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POST-REMEDIAL ACTION REPORT FOR THE CHEMICAL STABILIZATION AND SOLIDIFICATION (CSS) WORK ZONE (WP-437/RU023)

WELDON SPRING SITE REMEDIAL ACTION PROJECT
WELDON SPRING, MISSOURI

NOVEMBER 2001 **REV. 0**

RECORD

U.S. Department of Energy
Oak Ridge Operations Office
Weldon Spring Site Remedial Action Project

Prepared by MK-Ferguson Company and Jacobs Engineering Group

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APPROVALS

Environmental Safety and Health Manager	11-13-01 Date
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Weldon Spring Site Remedial Action Project

Post-Remedial Action Report for the Chemical Stabilization and Solidification (CSS) Work Zone (WP-437/RU023)

Revision 0

November 2001

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Under Contract DE-AC05-86OR21548

ABSTRACT

Work Package-437 (WP-437) has been divided into twelve work zones. This report details the confirmation field activities and analytical results for contaminated soil removal of the CSS work zone portion of WP-437. Most of this 10-acre work zone was confirmed as part of previous work packages, but about half of this work zone was reconfirmed as part of WP-437. These portions of the CSS work zone have been designated as Remedial Unit 23 and further subdivided into nine confirmation units.

The CSS work zone included the CSS Facility and Pilot Plant. Remediation was designed to achieve surface ALARA goals and confirmation of soil remediation was required to meet cleanup standards as established in the *Record of Decision for Remedial Action at the Chemical Plant Area of the Weldon Spring Site*. Final confirmation data verify that the established goals and standards were achieved.

TABLE OF CONTENTS

SECTION **PAGE**

1. INTRODUCTION 1
1.1 Purpose 1
1.2 Scope 1
1.3 Remediation and Confirmation Process 2
2. PRE-REMEDIATION ACTIVITIES 5
2.1 Determining Contaminants of Concern 5
2.2 Data Quality Objectives 5
2.3 Cleanup Standards 5
2.4 Cleanup Confirmation Process 6
3. REMEDIAL ACTIVITIES 8
3.1 Field Activities 8
3.1.1 Walkover Surveys 8
3.1.2 Soil Sampling 8
3.2 Laboratory Activities 9
3.3 Verification Activities 9
4. CONFIRMATION UNITS RESULTS SUMMARY 10
5. DATA EVALUATION 29
5.1 Data Verification 29
5.2 Data Review 29
5.3 Data Validation 29
6. SUMMARY OF CLOSURE REPORT FINDINGS 31
6.1 Data Evaluation 31
6.2 Summary of WP-437 Confirmation Results 31
6.3 Summary of Chemical Plant Confirmation Results 32
6.4 Comparison of Standard Deviations 32
7. REFERENCES 34

APPENDIXES

A WP-437 RU023 Final Walkover Forms
B WP-437 RU023 Final Data
C WP-437 RU023 Sample Location Coordinates
D Interoffice Correspondence
E Supplemental Information for CU374

LIST OF FIGURES

NUMBER **PAGE**

Figure 1-1 WP-437 Work Zone Designations 3
Figure 1-2 Confirmation Units in Remedial Unit RU023 4
Figure 2-1 Cleanup Confirmation Process 7
Figure 4-1 Sample Locations in Remedial Unit RU023 Confirmation Unit CU370 12
Figure 4-2 Sample Locations in Remedial Unit RU023 Confirmation Unit CU371 14
Figure 4-3 Sample Locations in Remedial Unit RU023 Confirmation Unit CU372 16
Figure 4-4 Sample Locations in Remedial Unit RU023 Confirmation Unit CU373 18
Figure 4-5 Sample Locations in Remedial Unit RU023 Confirmation Unit CU374 20
Figure 4-6 Sample Locations in Remedial Unit RU023 Confirmation Unit CU375 22
Figure 4-7 Sample Locations in Remedial Unit RU023 Confirmation Unit CU376 24
Figure 4-8 Sample Locations in Remedial Unit RU023 Confirmation Unit CU377 26
Figure 4-9 Sample Locations in Remedial Unit RU023 Confirmation Unit CU384 28

LIST OF TABLES

NUMBER **PAGE**

Table 2-1 ROD Cleanup Standards for COCs within the WP-437 CSS Work Zone 6
Table 4-1 Summary of CU370 11
Table 4-2 Summary of CU371 13
Table 4-3 Summary of CU372 15
Table 4-4 Summary of CU373 17
Table 4-5 Summary of CU374 19
Table 4-6 Summary of CU375 21
Table 4-7 Summary of CU376 23
Table 4-8 Summary of CU377 25
Table 4-9 Summary of CU384 27
Table 6-1 Summary Totals for RU023 31
Table 6-2 Summary Totals for Confirmation 32
Table 6-3 Comparison of Standard Deviations 33

1. INTRODUCTION

1.1 Purpose

Work Package-437 (WP-437) is divided into 12 work zones, 11 of which are identified in Figure 1-1. In addition, there is the Vicinity Property DA-6 work zone off site just west of the Ash Pond work zone. This report details the confirmation field activities and analytical results for contaminated soil removal of the Chemical Stabilization and Solidification (CSS) work zone portion of WP-437.

The major features of the CSS Work Zone consist of the Chemical Stabilization/Solidification Plant and the pilot plant. Previous soil characterization results and pre-excavation walkovers of this area determined that there were contaminant concentrations that exceeded the As Low As Reasonably Achievable (ALARA) goals established in the *Record of Decision for Remedial Action at the Chemical Plant Area of the Weldon Spring Site* (ROD) (Ref. 1). Remediation was designed to achieve surface ALARA goals, and confirmation of soil remediation to the ROD cleanup standards was required and conducted under an earlier work package – WP-420 (see Section 1.2). WP-437 remediation activities involved confirming under the footprint of the CSS Secondary Containment, the pilot plant and roads removed as contaminated.

The CSS work zone was subdivided into nine confirmation units (CUs) that are collectively known as remedial unit (RU) 023 and are identified in Figure 1-2. Individual CU figures are presented in Section 4 of this report.

1.2 Scope

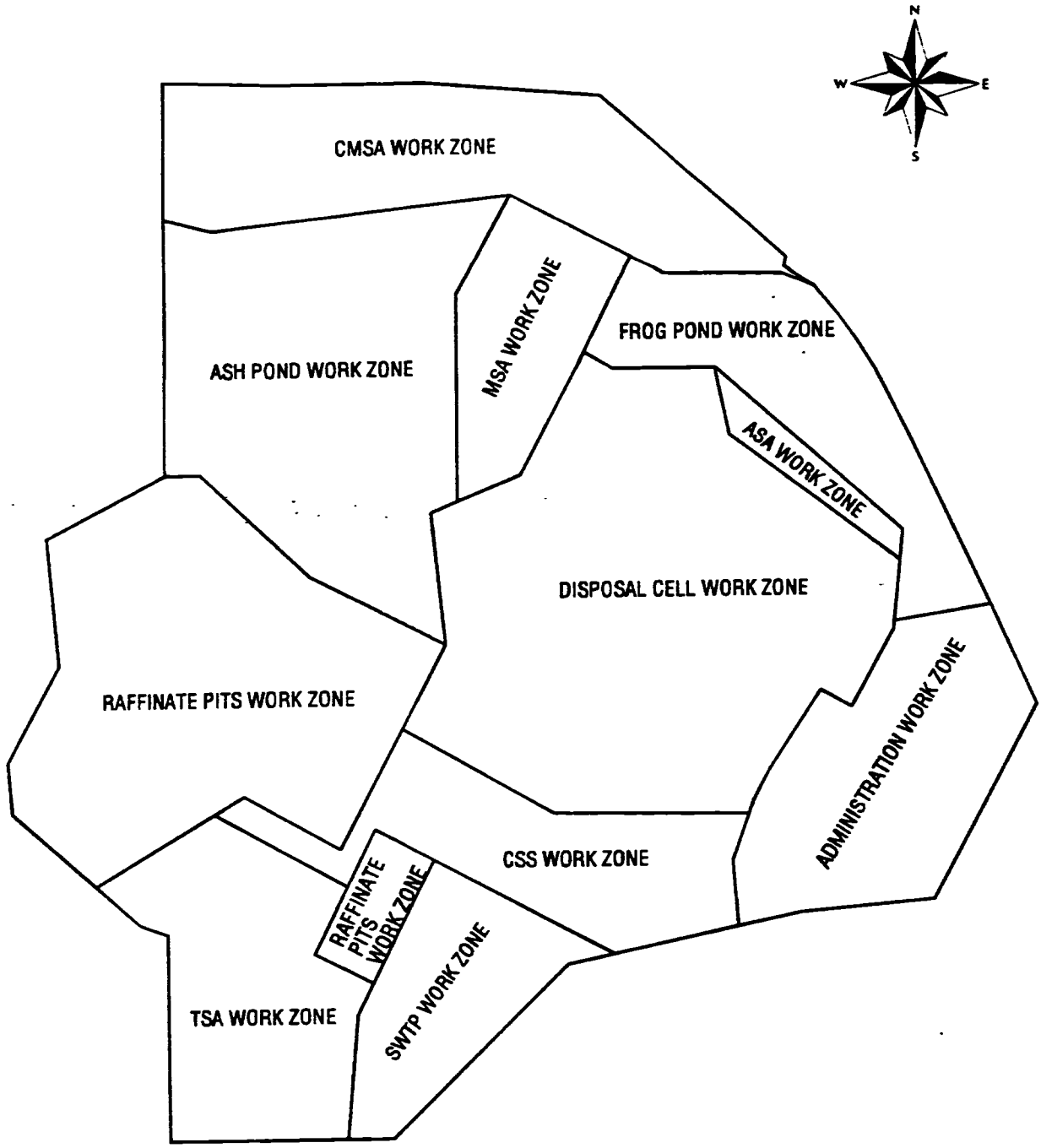
This report describes the remedial activities and confirmation surveying and sampling conducted on contaminated soils within RU023. Confirmation walkovers and soil sampling were conducted in accordance with the *Confirmation Sampling Plan Details for the Disposal Cell Facility (WP-437)* (Ref. 2). This plan was developed to ensure that the objectives identified in the *Chemical Plant Area Cleanup Attainment Confirmation Plan* (Ref. 3) were accomplished, and to ensure that the remediation requirements of the ROD were met.

The majority of this 10-acre work zone was previously confirmed during WP-420. Details can be found in the *Post-Remedial Action Report for Work Package 420: Chemical Plant Area Foundations and Contaminated Soil Removal – RU7 and RU8* (Refs. 8 and 9). Approximately half of this work zone was reconfirmed under WP-437.

1.3 Remediation and Confirmation Process

This report details the activities conducted to remediate the CSS portion of WP-437, which consists of CU370 through 377 and CU384. Remediation consisted of excavation of contaminated soils and debris. Following remediation, walkovers were conducted, and confirmation samples were collected to ensure that all contaminated materials had been remediated.

The entire remediation process included characterization sampling, historical data review, contaminants of concern (COC) identification, confirmation plan development, contaminated soil excavation, radiological walkover surveys, confirmation soil sampling, preliminary and final data review, completion of disposition forms, quality assurance/quality control (QA/QC) review, summary of findings and conclusions, and closure report preparation.



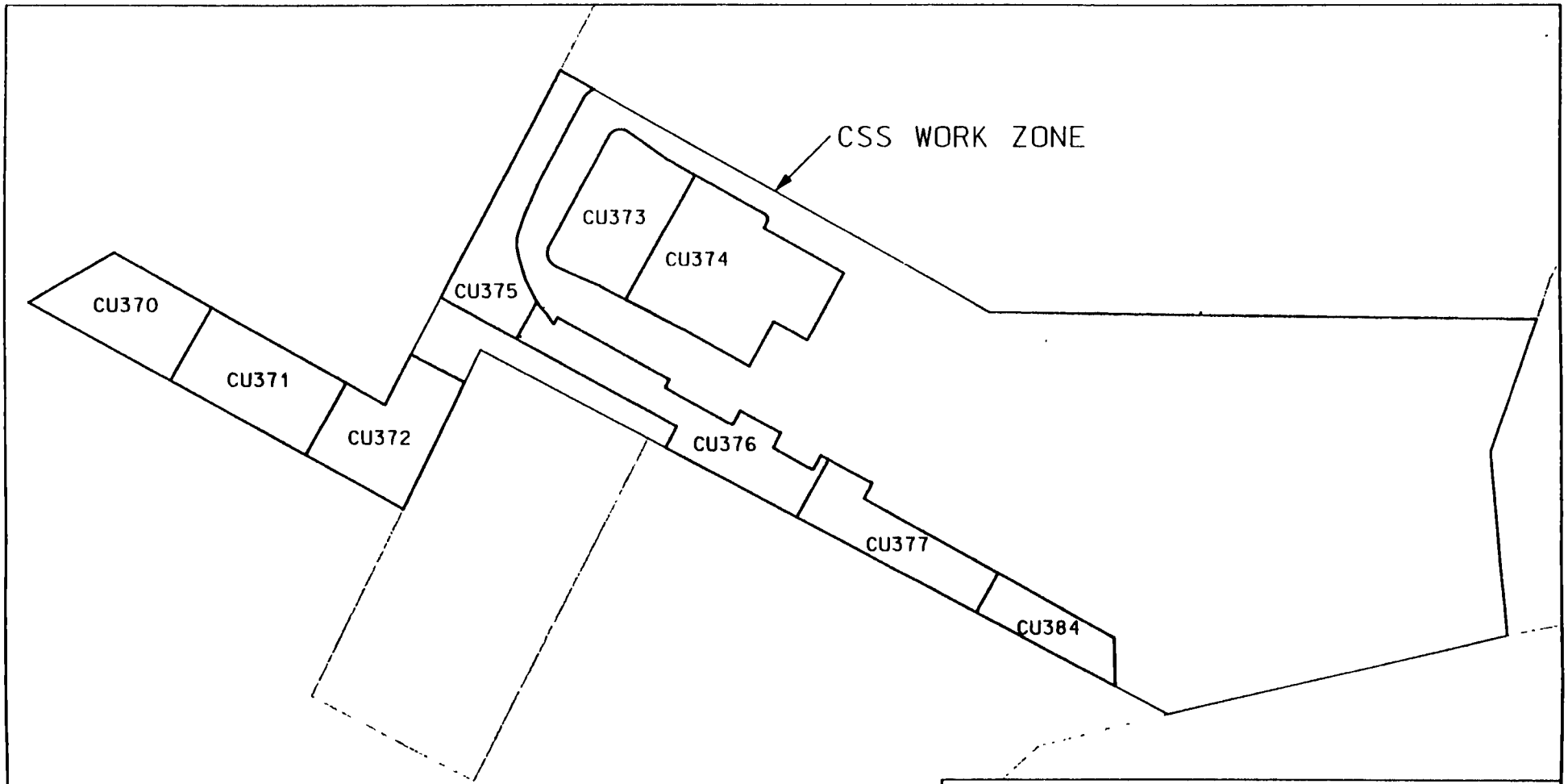
100 50 0 100 METERS

100 150 0 300 FEET

WP-437 WORK ZONE DESIGNATIONS

Figure: 1-1

REPORT NO	EXHIBIT NO	
DOE/OR/21548-898	N/A	
ORIGINATOR	DRAWN BY	DATE
MGL	WSSRAP GIS	08/07/01



CONFIRMATION UNITS
IN
REMEDIAL UNIT 023

FIGURE 1-2

REPORT NO.:	DOE/OR/21548-898	EXHIBIT NO.:	A/CP/010/0101		
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2. PRE-REMEDIATION ACTIVITIES

2.1 Determining Contaminants of Concern

Contaminant of concern (COCs) determination was dependant upon historical information, characterization results, and visual observation during field activities, and not all COCs were required for all sample locations. The full process for identifying COCs is detailed in the *Confirmation Sampling Plan Details for the Disposal Cell Facility (WP-437)* (Ref. 2). COCs identified for RU023 were arsenic (As), chromium (Cr), lead (Pb), thallium (Tl), polynuclear aromatic hydrocarbon (PAH), polychlorinated biphenyl (PCB), Radium-226 (Ra-226), Radium-228 (Ra-228), Thorium-230 (Th-230), Thorium-232 (Th-232), and Uranium-238 (U-238).

2.2 Data Quality Objectives

Data Quality Objectives (DQOs) were identified to specify quality data and ensure that the data would be sufficient to support the decision making process throughout remedial activities, including the confirmation process. Confirmation DQOs were developed for sampling and analyzing soils during remediation and for the subsequent data evaluation. The DQOs were designed to make statistically defensible decisions regarding attainment of cleanup standards. Sampling and analytical programs for the WP-437 work zones were designed in accordance with DQOs stated in the *Chemical Plant Area Cleanup Attainment Confirmation Plan* (Ref. 3).

2.3 Cleanup Standards

The objective of the Department of Energy (DOE) ALARA process is to reduce exposures and risks associated with residual contamination. The ROD (Ref. 1) established two different sets of cleanup standards: risk-based cleanup criteria and As Low As Reasonably Achievable (ALARA) goals. Remedial activities for WP-437 were designed to remove soil where the COC concentrations were found by characterization or during remediation activities to exceed ALARA goals. Table 2-1 summarizes the cleanup criteria and ALARA goals established in the ROD that are applicable for COCs in the CSS work zone. Throughout the remedial activities at RU023, COC concentrations were evaluated with the ALARA process.

2.4 Cleanup Confirmation Process

The cleanup confirmation process is used to determine, under the remedial guidelines, if remediation activities have achieved the cleanup standards. Figure 2-1 shows the cleanup confirmation process for remedial activities conducted at the WP-437 area.

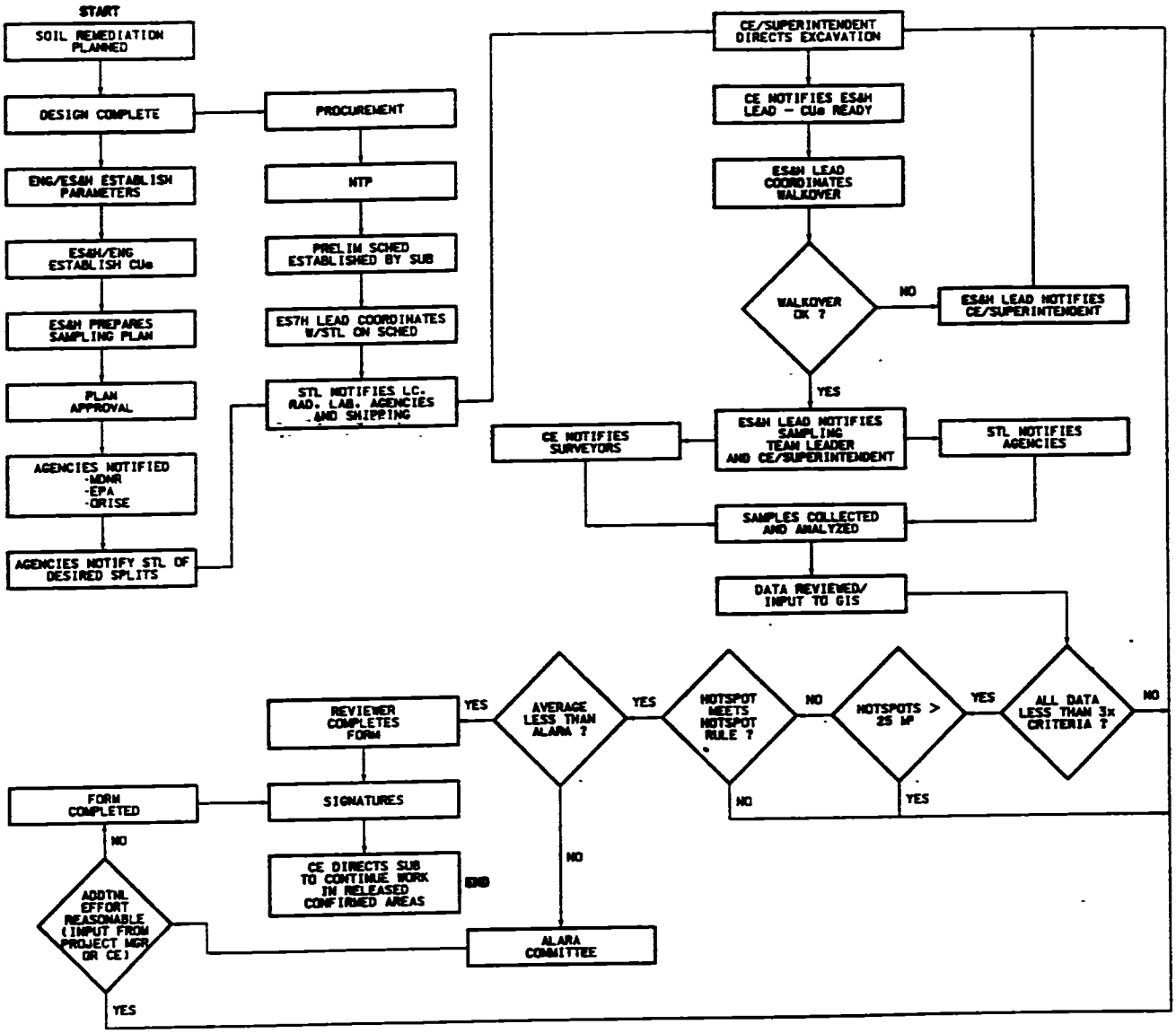
The decision-making process specifies how the data will be applied and evaluated within the cleanup confirmation process. The decision-making process includes provisions for any hot spots that may be encountered by applying a formula to determine the acceptable concentration for the COC.

Table 2-1 ROD Cleanup Standards for COCs within the WP-437 CSS Work Zone

	SURFACE [a]		SUBSURFACE [b]	
RADIONUCLIDE (pCi/g)	**ALARA**	**CRITERIA**	**ALARA**	**CRITERIA**
Ra-226	5.0	6.2	5.0	16.2
Ra-228	5.0	6.2	5.0	16.2
Total Radium	5.0	6.2	5.0	16.2
Th-230	5.0	6.2	5.0	16.2
Th-232	5.0	6.2	5.0	16.2
U-238	30.0	120	30.0	120.0
CHEMICAL (mg/kg)				
Arsenic	45	75	75	750
Chromium	90	100	100	1000
Lead	240	450	450	4500
Thallium	16	20	20	200
PAH	0.44	5.6	5.6	26
PCB	0.65	8	8	80

(a) Values listed for surface soils apply to contamination within the upper 15 cm (6 in.) of the soil column.
(b) Values for subsurface apply to contamination in soils below 15 cm (6 in.).

Source: *Record of Decision for Remedial Action at the Chemical Plant Area of the Weldon Spring Site* (Ref 1)



CLEANUP CONFIRMATION PROCESS

FIGURE 2-1

REPORT NO.:	DOE/OR/21548-898	EXHIBIT NO.:	A/PI/044/0801		
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3. REMEDIAL ACTIVITIES

3.1 Field Activities

Contaminated soils and other debris from the CSS work zone were first excavated to design depth as detailed in the CSS work zone specifications (Ref. 6). After the initial excavation was complete, radiological walkover surveys were conducted to evaluate the need for additional excavation. When the surveys indicated no additional excavation was needed, confirmation soil samples were collected.

Confirmation results were then reviewed, and additional excavation and confirmation sampling was conducted in hot spot areas, if necessary. After achieving cleanup standards, a disposition form was completed with preliminary analytical results. The form was reviewed and signed by authorized project personnel. The confirmation unit (CU) was then released back to the subcontractor for final grading.

Field activities completed during remediation, such as walkover surveys and soil sampling, were conducted in accordance with procedures specified in the *Confirmation Sampling Plan Details for the Disposal Cell Facility (WP-437)* (Ref. 2). Field activities were conducted to achieve and document sampling objectives specified in the *Chemical Plant Area Cleanup Attainment Confirmation Plan* (Ref. 3). All sampling and remedial action surveys were conducted and documented in accordance with Weldon Spring Site Remedial Action Project (WSSRAP) Environmental Safety and Health (ES&H) procedures.

3.1.1 Walkover Surveys

Radiological walkover surveys were conducted after contaminated soil removal was completed to determine if confirmation sample collection could begin. The surveys were conducted using a 2 in. x 2 in. sodium iodide (NaI) scintillation detector. The survey readings were within an acceptable range (less than 1.5 times background) throughout the entire work zone. The background ranges for each CU are listed in the CU Summary Forms in Section 4 of this report. Copies of the walkover forms are presented in Appendix A.

3.1.2 Soil Sampling

Once the walkovers were completed, soil sampling was conducted as part of the confirmation process. The sampling locations for CUs in RU023 are shown in the figures in Section 4. Analytical suites for the CUs were dependant upon the COC list developed from historical information, characterization data, and visual identification in the field as discussed in Section 2.

Nine Th-230 hot spots were encountered during confirmation of this RU. All of these locations were further remediated in accordance with the guidelines established in the *Chemical*

Plant Area Cleanup Attainment Confirmation Plan (Ref. 3). Details can be found in the appropriate CU Summary Forms in Section 4 of this report.

The subsequent survey and confirmation sample results indicated that contaminants were below cleanup standards and the averages were less than ALARA; therefore, no further remediation was conducted for RU023. Disposition forms were completed following the receipt of preliminary analytical data for all CUs within the CSS work zone.

3.2 Laboratory Activities

Radiological analyses for RU023 were conducted at both the on-site and off-site laboratories in accordance with the *Project Management Contractor Quality Assurance Program* (Ref. 4) and the *Environmental Quality Assurance Project Plan* (EQAPjP) (Ref. 5). CU releases were based on estimated Ra-226 results. In addition, the concentration of Th-232 was calculated based on the analytical results of Ra-228 and the calculated value was used for CU releases. Both of these calculations are explained in detail in interoffice correspondences (IOCs) in Appendix D.

Chemical analyses for RU023 were conducted at subcontracted off-site laboratories using Contract Laboratory Program (CLP) methodologies. Summaries of the analytical results for each CU can be found in Section 4 of this report. Analytical data were subjected to data evaluation and validation upon receipt from the laboratory.

3.3 Verification Activities

The Oak Ridge Institute for Science and Education (ORISE) was contracted by the U. S. Department of Energy (DOE) to verify confirmation soil sampling in the chemical plant area. Verification activities included independent walkover radiological surveys and collection and analysis of soil samples to verify proper disposition of CUs. Field verification activities were conducted in accordance with ORISE's final survey plan (Ref. 7).

ORISE visits to verify WP-437 work zones did not include the CSS work zone. A final verification report will be prepared by ORISE. The ORISE report will contain verification of walkover surveys and soil sampling results and will affirm that the remedial action objectives were achieved.

4. CONFIRMATION UNITS RESULTS SUMMARY

This section summarizes the confirmation unit analytical results for the nine CUs in RU023. In total, 246 locations were sampled between April 14, 1999 and August 10, 2000. Preliminary results were below cleanup criteria with the exception of nine hotspots as discussed in Section 3 of this report and the following summary forms. Average COC concentrations as indicated by preliminary data for RU023 remained below ALARA goals. All 100 m^2 averages from final data were less than criteria.

After the preliminary data were reviewed, disposition forms were completed and signed by authorized reviewers. Based on the preliminary confirmation data, all CUs in RU023 were fully released as complying with surface cleanup standards.

