SUB-AREA F
FINAL STATUS SURVEY REPORT

CIMARRON CORPORATION
NUCLEAR FUEL FABRICATION FACILITY
DECOMMISSIONING PROJECT

AUGUST 2005
Revision 0

Cimarron Corporation
Crescent, Oklahoma

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September 8, 2005

Mr. Kenneth Kalman
Office of Nuclear Materials Safety & Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Re: Docket No. 70-925; License No. SNM-928
Final Status Survey Report for Subarea F

Dear Mr. Kalman:
Cimarron Corporation (Cimarron) encloses herein six copies of Final Status Survey for Subarea F for NRC review and approval. This Final Status Survey Report (FSSR) demonstrates that the soil and other materials (excluding groundwater) in Subarea F comply with the decommissioning criteria listed in condition 27(c) of license SNM-928.

Cimarron does not request release of this subarea from license SNM-928, because it is recognized that groundwater exceeding license release criteria is present in this subarea. However, Cimarron believes the review and approval of this FSSR is important to the successful and timely completion of decommissioning for the following reasons:

- This report (as well as all previous FSSRs) presents final status survey data in accordance with NUREG-5849, as stipulated in license SNM-928. NUREG-5849 provides no guidance for groundwater.
- Review and approval of this FSSR provides all stakeholders NRC's assurance that groundwater is the only remaining media which requires further remediation to meet license criteria.
- Some groundwater remediation methods may require the excavation or handling of soil, and NRC concurrence that soil within this area is releasable for unrestricted use may facilitate approval of work plans by other regulatory agencies (i.e., Oklahoma Department of Environmental Quality).

Consequently, Cimarron requests that NRC perform such confirmatory surveys and reviews as are necessary to provide written concurrence that, with the exception of groundwater, Subarea F is releasable for unrestricted use.

If you have any questions or comments, please feel free to call me at (405) 642-5152.

Sincerely,

Jeff Lux
Project Manager

Cc: Blair Spitzberg, NRC Region IV

Cimarron Corporation
Nuclear Fuel Fabrication Facility
Crescent, Oklahoma
Decommissioning Project

FINAL STATUS SURVEY REPORT
SUB-AREA F

PREPARED BY:

NEXTEP Environmental, Inc.

August 2005
Revision 0

SUBMITTED BY:
CIMARRON CORPORATION

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CIMARRON CORPORATION
NUCLEAR FUEL FABRICATION FACILITY
CRESCENT, OKLAHOMA
DECOMMISSIONING PROJECT

FINAL STATUS SURVEY REPORT

SUB-AREA F

1 INTRODUCTION

1.1 PURPOSE

1.1.1 This Final Status Survey Report (FSSR) is being submitted by Cimarron Corporation to the Nuclear Regulatory Commission (NRC) for an area on the Cimarron Site designated as Phase II, Sub-area F. The location of Sub-area F on the Cimarron Site is shown in Appendix A, Figure 1.1. This FSSR demonstrates that the residual radioactivity in the soil[1] of the sector complies with decommissioning criteria stipulated in License SNM-928 and the Site Decommissioning Plan (SDP).

1.2 BACKGROUND

1.2.1 Cimarron Corporation, a subsidiary of Kerr-McGee Corporation (KMC), operated a plant near Crescent, Oklahoma for the manufacture of enriched uranium. The 840-acre Cimarron Site was originally licensed for the Uranium Plant (U-Plant) under license SNM-928 in 1965. The facility operated through 1975, at which time it was shut down and decommissioning work was initiated.

1.2.2 The licensed materials at this site, covered by license SNM-928, are uranium and thorium.

1.2.3 Decommissioning efforts at the Cimarron U-Plant Facility involving characterization, decontamination, and remediation were initiated in 1976 and are nearing completion. The goal of the decommissioning effort is to release the entire 840-acre site for unrestricted use.

1.2.4 Based on historic knowledge of site operations and the site characterization work, Cimarron Corporation completed and submitted the Cimarron Radiological

[1] Groundwater will be addressed separately.

Characterization Report[2] to the NRC. The Characterization Report described how the entire 840-acre site was divided into unaffected and affected areas, with three major areas referenced as Phases I, II, and III, for the final status survey (FSS). These major areas were then subdivided into smaller "sub-areas", which were designated as Sub-areas A through O. Each phase area of the site was divided into five sub-areas. Phase I included only unaffected Sub-areas A, B, C, D, and E. Phase II included affected areas and contiguous unaffected areas which were designated Sub-areas F, G, H, I, and J. Phase III included only affected Sub-areas K, L, M, N, and O.

1.2.5 The FSSRs for the soil in all sub-areas except Sub-area F have been completed and submitted to the NRC. All of the submitted FSSRs have been accepted by the NRC, and confirmatory soil surveys have been completed and approved. All of the approved sub-areas have been released from license SNM-928 except for Sub-areas G and N, which are pending release. A summary of the status of the Cimarron Site sub-areas is included in Table 1.1.

Table 1.1
Cimarron Site Final Status Survey Completion Status

Phase	Sub-Area	Area (Acres)	FSSP[a] Approved	FSSR Submitted	NRC Confirmatory Sampling	Unrestricted Release
I	A, B, C, D, E	688	5/1/95	5/95	Completed	4/23/96
II	F	19.6	3/14/97	3/98[b], 8/05	Pending	Pending
	G	37.8	3/14/97	10/99	Completed	Pending
	H	38.5	3/14/97	11/98	Completed	4/9/01
	I	19.1	3/14/97	6/99	Completed	4/9/01
	J	7	3/14/97	9/97	Completed	4/17/00
III	K	4.5	9/11/98	2/00	Completed	5/28/02
	L	5	9/11/98	2/96 (Subsurface)[c], 7/98 (Surface)[c]	Completed	4/9/01
	M	2.5	9/11/98	12/98	Completed	4/9/01
	N	11.6	9/11/98	1/02	Completed	Pending
	O	6.4	9/11/98	3/98 (Subsurface)[c], 2/99 (Surface)	Completed	4/17/00

[a] Final Status Survey Plan
[b] FSSR for Concrete Rubble in Sub-area F;
[c] These reports were submitted with NRC concurrence while the FSSP for Phase III Areas was still in the approval cycle.

[2] *Radiological Characterization Report for Cimarron Corporation's Former Nuclear Fuel Fabrication Facility, Crescent, Oklahoma*, Chase Environmental Group, October 1994.

2 SCOPE OF THE FINAL STATUS SURVEY

2.1 SURVEY UNIT DESCRIPTION

2.1.1 Sub-area F consists of approximately 19.6 acres located in the northeast quadrant of the Cimarron Site, just north of Reservoir #2, as depicted in Appendix A, Figure 1.1. Sub-area F contains the former Burial Ground #1 (BG #1), a groundwater investigation area north of BG #1, an adjacent drainage way north of Reservoir 2, an area of concrete rubble in the drainage way, the roadway that was used as a haul road during prior site operations, and the contiguous unaffected area. BG #1 was remediated and released for backfill by the NRC in December 1992. The concrete rubble is used for erosion control in a portion of the drainage spillway and was addressed via the FSSR submitted to the NRC in March 1998. These areas are depicted in Appendix A, Figure 2.1.

2.1.2 Sub-area F was divided into four survey areas to facilitate data analysis. A map of Sub-area F and the survey areas is presented in Appendix A, Figure 2.2. The four survey areas are listed in Table 2.1. The BG #1 Affected Area (FA) data set includes the former BG #1 and a topographically low area adjacent to it. The Drainage Area (FD) and the Roadway Area (FR) are surface locations that could have possibly been affected by site activities. The Drainage Area includes the drainage way from the outlet of Reservoir #2 to the northern boundary of Sub-area F. The Roadway Area, which was used by site vehicular traffic during prior site process operations, includes the road surface from the west end of Sub-area F to the outlet of Reservoir #2. The Unaffected Area (FU) includes the remaining surface area of Sub-area F that was not affected by site activities. The former access road between the haul road and BG #1 was determined not to be affected because the material excavated from BG #1 was containerized in a loading zone within the BG #1 Affected Area.

Table 2.1
FSS Areas for Sub-area F

Survey Areas	Physical Description
FA	BG #1 Affected Area
FD*	Drainage Area
FR	Roadway Area
FU	Unaffected Area

* 14 data points that were coded FA on the original data sheets were actually located in the Drainage Area and are included in the FD data set. (See Table 2A in Appendix B.)

2.2 RADIONUCLIDES OF INTEREST

2.2.1 The radiological contaminants at the site have been determined to be U-234, U-235, U-238, and natural thorium[3]. The uranium is comprised of natural, depleted, and

[3] *FSSP for Phase II Areas, Cimarron Corporation's Former Nuclear Fuel Fabrication Facility, Crescent, Oklahoma*, Chase Environmental Group, July 1995.

enriched[4] forms which result in an average enrichment above the naturally occurring level. Although natural thorium was present in the material buried on site in BG #1 it was not a product of Cimarron operations. BG #1 was remediated between 1986 and 1988 and a confirmatory report[5] was issued in 1992. Approval for the back-filling and reseeding of BG #1 is contained in a 1992 letter from the NRC[6]. Samples collected for the final status surveys were analyzed for total uranium and natural thorium to ensure a complete and accurate characterization.

2.3 SUB-AREA F DECOMMISSIONING ACTIVITIES

2.3.1 BG #1 Subsurface Data

2.3.1.1 Included in Sub-area F are former Burial Ground #1 and the surrounding area. Radioactive contaminated solid wastes generated from the Cimarron uranium plant activities were buried at a designated on-site radioactive waste disposal area (BG #1) from 1966 to 1970. Thorium was also present at this former burial site due to drummed waste materials being shipped to Cimarron from the decommissioning of the KMC Cushing facility. BG #1 was excavated and remediated and the former contents were disposed of according to the site license requirements. After remediation and confirmation sampling, BG #1 was released for backfilling by the NRC[7] and subsequently back-filled with clean soil and re-seeded. The former location of BG #1 is shown in Figure 2.1 in Appendix A. The vicinity around former BG #1 was designated as the BG #1 Affected Area. Due to the fact that the bottom surface of BG #1 met the license criteria[8], no subsurface data from the BG #1 Affected Area is presented in this report.

2.3.2 FSS Soil Sample Data

2.3.2.1 Affected and unaffected areas within Sub-area F were sampled on the surface following the requirements of NUREG/CR-5849[9] and the SDP as outlined in Section 8 of the FSSP for Phase II Areas. Surface sampling results for all affected and unaffected areas within Sub-area F are presented in this report.

2.3.2.2 Subsurface samples were collected in the Drainage and Roadway Areas in accordance with the sampling protocol outlined in the report submitted to the NRC in January 1997.[10] The results are presented in this report.

2.3.2.3 Subsurface data from the BG #1 Affected Area have previously been submitted to the NRC and are not addressed in this report per the report submitted to the NRC in

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4 Average enrichment on the Cimarron Site is 2.7 weight percent per Section 6 of the FSSP for Phase II Areas.

5 "*Confirmatory Radiological Survey Former Burial Ground, Cimarron Corporation Facility, Crescent, Oklahoma*"; Oak Ridge Associated Universities (ORAU), July 1992.

6 USNRC letter for License SNM-928 Amendment No. 9, from G.M. McCann, Chief Materials Licensing Section, to J. Stauter, V.P. Environmental Services, Kerr-McGee Corporation, December 30, 1992.

7 NRC letter dated 12/30/92, Ibid.

8 License SNM-928 Condition 22(a), and *Decontamination and Final Survey Report for Cimarron Facility Contaminated Waste Burial Ground,* Cimarron Corporation, November 1991.

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

10 *Response to NRC Comments on the Cimarron Corporation FSSP for Phase II Areas,* KMC, January 1997.

January 1997[11]. Subsurface sampling was not required by the sampling protocol for the open land Unaffected Area and no such samples were collected for the FSS.

2.3.3 Concrete Rubble

2.3.3.1 Also included in Sub-area F is concrete rubble previously surveyed for release and placed in the drainage way north of Reservoir #2 for erosion control. Survey results for this concrete rubble have been submitted to the NRC in the March 1998 FSSR[12]. By letter dated March 1, 1999, the NRC informed Cimarron that all NRC staff comments concerning the Sub-area F Concrete Rubble FSSR had been resolved. The concrete rubble is pending final release and is not addressed in this report. The location of the concrete rubble is shown in Figure 2.1 in Appendix A.

2.3.4 Groundwater Investigation-Related Soil Data

2.3.4.1 A groundwater investigation was initiated in 1999 for the BG #1 affected area. Soil samples were collected from the groundwater well borings located in the Affected Area of Sub-area F. The groundwater investigation has since moved down-gradient and north from the former Burial Ground #1 and outside the boundaries of Sub-area F. Soil samples collected from groundwater well borings installed for this groundwater investigation have been analyzed for total uranium and natural thorium and all analyses have been below the site limits. Groundwater investigation results (including these soil samples) were submitted in groundwater reports dated January 2000[13], June 2000[14], and January 2003[15].

2.3.4.2 As approved by the NRC in the SDP, Cimarron Corporation is committed to address groundwater investigations for the site in separate reports. Therefore, the groundwater investigation data are not included in this report.

2.4 SITE BACKGROUND LEVELS

2.4.1 Uranium in Soil

2.4.1.1 Natural background levels for uranium in soil have been established through numerous measurements by Cimarron personnel utilizing the on-site soil counter and through independent regulatory review and laboratory analysis. Cimarron personnel collected, analyzed and performed a statistical evaluation on 30 surface soil samples from the perimeter of the Cimarron site during the first quarter 1995 to further validate background levels. Total uranium ranged from 2.3 pCi/g to 6.6 pCi/g, with an average value of 4.0 pCi/g[16].

2.4.1.2 The on-site soil counter is calibrated based on the average uranium enrichment on the site, which was determined to be 2.7 weight percent. This evaluation was submitted

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[11] *Response to NRC*, January 1997, Ibid.

[12] *FSSR for Concrete Rubble in Sub-area F, Cimarron Corporation's Former Nuclear Fuel Fabrication Facility, Crescent Oklahoma*, Kerr McGee Corp., March 1998.

[13] *Progress Report – Burial Ground #1 Groundwater Evaluation*, KMC, January 2000.

[14] *Response to NRC Comments on Cimarron Progress Report Regarding Burial Ground #1 Groundwater Evaluation*, KMC, June 2000.

[15] *Burial Ground #1 Groundwater Assessment Report*, KMC, January 2003.

[16] ± 2.6 pCi/g (2 sigma).

to the NRC in a letter from Cimarron dated June 1995[17]. Based on this sampling event, the average background value of 4.0 pCi/g total uranium was adopted and applied when the FSS analytical results were compared to guideline values.

2.4.2 Thorium in Soil

2.4.2.1 In accordance with the FSSP for Phase II Areas[18], a background value of 1.5 pCi/g natural thorium was used to evaluate thorium data in this report.

2.4.3 Exposure Rate Measurements

2.4.3.1 Background exposure rates have been established at the Cimarron site by taking gamma μR readings at off-site sample locations in addition to the Cimarron site areas that were unaffected by past operations. Site background exposure rates of approximately 7 μR/hr have been observed in background areas by Cimarron personnel using a Ludlum gamma μR survey meter. Site background exposure rates of approximately 7 μR/hr have also been determined by ORISE[19] personnel using similar instrumentation. Additionally, site background exposure rates of approximately 10 μR/hr have been determined by ORISE personnel using a pressurized ion chamber (PIC)[20]. More recent background exposure rates measured in Sub-area F were determined to be approximately 9 μR/hr using both gamma μR survey meters and a PIC (see Section 3.2.3). Because the Ludlum gamma μR meter was used in the FSS, the more conservative background value of 7 μR/hr was used for this report.

