4	56	6	1	0.0	
Grid 159	-2	30	6	1	0.0	
Grid 160	-2	51	0	6	0.0	
Grid 161	-9	4	0	1	0.0	
Grid 162	-9	114	0	1	0.0	
Grid 163	-9	32	6	6	0.0	
Grid 164	4	114	0	6	0.0	
Grid 165	-9	48	0	0	0.0	
Grid 166	-9	51	0	0	0.0	
Grid 167	4	56	0	0	0.0	
Grid 168	-9	22	0	1	0.0	
Grid 169	-9	-25	0	0	0.0	
Grid 170	11	77	6	1	0.0	
Grid 171	4	135	0	0	0.0	
Grid 172	-9	161	0	0	0.0	
Grid 173	-9	46	6	0	0.0	
Grid 174	-2	27	0	6	0.0	
Grid 175	-9	19	0	1	0.0	
Grid 176	-9	61	0	6	0.0	
Grid 177	-9	-15	0	1	0.0	
Grid 178	-9	6	0	0	0.0	
Grid 179	-9	119	0	6	0.0	
Grid 180	-2	77	0	0	0.0	
Grid 181	-2	14	0	0	0.0	
Grid 182	-9	38	0	0	0.0	
Grid 183	-9	67	0	1	0.0	
Grid 184	-2	-83	0	0	0.0	
Sample Storage Shed Interior Walls						**SU-911**
Grid 447	-9	-152	0	1	N/A	
Grid 448	-9	-162	0	0	N/A	
Grid 449	-2	-99	6	5	N/A	
Grid 450	-9	-131	0	0	N/A	
Grid 451	-9	-168	0	1	N/A	
Grid 452	-9	-162	0	1	N/A	
Grid 453	-9	-73	0	0	N/A	
Grid 454	-2	9	0	5	N/A	
Grid 455	2	37	0	0	N/A	
Grid 456	-4	39	0	0	N/A	
Grid 457	2	8	0	5	N/A	
Grid 458	-4	100	0	5	N/A	
Grid 459	2	147	0	1	N/A	
Grid 460	-4	100	0	0	N/A	
Grid 461	-4	53	0	1	N/A	
Grid 462	-4	13	0	5	N/A	
Grid 463	-4	53	0	0	N/A	
Grid 464	-4	42	0	0	N/A	
Grid 465	-4	-66	0	0	N/A	
Grid 466	9	-13	0	1	N/A	
Grid 467	-4	-34	0	1	N/A	
Grid 468	-4	58	0	1	N/A	
Grid 469	-4	-8	0	0	N/A	
Grid 470	-4	-29	6	0	N/A	
Grid 471	-4	74	0	0	N/A	
Grid 472	-4	232	0	1	N/A	
Grid 473	-4	132	0	1	N/A	
Grid 474	-4	53	0	1	N/A	
Grid 475	-4	-34	0	0	N/A	

Table 3
Alpha/Beta-Gamma Surface and Exposure Rate Measurements

Grid Point	Direct (dpm/100 cm²)		Removable (dpm/100 cm²)		Net Exposure Rate	ID
	Alpha	Beta	Alpha	Beta	μR/hr	
Grid 476	-4	226	0	1	N/A	
Grid 477	9	53	0	1	N/A	
Grid 478	-4	126	0	0	N/A	
Grid 479	-4	-71	0	1	N/A	
Grid 480	2	0	0	0	N/A	
Grid 481	-4	63	0	1	N/A	
Grid 482	-4	-3	0	0	N/A	
Grid 483	-4	-50	0	5	N/A	
Grid 484	-4	42	0	0	N/A	
Grid 485	-4	16	0	0	N/A	
Grid 486	-4	89	0	10	N/A	
Sample Storage Shed Ceiling						SU-911
Grid 419	-4	32	0	1	N/A	
Grid 420	-4	68	0	5	N/A	
Grid 421	2	79	6	0	N/A	
Grid 422	2	26	0	5	N/A	
Grid 423	2	168	0	0	N/A	
Grid 424	-4	142	0	0	N/A	
Grid 425	-4	205	0	5	N/A	
Grid 426	2	100	0	0	N/A	
Grid 427	2	147	0	0	N/A	
Grid 428	-4	158	0	1	N/A	
Grid 429	-4	216	0	0	N/A	
Grid 430	-4	100	0	1	N/A	
Grid 431	2	295	0	1	N/A	

Grid Point	Direct (dpm/100 cm²)		Removable (dpm/100 cm²)		Net Exposure Rate	ID
	Alpha	Beta	Alpha	Beta	μR/hr	
Grid 432	2	221	0	0	N/A	
Grid 433	-4	42	0	5	N/A	
Grid 434	-4	63	0	5	N/A	
Sample Storage Shed Floor						SU-911
Grid 435	-9	30	0	5	0.6	
Grid 436	-2	130	0	1	0.0	
Grid 437	-9	56	0	0	0.0	
Grid 438	-9	119	0	0	0.0	
Grid 439	-2	35	0	5	0.0	
Grid 440	4	225	0	1	0.0	
Grid 441	-2	161	0	1	1.7	
Grid 442	4	188	0	1	0.6	
Grid 443	-9	209	6	5	0.6	
Grid 444	-2	93	0	0	0.0	
Grid 445	-9	98	0	0	0.0	
Grid 446	-9	130	0	5	0.0	

NOTE:

1. Exposure rate expressed in PIC – equivalent μR/hr. (μR/hr * 1.12) - 8.4 (PE site background)
2. Surfaces were scanned for beta-gamma and no hot spots exceeding the release criteria were identified.
3. Negative removable and μR measurements have been truncated to zero.