Note that the preliminary data were the initial results available immediately from the laboratory and were used for releases. These preliminary results could vary from the final results based upon laboratory quality checks or Weldon Spring Site Remedial Action Project (WSSRAP) verification activities. Upon receipt of the data packages, the final data were reviewed and compared to the preliminary data. The final analytical results agreed with the preliminary results and indicated that the remedial activities were completed. The final results met the cleanup standards as detailed in the *Chemical Plant Area Cleanup Area Attainment Confirmation Plan* (Ref. 3) for all CUs in RU023. Tables 4-1 through 4-9 and associated figures provide the confirmation details for each CU, and all data presented is final data. Copies of the final walkover forms are in Appendix A. The final data are presented in Appendix B. The list of coordinates is in Appendix C.

On the following tables, "Date Released for Unrestricted Use" refers to the date that confirmation activities were completed and the CU was released to the subcontractor to complete final backfilling and/or regrading. The phase is not synonymous with DOE Order 5400.5 terminology that refers to release without radiological restrictions.

Table 4-1 Summary of CU370

CU: 370 RU: 23

COC: Ra-226 [X], Ra-228 [X], Th-230 [X], Th-232 [X], U-238 [X], As [X], Cr [X], Pb [X], Tl [X], PAH [X], PCB [X]

Reference Figure: 4-1

DATE RELEASED FOR UNRESTRICTED USE: 11 / 02 / 99

CLEANUP STANDARD [X] SURFACE [ ] SUBSURFACE

EACH 100m² < CRITERIA? [X] YES [ ] NO

LOCATION DESCRIPTION: *Western side of the CSS Work Zone, south of raffinate pit 3.*

WALKOVER SURVEY INFORMATION

AVG BKGD: *8,250* cpm

FINAL SURVEY (S) BELOW 1.5 X BACKGROUND ? [X] YES [ ] NO

DATE(S) SCANNED: *06/03/99, 10/18/99, 10/25/99*

CONFIRMATION SAMPLING INFORMATION

TOTAL # OF SAMPLE LOCATIONS : *29*

AVERAGES < ALARA? [X] YES [ ]

HOTSPOTS REMAINING? [ ] YES [X] NO

TOTAL # OF UTILITY SAMPLES : *0*

ADDITIONAL EXCAVATION REQUIRED? [ ] YES [X] NO

GENERAL COMMENTS - *Planned confirmation grid sampling points represent raffinate pit in-situ areas (RPXs). Contaminated soils were identified in a visible gravel lens uncovered during post-confirmation excavation. Further investigation determined that this lens, which was positioned beneath the east berm of Raffinate Pit 3, should be removed to 1954 elevations and the affected locations resampled. The label suffix used for these resamples is -01. Both the original and resample results are included with the statistical data in order to represent soils left in place. All final results are below ALARA.*

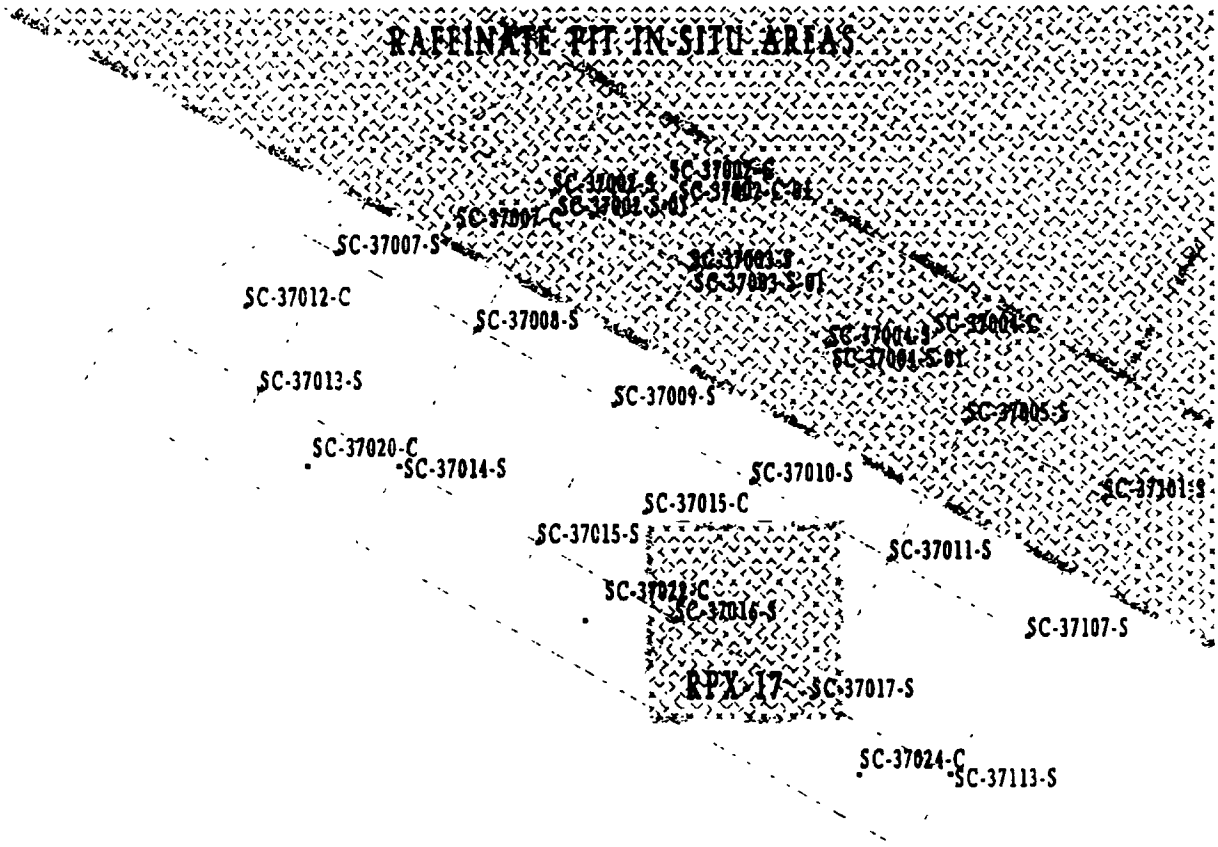
ORISE ACTION - *None.*

ALARA COMMITTEE ACTION - *None.*

CU FINAL RESULTS SUMMARY DATA

Arsenic	29	5.1 - 14.2	10.4	45	75	0	0
Chromium	29	15.1 - 26.4	20.7	90	100	0	0
Lead	29	8 - 84.8	19	240	450	0	0
Thallium	29	0.33 - 4.2	1.83	16	20	0	0
PAH	29	0.0 - 0.9	0.04	0.44	5.6	1	0
PCB	29	0.0 - 1.8	0.1	0.65	8	1	0
Ra-226	29	0.32 - 1.79	0.9	5	6.2	0	0
Ra-228	29	0.45 - 1.42	0.9	5	6.2	0	0
Total Radium	29	0.84 - 2.38	1.78	5	6.2	0	0
Th-230	29	0.84 - 3.28	1.52	5	6.2	0	0
Th-232	29	0.46 - 1.46	0.93	5	6.2	0	0
U-238	29	1.01 - 3.41	1.42	30	120	0	0

NOTE: Radiological contaminants are listed in pCi/g. Chemical contaminants are mg/kg.



150 75 0 150 FEET

50 25 0 50 METERS

Sample Locations in Remedial Unit RU023
Confirmation Unit CU370

Figure: 4-1

REPORT NO.:	DOE/OR/21548-898	EXHIBIT NO ·			
ORIGINATOR.	MGL	DRAWN BY:	LGB	DATE.	8/8/01

Table 4-2 Summary of CU371

CU: 371 RU: 23

COC				
	Ra-226	X	As	X
	Ra-228	X	Cr	X
	Th-230	X	Pb	X
	Th-232	X	Tl	X
	U-238	X	PAH	X
	2,4-DNT		PCB	X
Reference Figure: 4-2			TNT	

DATE RELEASED FOR UNRESTRICTED USE: 06/14/2000

CLEANUP STANDARD [X] SURFACE [ ] SUBSURFACE

EACH 100m² < CRITERIA? [X] YES [ ] NO

LOCATION DESCRIPTION: *Western portion of the CSS Work Zone, south of raffinate pit 3.*

WALKOVER SURVEY INFORMATION

AVG BKGD: *9,580* cpm

FINAL SURVEY (S) BELOW 1.5 X BACKGROUND ? [X] YES [ ] NO

DATE(S) SCANNED: *04/13/99, 06/03/99, 06/06/99, 07/18/99, 07/21/99, 10/25/99*

CONFIRMATION SAMPLING INFORMATION

TOTAL # OF SAMPLE LOCATIONS : *28*

TOTAL # OF UTILITY SAMPLES : *0*

AVERAGES < ALARA? [X] YES [ ] NO

HOTSPOTS REMAINING? [ ] YES [X] NO

ADDITIONAL EXCAVATION REQUIRED? [X] YES [ ] NO

GENERAL COMMENTS - *(1) Planned confirmation grid sampling points represent raffinate pit in-situ areas (RPXs). (2) Four Th-230 hotspots were identified (SC-37104-S; SC-37109-S; SC-37117-S; SC-37118-S). These four hotspots were remediated and reconfirmed. (3) All final results are below ALARA.*

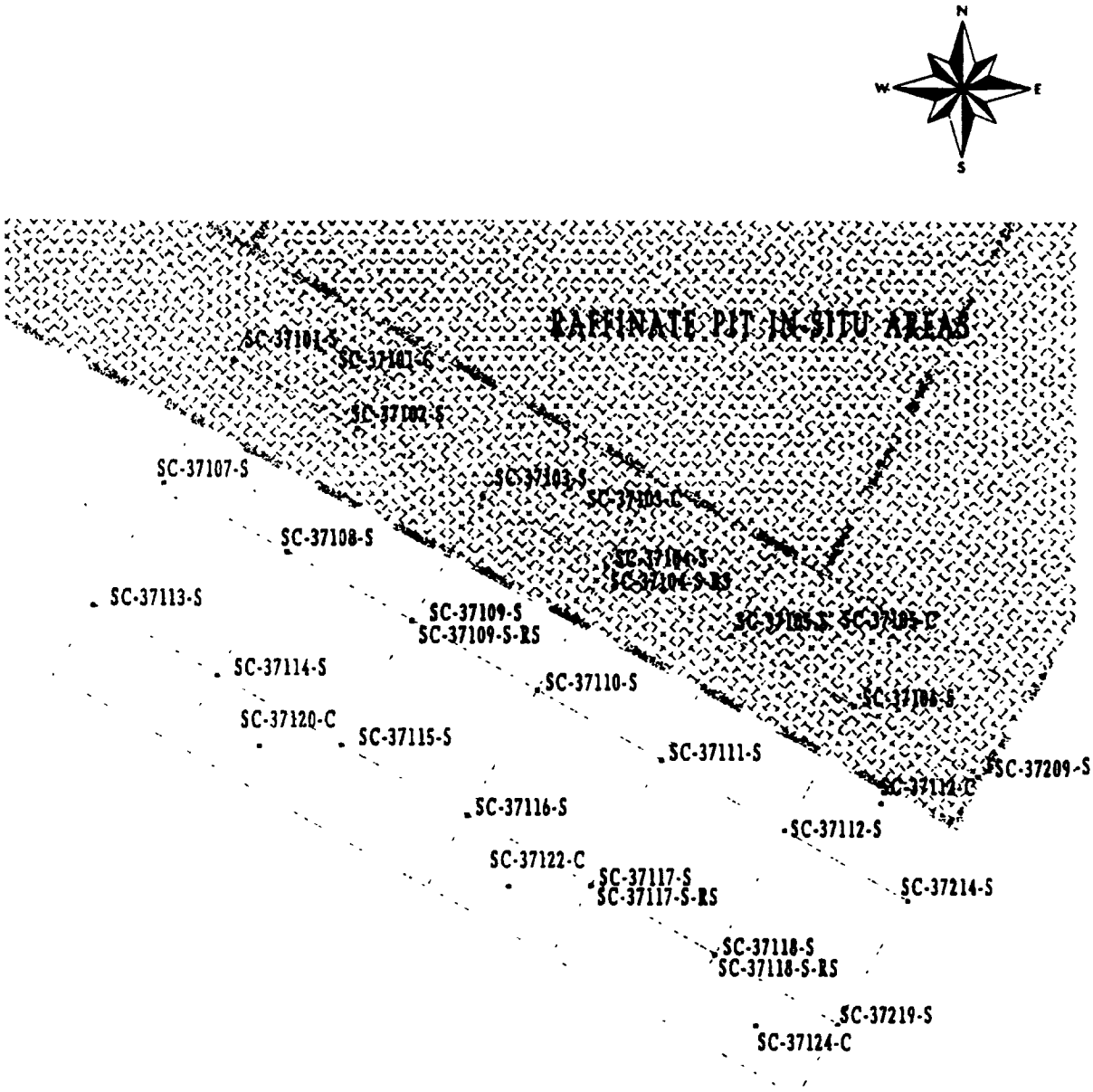
ORISE ACTION - *None.*

ALARA COMMITTEE ACTION - *None.*

CU FINAL RESULTS SUMMARY DATA

Arsenic	28	2.3 - 15.1	9.46	45	75	0	0
Chromium	28	2.5 - 26.4	17.84	90	100	0	0
Lead	28	3.3 - 30.6	15.37	240	450	0	0
Thallium	28	0.35 - 4.2	1.51	16	20	0	0
PAH	28	0.0 - 0.23	0.031	0.44	5.6	0	0
PCB	28	0.0 - 0.10	0.004	0.65	8	0	0
Ra-226	28	0.30 - 2.12	0.91	5	6.2	0	0
Ra-228	28	0.22 - 1.93	0.96	5	6.2	0	0
Total Radium	28	0.53 - 3.05	1.87	5	6.2	0	0
Th-230	28	0.71 - 4.48	1.56	5	6.2	0	0
Th-232	28	0.23 - 1.98	0.98	5	6.2	0	0
U-238	28	0.84 - 3.41	1.46	30	120	0	0

NOTE Radiological contaminants are listed in pCi/g. Chemical contaminants are mg/kg.



150 75 0 150 FEET

50 25 0 50 METERS

Sample Locations in Remedial Unit RU023
Confirmation Unit CU371

Figure: 4-2

REPORT NO.:	DOE/OR/21548-898	EXHIBIT NO :			
ORIGINATOR:	MGL	DRAWN BY:	LGB	DATE	8/8/01

Table 4-3 Summary of CU372

CU: 372 RU: 23

COC: Ra-226 [X], Ra-228 [X], Th-230 [X], Th-232 [X], U-238 [X], 2,4-DNT [ ], As [X], Cr [X], Pb [X], Tl [X], PAH [X], PCB [X], TNT [ ]

Reference Figure: 4-3

DATE RELEASED FOR UNRESTRICTED USE: 06/16/2000

CLEANUP STANDARD [X] SURFACE [ ] SUBSURFACE

EACH 100m² < CRITERIA? [X] YES [ ] NO

LOCATION DESCRIPTION: *Western portion of the CSS Work Zone, west of raffinate pit 1.*

WALKOVER SURVEY INFORMATION

AVG BKGD: *6,000 - 12,000* cpm

FINAL SURVEY (S) BELOW 1.5 X BACKGROUND ? [X] YES [ ] NO

DATE(S) SCANNED: *07/21/99; 03/30/00; 06/02/00; walkover form was not located for SC-37222-C, SC-37223-C, and SC-37223-S.*

CONFIRMATION SAMPLING INFORMATION

TOTAL # OF SAMPLE LOCATIONS : 29

TOTAL # OF UTILITY SAMPLES : 0

AVERAGES < ALARA? [X] YES [ ] NO

HOTSPOTS REMAINING? [ ] YES [X] NO

ADDITIONAL EXCAVATION REQUIRED? [X] YES [ ] NO

GENERAL COMMENTS - *One Th-230 hotspot (SC-37204-S) was identified. This hotspot was remediated and resampled. All final results are below ALARA.*

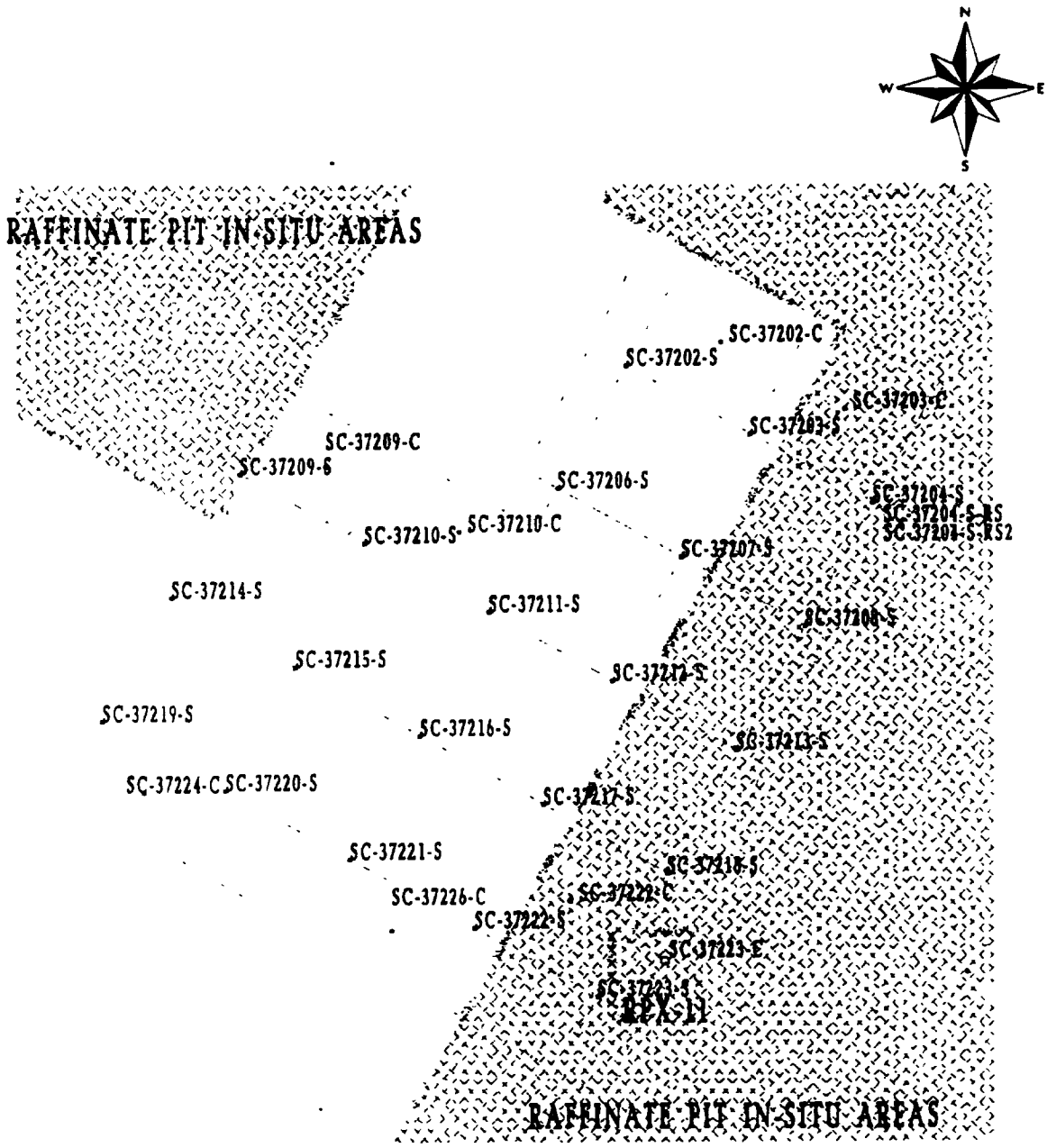
ORISE ACTION - *None.*

ALARA COMMITTEE ACTION - *None.*

CU FINAL RESULTS SUMMARY DATA

Arsenic	29	2.3 - 17.7	11.91	45	75	0	0
Chromium	29	13.0 - 26.1	18.78	90	100	0	0
Lead	29	9.4 - 32.8	19.95	240	450	0	0
Thallium	29	0.36 - 2.10	0.98	16	20	0	0
PAH	29	0.0 - 0.23	0.02	0.44	5.6	0	0
PCB	29	All results < detection limit	N/A	0.65	8	0	0
Ra-226	29	0.58 - 1.23	0.96	5	6.2	0	0
Ra-228	29	0.40 - 1.31	0.99	5	6.2	0	0
Total Radium	29	1.27 - 2.32	1.94	5	6.2	0	0
Th-230	29	0.87 - 3.64	1.68	5	6.2	0	0
Th-232	29	0.41 - 1.34	1.01	5	6.2	0	0
U-238	29	1.09 - 3.57	1.28	30	120	0	0

NOTE: Radiological contaminants are listed in pCi/g. Chemical contaminants are mg/kg.



150 75 0 150 FEET

50 25 0 50 METERS

Sample Locations in Remedial Unit RU023
Confirmation Unit CU372

Figure: 4-3

REPORT NO.:	DOE/OR/21548-898	EXHIBIT NO			
ORIGINATOR	MGL	DRAWN BY:	LGB	DATE	8/8/01

Table 4-4 Summary of CU373

CU: 373 RU: 23

COC				
	Ra-226	X	As	X
	Ra-228	X	Cr	X
	Th-230	X	Pb	X
	Th-232	X	Tl	X
	U-238	X	PAH	X
	2,4-DNT		PCB	X
Reference Figure: 4-4			TNT	

DATE RELEASED FOR UNRESTRICTED USE: 07/22/1999

CLEANUP STANDARD: [ ] SURFACE [X] SUBSURFACE

EACH 100m² < CRITERIA? [X] YES [ ] NO

LOCATION DESCRIPTION: *CU located just east of raffinate pit 3 and north of raffinate pits 1&2. This CU represents the western portion of the CSS facility secondary containment.*

WALKOVER SURVEY INFORMATION

AVG BKGD: *10,500* cpm

FINAL SURVEY (S) BELOW 1.5 X BACKGROUND ? [X] YES [ ] NO

DATE(S) SCANNED: *07/14/1999*

CONFIRMATION SAMPLING INFORMATION

TOTAL # OF SAMPLE LOCATIONS : *30*

TOTAL # OF UTILITY SAMPLES : *0*

AVERAGES < ALARA? [X] YES [ ] NO

HOTSPOTS REMAINING? [ ] YES [X] NO

ADDITIONAL EXCAVATION REQUIRED? [ ] YES [X] NO

GENERAL COMMENTS - *All final results are below subsurface criteria.*

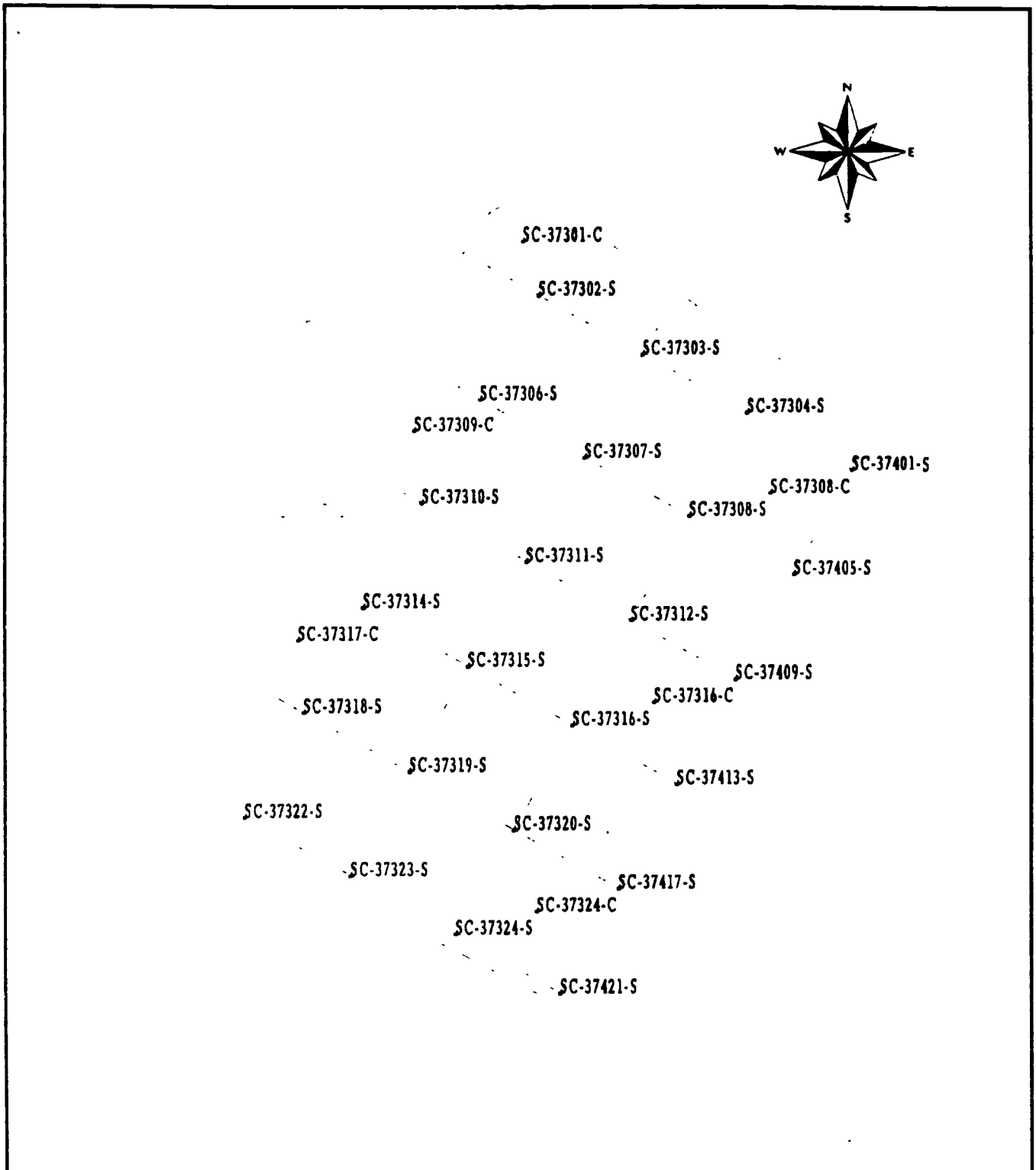
ORISE ACTION - *None.*

ALARA COMMITTEE ACTION - *None.*

CU FINAL RESULTS SUMMARY DATA

Arsenic	30	2.6 - 18.7	7.19	75	750	0	0
Chromium	30	10.3 - 20.3	15.36	100	7000	0	0
Lead	30	6.6 - 46	14.29	450	4500	0	0
Thallium	30	0.98 - 3.8	2.63	20	200	0	0
PAH	30	0.0 - 0.04	0.003	5.6	56	0	0
PCB	30	All results < detection limit	N/A	8	80	0	0
Ra-226	30	0.55 - 1.25	0.86	5	16.2	0	0
Ra-228	30	0.37 - 1.32	0.93	5	16.2	0	0
Total Radium	30	1.16 - 2.28	1.78	5	16.2	0	0
Th-230	30	0.94 - 8.48	1.88	5	16.2	2	0
Th-232	30	0.38 - 1.35	0.95	5	16.2	0	0
U-238	30	1.17 - 4.00	1.39	30	120	0	0

NOTE: Radiological contaminants are listed in pCi/g. Chemical contaminants are mg/kg.