2.4.3.2 All background values used in this FSSR are listed in Table 2.2.

Table 2.2
Cimarron Background Values

Radiological Measurement	Background Value
U_{total}	4.0 pCi/g
Th_{nat}	1.5 pCi/g
Exposure Rate	7.0 μR/hr

2.5 RESIDUAL RADIOACTIVITY LIMITS

2.5.1 Release Criteria for Radionuclides in Soil

2.5.1.1 The release criteria for uranium and thorium contamination in soil are stipulated in license condition 27(c) and are reflective of the release criteria stipulated by the NRC

[17] *Cimarron letter from J. Larsen, V.P. Cimarron Corporation, to M. Weber, Chief Low-level Waste and Decommissioning Project Branch, USNRC*, June 21, 1995.
[18] Phase II FSSP, Ibid.
[19] Oak Ridge Institute of Science and Education.
[20] *"Interim Report - Confirmatory Survey of Portions of the Sequoyah Fuels Corporation Cimarron Plant"*, Oak Ridge Associated Universities, January 1989.

in the Branch Technical Position (BTP) paper[21] for Option 1 material. All release criteria are net of background.

2.5.1.2 Since residual uranium on site averages 2.7% enrichment, the soil survey data for Sub-area F will be compared with the release criteria for enriched uranium (30 pCi/g above background). More restrictive criteria apply for unaffected open land areas as specified in the FSSP[22]. The applicable release criteria for Sub-area F are listed in Table 2.3.

Table 2.3
Applicable BTP Option 1 Release Criteria for Soils[a]
(License Condition 27.c)

Radionuclide	Affected Area (pCi/g)	Unaffected Area (pCi/g)
Net Total Uranium	30	22.5[b]
Net Natural Thorium	10	7.5[b]

[a] Net of background

[b] Any concentration in an unaffected area greater than 25% of the affected area release limit requires additional investigation and will result in reclassification if greater than 75% of the limit. (No such values were measured.)

2.5.2 Release Criteria for Gamma Exposure Rate

2.5.2.1 The average exposure rate guideline for release is 10 μR/hr above background at one meter above the surface. Exposure rates may be averaged over a 100 m^2 grid area. The maximum exposure rate measurement at any discrete location cannot exceed 20 μR/hr above background.

2.6 MINIMUM DETECTABLE ACTIVITY (MDA)

2.6.1 Soil radioactivity was measured by collecting soil samples for analysis by the Cimarron soil counter, and by taking exposure rate (μR) readings in the field. The MDA for the instrumentation should, if practical, be less than 25% of the release limit. The instrumentation that was available for use and typical MDA values for those instruments are listed in Table 2.4.

2.6.2 MDA values listed in Table 2.4 for the Cimarron soil counter and the Ludlum (Models 12 and 19) μR meter meet or exceed the 25% requirement.

2.7 ACTION THRESHOLDS FOR GAMMA SCAN SURVEYS

2.7.1 Gamma scan measurements were taken with a sodium iodide (NaI) crystal gamma detector as an additional screening device for qualitative identification of residual contamination in soil. Any survey instrument reading (in counts per minute) greater than twice background was used as an indication that a location required additional investigation.

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[21] *BTP for Disposal or On-site Storage of Thorium or Uranium Wastes from Past Operations, Uranium Fuel Licensing Branch*, USNRC, 1981.

[22] Phase II FSSP, Ibid.

2.8 QUALITY CONTROL

2.8.1 Cimarron Quality Assurance Program (QAP)

2.8.1.1 The Cimarron Corporation QAP is an integral part of the Cimarron Radiation Protection Program. A principal component of the QAP is the confirmation of the quality of project work performed during decommissioning by assuring that all tasks are performed in a quality manner by qualified personnel. The QAP ensures that samples are collected, controlled, and analyzed in accordance with applicable quality controls to provide confidence in the resulting data accuracy and validity. Cimarron's QA/QC program is structured to generate data that can be verified through independent review.

2.8.1.2 The Cimarron QAP is implemented and maintained in accordance with written policies and procedures. This program is administered under the direction of the Cimarron Quality Assurance Coordinator. Periodic surveillance and reviews are conducted to ensure that all aspects of the program are addressed. The Cimarron QAP satisfies the applicable requirements of ASME NQA-1[23]. Details of the Cimarron QAP are included in Section 4 of the FSSP[24].

2.8.2 Soil Split Samples

2.8.2.1 In addition to the routine monitoring of the soil counters using in-process standards and calibration standards, four soil samples from Sub-area F were split and submitted to an independent, off-site laboratory for confirmatory analysis in accordance with Section 8.5 of the FSSP. The results showed satisfactory levels of agreement (see Section 4.4).

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[23] American Society of Mechanical Engineers, "*Quality Assurance Requirements for Nuclear Facility Applications*", ASME NQA-1, 1994.

[24] Phase II FSSP, Ibid.

Table 2.4
Cimarron Radiation Monitoring Instruments

INSTRUMENT TYPE	RADIATION DETECTED	SCALE RANGE	BKG	TYPICAL EFFICIENCY	TYPICAL MDA 95% CONFIDENCE LEVEL
Micro-R Meter (Ludlum 12-S & 19) 1" x 1" NaI Detector	Gamma	0-5,000 μR/h	7 μR/h	N/A	2 μR/h
3" x 1/2" NaI Scintillation (Ludlum 2220/2221)	Gamma	0-500,000 cpm	3,000 cpm avg 9,000 cpm avg	N/A	250 cpm 500 cpm
Soil Counter – Computer Linked 4" x 4" x 16" NaI (T1) Detector	Gamma	---	4 pCi/g U_{tot} 1.5 pCi/g Th_{nat}	4% 15%	5 pCi/g U_{tot} (5 min. count) 0.6 pCi/g Th_{nat} (5 min. count) 3 pCi/g U_{tot} (15 min. count) 0.3 pCi/g Th_{nat} (15 min. count)
*Reuter-Stokes PIC Model RSS-112	Gamma	0-100 mR/h	9-10 μR/h	N/A	0.5 μR/h (10 min. count)

* Cushing site instrument available for Cimarron use.

2.8.3 Statistical Test Calculations

2.8.3.1 As each survey unit was evaluated against the release criteria, statistical calculations were performed to ensure that the 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.

2.8.3.2 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 and exposure rate data used for the FSS.

Equation 1

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

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 the degrees of freedom, df = 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.

2.8.3.3 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 Sub-area F Final Status Survey was implemented in conformance with all Cimarron plans, procedures and other requirements. The instrumentation used to generate the FSS data was maintained by site personnel in accordance with the Cimarron Radiation Protection Program procedures. These procedures follow the guidance contained in ANSI N323-1978[25]. Specific requirements include traceability of calibrations to NIST standards, field checks for operability, background radioactivity checks, operation of instruments within established environmental bounds, training of operators, scheduled performance checks, calibration with isotopes of energies similar to those to be measured, quality assurance tests, data review, and recordkeeping.

3.2 INSTRUMENTATION

3.2.1 A list of Cimarron instrumentation used for the FSS is presented in Table 2.4.

3.2.2 Soil Sample Laboratory Analysis (Gamma Spectroscopy)

3.2.2.1 Analyses for the uranium and thorium series were performed using the gamma spectroscopy soil counter at the Cimarron facility. The Cimarron Soil Counter consists of a 4" x 4" x 16" sodium iodide crystal housed in a shielded chamber that is computer linked to multi-channel analyzer (MCA). The counting system is programmed to determine the total uranium present in the soil sample by calculating the U-234 activity based upon the U-235 activity measured in the soil sample. The U-234 and U-235 activities are summed with the detected U-238 activity to obtain the total U activity. The counter also adjusts for system background. Calibration of this counting system is performed annually and is traceable to NIST standards through contractor laboratory evaluations of the on-site standards.

3.2.2.2 Established quality assurance measures for the soil counter include Cesium-137 centroid checks, Chi-square tests, background determinations, and the counting of appropriate soil standards. All of these quality assurance controls are recorded on control charts and are trended on a continuing basis.

3.2.3 Exposure Rate (μR) Instrumentation

3.2.3.1 All μR data were taken using Ludlum Model 19 and Model 12-S field instruments. The μR meter is a 1" x 1" NaI crystal detector that measures exposure rates between 0 and 5,000 μR/hr. Background readings were obtained daily at a defined location prior to placing each instrument into service. The instrument is utilized, in general, for determination of exposure rates at both systematic and random locations and at locations of elevated radiation identified by area scans.

3.2.3.2 QA/QC comparison measurements were obtained routinely to provide information concerning any measurement bias. These measurements were made using a PIC

[25] American National Standards Institute, "*Radiation Protection Instrumentation Test and Calibration*", ANSI N323-1978, Institute of Electrical and Electronic Engineers, Inc., September 1977.

instrument. Comparison measurements for Sub-area F are included in Table 3.1 and demonstrate acceptable agreement between the μR meter and the PIC.

Table 3.1
Sub-area F Exposure Rate Comparison Measurements
(1 meter above ground surface)

Location	Ludlum Model 19 (μR/hr)	Ludlum Model 12-S (μR/hr)	PIC (μR/hr)
BKG-Highway #1 Marker	9.0	8.5	8.4
714N-1248E	9.0	9.5	8.9
700N-1355E	9.0	9.0	10.2
772N-1228E	9.5	10.0	9.5
632N-1031E	10.5	10.0	9.6
582N-957E	9.0	9.0	8.1
Average	9.3	9.3	9.1

3.2.4 Gamma Surface Survey Instrumentation

3.2.4.1 Gamma scans were performed using Ludlum Model 2221 3"x ½" NaI field instruments in the lead shielded and unshielded configurations. The unshielded instrument configuration was utilized with a portable scaler/rate-meter that had single channel analyzer capability. It was operated in the "window out" mode and the energy threshold was set at 40 keV. This energy range corresponded to the energies of interest for surveying uranium and thorium contamination.

3.2.4.2 The shielded instrument configuration was a 3"x ½" NaI crystal gamma detector that was shielded with lead around the top socket and sides to improve the directional sensing capabilities of the equipment. Similar to the unshielded detector, the shielded detector was utilized with a portable scaler/rate-meter that has a single channel analyzer capacity. Threshold and window settings were the same. This instrument was normally utilized in areas where background may have been elevated.

3.3 GEOGRAPHICAL REFERENCE

3.3.1 **Reference Coordinate System.** The Cimarron Site has an established grid coordinate system with the site origin set at a fixed point just south of the main entrance gate (see Figure 1.1 in Appendix A). Locations are referenced in meters east and north from the site origin. The Oklahoma State Plane coordinates of the site origin are presented in Table 3.2.

Table 3.2
Cimarron Site Origin Coordinates*

Direction	Site Grid (meters)	State Plane (feet)
North	0.0	319,820.5
East	0.0	2,091,476.6

* Site origin coordinates provided by KMC Hydrology Department.

3.4 SOIL SAMPLE SURVEYS

3.4.1 A five-meter grid of surface samples was completed in the BG #1 Affected Area. Surface samples were also collected along the linear path of the adjacent Drainage and Roadway Areas with 5-meter spacing to demonstrate that these areas were not affected by site decommissioning activities. Surface samples were also collected in the Unaffected Area at selected 10-meter grid locations chosen at random.

3.4.2 Surface samples were composites of 4-inch diameter soil cores taken from the ground surface to approximately six inches of depth.

3.4.3 Subsurface samples were collected in the Drainage and Roadway Areas, which are potentially-affected open land areas that have not had previous subsurface sampling. The subsurface samples were collected as composite samples at one-foot intervals down to a maximum depth of four feet. The subsurface samples were collected at a frequency of one for each 100 meters in length.

3.4.4 Subsurface samples were not collected for this FSS in open land unaffected areas or in the former Burial Ground #1 which has already been investigated and released for backfill by the NRC[26].

3.5 EXPOSURE RATE MEASUREMENTS

3.5.1 Exposure rate measurements were taken at the ground surface and at one meter above the surface of the ground at every location where a soil sample was taken. Exposure rate measurements were not taken at locations where there was standing water at the time of the survey. All exposure rate measurements were taken per the procedures listed in KM-CI-RP-51[27].

3.6 GAMMA SCANS

3.6.1 Gamma scans were taken on 100% of the surface of the BG #1 Affected Area, the Drainage Area and the Roadway Area. Gamma scans were taken on a minimum of 10% of the surface of the Unaffected Area.

3.6.2 Gamma scans were taken with the instrument in the unshielded configuration.

3.6.3 The gamma scans were performed by traversing the 10m x 10m grid areas back and forth with each traverse covering an area approximately two meters in width. The highest reading found within each grid area was recorded. All gamma scans were taken per the procedures listed in KM-CI-RP-49[28].

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[26] NRC Letter dated 12/30/92, Ibid.

[27] KM-CI-RP-51, *Instrument Calibration and Usage, Ludlum Model 19 & 12-S Micro-R Meters.*

[28] KM-CI-RP-49, *Calibration and Use of Ludlum 2220/2221 NaI 3" Detector.*

4 FINAL STATUS SURVEY RESULTS AND DISCUSSION

4.1 SOIL SAMPLES

4.1.1 The FSS of Sub-area F was performed from March 1996 to September 1997. During the FSS, surface soil samples were collected on 5x5m grids in the BG #1 Affected Area, and along the center line of the Drainage and Roadway Areas with 5-meter spacing. Additionally, subsurface soil samples were collected in the Drainage and Roadway Areas at one sample location for every 100 meters in length. 30 random, 10m grid surface locations were also sampled from the contiguous Unaffected Area. All samples and measurements were taken in accordance with the SDP, and all of the FSS data are presented net of average background (see Tables 1-4 in Appendix B).

4.1.2 Soil samples collected for the final status surveys were analyzed for total uranium and natural thorium to ensure a complete and accurate characterization. All gross natural thorium values recorded for the FSS were rounded to the nearest whole number. The net values of natural thorium throughout Sub-area F ranged from -0.5 pCi/g to 0.5 pCi/g. Since natural thorium is present near background levels and the highest measurement is 5% of the release criteria in Sub-area F, no further discussion of the thorium results is presented in this report.

4.1.3 BG #1 Affected Area (FA)

4.1.3.1 533 soil samples were collected from the surface of the BG #1 Affected Area. These samples are shown on a map in Appendix A, Figure 4.1. One grid location was obstructed by a concrete slab, which was placed in the location for erosion control.

4.1.3.2 A summary of the surface sample results from the BG #1 Affected Area survey is presented in Table 4.1. It shows that the maximum activity measured was 14 pCi/g total uranium, which is below the release criterion of 30 pCi/g. The average value for the BG #1 Affected Area surface was 3.4 pCi/g and the 95% confidence level was 3.6 pCi/g total uranium. The measurements for each sample are listed individually in Appendix B, Table 1.

4.1.3.3 The surface soil samples in the BG #1 Affected Area meet the criteria in the SDP for unconditional release.

Table 4.1
Surface Samples Summary (pCi/g)

Sub-Area F Survey Area Sets	Number of Samples	Net U_{tot} 95% Confidence (μ_α)	Net U_{tot}		Net Th_{nat}	
			Max	Avg	Max	Avg
BG #1 Affected Area (FA)	533	3.6	14	3.4	0.5	-0.3
Drainage Area (FD)	81	3.2	9	2.9	0.5	-0.4
Roadway Area (FR)	104	3.2	11	2.9	0.5	-0.3
Unaffected Area (FU)	32	1.6	5	1.3	-0.5	-0.5

4.1.4 Drainage Area (FD)

4.1.4.1 81 soil samples were collected from the surface of the Drainage Area. These samples are shown on a map of the Drainage Area in Appendix A, Figure 4.2.

4.1.4.2 A summary of the surface sample results from the Drainage Area survey is presented in Table 4.1. It shows that the maximum activity measured was 9 pCi/g total uranium, which is below the release criterion of 30 pCi/g. The average value for the Drainage Area surface was 2.9 pCi/g and the 95% confidence mean was 3.2 pCi/g total uranium. The measurements for each sample are listed individually in Appendix B, Table 2A.

4.1.4.3 12 soil samples were collected below the surface of the Drainage Area. The subsurface sample location frequency was one for each 100 meters in length, so three subsurface sampling locations were required in the Drainage Area. The samples were collected as composite samples at one-foot intervals to a maximum depth of four feet. These subsurface samples are shown on a map of the Drainage Area in Appendix A, Figure 4.2.

4.1.4.4 A summary of the subsurface sample results from the Drainage Area survey is presented in Table 4.2. It shows that the maximum activity measured was 8 pCi/g total uranium, which is below the release criterion of 30 pCi/g. The average value for the Drainage Area subsurface was 4.5 pCi/g and the 95% confidence mean was 5.7 pCi/g total uranium. The measurements for each sample are listed individually in Appendix B, Table 2B.

4.1.4.5 The surface and subsurface soil samples in the Drainage Area meet the criteria in the SDP for unconditional release.

Table 4.2
Subsurface Samples Summary (pCi/g)

Sub-Area F Survey Area Sets	Number of Samples	Net U_{tot} 95% Confidence (μ_α)	Net U_{tot}		Net Th_{nat}	
			Max	Avg	Max	Avg
Drainage Area (FD)	12	5.7	8	4.5	0.5	-0.4
Roadway Area (FR)	20	3.6	7	2.9	0.5	-0.3

4.1.5 Roadway Area (FR)

4.1.5.1 104 soil samples were collected from the surface of the Roadway Area. These samples are shown on a map of the Roadway Area in Appendix A, Figure 4.3.

4.1.5.2 A summary of the surface sample results from the Roadway Area survey is presented in Table 4.1. It shows that the maximum activity measured was 11 pCi/g total uranium, which is below the release criterion of 30 pCi/g. The average value for the Roadway Area surface was 2.9 pCi/g and the 95% confidence mean was 3.2 pCi/g total uranium. The measurements for each sample are listed individually in Appendix B, Table 3A.

4.1.5.3 20 soil samples were collected below the surface of the Roadway Area. The subsurface sample location frequency was one for each 100 meters in length, so five subsurface sampling locations were required in the Roadway Area. The samples were collected as composite samples at one-foot depth intervals to a maximum depth of four feet. These subsurface samples are shown on a map of the Roadway Area in Appendix A, Figure 4.3.

4.1.5.4 A summary of the subsurface sample results from the Roadway Area survey is presented in Table 4.2. It shows that the maximum activity measured was 7 pCi/g total uranium, which is below the release criterion of 30 pCi/g. The average value for the Roadway Area subsurface was 2.9 pCi/g and the 95% confidence mean was 3.6 pCi/g total uranium. The measurements for each sample are listed individually in Appendix B, Table 3B.

4.1.5.5 The surface and subsurface soil samples in the Roadway Area meet the criteria in the SDP for unconditional release.

4.1.6 Unaffected Area (FU)

4.1.6.1 32 soil samples were collected at random locations on the surface of the Unaffected Area. These samples are shown on a map of the Unaffected Area in Appendix A, Figure 4.4. Duplicate samples were collected at two locations. Therefore only 30 sampling locations are shown on the map of the Unaffected Area.

4.1.6.2 A summary of the surface sample results from the Unaffected Area survey is presented in Table 4.1. It shows that the maximum activity measured was 5 pCi/g total uranium, which is below the release criterion of 30 pCi/g. The average value for the Unaffected Area was 1.3 pCi/g and the 95% confidence mean was 1.6 pCi/g total uranium. The measurements for each sample are listed individually in Appendix B, Table 4. None of the soil samples collected in the Unaffected Area had a net total uranium result greater than 7.5 pCi/g, which would have required further investigation.

4.1.6.3 The surface soil samples in the Unaffected Area meet the criteria in the SDP for unconditional release.

4.2 EXPOSURE RATE MEASUREMENTS

4.2.1 Exposure rate measurements were collected at 100% of the accessible grid locations in the sector at the ground surface and at a height of one meter above the ground surface. A summary of the net exposure rate measurements by survey area is presented in Table 4.3. At one meter above the ground surface the maximum exposure rate measurement for Sub-area F was 3 μR/hr, which is below the release criterion of 10 μR/hr. In the BG #1 Affected Area the average net exposure rate measurement at one meter above the surface was 0.9 μR/hr and the 95% confidence mean was 1.0 μR/hr. Similar measurements in all the other areas were lower.

4.2.2 No exposure rate measurement data were observed in Sub-area F above the release criteria. Drawings of the exposure rate measurements taken in Sub-area F are presented in Figures 4.5a through 4.5d in Appendix A.

4.2.3 The exposure rate measurements in Sub-area F meet the criteria in the SDP for unconditional release.

Table 4.3
Net Exposure Rate Measurements Summary (μR/hr)

Survey Area		# Pts	Sfc Max	Surface Average	Surface 95% Conf. (μ_α)	One Meter Max	One Meter Average	One Meter 95% Conf. (μ_α)
BG #1 Affected	(FA)	533	3	1.0	1.1	3	0.9	1.0
Drainage[a]	(FD)	59	2	0.3	0.4	1	-0.1	0.0
Roadway	(FR)	104	2	-0.3	-0.2	2	-0.7	-0.6
Unaffected	(FU)	32	3	0.6	0.9	2	0.3	0.5

[a] In the drainage area, 22 locations were under standing water and μR measurements could not be obtained

4.3 GAMMA SCAN MEASUREMENTS ON SOIL SURFACE

4.3.1 Gamma scans were performed on 100% of the accessible areas of the BG #1 Affected Area, Drainage Area, and Roadway Area, and on 10% of the Unaffected Area in Sub-area F. The scan threshold used for these surveys was twice background.

4.3.2 No gamma scans in Sub Area F exceeded the scan threshold of twice background.

4.4 QUALITY CONTROL SOIL SAMPLE SPLITS

4.4.1 Four soil samples collected in Sub-area F were split and sent off site for analysis as a quality control measure. The soil samples were first analyzed using the on-site counter prior to being packaged and sent off site for analysis at an independent laboratory. The independent laboratory for this project was Core Laboratories of Casper, Wyoming. The results for both the on-site and off-site sample analyses are listed in Table 4.4. These sample results show satisfactory agreement between the on-site and off-site analyses of the soil split samples. All samples agreed at the +/- 3σ confidence interval.

Table 4.4
Gross Total Uranium Soil Sample QC Results (pCi/g)

Sample ID Number	Cimarron Results*	Core Lab Results*
FA-129	12 +/- 4.9	8.9 +/- 1.6
FA-542	4 +/- 2.0	1.0 +/- 0.5
FU-12	4 +/- 4.0	1.9 +/- 0.8
FU-32	5 +/- 2.5	2.9 +/- 0.9

* 2 sigma confidence interval

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

5.1.1 Thorium was found near background levels in Sub-area F. No sample exceeded 5% of the release criteria. (Par. 4.1.2.)

5.1.2 No surface samples in the BG #1 Affected Area (FA) were found to be in excess of the criteria specified in the SDP for unconditional release. (Par. 4.1.3.3)

5.1.3 No surface or subsurface samples in the Drainage Area (FD) were found to be in excess of the criteria specified in the SDP for unconditional release. (Par. 4.1.4.5)

5.1.4 No surface or subsurface samples in the Roadway Area (FR) were found to be in excess of the criteria specified in the SDP for unconditional release. (Par. 4.1.5.5)

5.1.5 No surface samples in the Unaffected Area (FU) were found to be in excess of the criteria specified in the SDP for unconditional release. (Par. 4.1.6.3)

5.1.6 No exposure rate measurement data were observed in Sub-area F above the release criteria. (Par. 4.2.2)

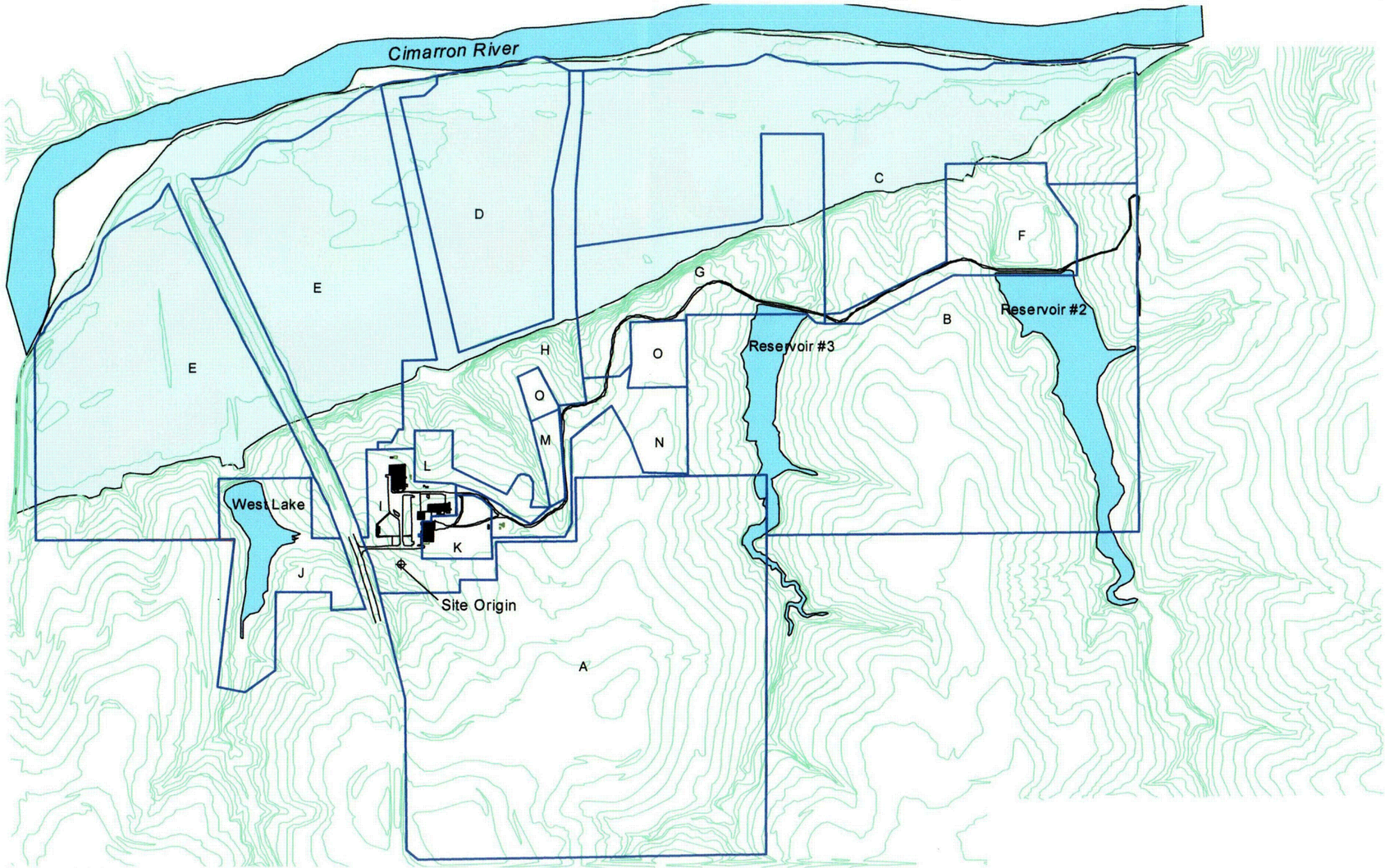
5.1.7 No gamma scan data were observed in excess of twice background. (Par. 4.3.2)

5.1.8 Sub-area F soil meets decommissioning criteria for release from license SNM-928.

5.2 RECOMMENDATIONS

5.2.1 Soils in Sub-area F should be released from license SNM-928.

APPENDIX A
FIGURES



CIMARRON CORPORATION

NEXTEP

- Site Area Boundaries
- Site Buildings
- Site Roads/Trails
- Reservoirs/River
- Alluvial Plain