150 75 0 150 FEET

50 25 0 50 METERS

Sample Locations in Remedial Unit RU023
Confirmation Unit CU373

Figure: 4-4

REPORT NO :	DOE/OR/21548-898	EXHIBIT NO :			
ORIGINATOR:	MGL	DRAWN BY:	LGB	DATE	8/8/01

Table 4-5 Summary of CU374

CU: 374 RU: 23

COC				
	Ra-226	X	As	X
	Ra-228	X	Cr	X
	Th-230	X	Pb	X
	Th-232	X	Tl	X
	U-238	X	PAH	X
Reference Figure:	4-5		PCB	X

DATE RELEASED FOR UNRESTRICTED USE: 07/27/1999

CLEANUP STANDARD: [ ] SURFACE [X] SUBSURFACE

EACH 100m² < CRITERIA? [X] YES [ ] NO

LOCATION DESCRIPTION: *CU located just east of raffinate pit 3 and north of raffinate pits 1&2. This CU represents the eastern portion of the CSS facility secondary containment.*

WALKOVER SURVEY INFORMATION FINAL SURVEY (S)

AVG BKGD: *10,050* cpm BELOW 1.5 X BACKGROUND ? [X] YES [ ] NO

DATE(S) SCANNED: *07/14/1999*

CONFIRMATION SAMPLING INFORMATION AVERAGES < ALARA? [X] YES [ ] NO

TOTAL # OF SAMPLE LOCATIONS: 48 HOTSPOTS? [ ] YES [X] NO

TOTAL # OF UTILITY SAMPLES: 6 ADDITIONAL EXCAVATION REQUIRED? [X] YES [ ] NO

GENERAL COMMENTS - *(1) CU374 was expanded to include the concrete foundation (see ALARA Committee Action below). Six concrete samples (SC-47301-U thru SC-37406-U) and fifteen soil samples (SC-37424-S thru SC-37438-S) were added. Based upon survey results, this concrete foundations did not meet the unrestricted release limits as defined in 10 CFR 835. A detailed discussion of the scanning results and associated requirements are provided in Appendix E. (2) One Th-230 hotspot was identified (SC-37408-S), which was further excavated and resampled. (3) All final results are below subsurface criteria.*

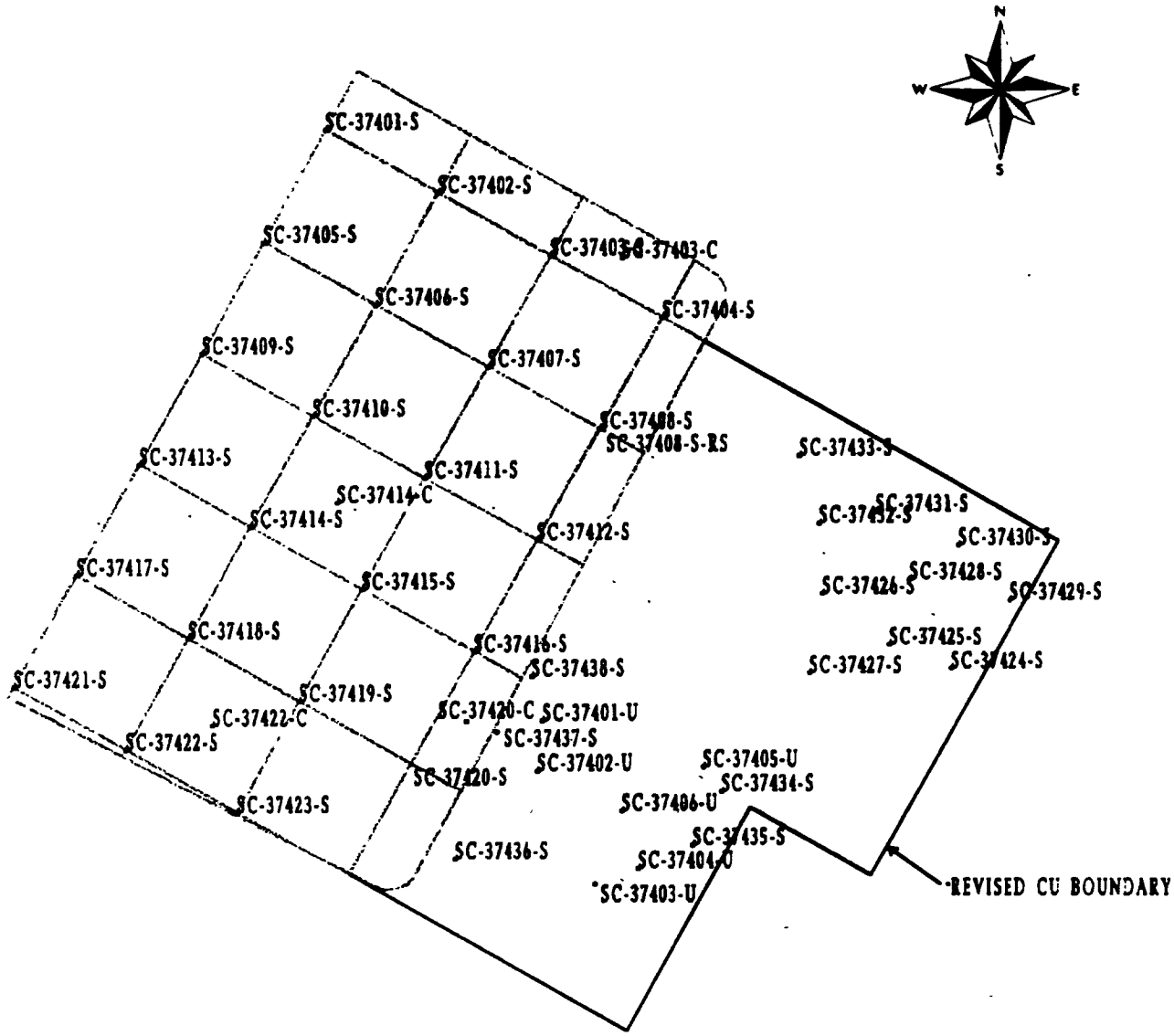
ORISE ACTION - *None.*

ALARA COMMITTEE ACTION - *Decision made to allow the CSS concrete foundation (located east of the secondary containment) to remain in place after deconning and sampling since the concrete would remain under 2 foot of soil after final grade. See discussion presented in Appendix E.*

CU FINAL RESULTS SUMMARY DATA

Arsenic	27	3.1 - 13.4	7.17	45	750	0	0
Chromium	27	10.3 - 18.3	14.04	90	7000	0	0
Lead	27	8.7 - 23.6	13.93	240	4500	0	0
Thallium	27	1.6 - 4.6	3.11	16	200	0	0
PAH	27	0.0 - 0.024	0.002	0.44	56	0	0
PCB	27	All results < detection limit	N/A	0.65	80	0	0
Ra-226	42	0.3 - 1.44	0.86	5	16.2	0	0
Ra-228	42	0.2 - 1.37	0.89	5	16.2	0	0
Total Radium	42	0.79 - 2.49	1.75	5	16.2	0	0
Th-230	42	0.84 - 10.6	1.96	5	16.2	1	0
Th-232	42	0.21 - 1.40	0.91	5	16.2	0	0
U-238	42	1.04 - 1.72	1.32	30	120	0	0

NOTE: Radiological contaminants are listed in pCi/g. Chemical contaminants are mg/kg.



150 75 0 150 FEET

50 25 0 50 METERS

Sample Locations in Remedial Unit RU023
Confirmation Unit CU374

Figure: 4-5

REPORT NO.:	DOE/OR/21548-898	EXHIBIT NO			
ORIGINATOR	MGL	DRAWN BY:	LGB	DATE	8/27/01

Table 4-6 Summary of CU375

CU: 375 RU: 23

COC				
	Ra-226		As	
	Ra-228		Cr	
	Th-230	X	Pb	
	Th-232		Tl	
	U-238	X	PAH	
	2,4-DNT		PCB	
			TNT	

Reference Figure: 4-6

DATE RELEASED FOR UNRESTRICTED USE: 06/13/2000

CLEANUP STANDARD [X] SURFACE [ ] SUBSURFACE

EACH 100m² < CRITERIA? [X] YES [ ] NO

LOCATION DESCRIPTION: *CU located between raffinate pit 3 and the CSS Facility.*

WALKOVER SURVEY INFORMATION

AVG BKGD: *8,000* cpm

FINAL SURVEY (S) BELOW 1.5 X BACKGROUND ? [X] YES [ ] NO

DATE(S) SCANNED: *04/12/99; 06/04/00; walkover form not located for SC-37522-S or SC-37526-S*

CONFIRMATION SAMPLING INFORMATION

TOTAL # OF SAMPLE LOCATIONS : 27

TOTAL # OF UTILITY SAMPLES : 0

AVERAGES < ALARA? [X] YES [ ] NO

HOTSPOTS REMAINING? [ ] YES [X] NO

ADDITIONAL EXCAVATION REQUIRED? [X] YES [ ] NO

GENERAL COMMENTS - *Two Th-230 hotspots (SC-37504-S and SC-37511-C) were identified. Both hotspots were remediated and reconfirmed. All final results were below criteria.*

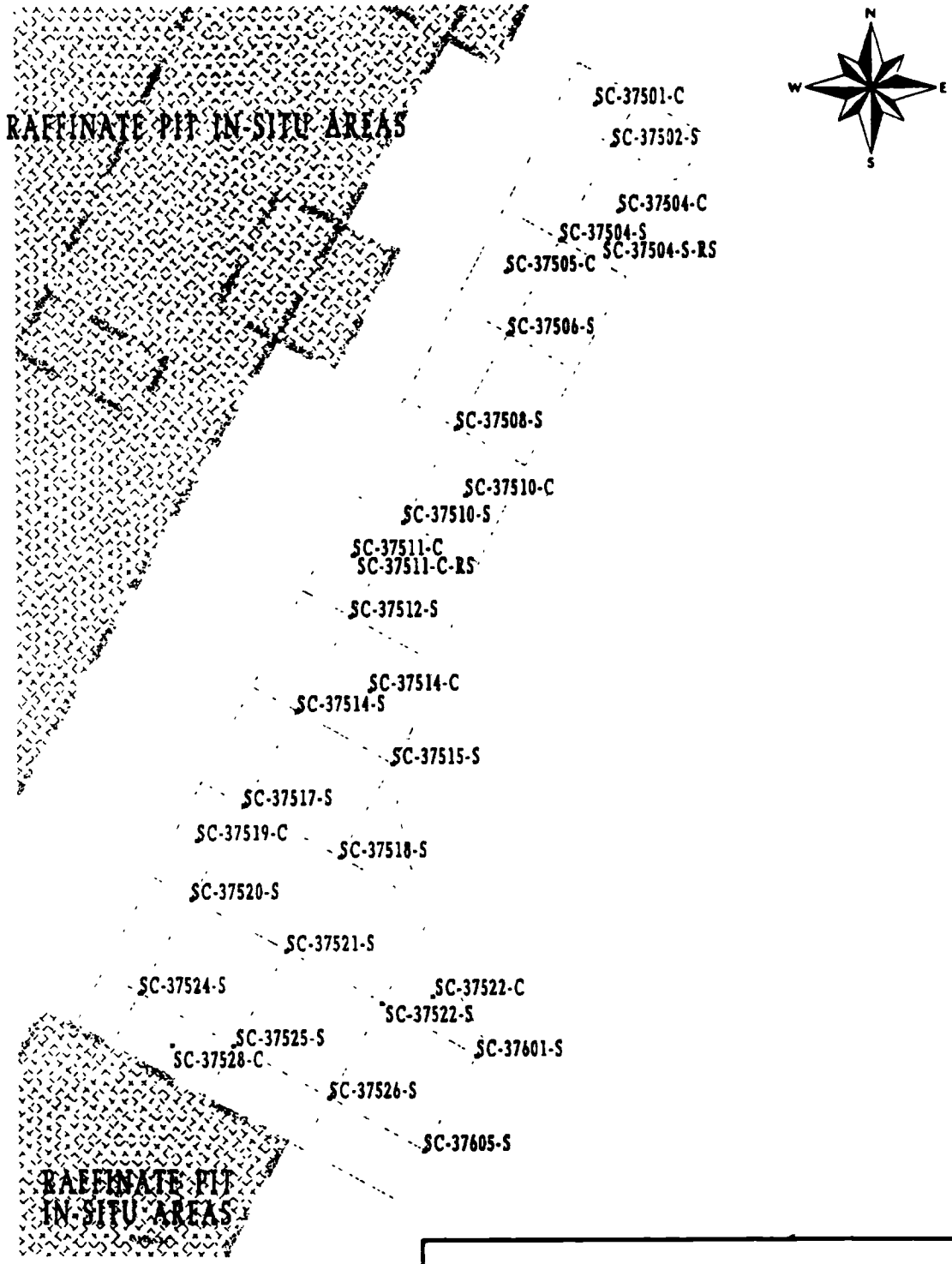
ORISE ACTION - *None.*

ALARA COMMITTEE ACTION - *None.*

CU FINAL RESULTS SUMMARY DATA

Th-230	27	0.66 - 6.07	2.22	5	6.2	2	0
U-238	27	0.26 - 4.90	2.24	30	120	0	0

NOTE: Radiological contaminants are listed in pCi/g.



160 75 0 150 FEET

50 25 0 50 METERS

Sample Locations in Remedial Unit RU023
Confirmation Unit CU375

Figure: 4-6

REPORT NO.:	DOE/OR/21548-898	EXHIBIT NO :			
ORIGINATOR:	MGL	DRAWN BY:	LGB	DATE	8/8/01

Table 4-7 Summary of CU376

CU: 376 RU: 23

COC: Ra-226 [X], Ra-228 [X], Th-230 [X], Th-232 [X], U-238 [X], 2,4-DNT [ ]; As [ ], Cr [ ], Pb [ ], Tl [ ], PAH [ ], PCB [ ], TNT [ ]

Reference Figure: 4-7

DATE RELEASED FOR UNRESTRICTED USE: 08/16/2000

CLEANUP STANDARD [X] SURFACE [ ] SUBSURFACE

EACH 100m^2 < CRITERIA? [X] YES [ ] NO

LOCATION DESCRIPTION: *CU located just north of raffinate pits 1&2.*

WALKOVER SURVEY INFORMATION

AVG BKGD: *5,325* cpm

FINAL SURVEY (S) BELOW 1.5 X BACKGROUND ? [X] YES [ ] NO

DATE(S) SCANNED: *03/04/00; 05/19/00; 06/04/00; 07/20/00*

CONFIRMATION SAMPLING INFORMATION

TOTAL # OF SAMPLE LOCATIONS : *34*

TOTAL # OF UTILITY SAMPLES : *2*

AVERAGES < ALARA? [X] YES [ ] NO

HOTSPOTS REMAINING? [ ] YES [X] NO

ADDITIONAL EXCAVATION REQUIRED? [ ] YES [X] NO

GENERAL COMMENTS - *(1) The remainder of a utility line, the majority having been removed under a previous work package, was removed under WP-437. Two utility sample locations (SC-37601-U and SC-37602-U) were added on the floor of the excavations. (2) All final results are below criteria.*

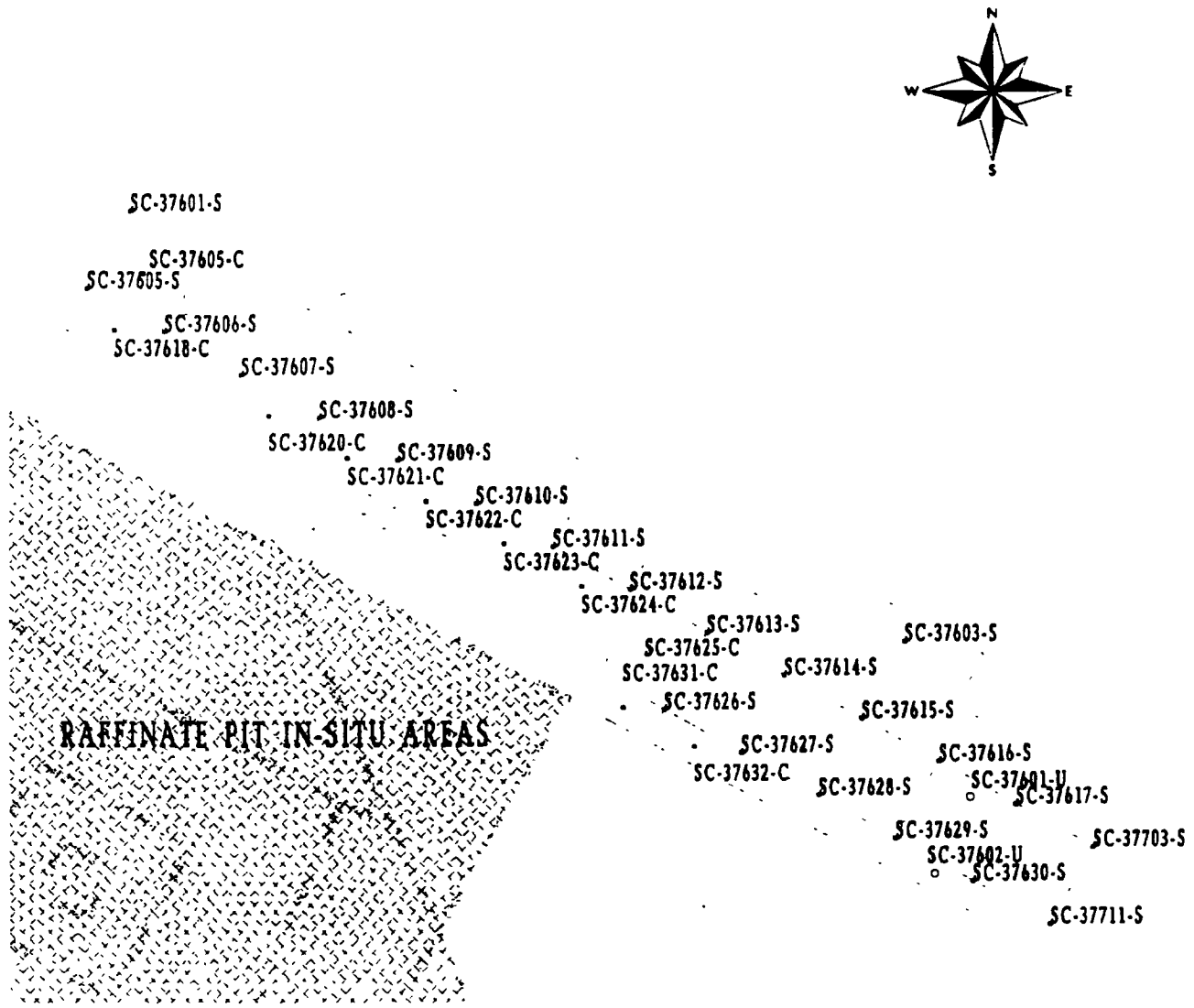
ORISE ACTION - *None.*

ALARA COMMITTEE ACTION - *None.*

CU FINAL RESULTS SUMMARY DATA

Ra-226	2	0.62 - 0.78	0.7	5	6.2	0	0
Ra-228	2	1.04 - 1.30	1.17	5	6.2	0	0
Total Radium	2	1.66 - 2.08	1.87	5	6.2	0	0
Th-230	34	0.72 - 5.86	1.42	5	6.2	1	0
Th-232	2	1.07 - 1.33	1.2	5	6.2	0	0
U-238	34	0.98 - 7.02	1.32	30	120	0	0

NOTE: Radiological contaminants are listed in pCi/g.



150 75 0 150 FEET

50 25 0 50 METERS

Sample Locations in Remedial Unit RU023
Confirmation Unit CU376

Figure: 4-7

REPORT NO:	DOE/OR/21548-898	EXHIBIT NO:			
ORIGINATOR:	MGL	DRAWN BY:	LGB	DATE	8/8/01

Table 4-8 Summary of CU377

CU: 377 RU: 23

COC				
	Ra-226	X	As	
	Ra-228	X	Cr	
	Th-230	X	Pb	
	Th-232	X	Tl	
	U-238	X	PAH	
	2,4-DNT		PCB	
Reference Figure:	4-8		TNT	

DATE RELEASED FOR UNRESTRICTED USE: 08/15/2000

CLEANUP STANDARD [X] SURFACE [ ] SUBSURFACE

EACH 100m² < CRITERIA? [X] YES [ ] NO

LOCATION DESCRIPTION: *CU located north of the Site Water Treatment Plant Effluent Ponds 3 and 4.*

WALKOVER SURVEY INFORMATION

AVG BKGD: *6,150* cpm

FINAL SURVEY (S) BELOW 1.5 X BACKGROUND ? [X] YES [ ] NO

DATE(S) SCANNED: *07/19/00; 07/20/00*

CONFIRMATION SAMPLING INFORMATION

TOTAL # OF SAMPLE LOCATIONS : 25

TOTAL # OF UTILITY SAMPLES : 2

AVERAGES < ALARA? [X] YES [ ] NO

HOTSPOTS REMAINING? [ ] YES [X] NO

ADDITIONAL EXCAVATION REQUIRED? [X] YES [ ] NO

GENERAL COMMENTS - *(1) The remainder of B301 utility lines, the majority having been removed under WP-420, were removed under WP-437. One utility sample location was added to the floor of each excavation(SC-37701-U and SC-37702-U). (2) One Th-230 hotspot was identified at SC-37708-S, which was further excavated and resampled. (3) All final results are below ALARA.*

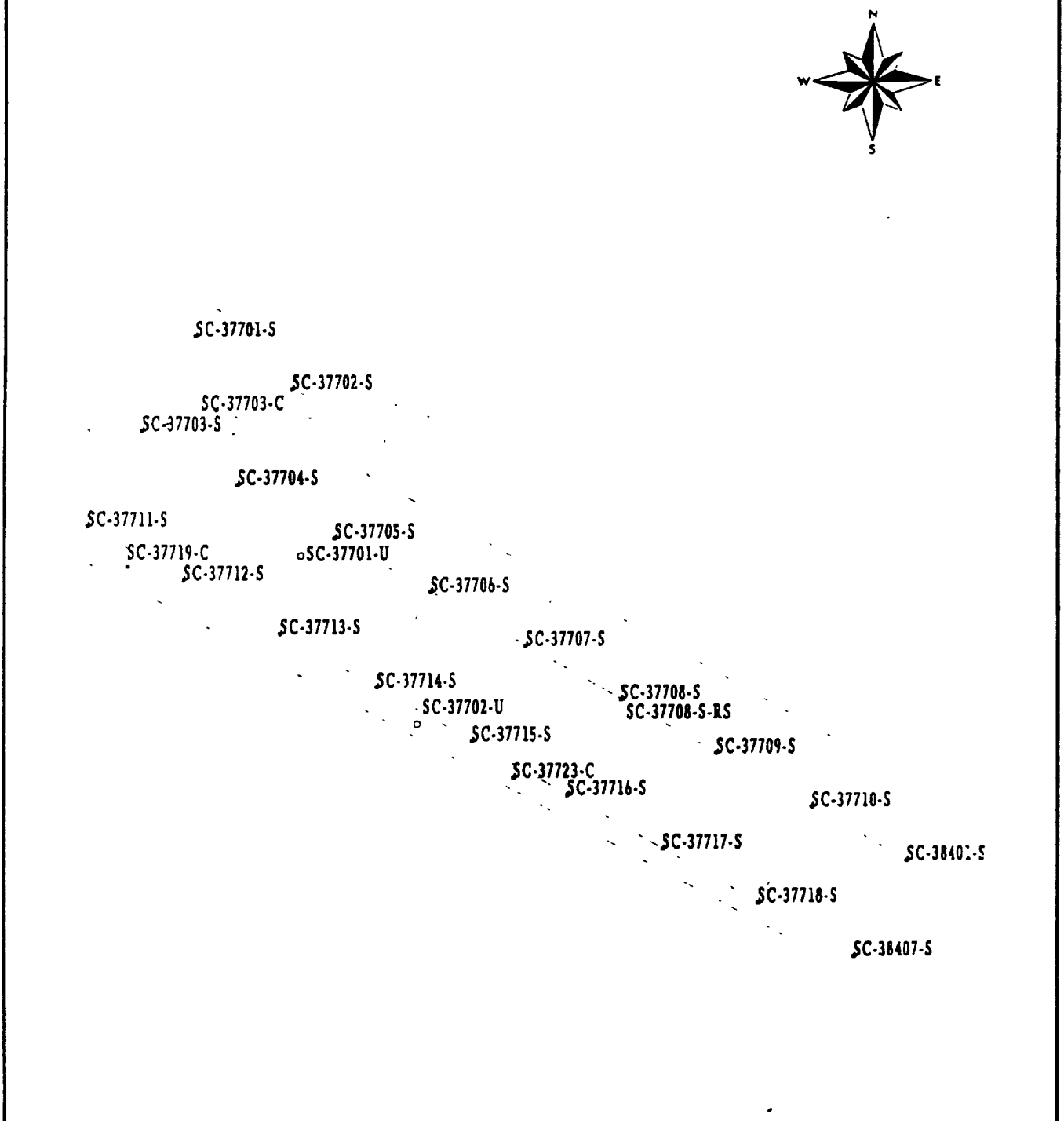
ORISE ACTION - *None.*

ALARA COMMITTEE ACTION - *None.*

CU FINAL RESULTS SUMMARY DATA

Ra-226	2	0.63 - 0.69	0.66	5	6.2	0	0
Ra-228	2	1.14 - 1.25	1.2	5	6.2	0	0
Total Radium	2	1.83 - 1.88	1.86	5	6.2	0	0
Th-230	25	0.83 - 3.32	1.28	5	6.2	0	0
Th-232	2	1.16 - 1.28	1.23	5	6.2	0	0
U-238	25	0.97 - 2.15	1.15	30	120	0	0

NOTE: Radiological contaminants are listed in pCi/g.