N W E S

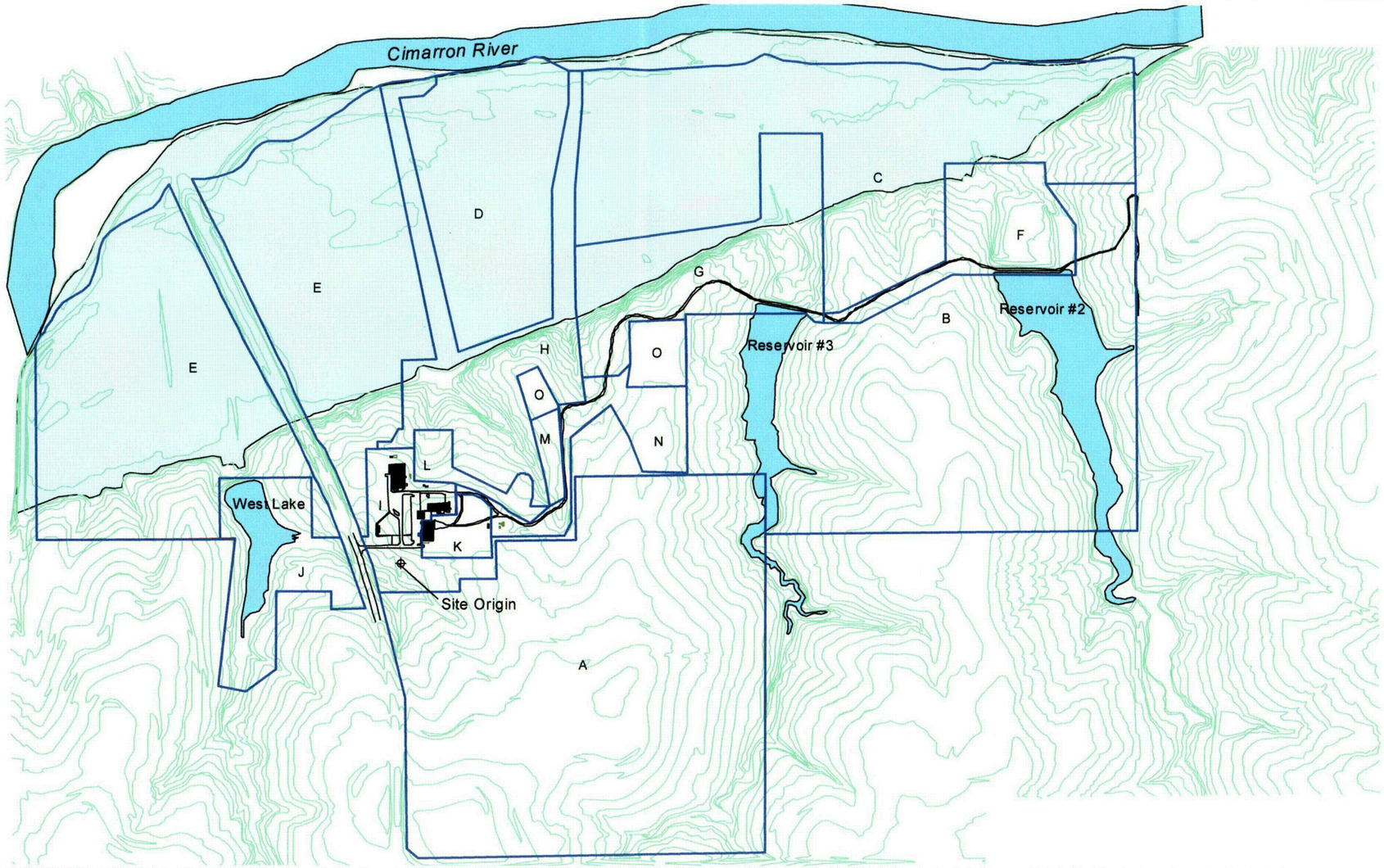
200 0 200 400 Meters

Cimarron Site Decommissioning
Sub-Area F Final Status Survey

Figure 1.1
Cimarron Site Map

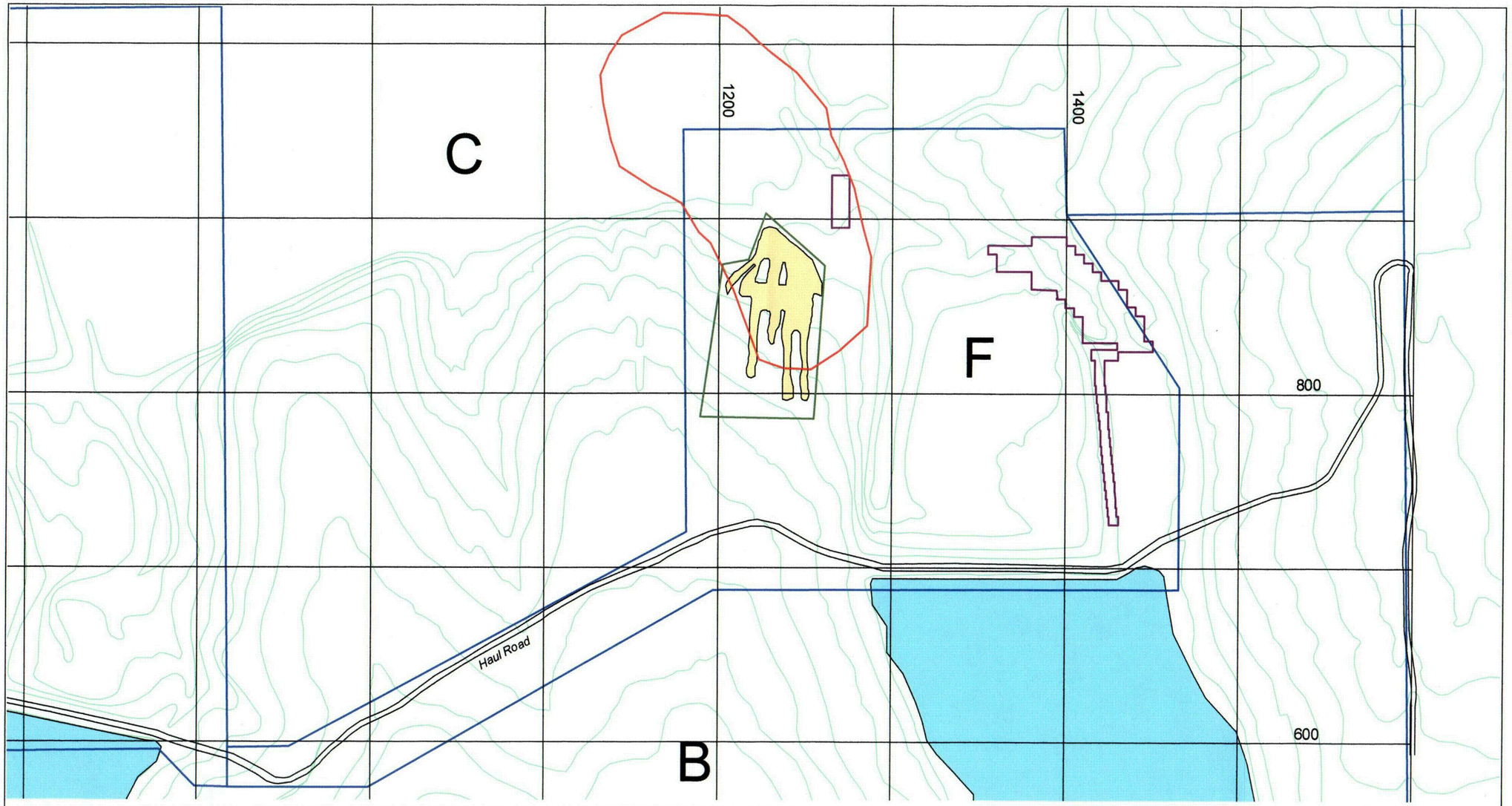
Cimarron Site	Drawn by: RDN
Revision: 0	Date: 02/15/2005

C01



CIMARRON CORPORATION	Site Area Boundaries Site Buildings Site Roads/Trails Reservoirs/River Alluvial Plain	N W E S 200 0 200 400 Meters	Cimarron Site Decommissioning Sub-Area F Final Status Survey Figure 1.1 Cimarron Site Map
NEXTEP			Cimarron Site / Drawn by: RDN Revision: 0 / Date: 02/15/2005

C02



CIMARRON CORPORATION

NEXTEP

- Sub-Area Boundary
- Burial Ground #1 Boundary
- Burial Ground #1 Excavation
- Concrete Rubble Areas
- Groundwater Investigation Area

N W E S

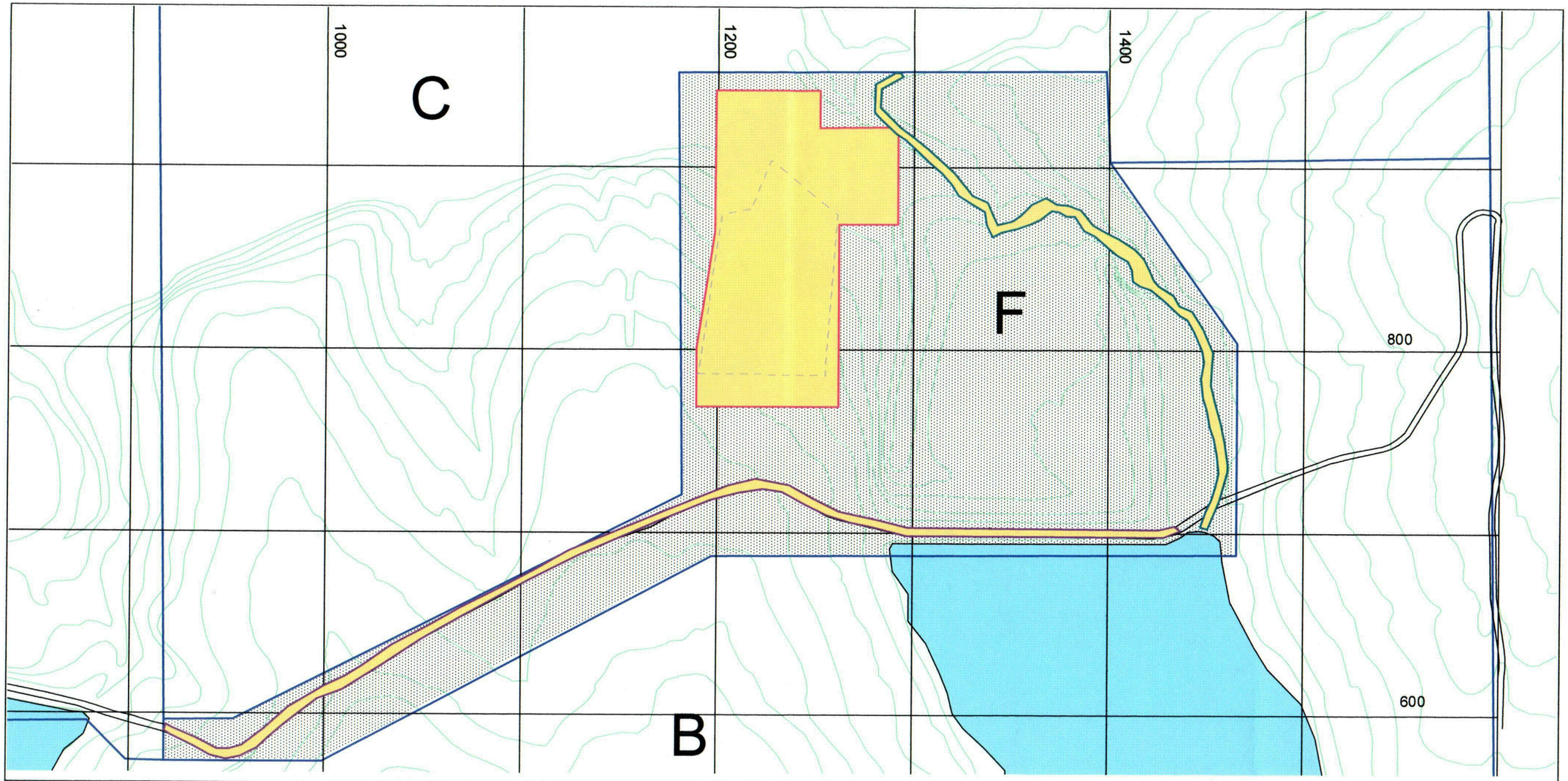
40 0 40 80 Meters

Cimarron Site Decommissioning
Sub-Area F Final Status Survey

Figure 2.1
Historical Areas

Cimarron Site	Drawn by: RDN
Revision: 0	Date: 02/15/2004

C03



CIMARRON CORPORATION

NEXTEP

Affected Areas
Unaffected Area (FU) in Sub-area F
BG #1 Affected Area (FA)
Drainage Area (FD)
Roadway Area (FR)

N
W E
S

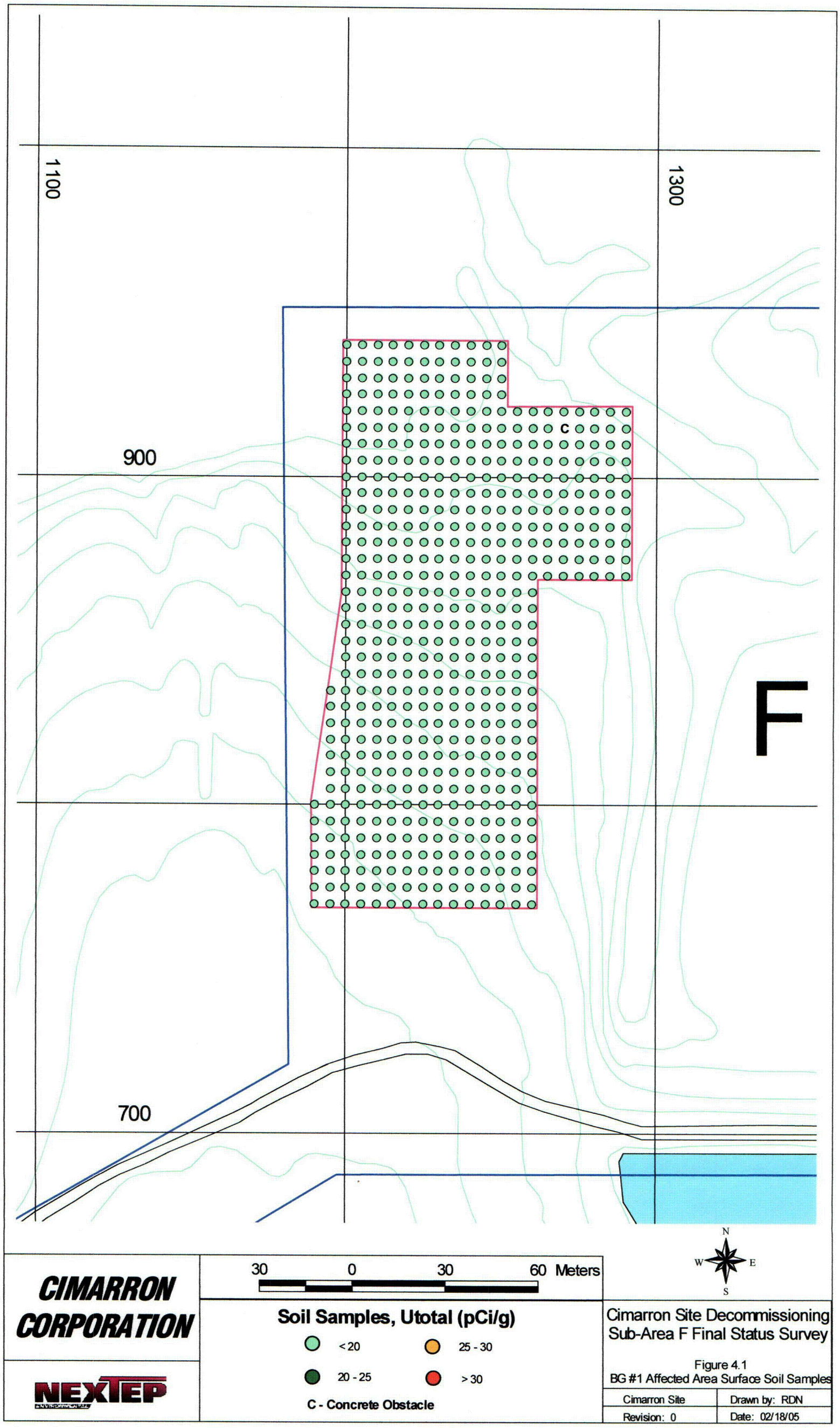
40 0 40 80 Meters

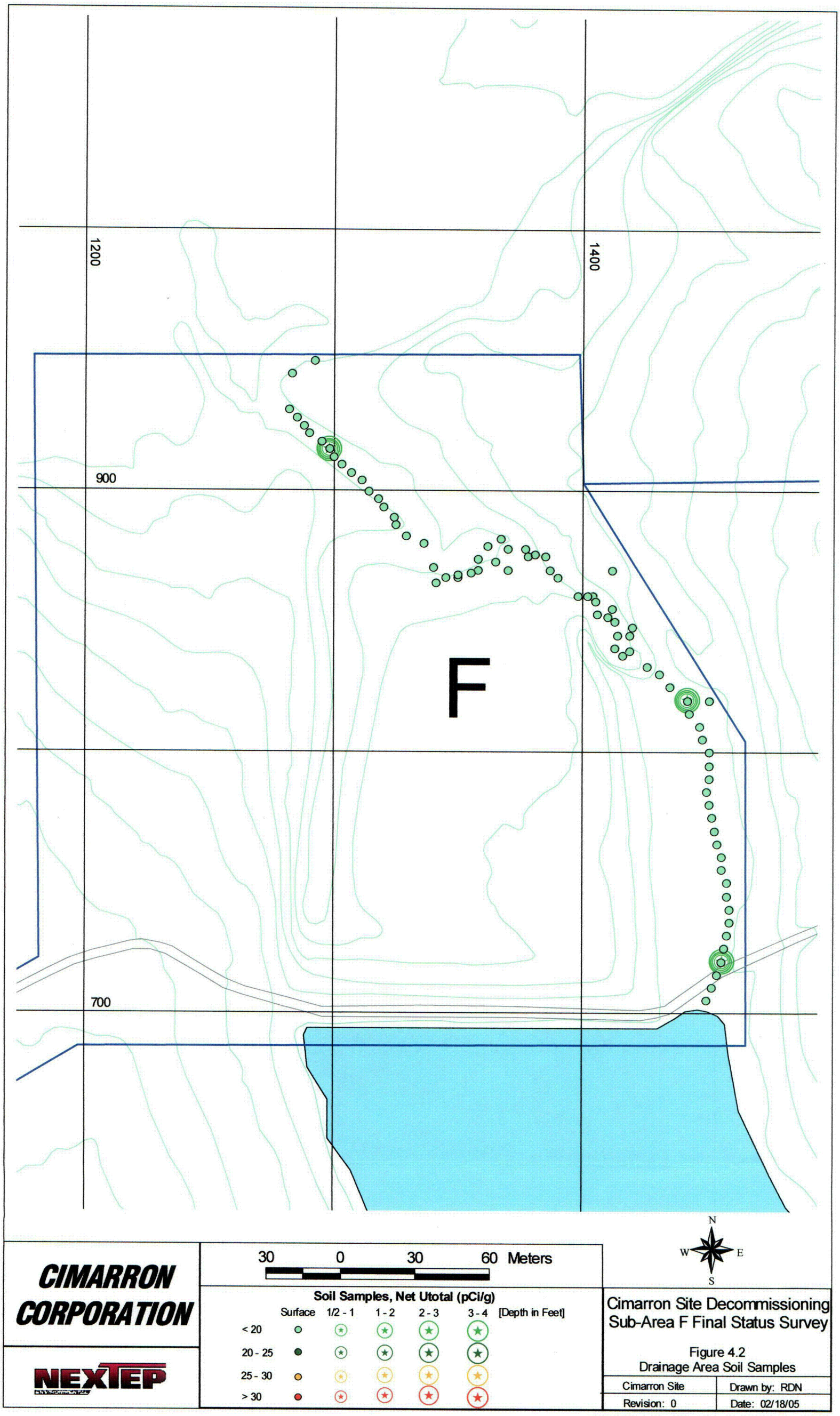
Cimarron Site Decommissioning
Sub-Area F Final Status Survey

Figure 2.2
Final Status Survey Areas

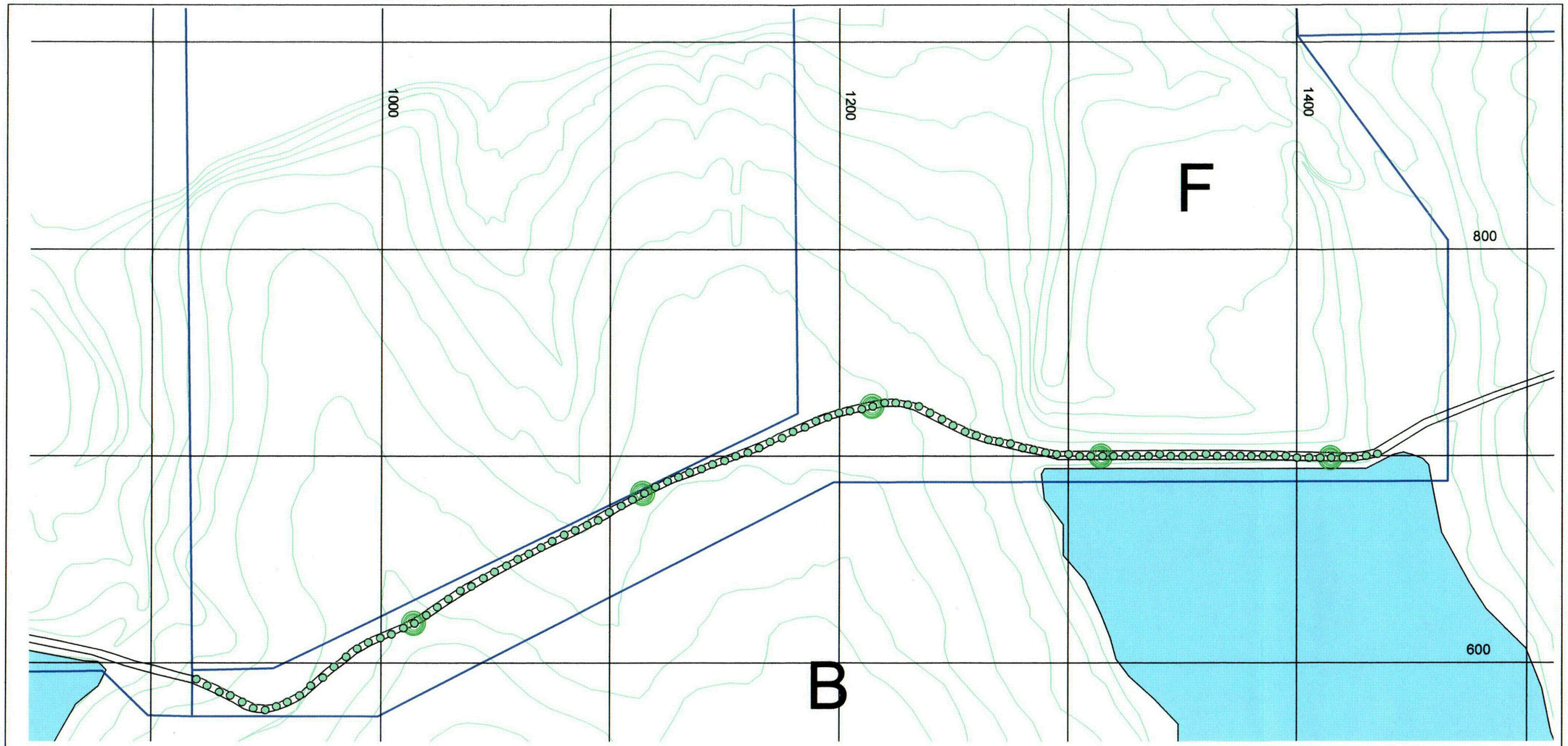
Cimarron Site	Drawn by: RDN
Revision: 0	Date: 02/16/2005

C04


1300
1100
900
700
C
F
30 0 30 60 Meters
N
W
E
S
CIMARRON CORPORATION
NEXTEP
Soil Samples, Utotal (pCi/g)
< 20
25 - 30
20 - 25
> 30
C - Concrete Obstacle
Cimarron Site Decommissioning
Sub-Area F Final Status Survey
Figure 4.1
BG #1 Affected Area Surface Soil Samples
Cimarron Site
Drawn by: RDN
Revision: 0
Date: 02/18/05


1400
1200
900
700
F
CIMARRON CORPORATION
NEXTEP
30 0 30 60 Meters
N
W
E
S
Soil Samples, Net Utotal (pCi/g)
Surface 1/2 - 1 1 - 2 2 - 3 3 - 4 [Depth in Feet]
< 20
20 - 25
25 - 30
> 30
Cimarron Site Decommissioning
Sub-Area F Final Status Survey
Figure 4.2
Drainage Area Soil Samples
Cimarron Site
Drawn by: RDN
Revision: 0
Date: 02/18/05

C06



CIMARRON CORPORATION

NEXTEP

Soil Samples, Net Utotal (pCi/g)

	Surface	1/2 - 1	1 - 2	2 - 3	3 - 4 [Depth in Feet]
< 20	●	⊛	⊛	⊛	⊛
20 - 25	●	⊛	⊛	⊛	⊛
25 - 30	●	⊛	⊛	⊛	⊛
> 30	●	⊛	⊛	⊛	⊛

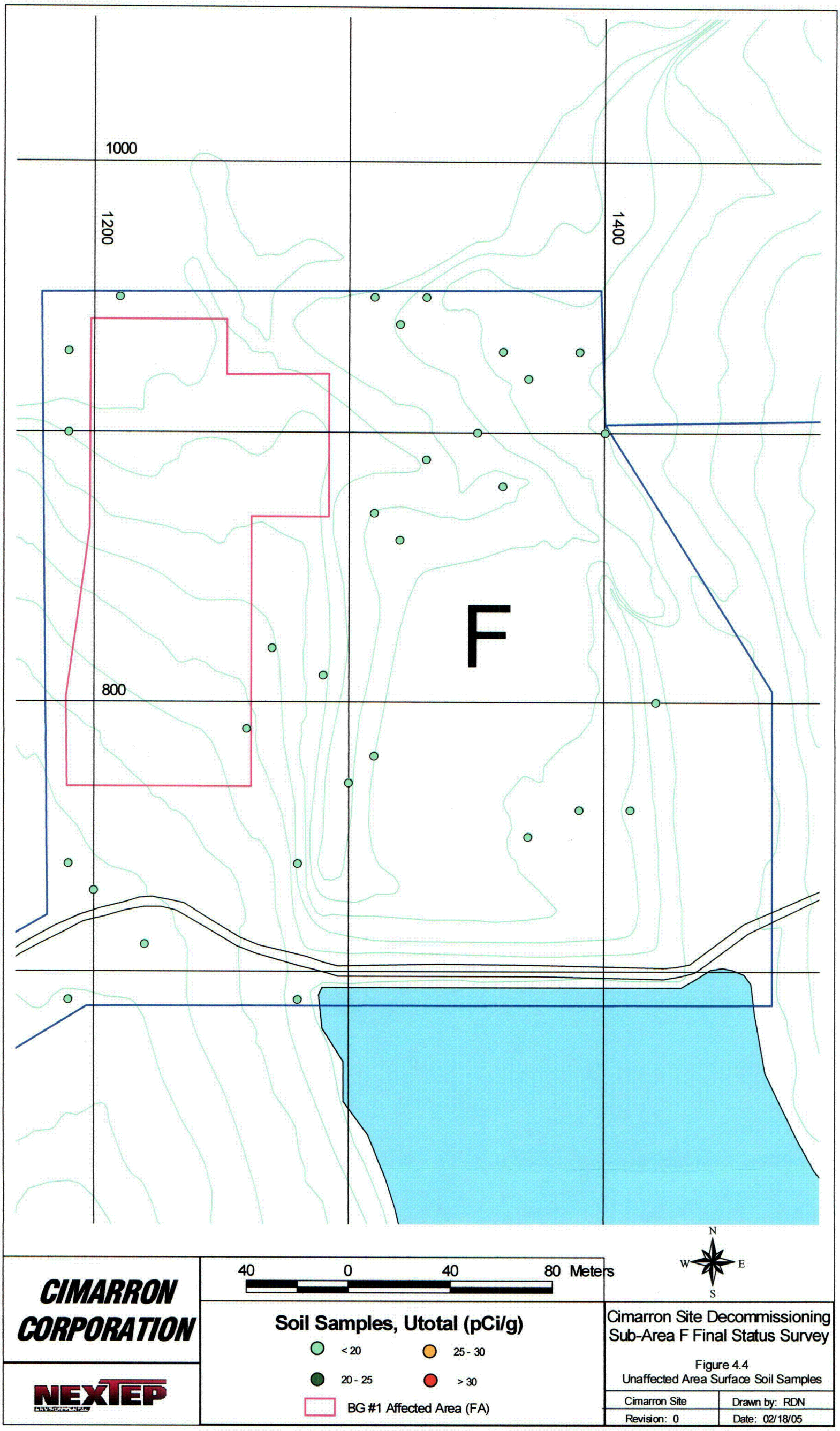
N W E S

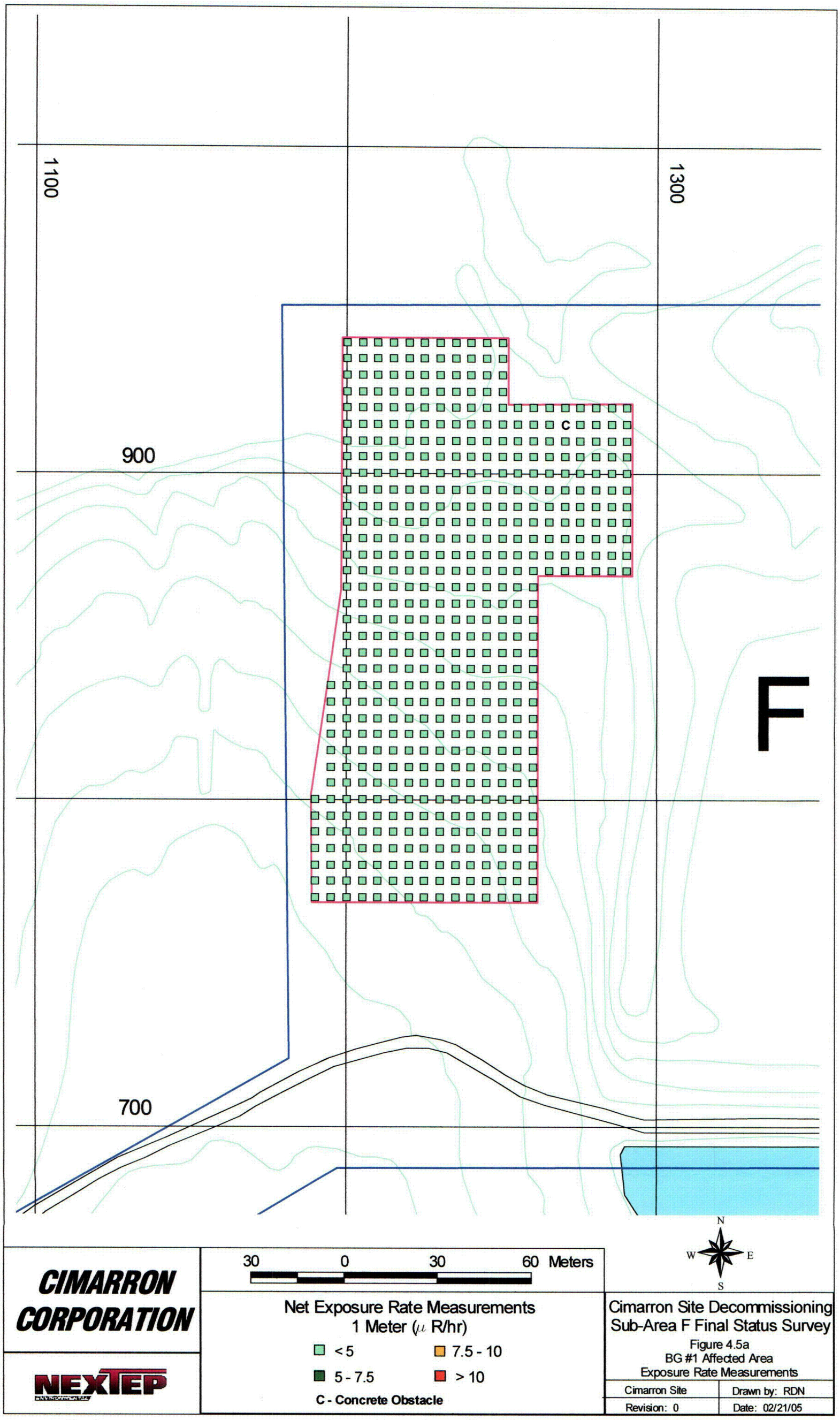
30 0 30 60 Meters

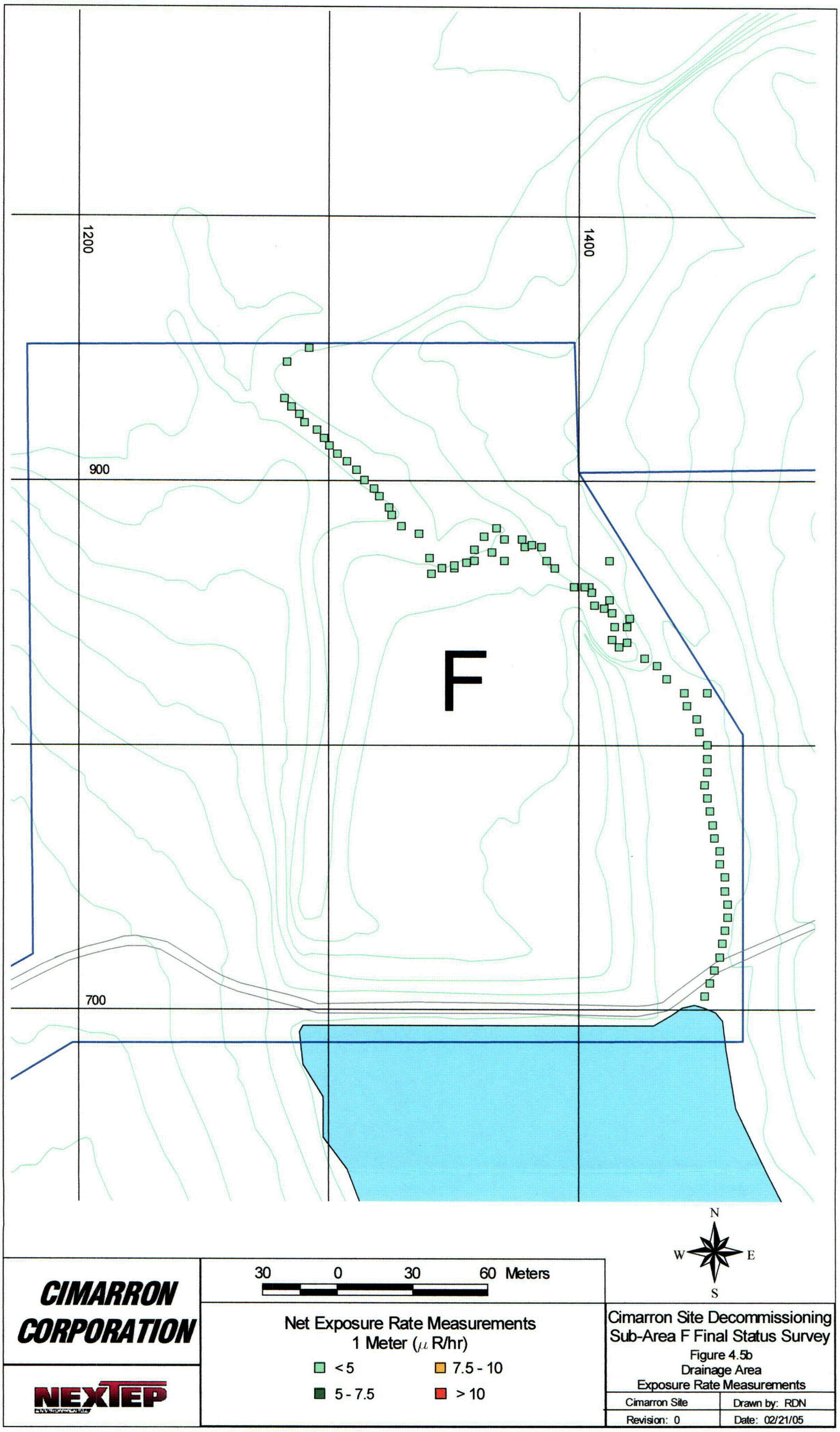
Cimarron Site Decommissioning
Sub-Area F Final Status Survey