150 75 0 150 FEET

50 25 0 50 METERS

Sample Locations in Remedial Unit RU023
Confirmation Unit CU377

Figure: 4-8

REPORT NO.:	DOE/OR/21548-898	EXHIBIT NO			
ORIGINATOR	MGL	DRAWN BY	LGB	DATE	8/8/01

Table 4-9 Summary of CU384

CU: 384 RU: 23

COC				
	Ra-226		As	
	Ra-228		Cr	
	Th-230	X	Pb	
	Th-232		Tl	
	U-238	X	PAH	
	2,4-DNT		PCB	
Reference Figure:	4-9		TNT	

DATE RELEASED FOR UNRESTRICTED USE: 07/26/2000

CLEANUP STANDARD [X] SURFACE [ ] SUBSURFACE

EACH 100m^2 < CRITERIA? [X] YES [ ] NO

LOCATION DESCRIPTION: *CU located north of the Site Water Treatment Plant Effluent Pond 4.*

WALKOVER SURVEY INFORMATION

AVG BKGD: *10,000* cpm

FINAL SURVEY (S) BELOW 1.5 X BACKGROUND ? [X] YES [ ] NO

DATE(S) SCANNED: *07/11/00; 07/19/00*

CONFIRMATION SAMPLING INFORMATION

TOTAL # OF SAMPLE LOCATIONS : *14*

TOTAL # OF UTILITY SAMPLES : *0*

AVERAGES < ALARA? [X] YES [ ] NO

HOTSPOTS REMAINING? [ ] YES [X] NO

ADDITIONAL EXCAVATION REQUIRED? [ ] YES [X] NO

GENERAL COMMENTS - *All final results are below ALARA.*

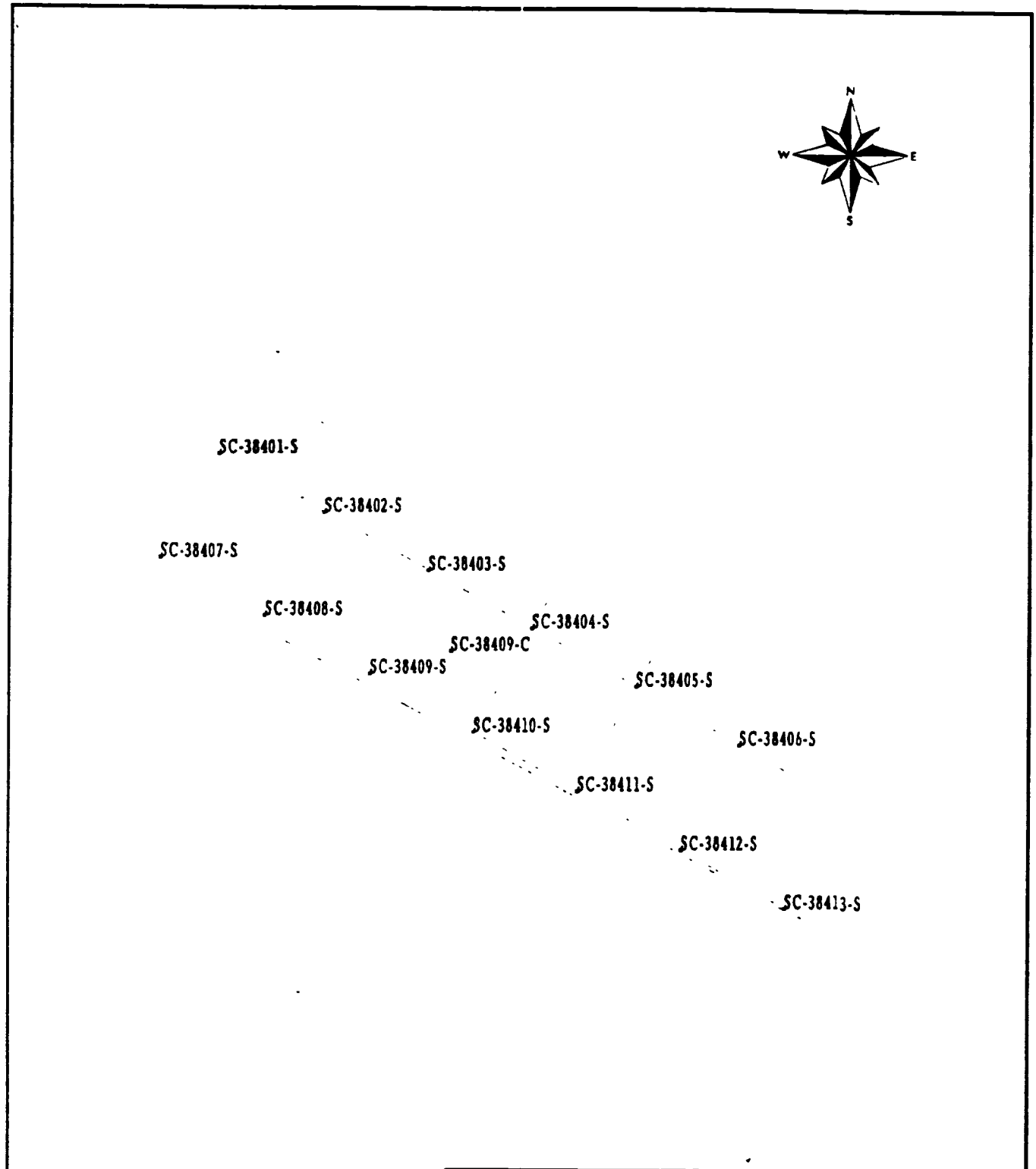
ORISE ACTION - *None.*

ALARA COMMITTEE ACTION - *None.*

CU FINAL RESULTS SUMMARY DATA

Th-230	14	0.71 - 1.23	0.96	5	6.2	0	0
U-238	14	1.06 - 2.39	1.22	30	120	0	0

NOTE: Radiological contaminants are listed in pCi/g.



150 75 0 150 FEET

50 25 0 50 METERS

Sample Locations in Remedial Unit RU023
Confirmation Unit CU384

Figure: 4-9

REPORT NO.:	DOE/OR/21548-898	EXHIBIT NO			
ORIGINATOR:	MGL	DRAWN BY:	LGB	DATE	8/8/01

5. DATA EVALUATION

Work Package-437 (WP-437) final analytical data were evaluated to determine whether data quality objectives developed for the Weldon Spring Site Remedial Action Project (WSSRAP) were met and to ensure that overall data quality- results were generated from these remedial activities. The data were evaluated in accordance with the *Project Management Contractor Quality Assurance Program* (Ref. 4) and the *Environmental Quality Assurance Project Plan* (Ref. 5). The data evaluation process was completed by data verification, data review, data validation, and data management activities as stated in the *Chemical Plant Area Cleanup Area Attainment Confirmation Plan* (Ref. 3).

5.1 Data Verification

Data verification was conducted in accordance with ES&H 4.9.1, *Environmental Monitoring Data Verification*, to ensure that documentation and data were reported in compliance with established reporting requirements and standard operating procedures (SOPs), and to ensure that all analyses were performed. All analytical results received from the laboratory were reviewed to verify that samples were properly handled according to WSSRAP protocol. The following factors were reviewed and evaluated: sample identification, chain of custody, holding times, sample preservation requirements, sample analysis request forms, data reviews, laboratory tracking, data reporting requirements, and the database transfer.

5.2 Data Review

Data packages were reviewed to ensure that final data were properly identified, analyzed, reported, and that they met data quality requirements (DQRs). The data were also reviewed to check for inconsistencies with the field quality control (QC) samples. Final analytical results were also compared to the preliminary results to identify any changes in data.

During confirmation of WP-437 areas, which included RU023, soil samples were obtained in accordance with the details provided in the *Confirmation Sampling Plan Details for the Disposal Cell Facility* (WP-437) (Ref. 2). This plan indicates that quality control samples were to be taken at a frequency of 1 per 20 samples or 5%. The quality control samples collected included duplicates, field replicates, secondary duplicates, matrix spikes/matrix spike duplicates, and equipment blanks. Since the 5% requirement was based on all WP-437 confirmation sampling, the quality control data will be discussed in a separate report entitled *WP-437 Confirmation Quality Control Results Report.*

5.3 Data Validation

Data validation was performed on 10% of all analytical data generated from the confirmation sampling activities. Data validation was conducted in accordance with ES&H 4.9.2, *Environmental Monitoring Data Validation.* Note that the validation of 10% of the

data is based upon all confirmation data collected for WP-437, and not 10% of each work zone. The percentage of confirmation validated will be discussed in the *WP-437 Confirmation Quality Control Results Report.*

6. SUMMARY OF CLOSURE REPORT FINDINGS

The CSS work zone requiring confirmation under WP-437 consisted of the nine confirmation units within RU023. Summary information regarding the remedial activities is presented in Section 4 of this report.

6.1 Data Evaluation

Upon completion of remediation activities, preliminary results were used to complete disposition forms in accordance with ES&H 1.2.1, *Soil Remediation Disposition Process*. Based on the preliminary results, each CU was released when disposition forms were reviewed and signed by authorized project personnel.

6.2 Summary of WP-437 Confirmation Results

Table 6-1 provides a summary of the total number of samples collected and analyzed for each contaminant during remedial activities in RU023. The number of results and the minimum, maximum, and average concentrations are also provided for each contaminant. The table was generated using final data sets compiled from all samples that represented soils left in place.

Table 6-1 Summary Totals for RU023

CONTAMINANT	NO. OF SAMPLES	CONCENTRATION RANGE	AVERAGE CONCENTRATION	SURFACE ALARA	SURFACE CRITERIA	RESULTS > ALARA
As (mg/kg)	130	2.3 – 18.7	9.26	45	75	0
Cr (mg/kg)	130	2.5 – 26.4	17.35	90	110	0
Pb (mg/kg)	130	3.3 – 84.8	16.62	240	450	0
Tl (mg/kg)	130	0.33 – 4.6	2.00	16	20	0
PAH (mg/kg)	130	0 – 0.9	0.02	0.44	5.60	1
PCB (mg/kg)	130	0 – 1.8	0.02	0.65	8.00	1
Ra-226 (pCi/g)	150	0.3 – 2.12	0.89	5.00	6.20	0
Ra-228 (pCi/g)	150	0.2 – 1.93	0.93	5.00	6.20	0
Total Radium* (pCi/g)	150	0.53 – 3.05	1.82	5.00	6.20	0
Th-230 (pCi/g)	240	0.66 – 10.6	1.64	5.00	6.20	8
Th-232 (pCi/g)	150	0.21 – 1.98	0.95	5.00	6.20	0
U-238 (pCi/g)	240	0.26 – 7.02	1.43	30.00	120.00	0

* Total Radium consists of Ra-226 values plus Ra-228 values.

Final analytical results generated from the remedial activities indicated that the RU023 average concentrations for each COC were below the ALARA goal. For each of the nine CUs, COC averages are also below ALARA. All 100 m^2 averages were less than criteria.

6.3 Summary of Chemical Plant Confirmation Results

To meet the requirements of the ROD, more than 50% of the results for each parameter had to be less than the ALARA goal. Table 6-2 summarizes the cumulative results to date.

Table 6-2 Summary Totals for Confirmation

CONTAMINANT	NO. OF SAMPLES	MINIMUM CONCENTRATION	MAXIMUM CONCENTRATION	AVERAGE CONCENTRATION	RESULTS > ALARA
Arsenic (mg/kg)	1174	0.48	123	7.97	1
Chromium (mg/kg)	1546	2.5	41.6	17.14	0
Pb (mg/kg)	1271	2.4	817	16.79	2
Thallium (mg/kg)	513	0.12	19	1.44	1
PAH (mg/kg)	981	0.00	6.65	0.14	81
PCB (mg/kg)	1781	0.00	6	0.04	22
TNT (mg/kg)	247	0.004	34	0.46	1
Ra-226 (pCi/g)	3230	0.13	9.43	1.23	3
Ra-228 (pCi/g)	3039	0.20	6.60	1.20	2
Th-230 (pCi/g)	2380	0.09	23.10	1.55	47
Th-232 (pCi/g)	2516	0.21	6.77	1.23	2
Toluene (mg/kg)	4	0.00	3.40	0.85	0
U-238 (pCi/g)	4755	0.26	228	3.46	50

NOTE: This table contains summary results from cumulative confirmation including WP-253, WP-399, WP-420, WP-458, WP-461, WP-471, WP-437 (RU016, RU017, RU018, RU019, and RU023), and WP-551/Task D (RU026).

6.4 Comparison of Standard Deviations

This section compares the estimated standard deviations calculated following U. S. Environmental Protection Agency (EPA) guidance with deviations calculated using confirmation results. Since there were no existing remediation data available to calculate the standard deviation (sigma), the *Chemical Plant Area Cleanup Area Attainment Confirmation Plan* (Ref. 3) estimated sigma using the range (assuming the average concentration remaining after remediation would not exceed cleanup criteria) divided by six. To determine whether the

specified level of precision was obtained, a comparison was made between the estimated sigma and the calculated sigma using the RU023 results.

The comparison indicated that the specified level of precision (a false positive = 0.05 and a false negative = 0.20) had been obtained. With the exception of Th-230, all of the calculations were less than estimated sigmas, indicating that the minimum specified precision was met. Table 6-3 presents the estimated sigma and calculated sigmas for each COC.

Table 6-3 Comparison of Standard Deviations

COC	Estimated Sigma(a)	RU023 Sigma (b)	Cumulative Sigma (c)
Arsenic (mg/kg)	12.5	3.39	4.89
Chromium (mg/kg)	18.3	4.24	4.81
Lead (mg/kg)	75	8.64	27.36
Thallium (mg/kg)	3.3	1.08	1.38
PAH (mg/kg)	0.93	0.09	0.46
PCB (mg/kg)	1.33	0.17	0.28
TNT (ug/g)	23.3	N/A	2.48
Ra-226 (pCi/g)	1.03	0.23	0.41
Ra-228 (pCi/g)	1.03	0.33	0.36
Th-230 (pCi/g)	1.03	1.20	1.30
Th-232 (pCi/g)	1.03	0.33	0.38
U-238 (pCi/g)	20	0.70	8.09

(a) Sigma estimated in the *Attainment Plan* (Ref. 3).
(b) Sigma calculated using only the WP-437 (RU023) confirmation results.
(c) Sigma calculated using cumulative confirmation results (WP-253, WP-399, WP-458, WP-461, WP-471, WP-437 (RU016, RU017, RU018, RU019, and RU023), and WP-551/Task D (RU026).

Both the RU023 calculated sigma and the cumulative sigma for Th-230 exceeded the estimated sigma. This is a factor of hot spots left in place based upon subsurface criteria in previous CUs. The estimated standard deviation, recalculated for Th-230 using subsurface criteria, was 2.7. The cumulative sigma was less than the estimated subsurface sigma.

7. REFERENCES

1. Department of Energy. *Record of Decision for Remedial Action at the Chemical Plant Area of the Weldon Spring Site*. DOE/OR/21548-376. Oak Ridge Field Office. St. Charles, MO. September 1993.

2. MK-Ferguson and Jacobs Engineering Group. *Confirmation Sampling Plan Details for the Disposal Cell Facility (WP-437)*, Rev 0. DOE/OR/21548-706. Prepared for the U.S. Department of Energy, Oak Ridge Field Office. St. Charles, MO. January 1998.

3. MK-Ferguson and Jacobs Engineering Group. *Chemical Plant Area Cleanup Attainment Confirmation Plan,* Rev. 3. DOE/OR/21548-491. Prepared for the U.S. Department of Energy, Oak Ridge Field Office. St. Charles, MO. December 1995.

4. MK-Ferguson Company and Jacobs Engineering Group. *Project Management Contractor Quality Assurance Program*, Rev. 3. DOE/OR/21548-506. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, MO. November 2000.

5. MK-Ferguson and Jacobs Engineering Group. *Environmental Quality Assurance Project Plan*, Rev. 5. DOE/OR/21548-352. Prepared for the U.S. Department of Energy, Oak Ridge Field Office. St. Charles, MO. November 2000.

6. MK-Ferguson Company. *CSS Work Zone Specifications*, Rev. 8. Specification Document No. 3840-7-437-02308. Prepared for the U.S. Department of Energy Weldon Spring Site Remedial Action Project. St. Charles, MO. August 1996.

7. Oak Ridge Institute for Science and Education. *Final Verification Survey Plan for the Chemical Plant Area Weldon Spring Site Remedial Action Project, Weldon Spring, Missouri.* Prepared by the Environmental Survey and Site Assessment Program, Energy/Environment Systems Division, for the U. S. Department of Energy. Weldon Spring, Missouri. December 7, 1995.

8. MK-Ferguson and Jacobs Engineering Group. *Post Remedial Action Report for Work Package 420: Chemical Plant Area Foundations and Contaminated Soil Removal, Remedial Unit 7*, Rev. 0. DOE/OR/21548-667. Prepared for the U.S. Department of Energy, Oak Ridge Field Office. St. Charles, MO. September 1997.

9. MK-Ferguson Company and Jacobs Engineering Group. *Post-Remedial Action Report for Work Package 420: Chemical Plant Area Foundations and Contaminated Soil Removal, Remedial Unit 8*, Rev. 0. DOE/OR/21548-684. Prepared for the U.S. Department of Energy, Oak Ridge Field Office. St. Charles, MO. February 1998.

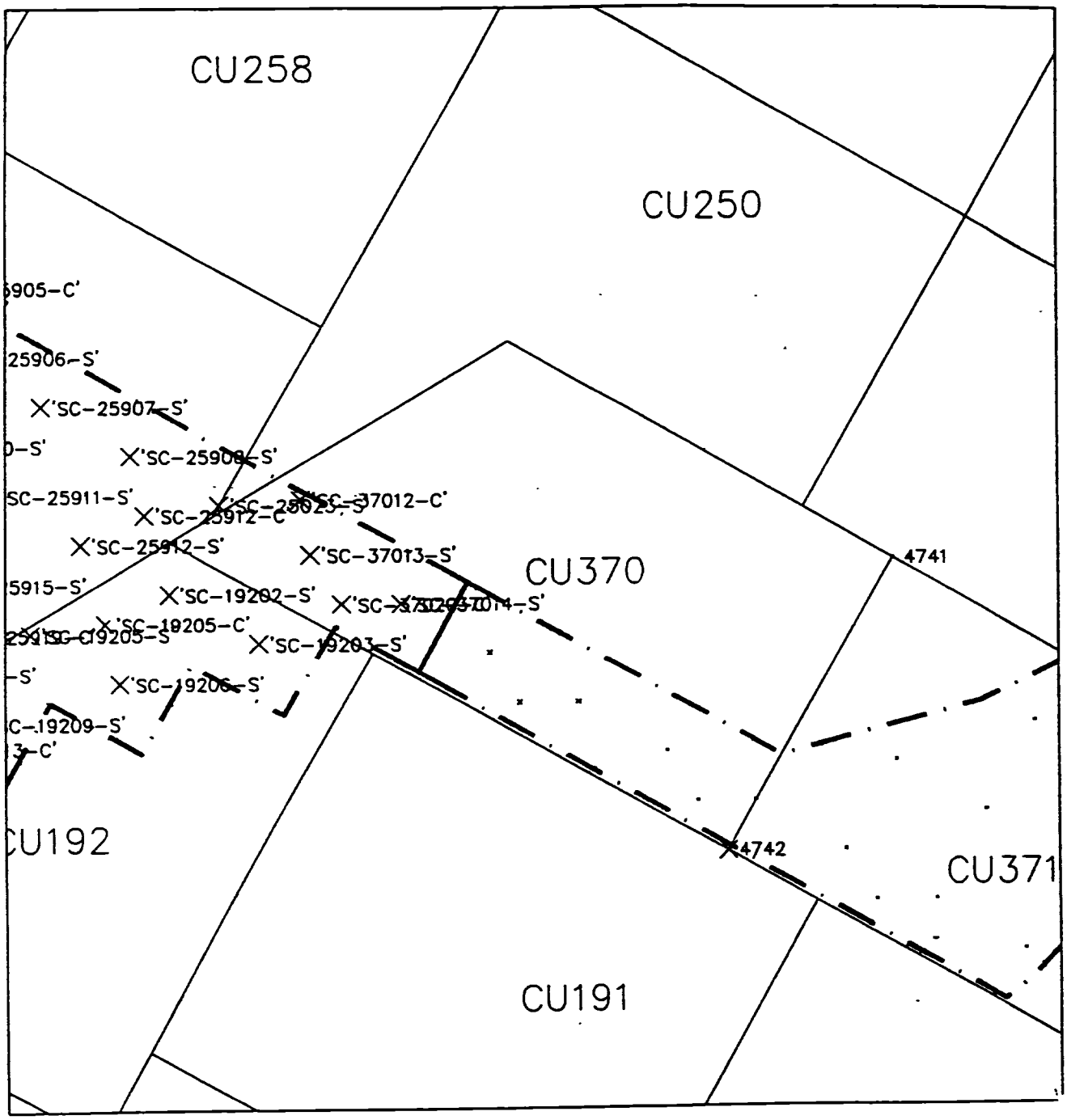
PROCEDURES

ES&H 1.2.1 *Soil Remediation Disposition Process*
ES&H 4.9.1 *Environmental Monitoring Data Verification*
ES&H 4.9.2 *Environmental Monitoring Data Validation*

ACRONYMS

ALARA	as low as reasonably achievable
CLP	Contract Laboratory Program
COC	contaminant of concern
CPM	counts per minute
CSS	chemical stabilization and solidification
CU	confirmation unit
DOE	Department of Energy
DQO	Data Quality Objectives
DQR	Data Quality Requirements
EPA	Environmental Protection Agency
EQAPjP	Environmental Quality Assurance Project Plan
ES&H	Environmental Safety and Health
IOC	Interoffice Correspondence
NaI	sodium iodide
NTP	Notice to proceed
ORISE	Oak Ridge Institute for Science and Education
PMC	Project Management Contractor
QA	quality assurance
QC	quality control
ROD	Record of Decision for Remedial Action at the Chemical Plant Area of the Weldon Spring Site
RU	remedial unit
SOP	standard operating procedure
STL	sampling team leader
WP	work package
WSSRAP	Weldon Spring Site Remedial Action Project

APPENDIX A
WP-437 RU023 Final Walkover Forms



LEGEND

SAMPLE POINTS NOT PINNED

X'SC-32606-S' SAMPLE POINTS PINNED

PINNING LIMITS

N

GRAPHIC SCALE

50 0 25 50

(IN FEET)

1 inch = 50 ft.

Radiation Survey Form WP 437, RU 23 CU 370

10/26/99

DEID CAD

Meter Model #: 2221 Detector Model #: 2+2 N-I "G"

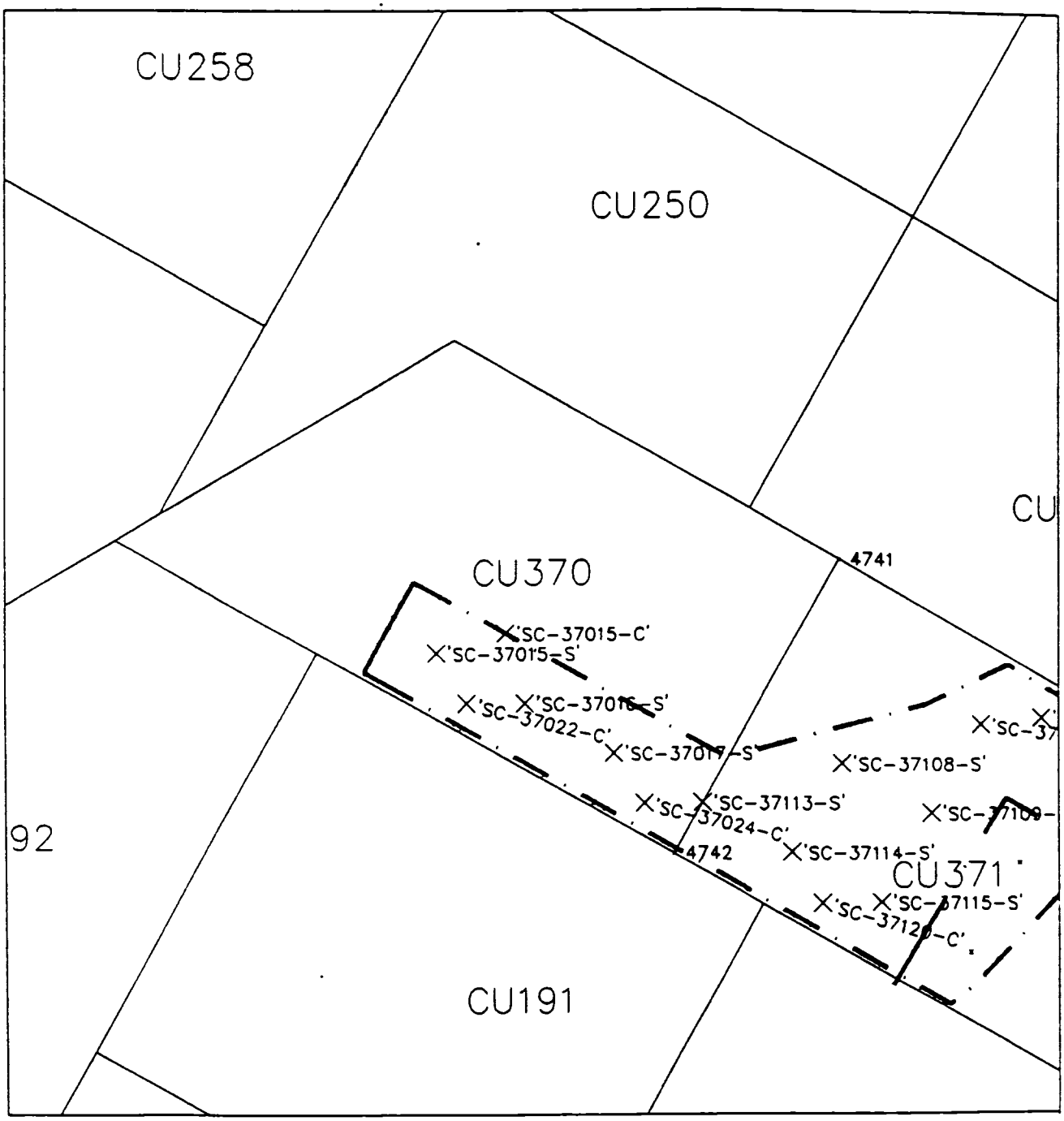
Meter Serial #: 127252 Detector Serial #: 4241

Calibration Due: CSA Tot 9/2/00 Calibration Due: 11/29/00

Survey Date / Time: 10/25/99 Field Bkg.: 8,000 cpm

Surveyor(s): C. Hamner

Comments: Area was surveyed and found to be less than 1.5 times background



LEGEND

'SC-32606-S' SAMPLE POINTS NOT PINNED

SAMPLE POINTS PINNED

PINNING LIMITS

N

GRAPHIC SCALE

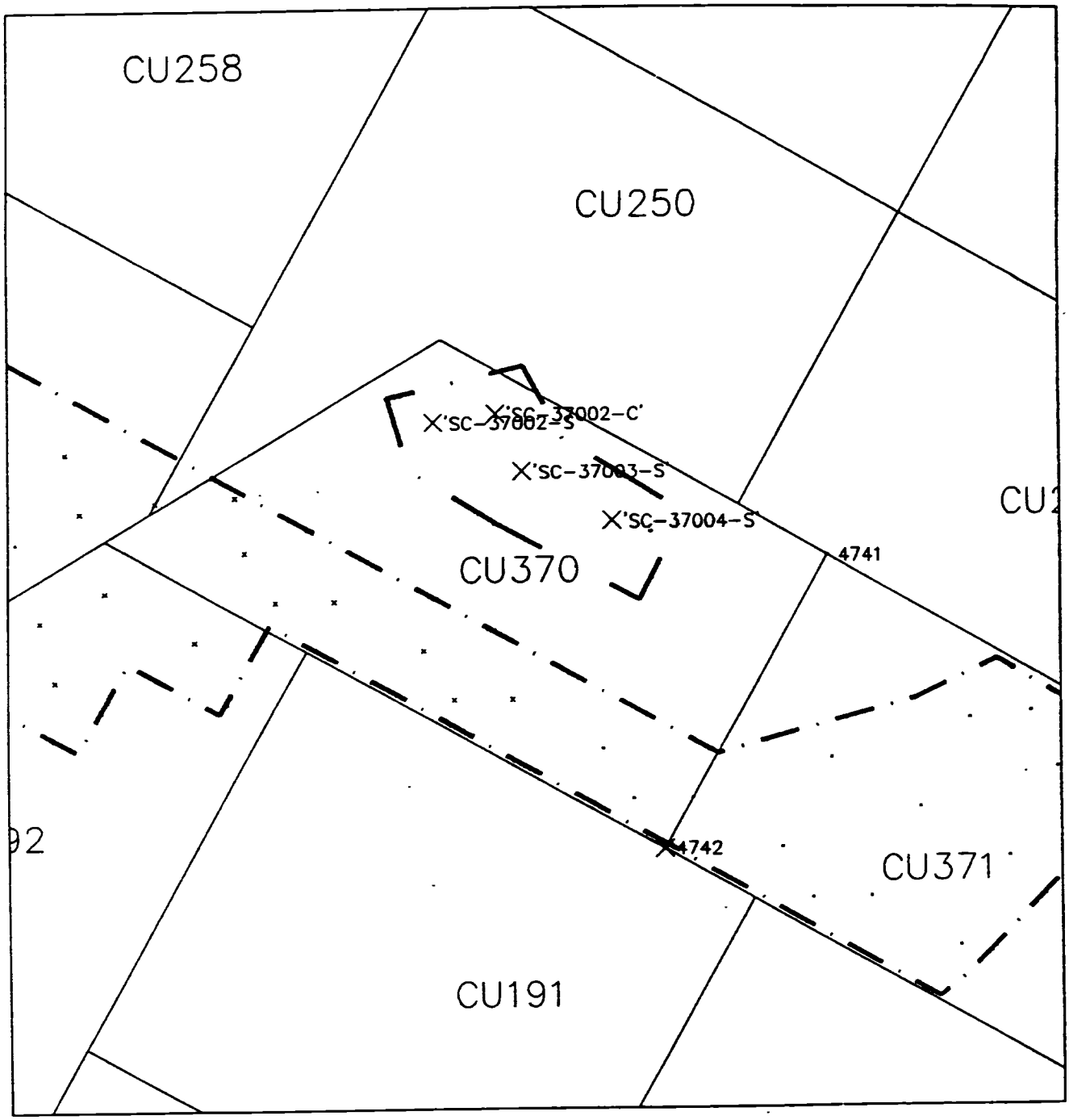
50 0 25 50

(IN FEET)

Radiation Survey Form WP 437, RU 23 **CU** 370

10/26/99 DEO CAD

Meter Model #:	2221	Detector Model #:	2.2 "G"
Meter Serial #:	127252	Detector Serial #:	DOE • 4241
Calibration Due:	09-02-00	Calibration Due:	01-24-00
Survey Date / Time:	10-25-99	Field Blg.:	B,000 cpm
Surveyor(s):	J. Rambo		
Comments:	Del areas < 1.5 BKG.		