Figure 4.3
Roadway Area Soil Samples

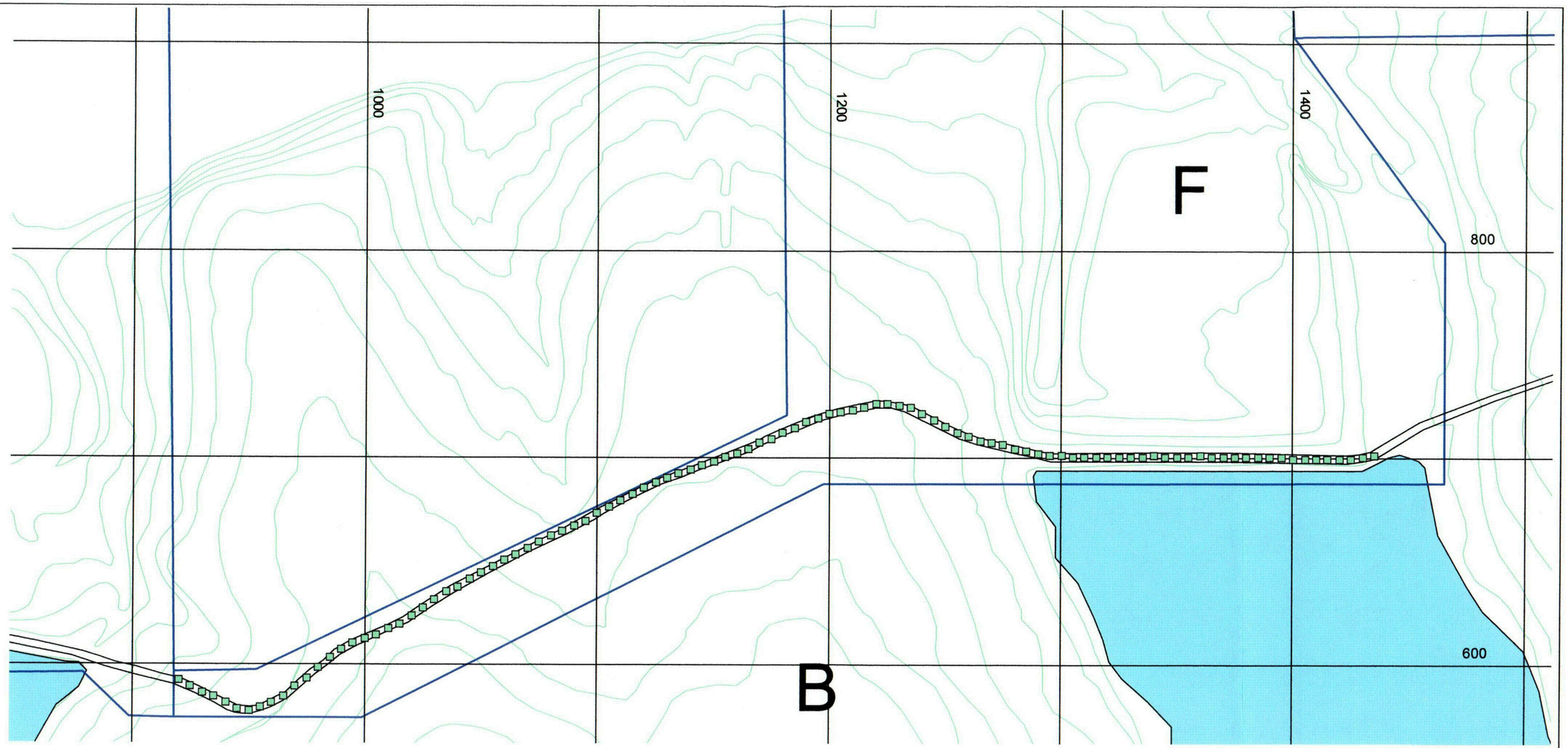
Cimarron Site	Drawn by: RDN
Revision: 0	Date: 02/18/2005


1000
1200
1400
800
F
CIMARRON CORPORATION
NEXTEP
40 0 40 80 Meters
N
W
E
S
Soil Samples, Utotal (pCi/g)
< 20
25 - 30
20 - 25
> 30
BG #1 Affected Area (FA)
Cimarron Site Decommissioning
Sub-Area F Final Status Survey
Figure 4.4
Unaffected Area Surface Soil Samples
Cimarron Site
Drawn by: RDN
Revision: 0
Date: 02/18/05


1300
1100
900
700
C
F
N
W
E
S
30 0 30 60 Meters
CIMARRON CORPORATION
NEXTEP
Net Exposure Rate Measurements
1 Meter (μ R/hr)
< 5
7.5 - 10
5 - 7.5
> 10
C - Concrete Obstacle
Cimarron Site Decommissioning
Sub-Area F Final Status Survey
Figure 4.5a
BG #1 Affected Area
Exposure Rate Measurements
Cimarron Site
Drawn by: RDN
Revision: 0
Date: 02/21/05


1400
1200
900
700
F
N
W
E
S
30 0 30 60 Meters
CIMARRON CORPORATION
NEXTEP
Net Exposure Rate Measurements
1 Meter (μ R/hr)
< 5
5 - 7.5
7.5 - 10
> 10
Cimarron Site Decommissioning
Sub-Area F Final Status Survey
Figure 4.5b
Drainage Area
Exposure Rate Measurements
Cimarron Site
Drawn by: RDN
Revision: 0
Date: 02/21/05

C10



CIMARRON CORPORATION

NEXTEP

Net Exposure Rate Measurements
1 Meter (μR/hr)

- < 5
- 5 - 7.5
- 7.5 - 10
- > 10

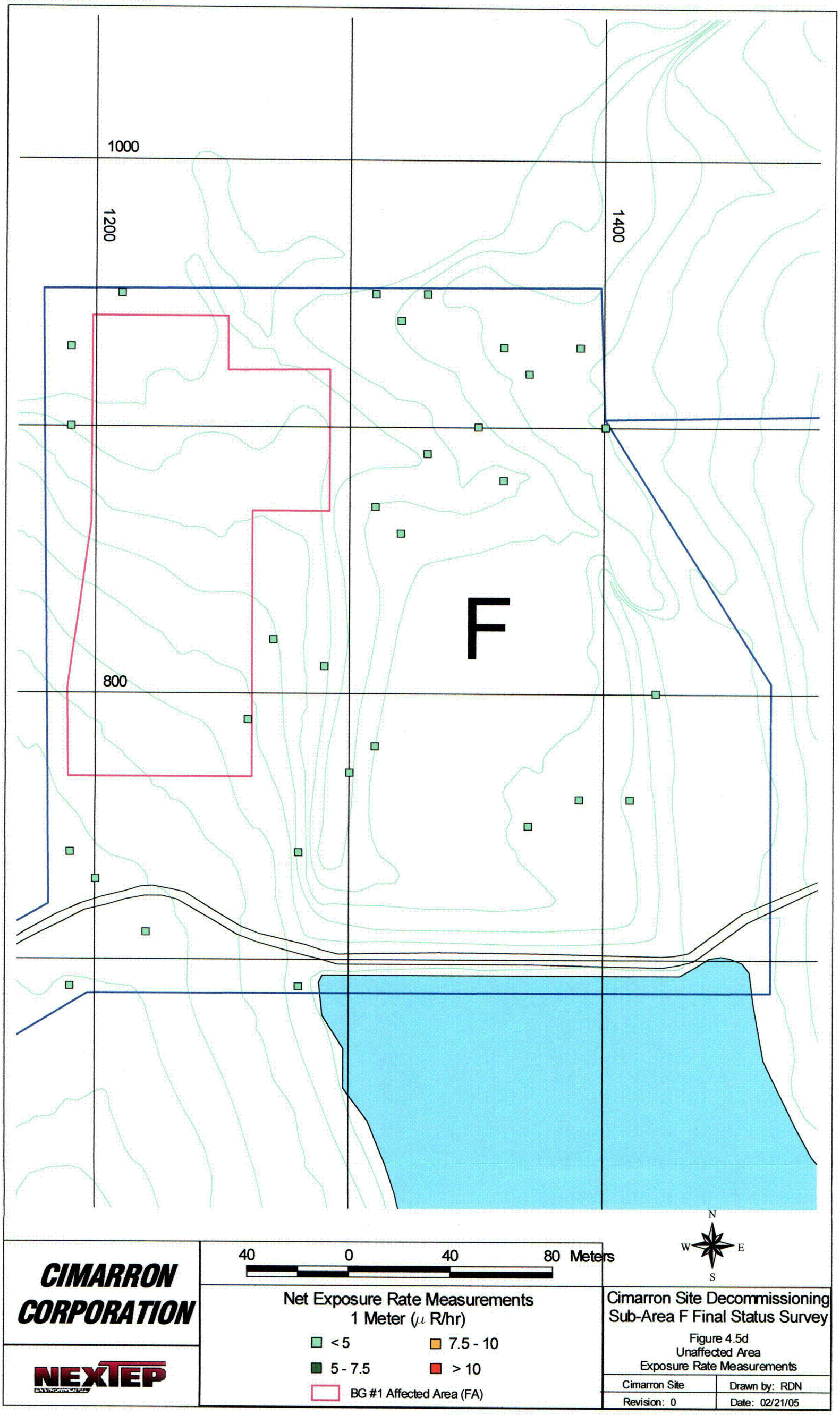
N
W E
S

30 0 30 60 Meters

Cimarron Site Decommissioning
Sub-Area F Final Status Survey

Figure 4.5c
Roadway Area Exposure Rate Measurements

Cimarron Site	Drawn by: RDN
Revision: 0	Date: 02/21/2005


1000
1200
1400
800
F
N
W
E
S
40
0
40
80 Meters
CIMARRON CORPORATION
NEXTEP
Net Exposure Rate Measurements
1 Meter (μ R/hr)
< 5
7.5 - 10
5 - 7.5
> 10
BG #1 Affected Area (FA)
Cimarron Site Decommissioning
Sub-Area F Final Status Survey
Figure 4.5d
Unaffected Area
Exposure Rate Measurements
Cimarron Site
Drawn by: RDN
Revision: 0
Date: 02/21/05

APPENDIX B
DATA TABLES

Table 1
BG #1 Affected Area Surface

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FA-0001	2	0.5	0	0
FA-0002	4	0.5	0	0
FA-0003	8	-0.5	1	1
FA-0004	4	0.5	1	1
FA-0005	3	-0.5	0	0
FA-0006	2	0.5	0	0
FA-0007	5	-0.5	0	0
FA-0008	5	-0.5	1	0
FA-0009	5	-0.5	0	0
FA-0010	4	-0.5	-1	-1
FA-0011	5	-0.5	0	0
FA-0012	4	0.5	1	1
FA-0013	6	0.5	2	2
FA-0014	2	-0.5	1	1
FA-0015	5	-0.5	1	1
FA-0016	1	-0.5	0	0
FA-0017	1	-0.5	0	1
FA-0018	5	-0.5	-1	-1
FA-0019	2	-0.5	0	0
FA-0020	4	-0.5	1	0
FA-0021	2	-0.5	1	1
FA-0022	6	-0.5	0	0
FA-0023	5	-0.5	1	1
FA-0024	7	-0.5	1	1
FA-0025	4	-0.5	1	0
FA-0026	2	-0.5	1	1
FA-0027	3	-0.5	1	1
FA-0028	2	-0.5	1	0
FA-0029	2	-0.5	1	1
FA-0030	2	-0.5	0	0
FA-0031	6	-0.5	0	0
FA-0032	6	-0.5	0	0
FA-0033	3	-0.5	0	0
FA-0034	3	-0.5	1	1
FA-0035	4	-0.5	0	0
FA-0036	2	0.5	1	1
FA-0037	4	-0.5	1	1
FA-0038	3	-0.5	1	1
FA-0039	9	-0.5	0	0
FA-0040	4	-0.5	1	1
FA-0041	4	-0.5	1	1
FA-0042	3	-0.5	1	1
FA-0043	4	-0.5	1	1
FA-0044	1	-0.5	1	0
FA-0045	3	-0.5	0	0
FA-0046	4	-0.5	0	0
FA-0047	3	0.5	1	0
FA-0048	2	-0.5	1	1
FA-0049	4	-0.5	1	1
FA-0050	4	-0.5	1	1
FA-0051	6	-0.5	1	1
FA-0052	6	-0.5	1	1
FA-0053	6	-0.5	1	1
FA-0054	2	-0.5	1	1
FA-0055	2	-0.5	1	1
FA-0056	5	-0.5	0	0
FA-0057	1	-0.5	0	0
FA-0058	4	-0.5	0	0
FA-0059	5	-0.5	0	0
FA-0060	3	-0.5	-1	-1
FA-0061	2	-0.5	-1	-1
FA-0062	2	-0.5	0	0
FA-0063	0	-0.5	-1	-1
FA-0064	0	-0.5	1	1
FA-0065	4	0.5	1	1
FA-0066	3	0.5	1	1
FA-0067	5	-0.5	1	1
FA-0068	1	-0.5	1	1
FA-0069	6	-0.5	1	1
FA-0070	4	-0.5	0	0
FA-0071	3	-0.5	1	1
FA-0072	2	-0.5	1	1
FA-0073	4	-0.5	1	1
FA-0074	3	-0.5	1	1
FA-0075	4	-0.5	1	1
FA-0076	3	-0.5	1	1
FA-0077	1	-0.5	1	1
FA-0078	2	-0.5	1	1
FA-0079	2	-0.5	0	0
FA-0080	3	-0.5	0	0
FA-0081	1	-0.5	0	0
FA-0082	3	-0.5	1	1
FA-0083	4	-0.5	1	1
FA-0084	0	-0.5	1	1
FA-0085	0	-0.5	1	1
FA-0086	5	-0.5	1	1
FA-0087	6	-0.5	1	1
FA-0088	0	-0.5	1	1
FA-0089	1	-0.5	2	2
FA-0090	1	-0.5	1	1
FA-0091	1	-0.5	1	1
FA-0092	4	-0.5	1	1
FA-0093	4	-0.5	1	1

Table 1
BG #1 Affected Area Surface

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FA-0094	2	-0.5	1	1
FA-0095	4	-0.5	1	1
FA-0096	1	-0.5	0	0
FA-0097	1	-0.5	0	0
FA-0098	6	-0.5	1	1
FA-0099	4	-0.5	1	1
FA-0100	3	-0.5	1	1
FA-0101	1	0.5	2	1
FA-0102	4	0.5	1	1
FA-0103	5	-0.5	1	1
FA-0104	3	-0.5	1	1
FA-0105	2	-0.5	2	2
FA-0106	5	-0.5	1	1
FA-0107	0	-0.5	2	2
FA-0108	3	0.5	1	1
FA-0109	6	0.5	2	2
FA-0110	4	-0.5	1	1
FA-0111	0	-0.5	1	1
FA-0112	5	-0.5	0	0
FA-0113	5	-0.5	1	0
FA-0114	5	-0.5	1	1
FA-0115	0	-0.5	0	0
FA-0116	4	0.5	0	0
FA-0117	2	0.5	1	1
FA-0118	0	-0.5	1	2
FA-0119	6	-0.5	1	1
FA-0120	2	-0.5	2	2
FA-0121	3	-0.5	2	2
FA-0122	3	-0.5	2	2
FA-0123	7	-0.5	2	2
FA-0124	1	-0.5	1	1

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FA-0125	1	-0.5	2	1
FA-0126	2	-0.5	1	1
FA-0127	4	0.5	2	1
FA-0128	3	0.5	2	2
FA-0129	8	-0.5	1	1
FA-0130	3	-0.5	1	0
FA-0131	5	-0.5	1	1
FA-0132	2	-0.5	1	1
FA-0133	3	-0.5	1	1
FA-0134	3	-0.5	1	1
FA-0135	2	-0.5	2	2
FA-0136	2	-0.5	2	2
FA-0137	6	-0.5	1	1
FA-0138	4	-0.5	1	1
FA-0139	1	0.5	2	2
FA-0140	3	-0.5	2	2
FA-0141	5	-0.5	2	2
FA-0142	3	0.5	2	2
FA-0143	9	-0.5	2	1
FA-0144	6	-0.5	2	2
FA-0145	6	-0.5	1	1
FA-0146	7	-0.5	2	2
FA-0147	4	-0.5	1	1
FA-0148	0	0.5	1	1
FA-0149	3	0.5	1	1
FA-0150	6	-0.5	1	1
FA-0151	5	-0.5	1	1
FA-0152	2	-0.5	0	0
FA-0153	4	-0.5	1	1
FA-0154	2	-0.5	2	1
FA-0155	0	0.5	2	2

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FA-0156	2	-0.5	2	2
FA-0157	2	-0.5	1	1
FA-0158	4	0.5	3	2
FA-0159	4	-0.5	2	2
FA-0160	5	-0.5	3	3
FA-0161	2	-0.5	1	1
FA-0162	3	0.5	1	1
FA-0163	8	-0.5	1	1
FA-0164	4	0.5	2	2
FA-0165	5	-0.5	2	1
FA-0166	4	-0.5	1	1
FA-0167	3	0.5	1	1
FA-0168	3	-0.5	2	1
FA-0169	1	-0.5	1	1
FA-0170	4	0.5	1	1
FA-0171	7	-0.5	1	1
FA-0172	6	-0.5	2	1
FA-0173	4	-0.5	2	1
FA-0174	5	-0.5	2	2
FA-0175	3	0.5	2	2
FA-0176	3	0.5	2	1
FA-0177	4	-0.5	2	2
FA-0178	1	0.5	3	3
FA-0179	3	-0.5	2	2
FA-0180	5	0.5	1	2
FA-0181	9	0.5	2	2
FA-0182	7	-0.5	0	0
FA-0183	5	0.5	2	2
FA-0184	2	0.5	1	2
FA-0185	4	0.5	1	1
FA-0186	3	-0.5	1	1

Table 1
BG #1 Affected Area Surface

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FA-0187	6	0.5	1	1
FA-0188	4	0.5	1	0
FA-0189	0	0.5	0	0
FA-0190	3	-0.5	0	0
FA-0191	9	0.5	1	1
FA-0192	6	-0.5	1	1
FA-0193	7	-0.5	1	1
FA-0194	8	0.5	1	1
FA-0195	1	0.5	2	2
FA-0196	4	-0.5	1	1
FA-0197	6	-0.5	3	3
FA-0198	5	0.5	3	2
FA-0199	4	0.5	3	3
FA-0200	2	0.5	2	2
FA-0201	6	-0.5	1	1
FA-0202	4	0.5	1	1
FA-0203	8	0.5	1	1
FA-0204	8	-0.5	1	1
FA-0205	6	0.5	2	1
FA-0206	1	0.5	1	1
FA-0207	4	-0.5	1	1
FA-0208	2	-0.5	1	1
FA-0209	6	-0.5	1	1
FA-0210	1	-0.5	1	1
FA-0211	6	0.5	2	1
FA-0212	2	-0.5	2	2
FA-0213	4	0.5	2	2
FA-0214	3	-0.5	2	2
FA-0215	8	0.5	2	2
FA-0216	5	0.5	2	2
FA-0217	6	-0.5	2	2

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FA-0218	7	-0.5	1	1
FA-0219	2	-0.5	0	1
FA-0220	6	-0.5	0	0
FA-0221	2	0.5	1	1
FA-0222	1	-0.5	1	1
FA-0223	0	-0.5	1	1
FA-0224	3	-0.5	1	1
FA-0225	2	-0.5	1	1
FA-0226	5	-0.5	1	1
FA-0227	2	0.5	1	1
FA-0228	3	-0.5	1	-6
FA-0229	4	-0.5	1	1
FA-0230	6	-0.5	2	1
FA-0231	6	-0.5	1	1
FA-0232	5	-0.5	2	2
FA-0233	2	0.5	2	2
FA-0234	3	0.5	2	2
FA-0235	2	-0.5	1	1
FA-0236	9	-0.5	2	2
FA-0237	2	0.5	1	1
FA-0238	4	-0.5	1	1
FA-0239	5	-0.5	1	1
FA-0240	8	-0.5	1	1
FA-0241	1	0.5	1	1
FA-0242	4	0.5	1	1
FA-0243	5	-0.5	1	1
FA-0244	1	-0.5	1	1
FA-0245	5	-0.5	2	2
FA-0246	7	-0.5	1	1
FA-0247	4	-0.5	1	1
FA-0248	7	-0.5	1	1

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FA-0249	2	-0.5	2	1
FA-0250	5	0.5	1	1
FA-0251	5	-0.5	2	2
FA-0252	6	0.5	2	1
FA-0253	3	0.5	2	2
FA-0254	7	0.5	2	1
FA-0255	3	-0.5	1	1
FA-0256	2	-0.5	2	1
FA-0257	0	-0.5	1	1
FA-0258	2	-0.5	1	1
FA-0259	4	-0.5	1	1
FA-0260	2	-0.5	1	1
FA-0261	2	-0.5	0	0
FA-0262	3	0.5	0	0
FA-0263	2	-0.5	1	1
FA-0264	4	-0.5	1	1
FA-0265	3	-0.5	1	1
FA-0266	6	-0.5	2	1
FA-0267	4	0.5	2	2
FA-0268	2	-0.5	1	1
FA-0269	2	-0.5	1	1
FA-0270	4	0.5	1	1
FA-0271	6	-0.5	1	1
FA-0272	1	-0.5	1	1
FA-0273	5	-0.5	1	1
FA-0274	8	-0.5	1	1
FA-0275	7	-0.5	1	1
FA-0276	2	-0.5	1	1
FA-0277	2	-0.5	1	1
FA-0278	4	-0.5	1	1
FA-0279	3	-0.5	2	1

Table 1
BG #1 Affected Area Surface

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FA-0280	1	0.5	2	2
FA-0281	1	0.5	2	1
FA-0282	8	-0.5	1	1
FA-0283	5	-0.5	1	1
FA-0284	1	-0.5	1	1
FA-0285	1	-0.5	1	1
FA-0286	1	-0.5	1	1
FA-0287	5	-0.5	0	0
FA-0288	0	-0.5	0	0
FA-0289	2	-0.5	0	0
FA-0290	3	-0.5	1	1
FA-0291	6	-0.5	1	1
FA-0292	4	-0.5	1	1
FA-0293	3	-0.5	1	1
FA-0294	2	-0.5	1	0
FA-0295	1	-0.5	0	0
FA-0296	4	0.5	1	1
FA-0297	3	-0.5	0	0
FA-0298	1	-0.5	0	1
FA-0299	3	-0.5	0	0
FA-0300	0	-0.5	1	0
FA-0301	7	-0.5	1	1
FA-0302	3	-0.5	1	1
FA-0303	4	-0.5	1	0
FA-0304	0	0.5	1	0
FA-0305	2	-0.5	0	0
FA-0306	3	-0.5	1	1
FA-0307	4	0.5	1	1
FA-0308	3	-0.5	0	0
FA-0309	5	-0.5	1	1
FA-0310	3	-0.5	1	1

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FA-0311	2	-0.5	0	0
FA-0312	3	-0.5	1	1
FA-0313	4	0.5	1	1
FA-0314	6	-0.5	2	0
FA-0315	4	-0.5	1	1
FA-0316	1	0.5	0	0
FA-0317	3	0.5	1	0
FA-0318	2	-0.5	1	1
FA-0319	8	-0.5	1	1
FA-0320	1	-0.5	2	1
FA-0321	4	-0.5	2	1
FA-0322	3	-0.5	0	-1
FA-0323	5	-0.5	0	0
FA-0324	4	-0.5	0	0
FA-0325	3	-0.5	2	0
FA-0326	4	-0.5	0	0
FA-0327	5	0.5	1	0
FA-0328	6	-0.5	2	1
FA-0329	4	0.5	0	0
FA-0330	3	-0.5	0	0
FA-0331	0	-0.5	1	0
FA-0332	3	-0.5	1	1
FA-0333	3	-0.5	2	1
FA-0334	3	-0.5	0	0
FA-0335	1	-0.5	1	1
FA-0336	5	-0.5	1	1
FA-0337	0	-0.5	1	1
FA-0338	4	0.5	3	2
FA-0339	3	-0.5	1	1
FA-0340	6	-0.5	2	1
FA-0341	2	-0.5	1	1

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FA-0342	3	-0.5	1	1
FA-0343	3	0.5	1	1
FA-0344	1	-0.5	1	1
FA-0345	0	-0.5	0	0
FA-0346	0	-0.5	0	0
FA-0347	0	-0.5	0	0
FA-0348	1	-0.5	0	0
FA-0349	3	-0.5	0	0
FA-0350	1	-0.5	0	0
FA-0351	6	-0.5	1	1
FA-0352	2	-0.5	2	2
FA-0353	5	0.5	1	1
FA-0354	2	0.5	1	1
FA-0355	2	0.5	1	1
FA-0356	6	0.5	1	1
FA-0357	3	-0.5	0	0
FA-0358	3	-0.5	1	1
FA-0359	0	-0.5	0	0
FA-0360	3	-0.5	1	1
FA-0361	1	-0.5	0	-1
FA-0362	2	-0.5	-1	-1
FA-0363	0	-0.5	-1	-1
FA-0364	2	-0.5	-1	-1
FA-0365	5	-0.5	1	1
FA-0366	3	-0.5	2	1
FA-0367	0	-0.5	1	1
FA-0368	0	-0.5	1	1
FA-0369	6	-0.5	1	1
FA-0370	3	-0.5	1	1
FA-0371	6	-0.5	0	0
FA-0372	3	-0.5	0	0

Table 1
BG #1 Affected Area Surface

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FA-0373	2	-0.5	1	0
FA-0374	2	-0.5	1	1
FA-0375	1	-0.5	0	0
FA-0376	1	-0.5	-1	-1
FA-0377	-3	-0.5	0	0
FA-0378	5	-0.5	1	1
FA-0379	2	0.5	1	1
FA-0380	6	-0.5	2	2
FA-0381	2	-0.5	2	2
FA-0382	6	-0.5	2	1
FA-0383	10	-0.5	2	2
FA-0384	7	-0.5	1	1
FA-0385	1	-0.5	0	0
FA-0386	3	-0.5	0	0
FA-0387	5	-0.5	0	0
FA-0388	0	-0.5	0	0
FA-0389	0	-0.5	-1	-1
FA-0390	1	-0.5	0	0
FA-0391	3	-0.5	0	0
FA-0392	3	-0.5	1	1
FA-0393	5	-0.5	1	1
FA-0394	4	0.5	2	1
FA-0395	2	-0.5	1	1
FA-0396	7	-0.5	1	1
FA-0397	9	-0.5	1	1
FA-0398	5	0.5	1	1
FA-0399	1	-0.5	0	0
FA-0400	8	-0.5	1	1
FA-0401	4	-0.5	2	1
FA-0402	0	0.5	1	1
FA-0403	-1	-0.5	1	1

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FA-0404	5	-0.5	2	1
FA-0405	1	-0.5	2	1
FA-0406	1	-0.5	1	1
FA-0407	5	-0.5	2	2
FA-0408	3	-0.5	1	1
FA-0409	2	-0.5	2	2
FA-0410	7	0.5	1	1
FA-0411	7	-0.5	2	1
FA-0412	4	-0.5	1	1
FA-0413	1	-0.5	0	0
FA-0414	0	-0.5	1	1
FA-0415	1	-0.5	2	1
FA-0416	1	-0.5	1	1
FA-0417	2	-0.5	2	2
FA-0418	0	-0.5	2	2
FA-0419	1	0.5	1	1
FA-0420	3	0.5	1	1
FA-0421	1	-0.5	1	1
FA-0422	3	0.5	1	1
FA-0423	3	-0.5	1	1
FA-0424	7	-0.5	1	2
FA-0425	2	0.5	1	1
FA-0426	1	-0.5	1	1
FA-0427	0	-0.5	0	0
FA-0428	3	-0.5	0	0
FA-0429	2	-0.5	2	2
FA-0430	2	-0.5	2	2
FA-0431	2	-0.5	2	2
FA-0432	1	-0.5	1	1
FA-0433	1	-0.5	2	2
FA-0434	8	-0.5	1	1

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FA-0435	6	-0.5	1	1
FA-0436	6	-0.5	2	1
FA-0437	4	0.5	2	2
FA-0438	4	-0.5	2	2
FA-0439	4	0.5	2	2
FA-0440	2	-0.5	1	1
FA-0441	1	-0.5	1	1
FA-0442	3	-0.5	1	1
FA-0443	3	-0.5	1	1
FA-0444	3	0.5	2	2
FA-0445	3	-0.5	1	1
FA-0446	5	-0.5	1	1
FA-0447	2	0.5	1	1
FA-0448	6	-0.5	1	1
FA-0449	6	-0.5	1	1
FA-0450	2	-0.5	2	1
FA-0451	1	-0.5	2	2
FA-0452	9	-0.5	1	1
FA-0453	3	0.5	1	1
FA-0454	5	-0.5	2	2
FA-0455	6	-0.5	2	2
FA-0456	2	-0.5	1	1
FA-0457	2	-0.5	0	0
FA-0458	0	-0.5	1	1
FA-0459	1	0.5	2	2
FA-0460	4	-0.5	2	2
FA-0461	2	-0.5	1	0
FA-0462	3	-0.5	1	1
FA-0463	5	-0.5	1	1
FA-0464	3	-0.5	2	1
FA-0465	4	-0.5	1	1