LEGEND

SAMPLE POINTS NOT PINNED

X'SC-32606-S' SAMPLE POINTS PINNED

PINNING LIMITS

N

GRAPHIC SCALE

50 0 25 50

(IN FEET)

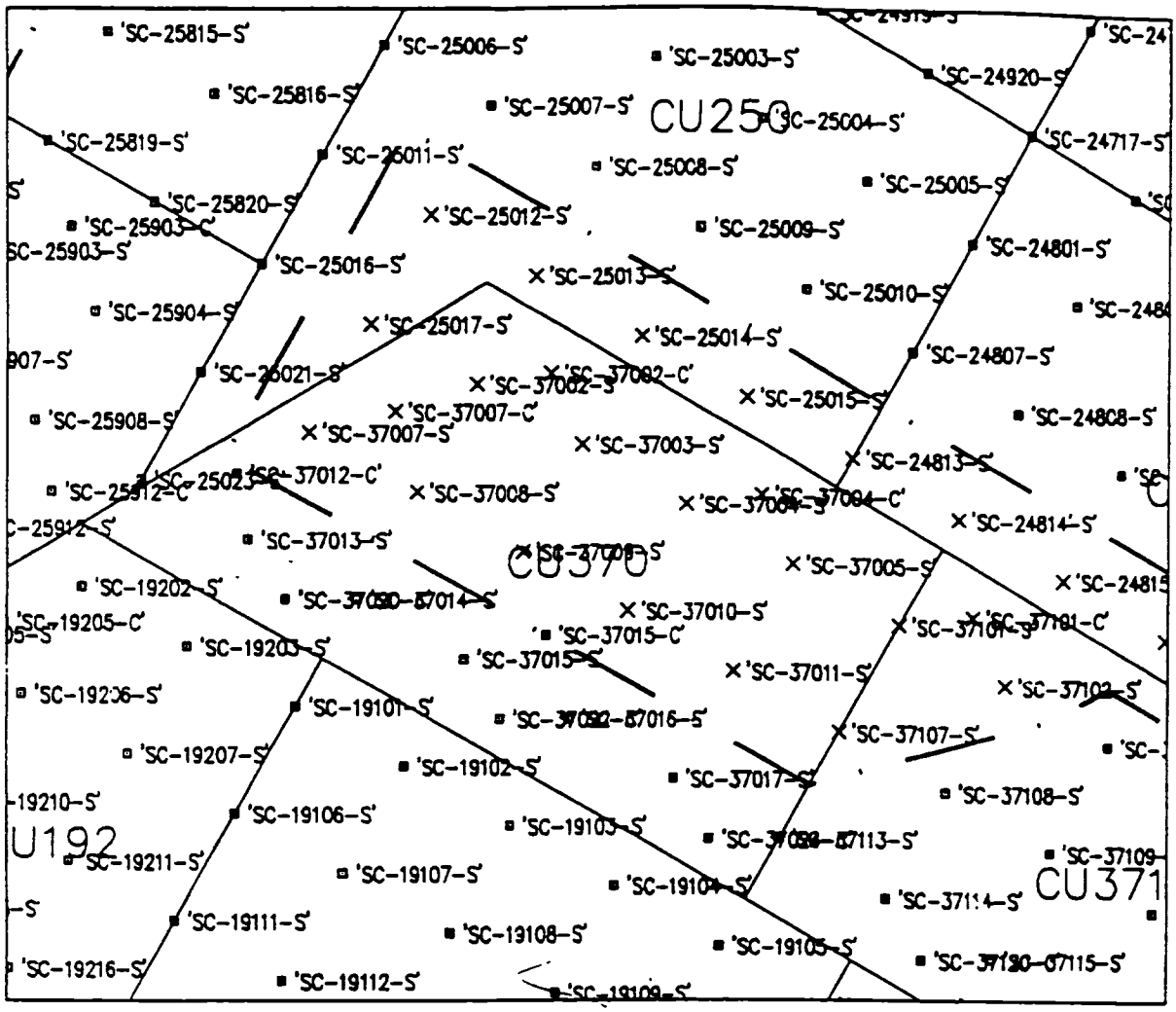
1 inch = 50 ft.

Radiation Survey Form WP 437, RU 23 **CU** 370

10-22-99

DHO CAD

Meter Model #:	2221	Detector Model #:	2x2
Meter Serial #:	127252	Detector Serial #:	DOE # 4241
Calibration Due:	9-2-00	Calibration Due:	01-24-00
Survey Date / Time:	10-18-~~00~~ 99 DF	Field Bkg.:	10K cpm
Surveyor(s):	J. Ranks		
Comments:	All areas < 1.5 BKG		



LEGEND

- ▪ 'SC-32606-S' SAMPLE POINTS NOT PINNED
- × 'SC-32606-S' SAMPLE POINTS PINNED
- — · — · — PINNING LIMITS

Radiation Survey Form WP 437, RU 23 CU 370

DBO CAD

Meter Model #:	2221	Detector Model #:	NaI "2x2"
Meter Serial #:	125435	Detector Serial #:	130763
Calibration Date:	12-20-99	Calibration Date:	8-11-99
Survey Date / Time:	6-03-99	Field Bkg.:	7K
Surveyor(s):	J Rankin		
Comments:	All areas < 1.5 BKG.		

N

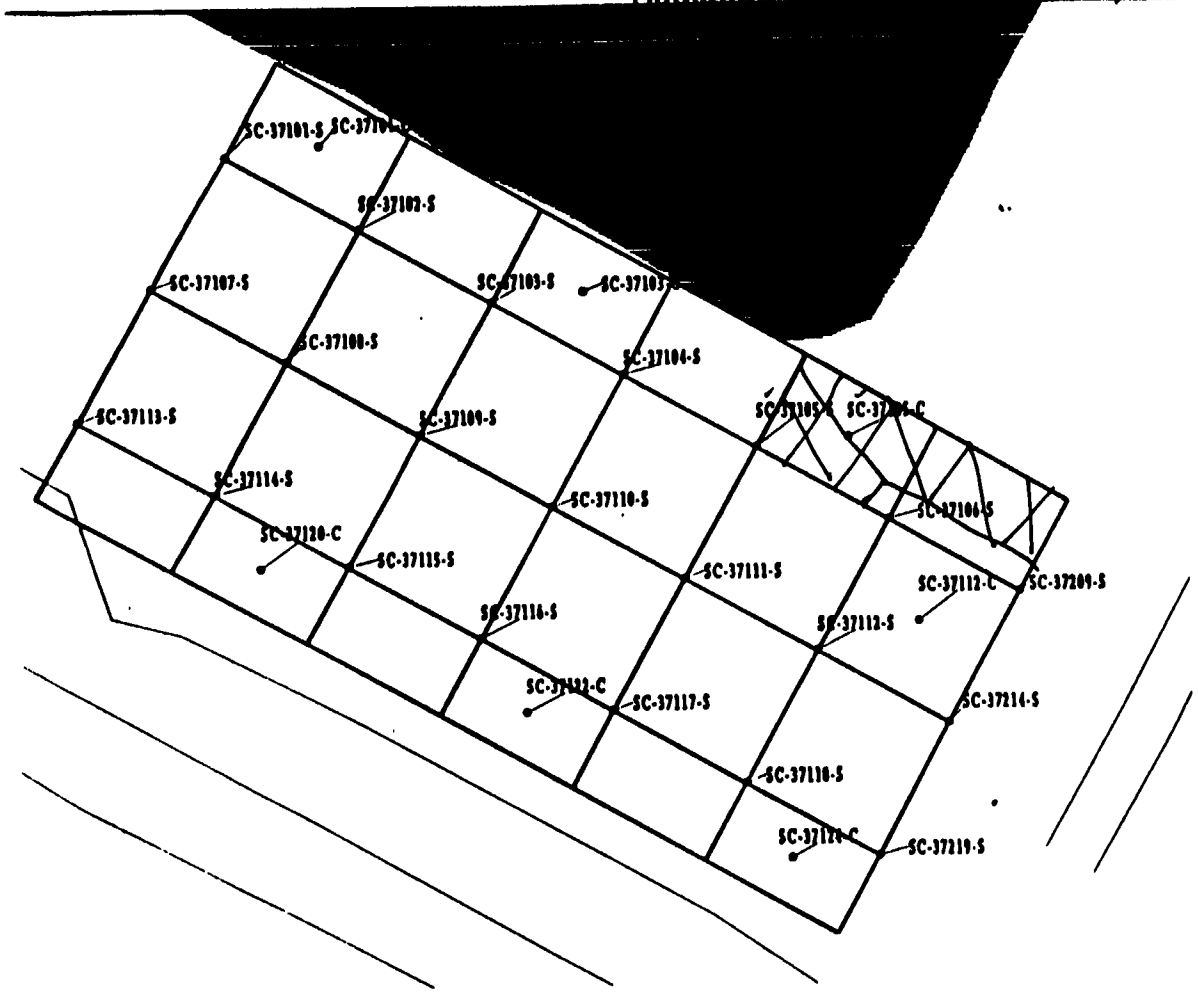
GRAPHIC SCALE

50 0 25 50

(IN FEET)

1 inch = 50 ft.

Radiation Survey Form WP 437, RU023CU371



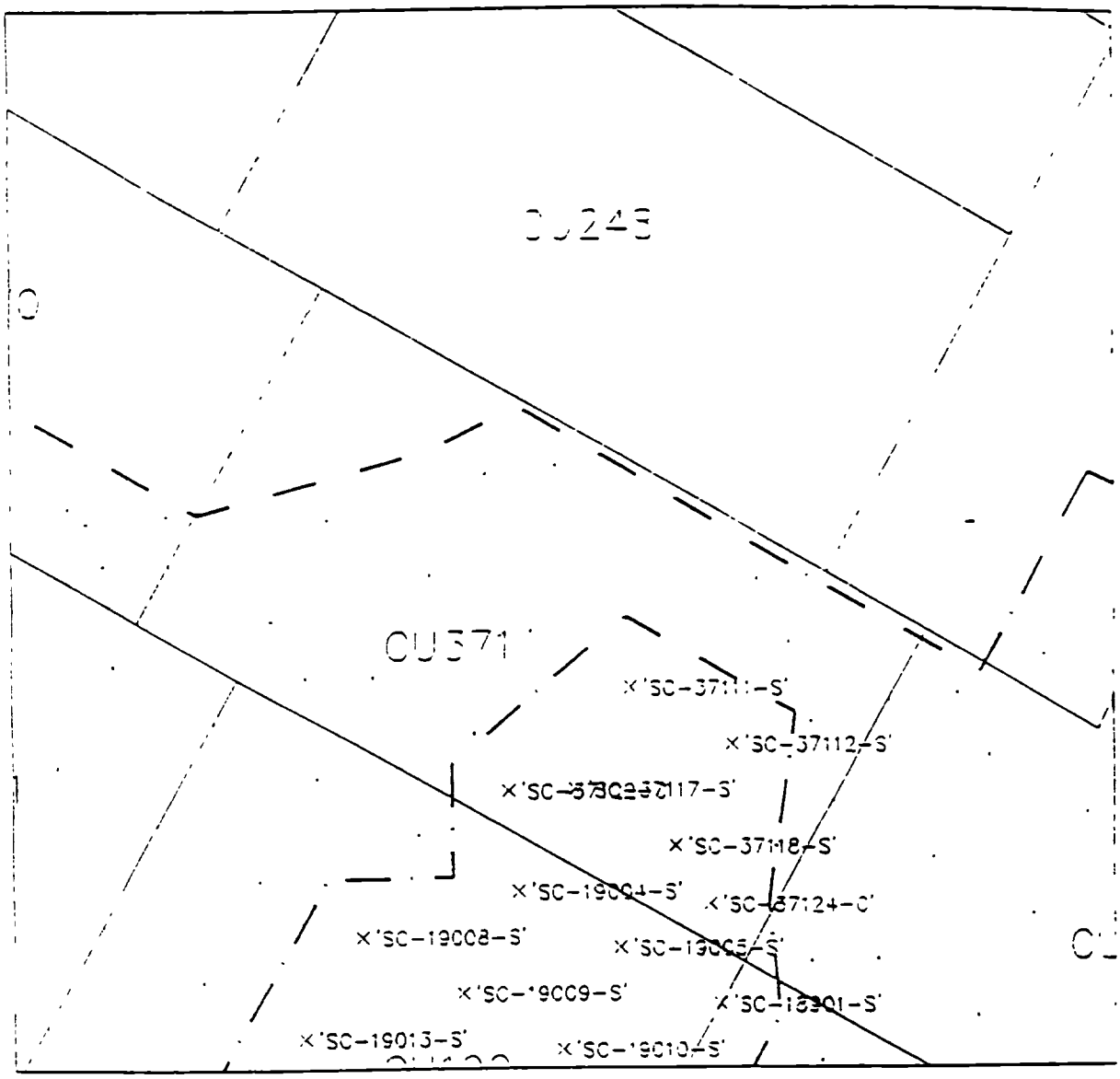
15 7.5 0 15 METERS

45 22.5 0 45 FEET

N E S

WSSRAP GIS

Meter Model#: 2221	Detector Model#: 2x2 NaI "F"
Meter Serial#: 127252	Detector Serial#: 122191
Calibration Due: 8-27-99	Calibration Due: 8-11-99
Survey Date/Time: 4-13-99	Field Bkg.: 8000 cpm
Surveyor(s): C. Hamm & T. Brown	
Comments: Area Surveyed and found to be less than 1.5 times background	



LEGEND

SAMPLE POINTS NOT PINNED

X'SC-32506-S' SAMPLE POINTS PINNED

PINNING LIMITS

Radiation Survey Form WP 437, RU 23 CU 371

DBO CJD

Meter Model #	2221	Detector Model #:	NaI "2x2"
Meter Serial #	117607	Detector Serial #:	25143
Calibration Due:	12-18-99	Calibration Due:	01-29-00
Survey Date / Time:	07-18-99	Field Bkg:	17,000 cpm
Surveyor:	J. Rambin		
Comments	All areas surveyed <1.5 BKG.		

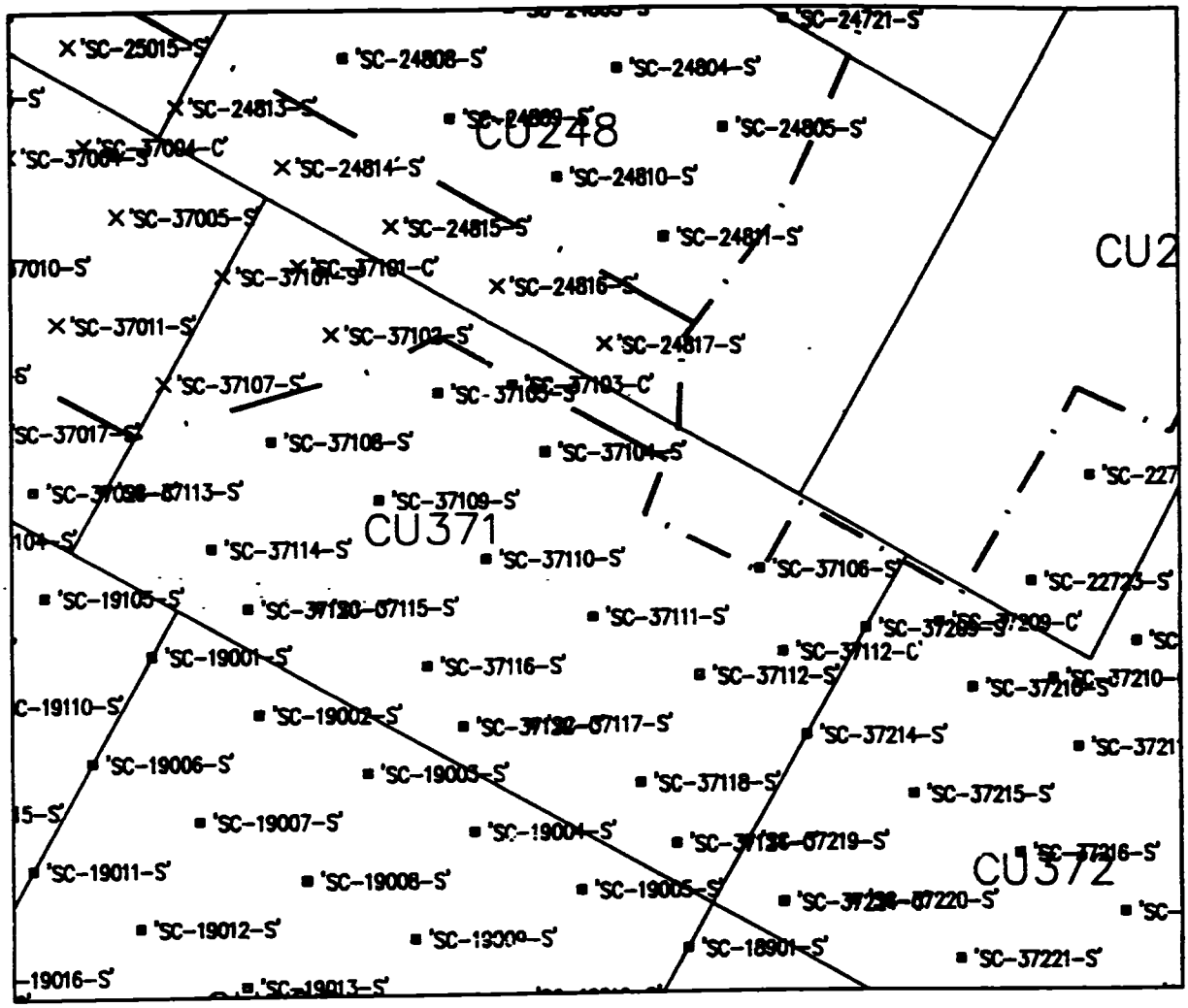
N

GRAPHIC SCALE

50 0 25 50

(IN FEET)

1 inch = 50 ft



LEGEND

- ▪ 'SC-32606-S' SAMPLE POINTS NOT PINNED
- × 'SC-32606-S' SAMPLE POINTS PINNED
- — · — · — PINNING LIMITS

Radiation Survey Form WP 437, RU 23 CU 371

DBO CAD

Meter Model #:	2221	Detector Model #:	NaI "2x2"
Meter Serial #:	125435	Detector Serial #:	130763
Calibration Due:	12-20-99	Calibration Due:	8-11-99
Survey Date / Time:	6-03-99	Field Bkg.:	7K
Surveyor(s):	J. Rambo		
Comments:	All areas ≤ 1.5 BKG.		

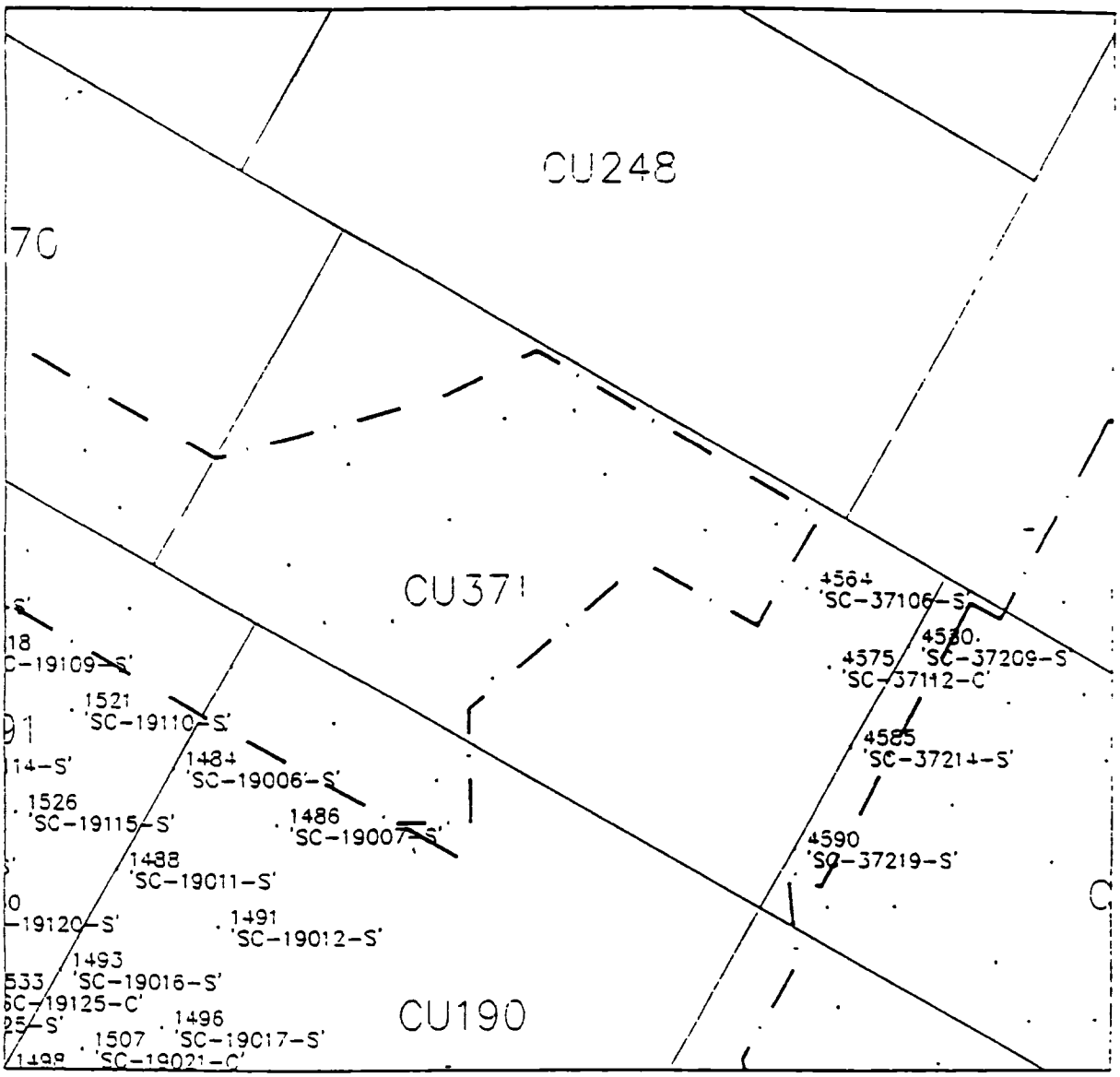
N

GRAPHIC SCALE

50 0 25 50

(IN FEET)

1 inch = 50 ft.



LEGEND

- SAMPLE POINTS NOT PINNED
- × 'SC-32606-S' SAMPLE POINTS PINNED
- — · — · — PINNING LIMITS

Radiation Survey Form WP 437, RU 23 CU 371

DEO CAD

Meter Model #	2221	Detector Model #:	NaI "2x2"
Meter Serial #	117607	Detector Serial #	25143
Calibration Due:	12-18-99	Calibration Due:	01-24-00
Survey Date / Time:	07-21-99	Field Bkg.:	12,000 cpm
Surveyor(s):	J. Rankin		
Comments:	All areas surveyed < 1.5 BKG.		

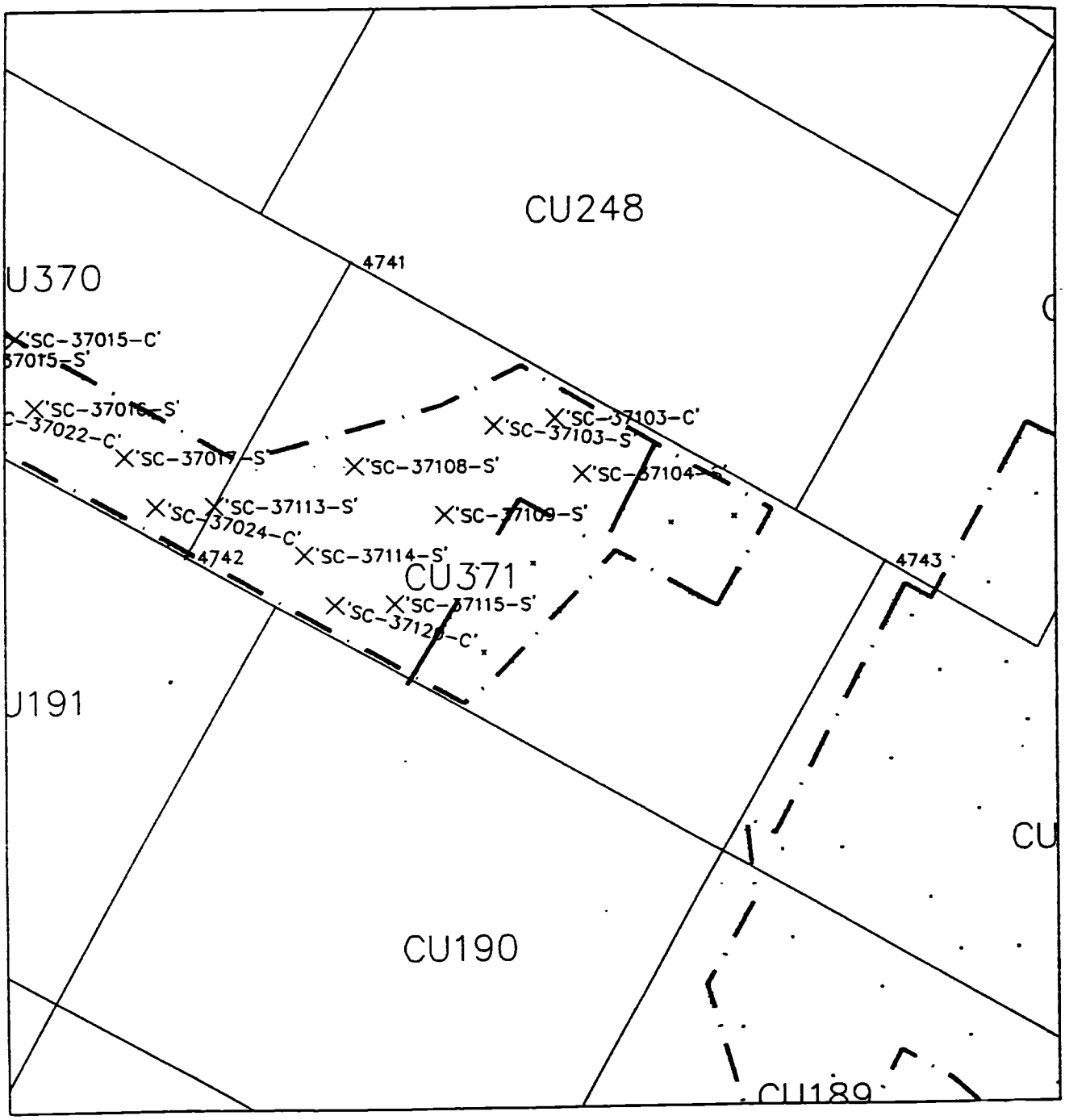
N

GRAPHIC SCALE

50 0 25 50

(IN FEET)

1 inch = 50 ft.



LEGEND

'SC-32606-S' — SAMPLE POINTS NOT PINNED

SAMPLE POINTS PINNED

PINNING LIMITS

N

GRAPHIC SCALE

50 0 25 50

(IN FEET)

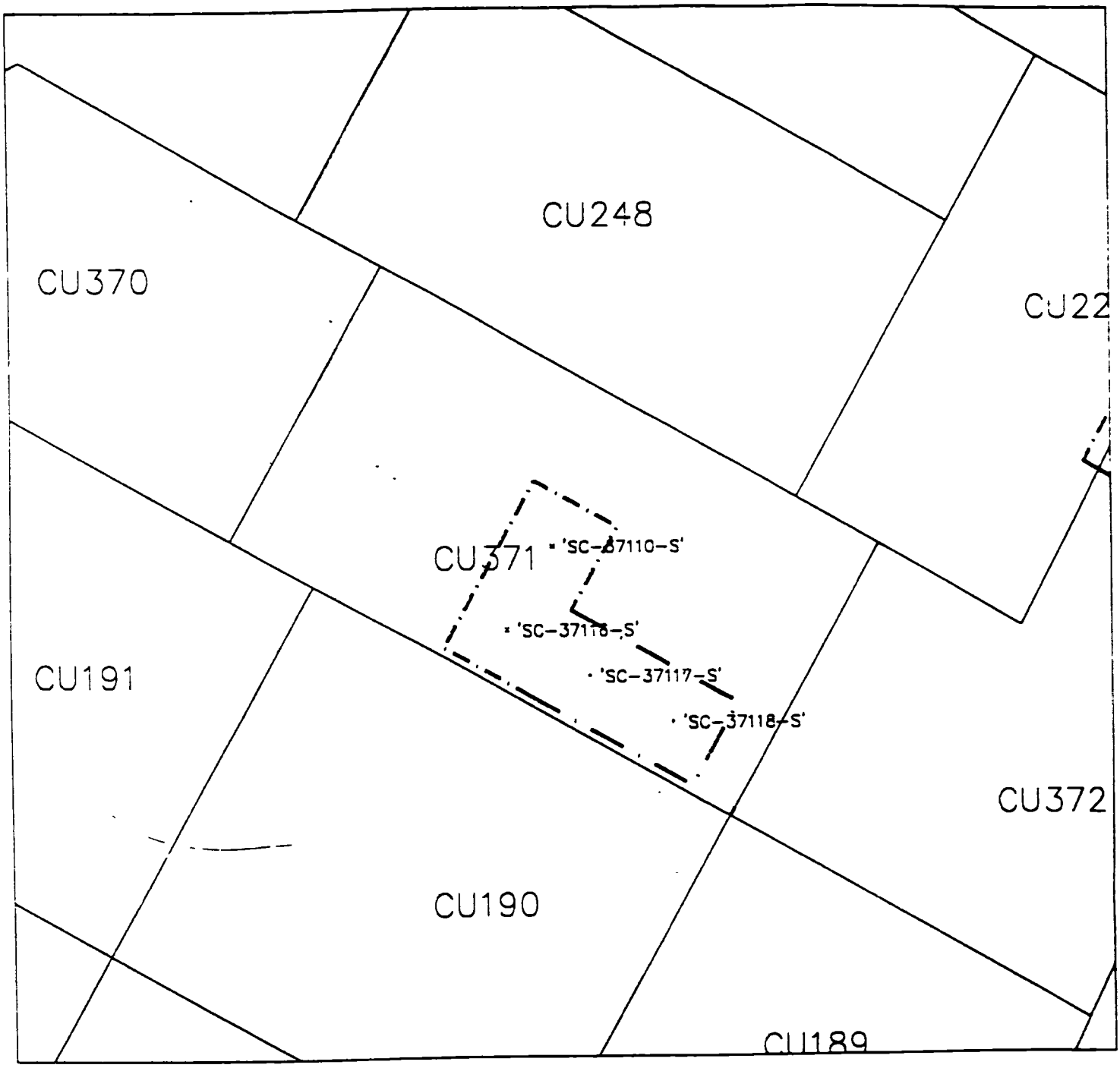
1 inch = 50 ft.

Radiation Survey Form WP 437, RU 23 CU 371

DBO CAD

Meter Model #:	2221	Detector Model #:	2.2 "G"
Meter Serial #:	127252	Detector Serial #:	DOE # 4241
Calibration Due:	09-02-00	Calibration Due:	01-24-00
Survey Date / Time:	10-25-99	Field Bkg.:	8,000 cpm
Surveyor(s):	J. Rankins		
Comments:	All areas < 1.5 BKG.		

90663



LEGEND

'SC-32606-S' SAMPLE POINTS PINNED

PINNING LIMITS

N

Radiation Survey Form WP 437, RU 23 CU 371

Date Plotted 6/06/00 DBD CAD

Meter Model #: 2221 Detector Model #: 4x2 NaI

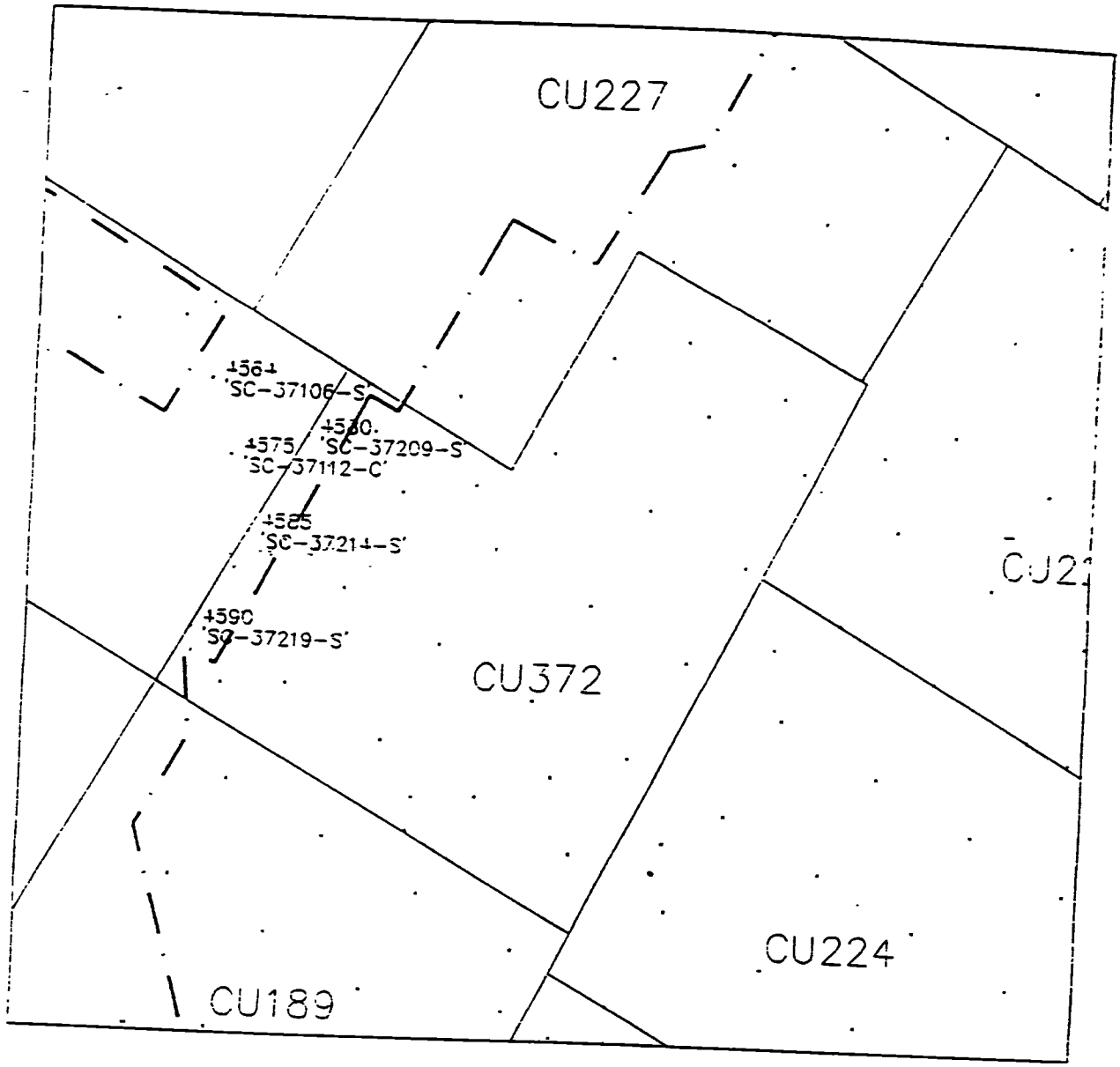
Meter Serial #: 154199 Detector Serial #: 17606

Calibration Due: 2/9/01 Calibration Due: 1/21/01

Survey Date / Time: 6/6/00 Field Bkg.: 10,500 cpm

Surveyor(s): C. Heaner

Comments: Area was surveyed and found to be less than 1.5 times background



LEGEND

SAMPLE POINTS NOT PINNED

× 'SC-32506-S' SAMPLE POINTS PINNED

PINNING LIMITS

Radiation Survey Form WP 437, RU 23 CU 372

DEO CAD

Meter Model #:	2221	Detector Model #:	NaI 1"x2"
Meter Serial #:	117607	Detector Serial #:	25193
Calibration Due:	12-18-99	Calibration Due:	01-24-00
Survey Date / Time:	07-21-99	Field Bkg.:	12,000 cpm
Surveyor(s):	J. Ramsey		
Comments:	All areas surveyed < 15 BKG		

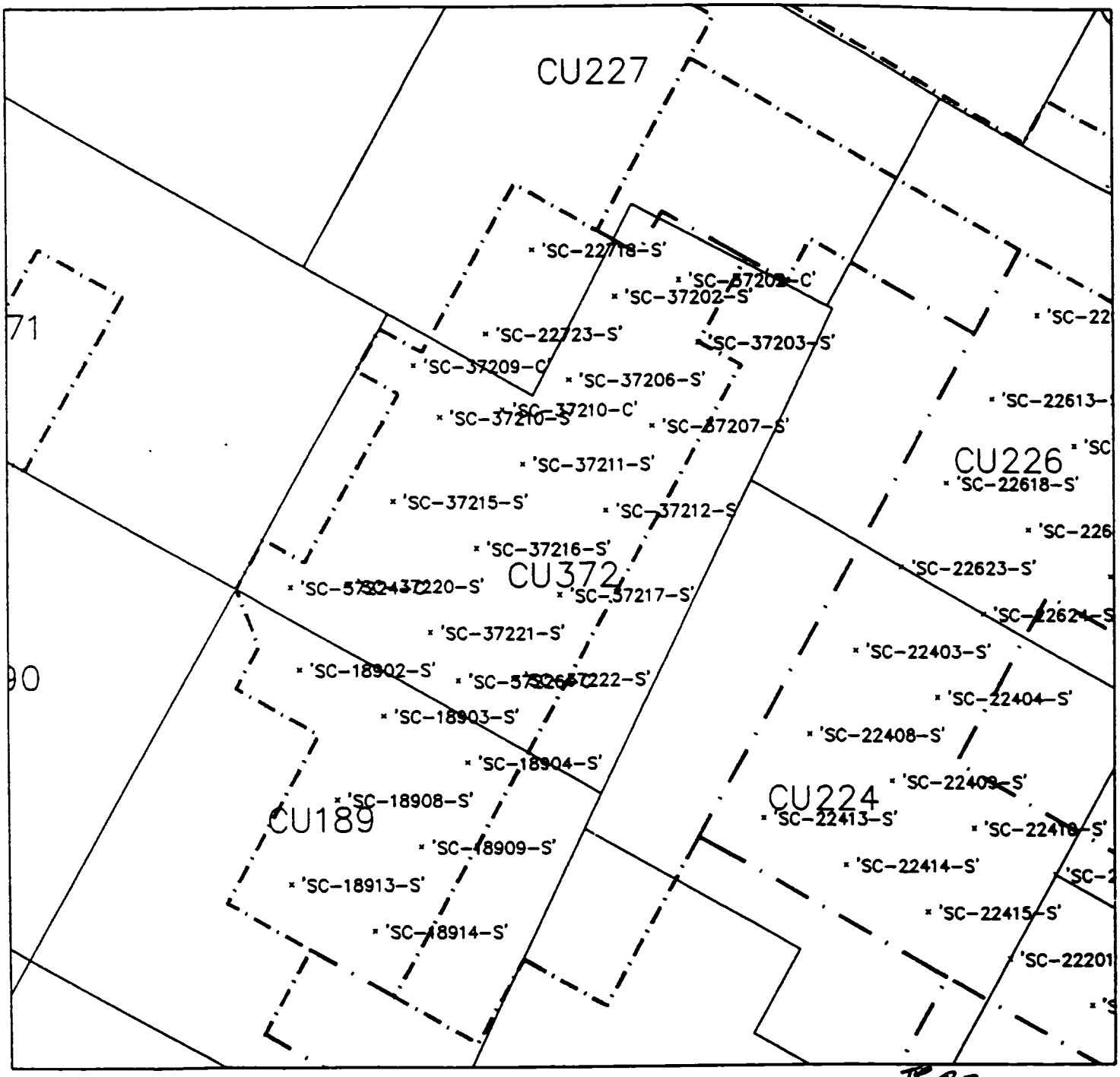
N

GRAPHIC SCALE

50 0 25 50

(IN FEET)

1 inch = 50 ft.



LEGEND

'SC-32606-S' SAMPLE POINTS PINNED

PINNING LIMITS

N

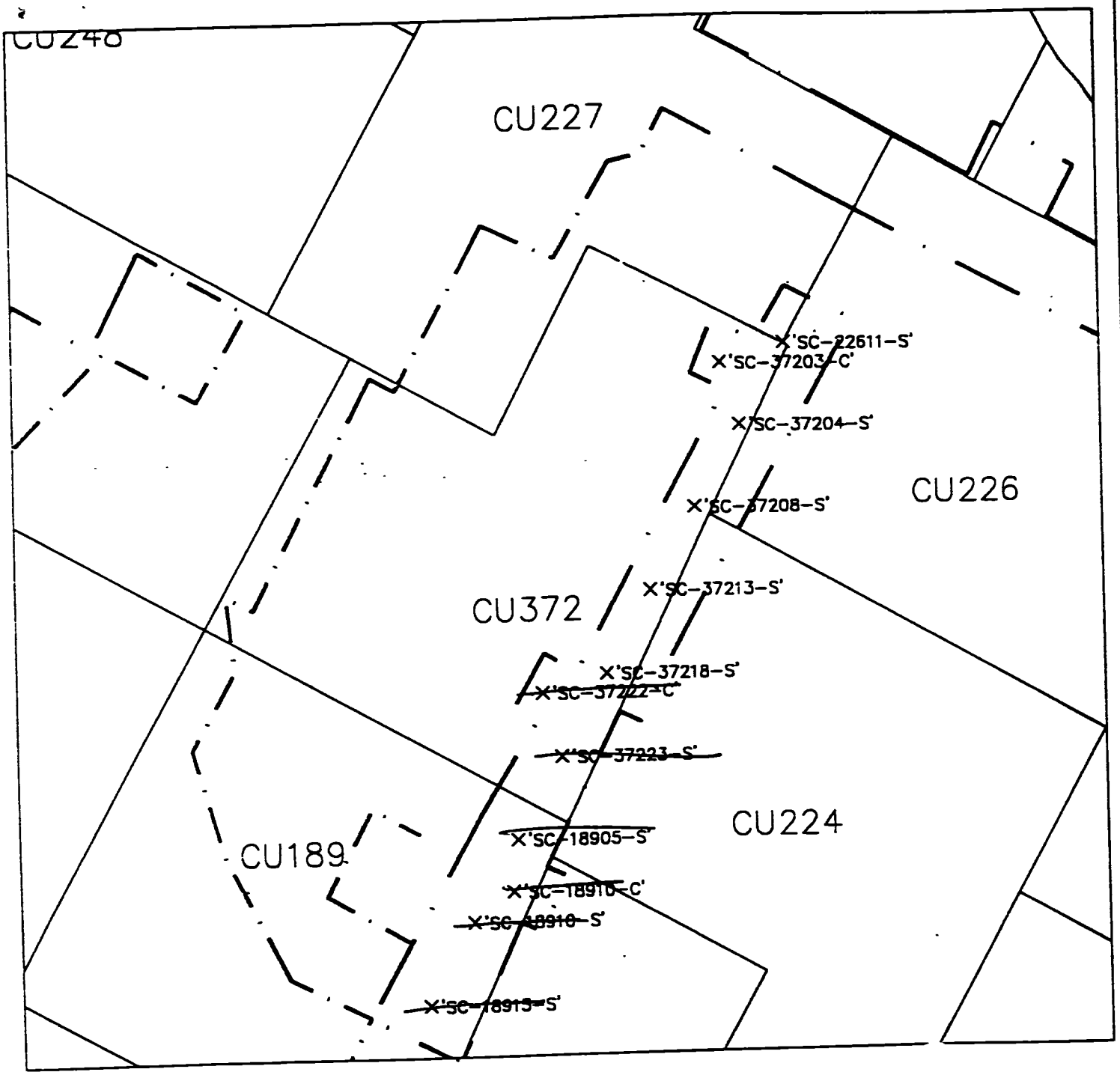
Radiation Survey Form WP 437, RU 23 CU 372

Date Plotted 6/2/00

DBD CAD

Meter Model #:	2221	Detector Model #:	2x2 NaI "P"
Meter Serial #:	154199	Detector Serial #:	17606
Calibration Due:	2/09/01	Calibration Due:	1/31/01
Survey Date / Time:	6/2/00	Field Bkg.:	10,000 cpm
Surveyor(s):	C. Hanner		

Comments: Area was surveyed and found to be less than 1.5 times background



LEGEND

'SC-32606-S' SAMPLE POINTS PINNED

PINNING LIMITS

N

GRAPHIC SCALE

50 0 50 100

(IN FEET)

1 inch = 50 ft.

Radiation Survey Form WP 437, RU 22 CU 372

Date Plotted _____ DBD CAD

Meter Model #: 2221 Detector Model #: 2x2 NaI "M"

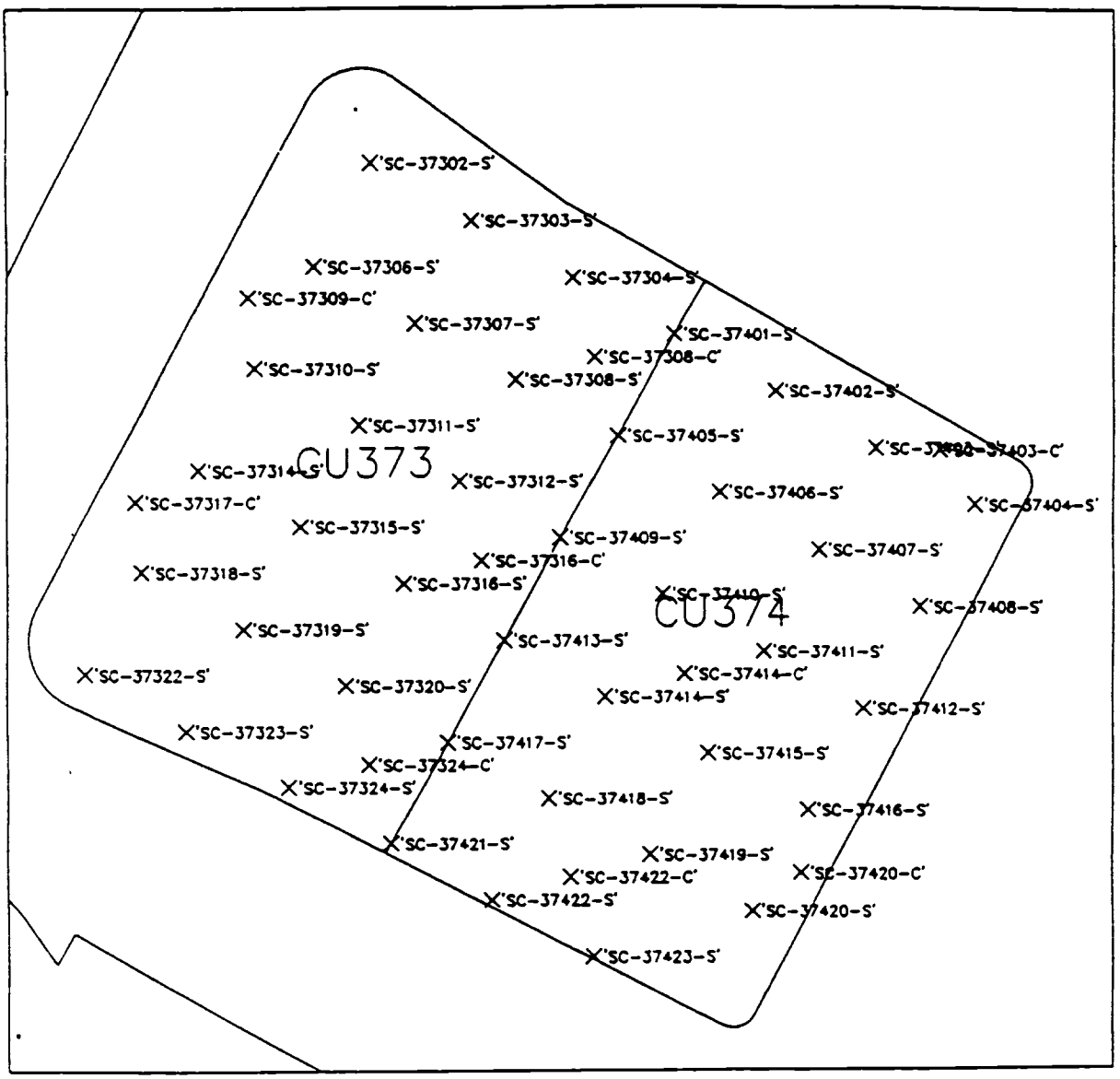
Meter Serial #: 117617 Detector Serial #: 130764

Calibration Date: 10/13/00 Calibration Date: 9/29/00

Survey Date / Time: 3/30/01 Field Bkg: 6000

Surveyor(s): C. Hamm

Comments: Area was surveyed and found to be less than 1.5 times background



LEGEND

. SAMPLE POINTS NOT PINNED

X'SC-32606-S' SAMPLE POINTS PINNED

— · — · — PINNING LIMITS

Radiation Survey Form WP 437, RU 23 CU 373

DBO CAD

Meter Model # :	2221	Detector Model #:	NaI "2x2"
Meter Serial # :	117607	Detector Serial #:	25143
Calibration Due:	12-18-99	Calibration Due:	1-24-00
Survey Date / Time:	7-14-99	Field Bkg.	10,500 cpm
Surveyor(s):	J. Bankins		
Comments:	All areas surveyed were < 1.5 times BKG.		

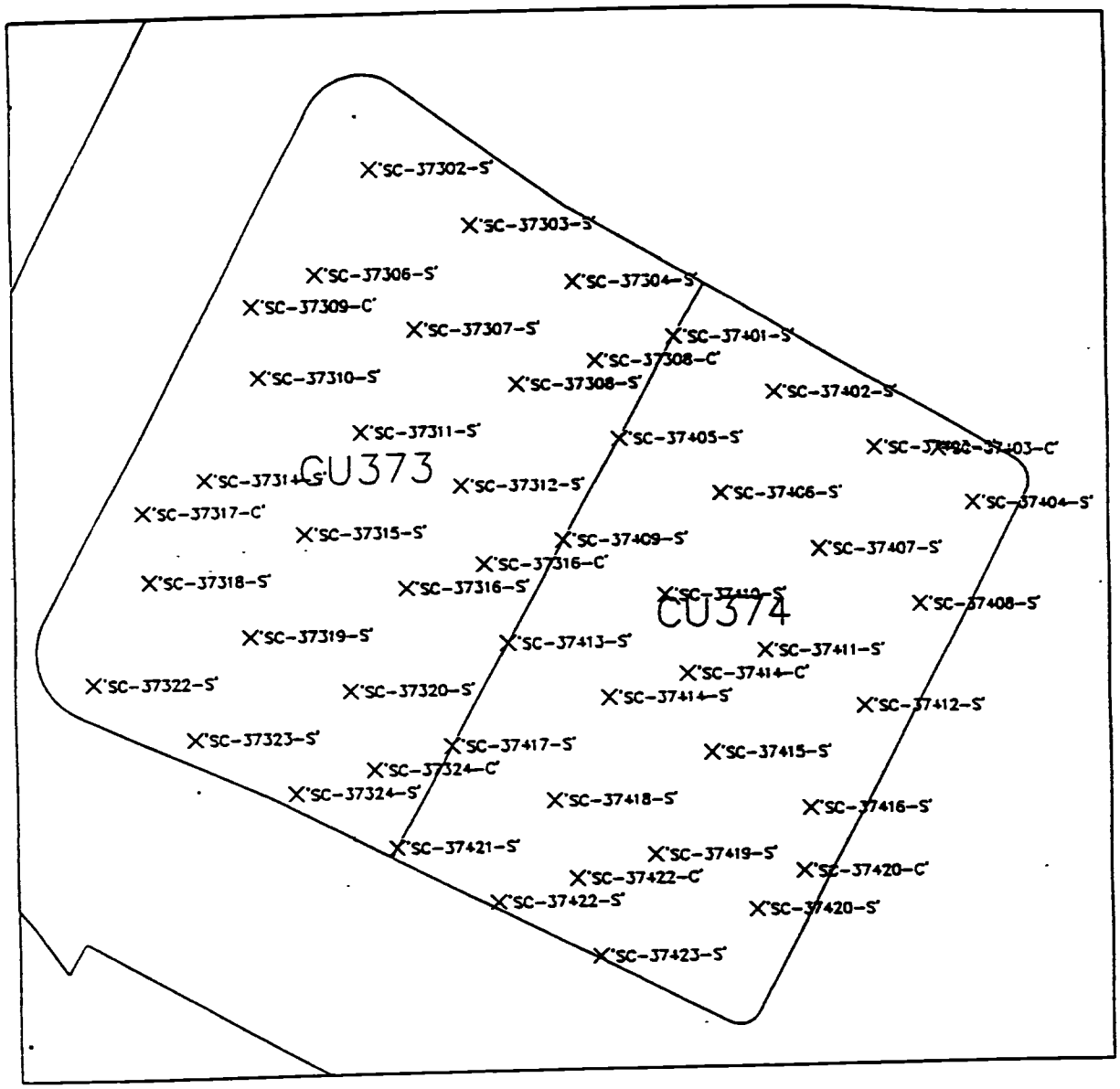
N

GRAPHIC SCALE

50 0 25 50

(IN FEET)

1 inch = 50 ft.