Table 1
BG #1 Affected Area Surface

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FA-0466	5	-0.5	1	1
FA-0467	5	0.5	1	1
FA-0468	3	-0.5	2	2
FA-0469	7	0.5	2	2
FA-0470	6	-0.5	2	2
FA-0471	9	-0.5	2	2
FA-0472	2	-0.5	1	1
FA-0473	2	-0.5	1	1
FA-0474	1	0.5	1	1
FA-0475	5	-0.5	0	0
FA-0476	14	-0.5	0	0
FA-0477	2	-0.5	0	0
FA-0478	5	-0.5	1	1
FA-0479	2	-0.5	1	1
FA-0480	3	-0.5	2	1
FA-0481	1	-0.5	1	1
FA-0482	4	-0.5	1	1
FA-0483	2	-0.5	1	1
FA-0484	3	-0.5	1	1
FA-0485	4	-0.5	1	1
FA-0486	4	-0.5	1	1
FA-0487	3	-0.5	1	1
FA-0488	6	-0.5	1	1

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FA-0489	2	-0.5	1	1
FA-0490	4	-0.5	0	0
FA-0491	5	-0.5	0	0
FA-0492	6	-0.5	0	0
FA-0493	7	-0.5	2	1
FA-0494	4	0.5	1	1
FA-0495	7	0.5	2	2
FA-0496	3	-0.5	2	1
FA-0497	3	-0.5	2	2
FA-0498	4	-0.5	2	2
FA-0499	3	-0.5	2	2
FA-0500	2	-0.5	2	1
FA-0501	1	-0.5	1	1
FA-0502	-1	-0.5	1	1
FA-0503	4	-0.5	1	1
FA-0504	4	-0.5	0	0
FA-0505	0	-0.5	0	0
FA-0506	1	0.5	0	0
FA-0507	3	0.5	1	1
FA-0508	3	-0.5	0	0
FA-0509	3	-0.5	0	0
FA-0510	3	-0.5	1	1
FA-0511	0	-0.5	1	1

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FA-0512	3	-0.5	1	1
FA-0513	3	-0.5	1	1
FA-0514	4	-0.5	1	1
FA-0515	4	-0.5	0	0
FA-0516	5	-0.5	1	1
FA-0517	6	0.5	1	1
FA-0518	2	-0.5	1	1
FA-0519	7	-0.5	1	1
FA-0520	4	0.5	0	0
FA-0521	1	-0.5	2	2
FA-0522	2	0.5	2	2
FA-0523	5	-0.5	0	0
FA-0524	2	-0.5	1	0
FA-0525	3	0.5	1	1
FA-0526	3	-0.5	1	1
FA-0527	3	-0.5	2	1
FA-0528	1	-0.5	2	2
FA-0529	9	-0.5	2	2
FA-0530	2	-0.5	1	1
FA-0531	1	-0.5	1	1
FA-0532	0	-0.5	1	1
FA-0533	8	0.5	2	2

Table 2A
Drainage Area Surface

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FA-0535	2	0.5	1	1
FA-0536	4	-0.5	1	0
FA-0537	5	-0.5	0	-1
FA-0538	4	-0.5	0	-1
FA-0539	-1	-0.5	1	0
FA-0540	5	-0.5	0	0
FA-0541	6	-0.5	0	0
FA-0542	0	-0.5	0	0
FA-0543	0	-0.5	-1	-1
FA-0544	-3	-0.5	0	-1
FA-0545	1	-0.5	1	0
FA-0546	2	-0.5	0	0
FA-0547	3	-0.5	0	-1
FA-0548	3	-0.5	-1	0
FD-0001	7	-0.5	2	0
FD-0002	2	-0.5	0	0
FD-0003	6	-0.5	2	0
FD-0004	1	-0.5	1	0
FD-0005	1	-0.5	1	0
FD-0006	7	-0.5	-1	-1
FD-0007	1	-0.5	0	-1
FD-0008	3	0.5	-1	-1
FD-0009	3	-0.5	-1	-1
FD-0010	2	-0.5	0	-1
FD-0011	2	-0.5	0	-1
FD-0012	0	-0.5	-1	-1
FD-0013	3	-0.5	-1	-1
FD-0014	1	-0.5	0	-1

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FD-0015	1	-0.5	-1	-1
FD-0016	1	-0.5	-1	-1
FD-0017	3	0.5	0	0
FD-0018	4	-0.5	0	0
FD-0019	3	-0.5	0	0
FD-0020	4	-0.5	1	0
FD-0021	4	0.5	1	0
FD-0022	3	0.5	0	0
FD-0023	5	-0.5	0	0
FD-0024	2	-0.5	1	0
FD-0025	7	-0.5	1	0
FD-0026	4	0.5	1	0
FD-0027	5	-0.5	1	1
FD-0028	2	-0.5	1	1
FD-0029	1	0.5	1	1
FD-0030	6	-0.5	1	0
FD-0031	3	-0.5	0	0
FD-0032	9	0.5	1	0
FD-0033	2	-0.5	1	1
FD-0034	4	0.5	0	0
FD-0035	3	0.5	1	1
FD-0036	7	-0.5	1	1
FD-0037	5	-0.5	1	1
FD-0038	7	-0.5	0	0
FD-0039	3	0.5	0	0
FD-0040	3	-0.5	1	0
FD-0041	5	-0.5	0	0
FD-0042	5	-0.5	0	0

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FD-0043	1	-0.5	-1	-1
FD-0044	2	-0.5	0	0
FD-0045	4	-0.5	1	1
FD-0046	2	-0.5	NA	NA
FD-0047	-1	-0.5	NA	NA
FD-0048	2	-0.5	NA	NA
FD-0049	1	-0.5	NA	NA
FD-0050	3	-0.5	NA	NA
FD-0051	1	-0.5	NA	NA
FD-0052	1	-0.5	NA	NA
FD-0053	3	-0.5	NA	NA
FD-0054	1	-0.5	NA	NA
FD-0055	2	-0.5	NA	NA
FD-0056	2	-0.5	NA	NA
FD-0057	4	0.5	NA	NA
FD-0058	2	-0.5	NA	NA
FD-0059	1	-0.5	NA	NA
FD-0060	4	-0.5	NA	NA
FD-0061	0	-0.5	NA	NA
FD-0062	4	-0.5	NA	NA
FD-0063	3	-0.5	NA	NA
FD-0064	2	-0.5	NA	NA
FD-0065	3	-0.5	NA	NA
FD-0066	2	-0.5	NA	NA
FD-0067	1	-0.5	NA	NA

Table 2B
Drainage Area Subsurface

Sample ID	Net U_{tot}	Net Th_{nat}	Depth 1[a]	Depth 2[a]
	(pCi/g)	(pCi/g)	(ft)	(ft)
FD-0068	1	-0.5	0.5	1.0
FD-0069	8	-0.5	1.0	2.0
FD-0070	5	-0.5	2.0	3.0
FD-0071	7	0.5	3.0	4.0
FD-0072	6	-0.5	0.5	1.0
FD-0073	4	-0.5	1.0	2.0
FD-0074	5	-0.5	2.0	3.0
FD-0075	1	-0.5	3.0	4.0
FD-0076	3	-0.5	0.5	1.0
FD-0077	7	-0.5	1.0	2.0
FD-0078	3	-0.5	2.0	3.0
FD-0079	4	-0.5	3.0	4.0

[a] Depth 1 is from the local surface to the top of the sample.
Depth 2 is to the bottom of the sample.

Table 3A
Roadway Area Surface

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FR-0001	2	-0.5	0	-1
FR-0002	2	-0.5	-1	-1
FR-0003	5	-0.5	0	-1
FR-0004	1	-0.5	-1	-1
FR-0005	1	-0.5	-1	-1
FR-0006	1	-0.5	-1	-1
FR-0007	2	-0.5	-2	-2
FR-0008	2	-0.5	0	-1
FR-0009	5	-0.5	-1	-1
FR-0010	4	-0.5	-1	0
FR-0011	6	-0.5	0	-1
FR-0012	1	-0.5	0	0
FR-0013	0	-0.5	-2	-1
FR-0014	2	-0.5	-1	0
FR-0015	2	-0.5	-1	-1
FR-0016	2	-0.5	0	-1
FR-0017	7	-0.5	0	0
FR-0018	1	-0.5	1	0
FR-0019	2	-0.5	1	1
FR-0020	0	-0.5	1	0
FR-0021	1	-0.5	2	1
FR-0022	2	-0.5	1	1
FR-0023	3	0.5	1	0
FR-0024	4	-0.5	2	1
FR-0025	5	-0.5	1	1
FR-0026	-2	0.5	1	0
FR-0027	6	-0.5	1	1
FR-0028	6	-0.5	1	2
FR-0029	6	-0.5	1	0
FR-0030	4	0.5	0	0
FR-0031	0	-0.5	0	0

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FR-0032	2	-0.5	-1	-1
FR-0033	3	-0.5	-1	-2
FR-0034	3	0.5	0	0
FR-0035	6	-0.5	-1	0
FR-0036	4	-0.5	-1	-1
FR-0037	1	-0.5	0	-1
FR-0038	5	0.5	1	0
FR-0039	5	-0.5	0	0
FR-0040	3	0.5	1	0
FR-0041	3	0.5	0	1
FR-0042	1	-0.5	0	0
FR-0043	3	-0.5	0	0
FR-0044	2	-0.5	0	0
FR-0045	5	0.5	1	-1
FR-0046	4	-0.5	0	0
FR-0047	4	-0.5	0	0
FR-0048	2	0.5	0	0
FR-0049	6	-0.5	1	-1
FR-0050	1	-0.5	-1	-1
FR-0051	1	-0.5	0	-1
FR-0052	4	-0.5	0	0
FR-0053	2	-0.5	0	-1
FR-0054	2	-0.5	-1	-1
FR-0055	0	-0.5	-2	-1
FR-0056	4	-0.5	0	-1
FR-0057	2	-0.5	0	0
FR-0058	5	-0.5	0	-1
FR-0059	4	-0.5	-1	-1
FR-0060	2	-0.5	0	0
FR-0061	2	-0.5	-1	0
FR-0062	1	-0.5	-1	-1

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FR-0063	4	-0.5	-2	-2
FR-0064	2	-0.5	0	-1
FR-0065	2	-0.5	-1	-1
FR-0066	2	-0.5	0	-1
FR-0067	4	-0.5	0	-1
FR-0068	4	-0.5	0	-1
FR-0069	2	-0.5	0	-1
FR-0070	1	-0.5	0	-1
FR-0071	4	0.5	0	-2
FR-0072	0	-0.5	-2	-2
FR-0073	4	-0.5	-1	-1
FR-0074	0	0.5	-1	-2
FR-0075	2	-0.5	0	0
FR-0076	4	-0.5	-1	-2
FR-0077	2	-0.5	-1	-2
FR-0078	5	-0.5	-1	-1
FR-0079	5	-0.5	-1	-1
FR-0080	8	0.5	0	-1
FR-0081	1	-0.5	0	-2
FR-0082	1	-0.5	-1	-2
FR-0083	1	0.5	0	-2
FR-0084	2	-0.5	-1	-2
FR-0085	0	0.5	0	-1
FR-0086	3	0.5	-1	-2
FR-0087	3	-0.5	-1	-1
FR-0088	0	0.5	0	-1
FR-0089	1	0.5	-1	-1
FR-0090	4	0.5	-2	-2
FR-0091	6	-0.5	-1	-2
FR-0092	1	-0.5	-1	-2

Table 3A
Roadway Area Surface

Sample ID	Net U_{tot}	Net Th_{nat}	Net µR Sfc	Net µR 1m
	(pCi/g)	(pCi/g)	(µR/hr)	(µR/hr)
FR-0093	0	-0.5	0	-1
FR-0094	1	-0.5	0	-1
FR-0095	9	-0.5	-1	-2
FR-0096	4	0.5	0	-1

Sample ID	Net U_{tot}	Net Th_{nat}	Net µR Sfc	Net µR 1m
	(pCi/g)	(pCi/g)	(µR/hr)	(µR/hr)
FR-0097	1	-0.5	0	-1
FR-0098	4	-0.5	0	-1
FR-0099	0	-0.5	-1	-1
FR-0100	1	0.5	-1	-1

Sample ID	Net U_{tot}	Net Th_{nat}	Net µR Sfc	Net µR 1m
	(pCi/g)	(pCi/g)	(µR/hr)	(µR/hr)
FR-0101	5	-0.5	0	0
FR-0102	11	-0.5	-1	-1
FR-0103	3	-0.5	-1	-2
FR-0104	8	0.5	-1	-1

Table 3B
Roadway Area Subsurface

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g	Depth 1[a] (ft)	Depth 2[a] (ft)
FR-0105	2	-0.5	0.5	1.0
FR-0106	2	-0.5	1.0	2.0
FR-0107	2	-0.5	2.0	3.0
FR-0108	1	-0.5	3.0	4.0
FR-0109	2	-0.5	0.5	1.0
FR-0110	7	0.5	1.0	2.0
FR-0111	1	0.5	2.0	3.0
FR-0112	5	0.5	3.0	4.0
FR-0113	0	-0.5	0.5	1.0
FR-0114	5	-0.5	1.0	2.0
FR-0115	6	-0.5	2.0	3.0
FR-0116	4	-0.5	3.0	4.0
FR-0117	1	0.5	0.5	1.0
FR-0118	4	-0.5	1.0	2.0
FR-0119	2	-0.5	2.0	3.0
FR-0120	3	-0.5	3.0	4.0
FR-0121	2	-0.5	0.5	1.0
FR-0122	1	-0.5	1.0	2.0
FR-0123	5	-0.5	2.0	3.0
FR-0124	3	-0.5	3.0	4.0

[a] Depth 1 is from the local surface to the top of the sample.
Depth 2 is to the bottom of the sample.

Table 4
Unaffected Area Surface

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FU-0001	1	-0.5	0	0
FU-0002	-1	-0.5	1	1
FU-0003	3	-0.5	2	2
FU-0004	5	-0.5	0	0
FU-0005	1	-0.5	0	0
FU-0006	2	-0.5	0	0
FU-0007	0	-0.5	-2	-1
FU-0008	2	-0.5	1	1
FU-0009	2	-0.5	0	1
FU-0010	1	-0.5	-1	-1
FU-0011	-1	-0.5	-1	-1
FU-0012	0	-0.5	-1	-1
FU-0013	1	-0.5	2	1
FU-0014	-1	-0.5	1	1
FU-0015	0	-0.5	0	-1
FU-0016	1	-0.5	0	0

Sample ID	Net U_{tot} (pCi/g)	Net Th_{nat} (pCi/g)	Net µR Sfc (µR/hr)	Net µR 1m (µR/hr)
FU-0017	2	-0.5	1	0
FU-0018	0	-0.5	0	0
FU-0019	2	-0.5	2	1
FU-0020	0	-0.5	0	0
FU-0021	3	-0.5	2	1
FU-0022	2	-0.5	-1	-1
FU-0023	3	-0.5	3	2
FU-0024	2	-0.5	0	1
FU-0025	1	-0.5	3	1
FU-0026	2	-0.5	0	0
FU-0027	1	-0.5	0	0
FU-0028	1	-0.5	1	1
FU-0029	1	-0.5	1	0
FU-0030	1	-0.5	2	1
FU-0031	2	-0.5	1	0
FU-0032	1	-0.5	1	0