LEGEND

SAMPLE POINTS NOT PINNED

X'SC-32606-S' SAMPLE POINTS PINNED

PINNING LIMITS

Radiation Survey Form WP-437, RU 23 CU 374

2224 (2)

DBO CAD

Meter Model #:	2221	Detector Model #:	NaI 2x2"
Meter Serial #:	117607	Detector Serial #:	25143
Calibration Due:	12-18-99	Calibration Due:	01-24-00
Survey Date / Time:	07-14-99	Field Bkg.:	10,500 cpm
Surveyor(s):	J. Hankins		
Comments:	All areas surveyed were <1.5 times BKG.		

N

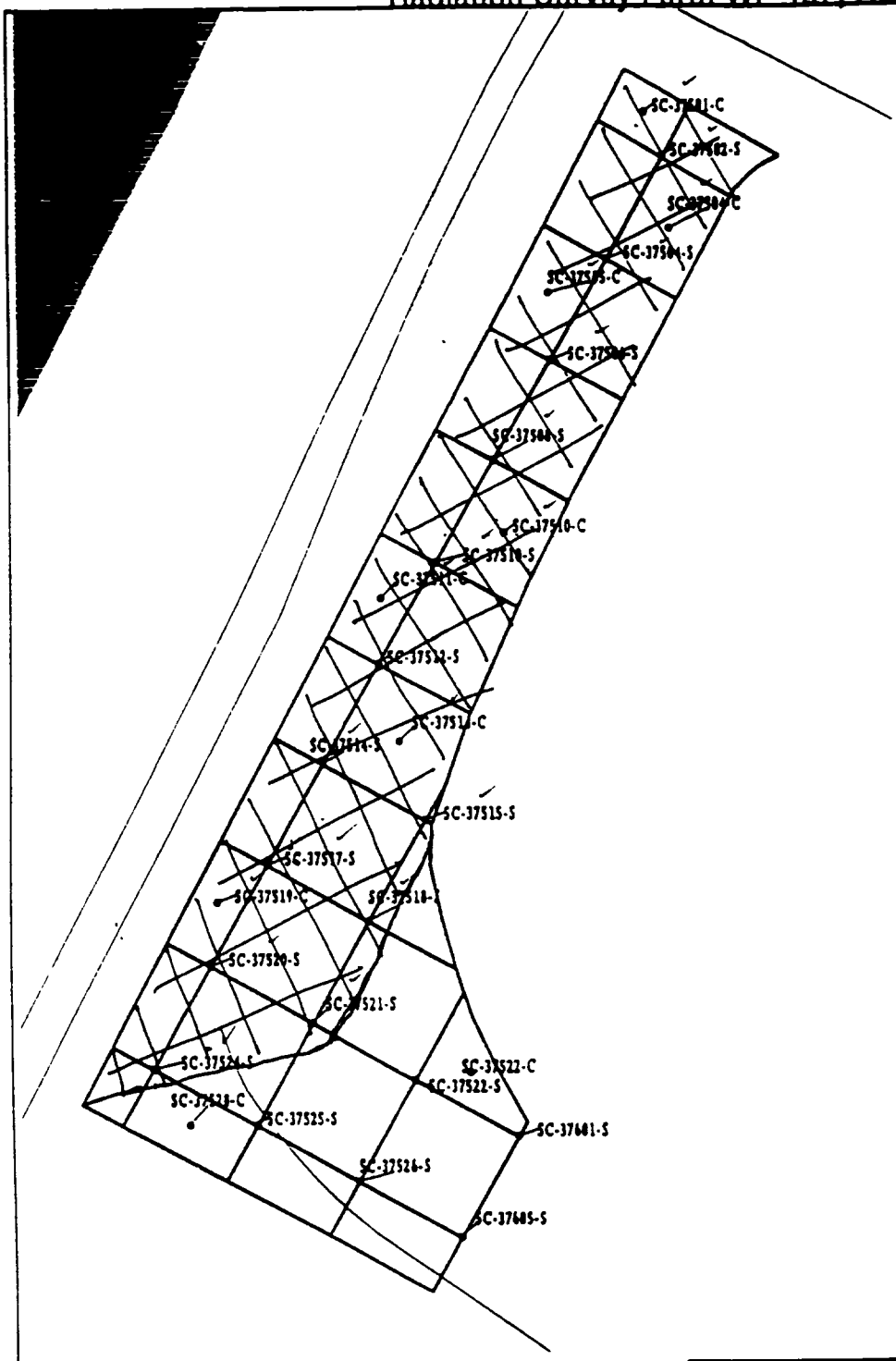
GRAPHIC SCALE

50 0 25 50

(IN FEET)

1 inch = 50 ft.

Radiation Survey Form WP 437, RU023 CU375



Area Surveyed

WSSRAP GIS

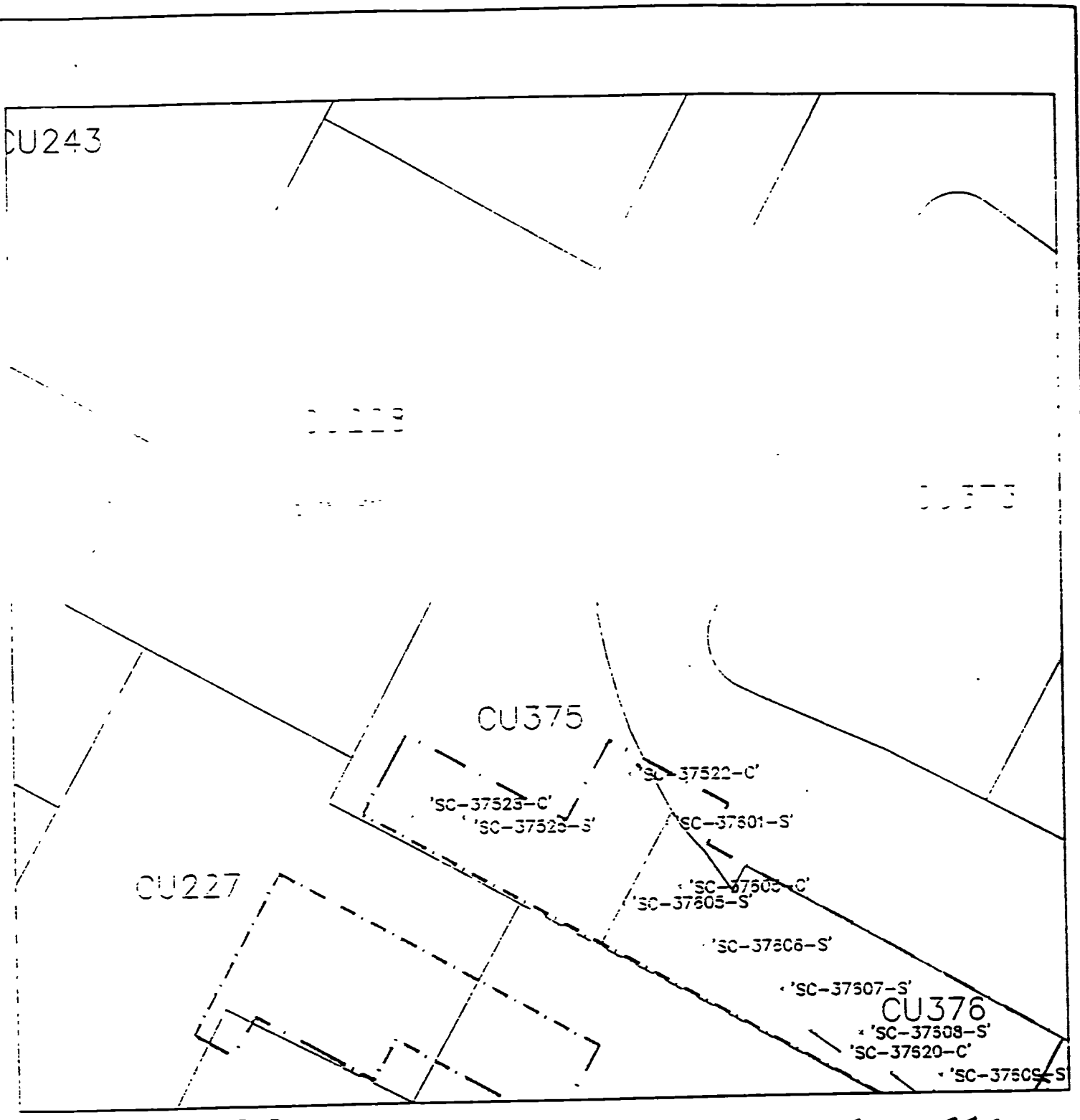
15 7.5 0 METERS

45 22.5 0 FEET

Meter Model#: 2221
Meter Serial#: 127252
Calibration Due: 8-27-99
Survey Date/Time: 4/12/99
Surveyor(s): C. Hanner

Detector Model#: 2x2 NaI "F"
Detector Serial#: 122191
Calibration Due: 8-11-99
Field Bkg.: 6000 cpm

Comments: Area was surveyed and found to be less than 1.5 times background



LEGEND

'SC-32606-S' SAMPLE POINTS PINNED

PINNING LIMITS

N

Radiation Survey Form WP 437, RU 23 CU 375

Date Plotted 6/4/01

DBO CAD

Meter Model #: 2221 Detector Model #: 2x2 NaI "P"

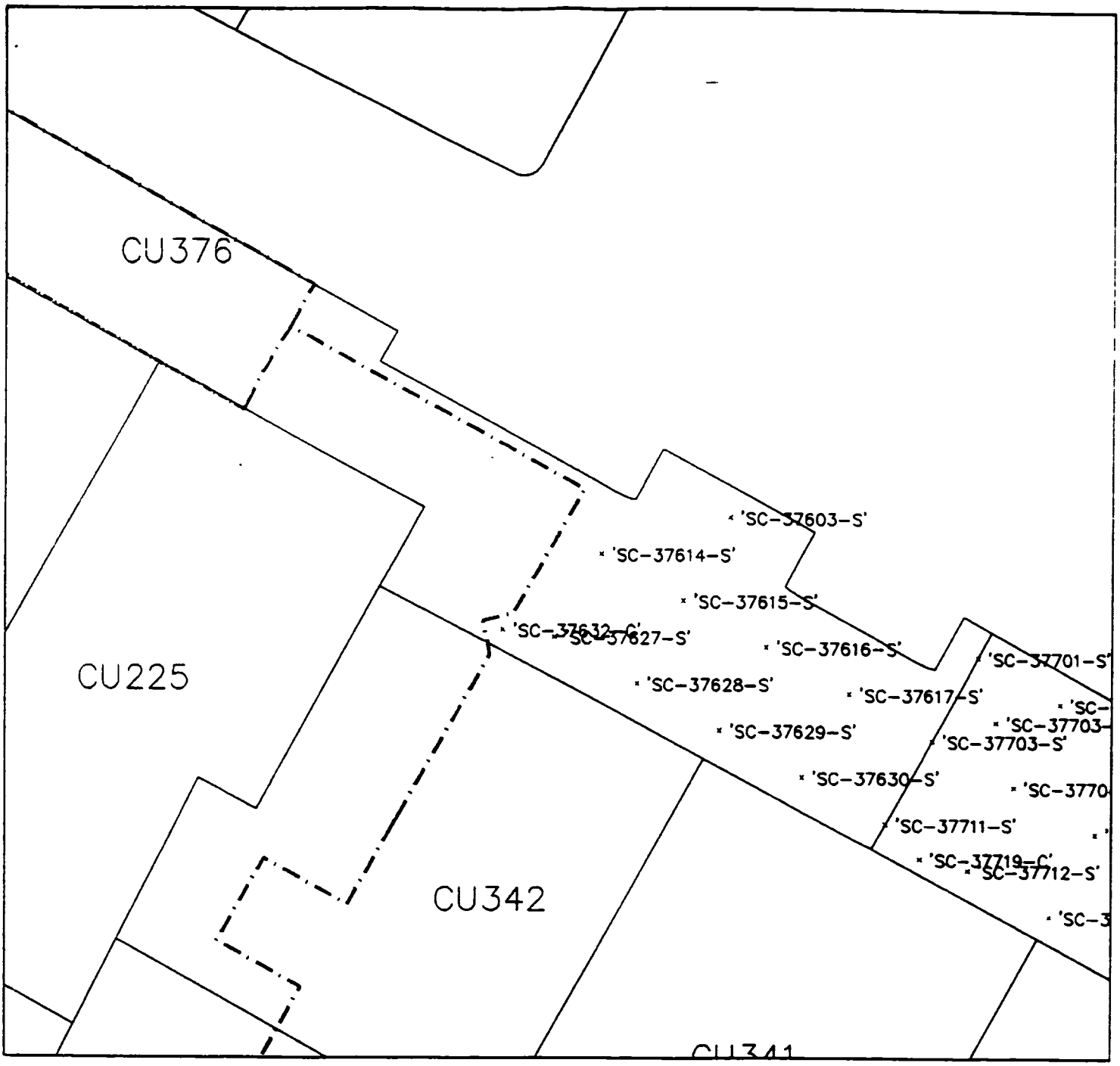
Meter Serial #: 154199 Detector Serial #: 17606

Calibration Date: 2/09/01 Calibration Date: 1/21/01

Survey Date, Time: 6/4/01 Field Disp. 10,000 cpm

Surveyor(s): C. Hanner

Comments: Area was surveyed and found to be less than 1.5 times background



LEGEND

'SC-32606-S' SAMPLE POINTS PINNED

PINNING LIMITS

N

GRAPHIC SCALE

50 0 50 100

(IN FEET)

1 inch = 50 ft.

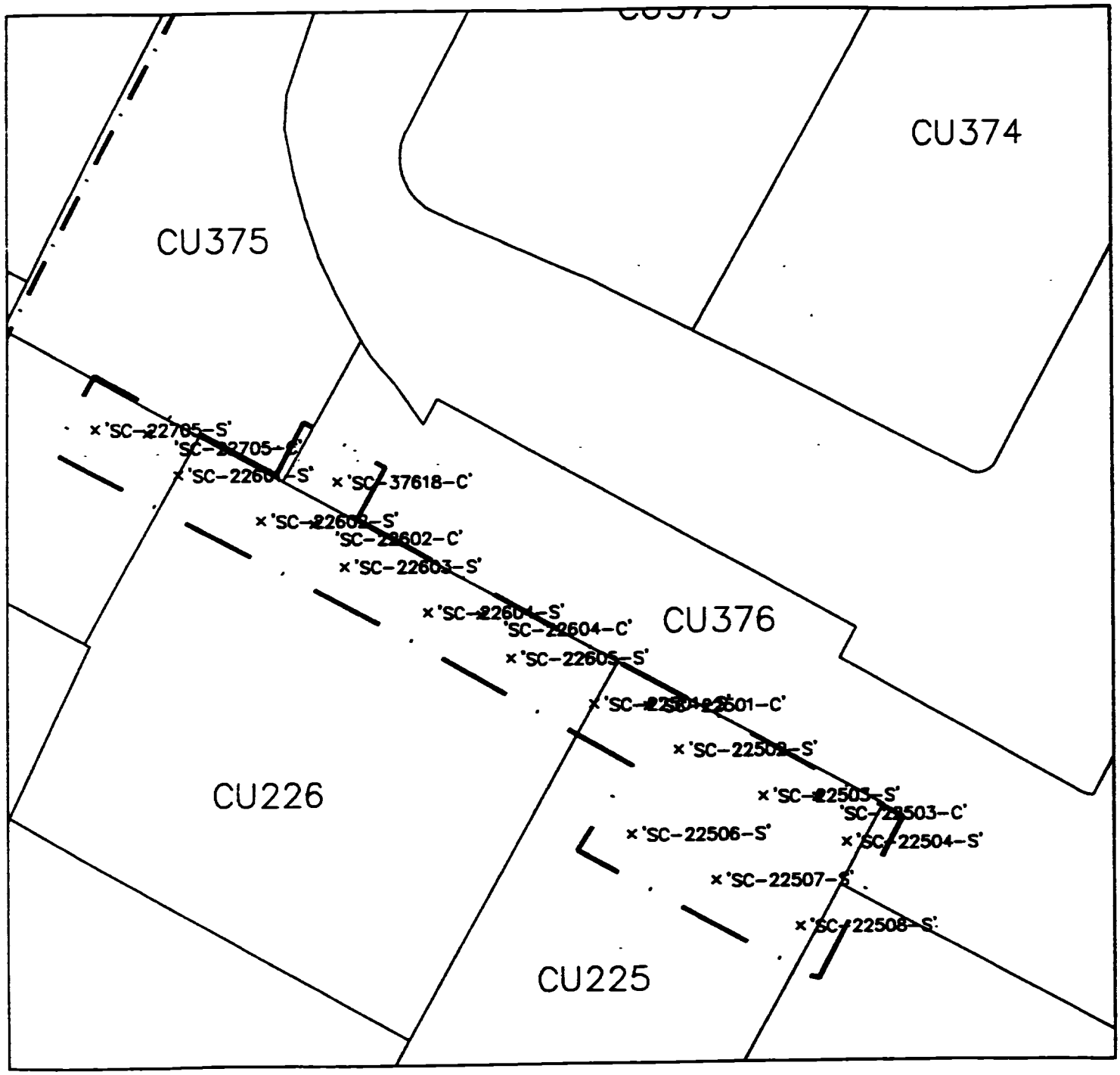
Radiation Survey Form WP 437, RU 23 CU 376

Date Plotted 7-21-00

DHO CAD

Meter Model #:	2221	Detector Model #:	44-10-2
Meter Serial #	125434	Detector Serial #:	130763 (L)
Calibration Due:	11-12-00	Calibration Due:	9-24-00
Survey Date / Time:	7-20-00/1900	Field Bkg.:	2,300 cpm
Surveyor(s):	J. BOWHAY		
Comments:	ALL RESULTS <1.5 x BKG		

Walkover performed on gravel road. Recorded field background is roughly ½ that of typical background range for gravel roads. Recorded background is likely due to a 30-sec (rather than 1-min) count. A background was likely 4,600 cpm. [signature] 10-15-0



LEGEND

'SC-32606-S' SAMPLE POINTS PINNED

PINNING LIMITS

N

GRAPHIC SCALE

80 0 80 100

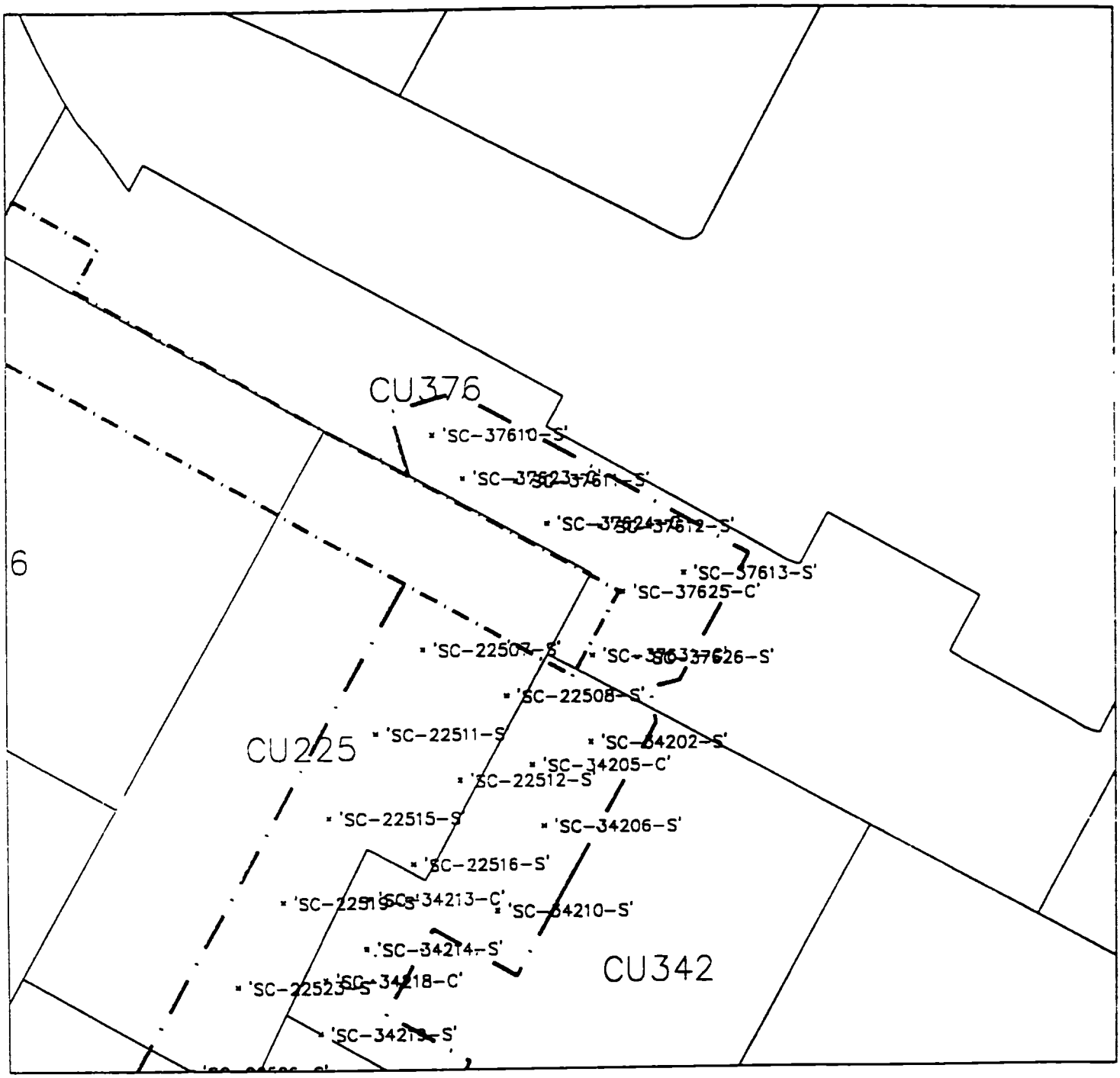
(IN FEET)

1 inch = 50 ft.

Radiation Survey Form WP 437, RU 21 CU 376

HRD CAD

Meter Model #:	2221	Detector Model #:	44-10 "F"
Meter Serial #:	99158	Detector Serial #:	122191
Calibration Date:	7/24/00	Calibration Date:	8/19/00
Survey Date/Time:	3/4/00	Field Rig:	5,000 CPM
Surveyor(s):	T. Brower		
Comments:	All readings @ 1.5 RKg		



LEGEND

'SC-32606-S' SAMPLE POINTS PINNED

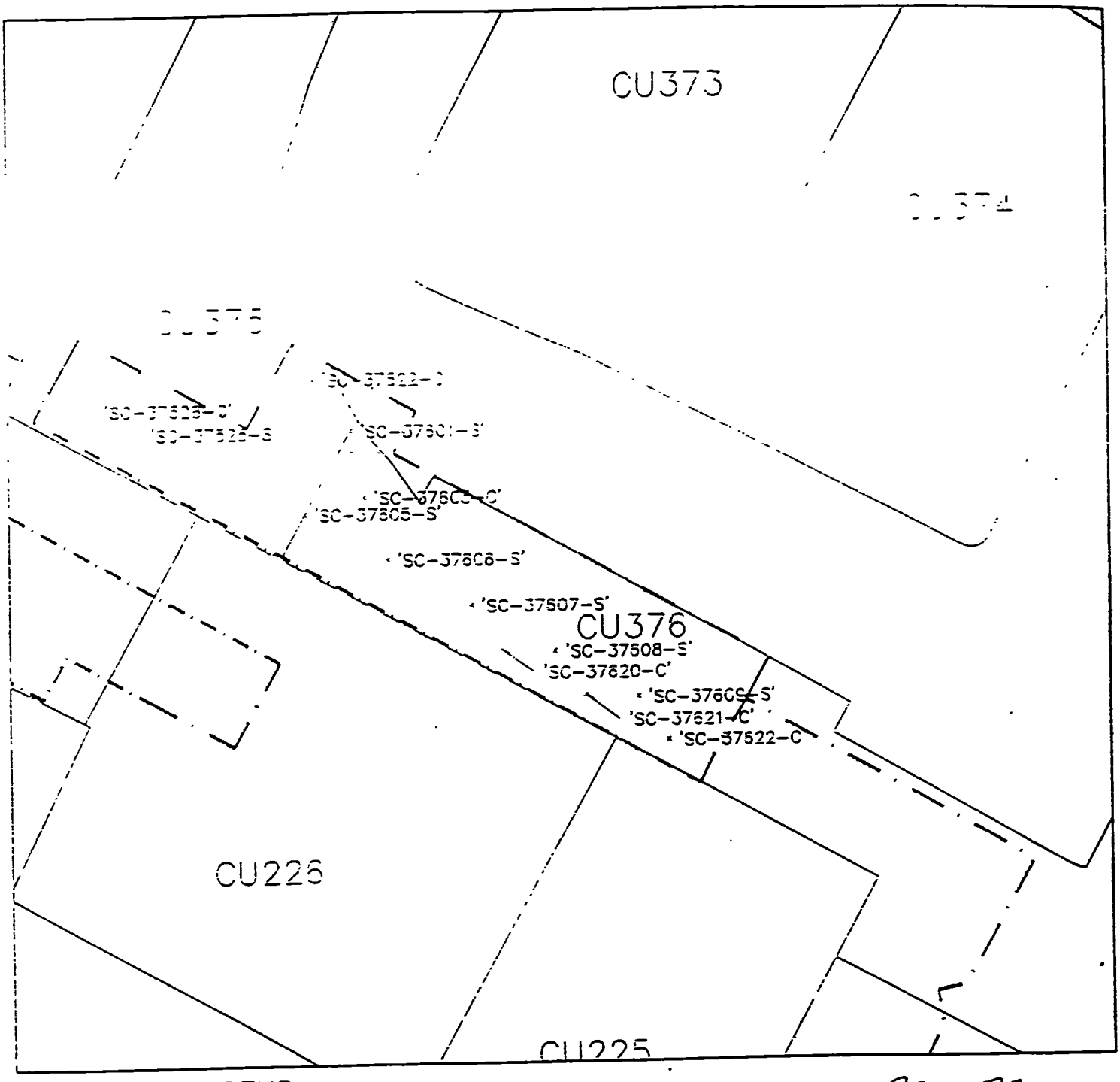
PINNING LIMITS

N

Radiation Survey Form WP 437, RU 23 CU 376

Date Plotted 5/20/00 DBD CAD

Meter Model #:	2221	Detector Model #:	2x2 'F'
Meter Serial #:	99158	Detector Serial #:	122191
Calibration Date:	7/24/00	Calibration Date:	9/24/00
Survey Date / Time:	5/19/00	Field Bkg.	4,000 cpm
Surveyor(s):	T. Brewer		
Comments:	All readings w.r.t. Bkg		



LEGEND

'SC-32606-S' SAMPLE POINTS PINNED

PINNING LIMITS

N

Radiation Survey Form WP 437, RU 23 CU 376

Date Plotted 6/4/00 DEO CAD

Meter Model #: 2221 Detector Model #: 7x7 NaI "P"

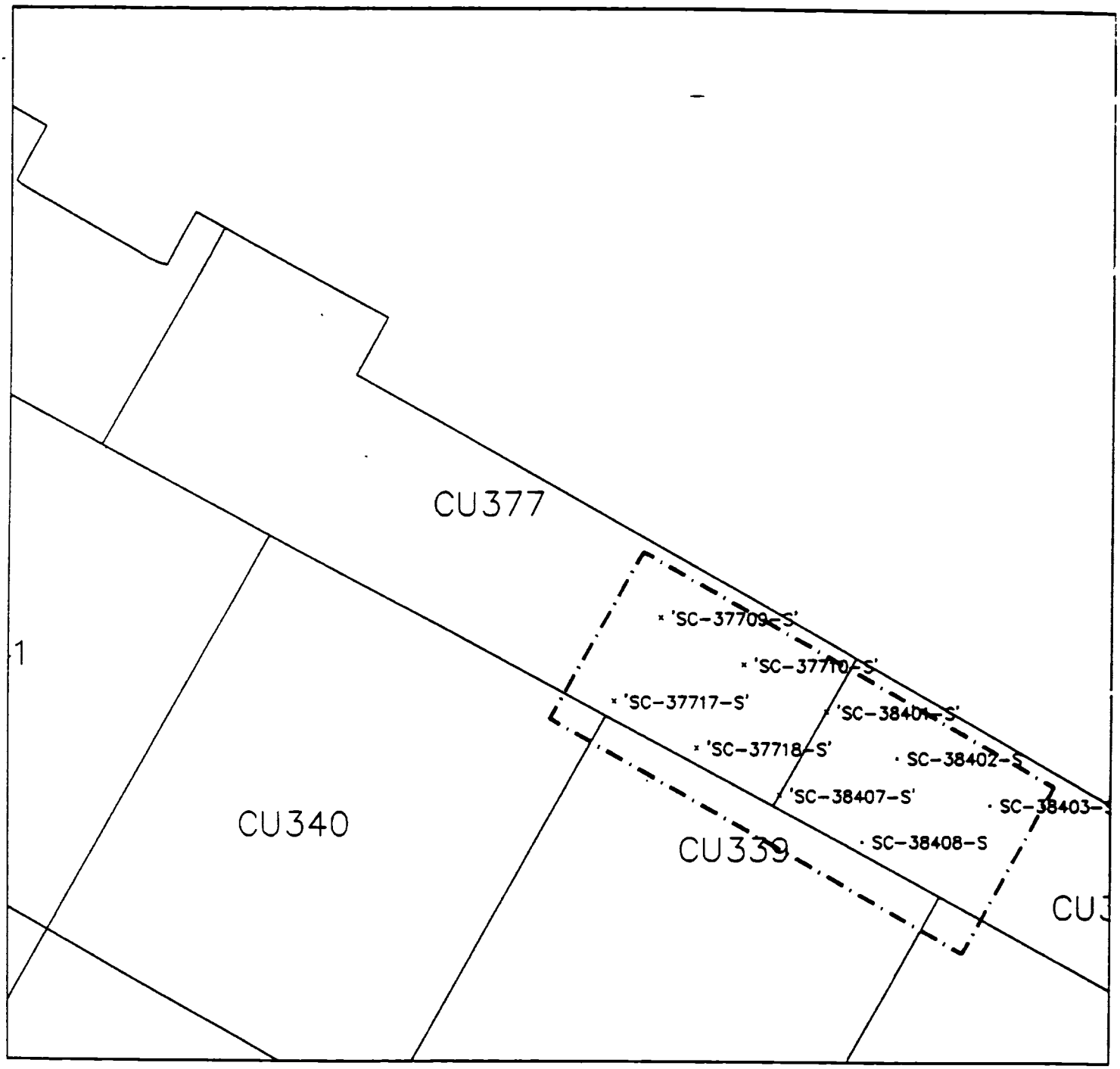
Meter Serial #: 154199 Detector Serial #: 17606

Calibration Due: 2/9/01 Calibration Due: 1/21/01

Survey Date/Time: 6/4/00 Field Dig. 10,000 Cpm

Surveyor(s): C. Hanner

Comments: Area was surveyed and found to be less than 1.5 times background



LEGEND

'SC-32606-S' SAMPLE POINTS PINNED

PINNING LIMITS

N

GRAPHIC SCALE

50 0 50 100

(IN FEET)

1 inch = 50 ft.

Radiation Survey Form WP-437, RU 23 CU 377

Date Plotted 7/19/00

DEO CAD

Meter Model #:	2221	Detector Model #:	2x2 "P"
Meter Serial #:	154199	Detector Serial #:	17606
Calibration Due:	2/9/01	Calibration Due:	1/21/01
Survey Date / Time:	7/19/00	Field Bkg.	10,000CPM
Surveyor(s):	T. Brouwer		
Comments:	All soil W.S 12Kg		

tumbarec <CPD. 07/19/00 [IIME: 09.14 AM] >

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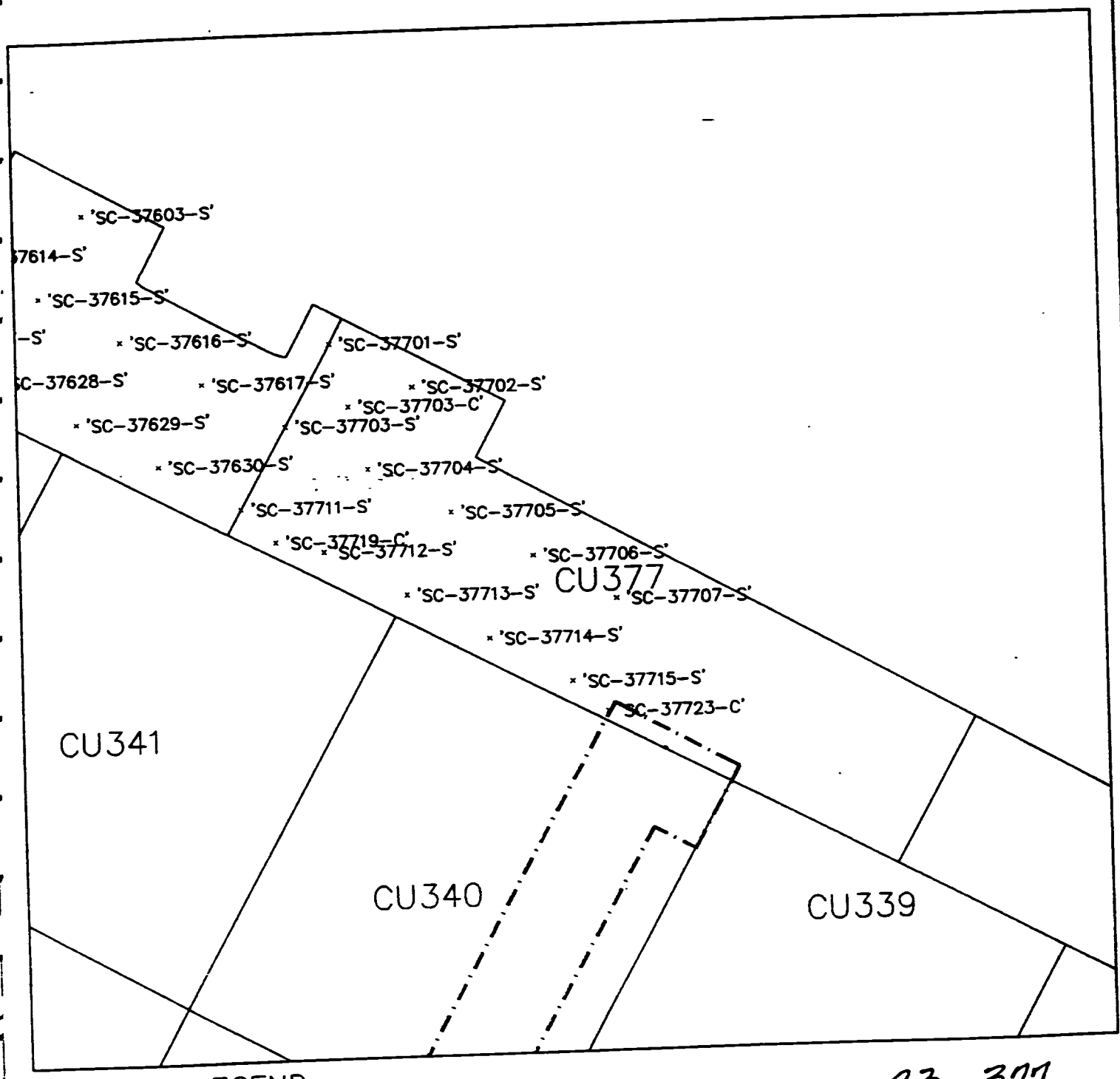


LEGEND

'SC-32606-S' SAMPLE POINTS PINNED

PINNING LIMITS

N

GRAPHIC SCALE

50 0 50 100

(IN FEET)

1 inch = 50 ft.

Radiation Survey Form WP 437, RU 23 CU 377

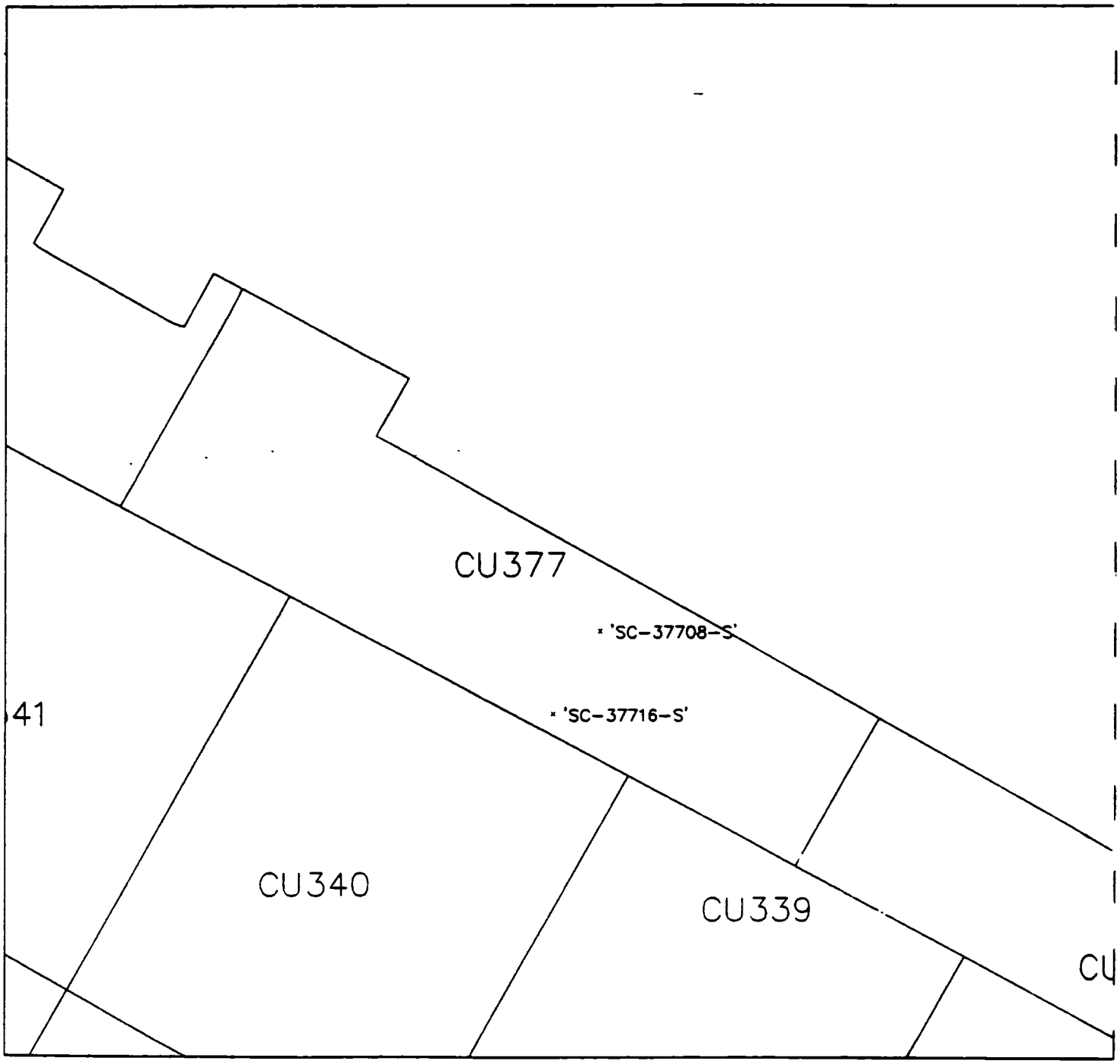
Date Plotted 7-21-00

DHO CAD

Meter Model #:	~~125434~~ 2221 (DF)	Detector Model #:	~~Z~~ 44-10-2 (DF)
Meter Serial #:	125434	Detector Serial #:	130763 ~~(Z)~~ (DF)
Calibration Due:	11-12-00	Calibration Due:	9-24-00 (DF)
Survey Date / Time:	7-20-00 / 1900	Field Bkg.:	2,300 cpm
Surveyor(s):	J. BOWHAY		
Comments:	ALL RESULTS <1.5 x BKG		

Walkover performed on gravel road. Recorded field background is roughly ½ that of typical background range for gravel roads. Recorded background is likely due to a 30-sec (rather than 1-min) count

Actual background was likely 4,600 cpm. Dist 2 [illegible] 10-15-



LEGEND

'SC-32606-S' SAMPLE POINTS PINNED

PINNING LIMITS

N

GRAPHIC SCALE

50 0 50 100

(IN FEET)
1 inch = 50 ft.

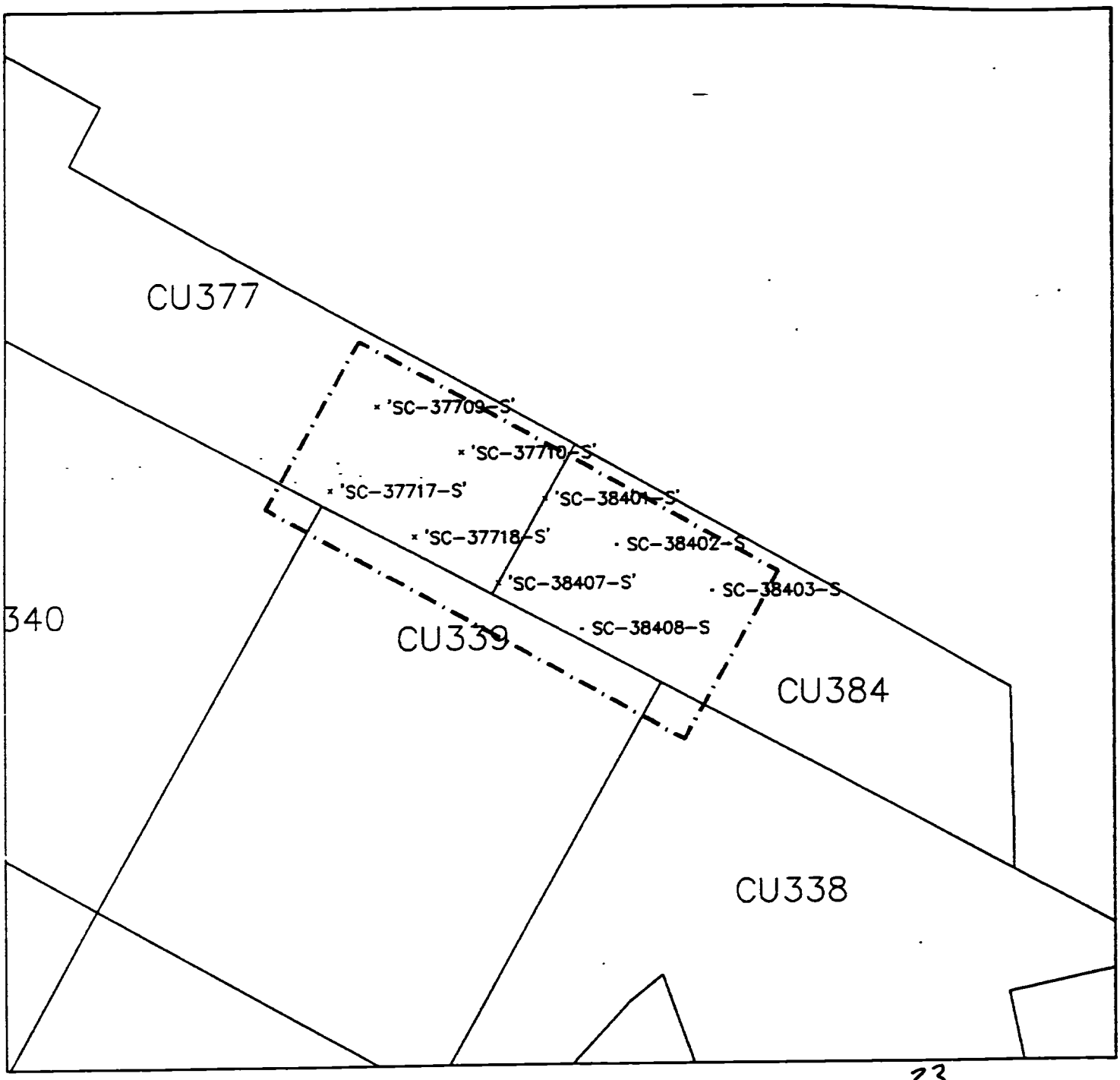
Radiation Survey Form WP 437, RU 23 CU 377

Date Plotted 7/21/00

DHO CAD

Meter Model #:	2221	Detector Model #:	44-10-2
Meter Serial #:	125434	Detector Serial #:	130763 (L)
Calibration Due:	11-12-00	Calibration Due:	9-24-00
Survey Date / Time:	7-20-00/1900	Field Bkg.:	2,300 cpm
Surveyor(s):	J. BOWHAY		
Comments:	ALL RESULTS <1.5x BKG		

Walkover performed on gravel road. Recorded field background is roughly ½ that of typical background range for gravel roads. Recorded background is likely due to a 30-sec (rather than 1-min) count. Act background was likely 4,600 cpm. Dart 2 Phy 10-15-0



LEGEND

Radiation Survey Form WP 437, RU 24 (23) CU 384

Date Plotted 7/19/00 DBD CAD

'SC-32606-S' SAMPLE POINTS PINNED

PINNING LIMITS

N

GRAPHIC SCALE

50 0 50 100

(IN FEET)

1 inch = 50 ft.

Meter Model #:	2221	Detector Model #:	2x2 "p"
Meter Serial #:	154199	Detector Serial #:	17606
Calibration Due:	2/9/01 (DP)	Calibration Due:	11/21/01
Survey Date / Time:	7/19/01 00	Field Bkg.:	10,000 ctm
Surveyor(s):	T. Brower		
Comments:	All soil < 1.5 BKg		

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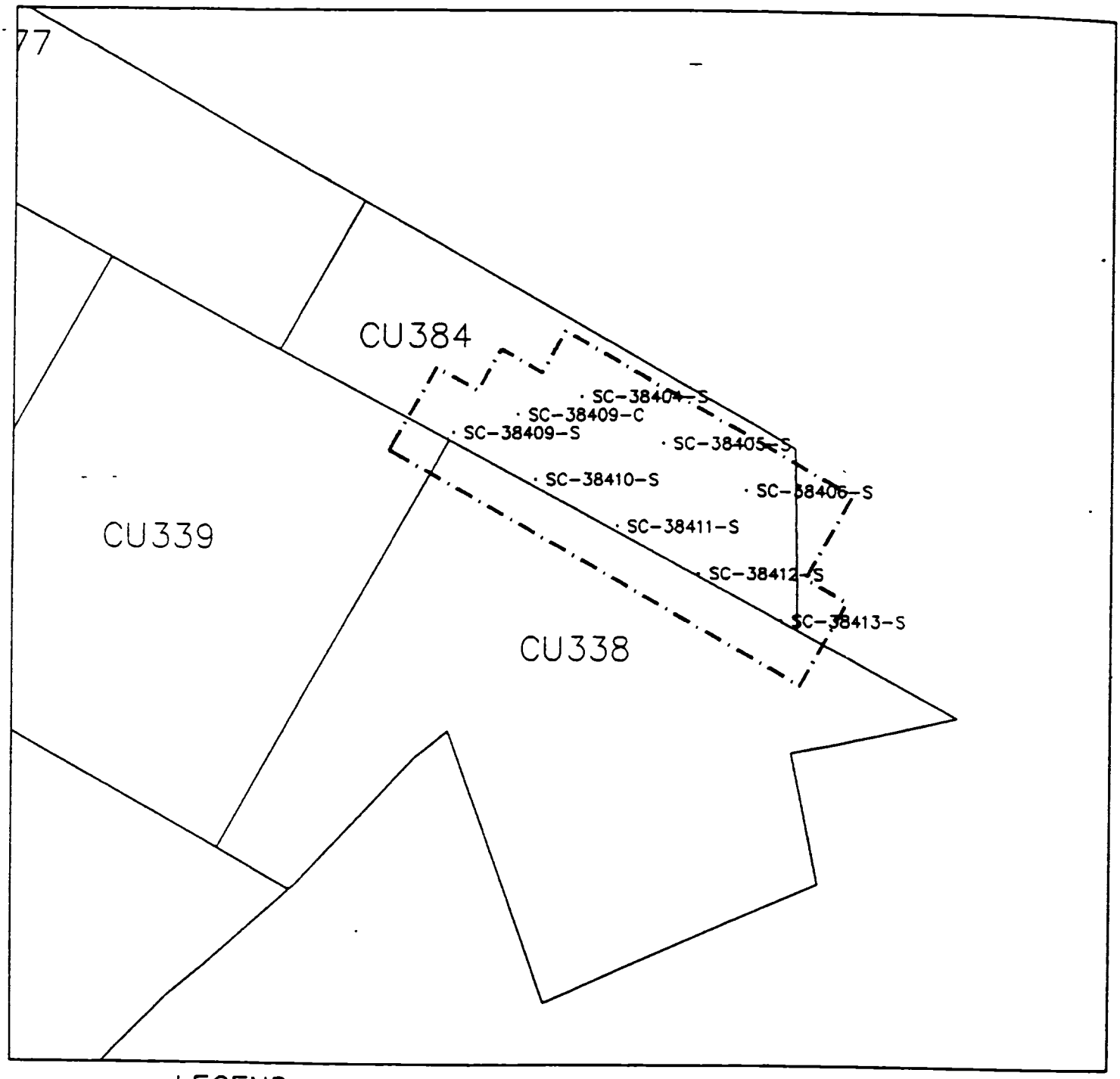


LEGEND

'SC-32606-S' SAMPLE POINTS PINNED

PINNING LIMITS

N

GRAPHIC SCALE

50 0 50 100

(IN FEET)

1 inch = 50 ft.

Radiation Survey Form WP 437, RU 23 CU 384

Date Plotted 7/11/00 DBO CAD

Meter Model #:	2221	Detector Model #:	2x2 "p"
Meter Serial #:	154199	Detector Serial #:	17606
Calibration Due:	2/9/01	Calibration Due:	1/21/01
Survey Date / Time:	7/11/00	Field Bkg.	10 200 cpm
Surveyor(s):	T Beaver		
Comments:	All soil 4.5x Bkg		

APPENDIX B
WP-437 RU023 Final Data

APPENDIX B WP-437 RU23 FINAL DATA

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37002-C	06/04/1999	PCB	0	42	UG/KG
SC-37002-C	06/04/1999	ARSENIC	5.1	0.45	UG/G
SC-37002-C	06/04/1999	PAH	0	19	UG/KG
SC-37002-C	06/04/1999	CHROMIUM	21.5	0.4	UG/G
SC-37002-C	06/04/1999	LEAD	8	0.3	UG/G
SC-37002-C	06/04/1999	RADIUM-226	0.97	0.3	PCI/G
SC-37002-C	06/04/1999	RADIUM-228	0.49	0.98	PCI/G
SC-37002-C	06/04/1999	THALLIUM	2.1	0.71	UG/G
SC-37002-C	06/04/1999	THORIUM-230	3.28	0.62	PCI/G
SC-37002-C	06/04/1999	URANIUM-238	1.265	2.53	PCI/G
SC-37002-C-01	10/22/1999	PCB	0	38	UG/KG
SC-37002-C-01	10/22/1999	ARSENIC	13.5	0.39	UG/G
SC-37002-C-01	10/22/1999	PAH	0	17	UG/KG
SC-37002-C-01	10/22/1999	CHROMIUM	18.8	0.18	UG/G
SC-37002-C-01	10/22/1999	LEAD	84.8	0.35	UG/G
SC-37002-C-01	10/22/1999	RADIUM-226	0.97	0.38	PCI/G
SC-37002-C-01	10/22/1999	RADIUM-228	0.52	1.04	PCI/G
SC-37002-C-01	10/22/1999	THALLIUM	2.2	0.62	UG/G
SC-37002-C-01	10/22/1999	THORIUM-230	1.21	0.64	PCI/G
SC-37002-C-01	10/22/1999	URANIUM-238	1.33	2.66	PCI/G
SC-37002-S	06/04/1999	PCB	0	40	UG/KG
SC-37002-S	06/04/1999	ARSENIC	5.7	0.43	UG/G
SC-37002-S	06/04/1999	PAH	0	18	UG/KG
SC-37002-S	06/04/1999	CHROMIUM	19.8	0.39	UG/G
SC-37002-S	06/04/1999	LEAD	12.9	0.29	UG/G
SC-37002-S	06/04/1999	RADIUM-226	0.81	0.29	PCI/G
SC-37002-S	06/04/1999	RADIUM-228	1.16	0.37	PCI/G
SC-37002-S	06/04/1999	THALLIUM	1.1	0.68	UG/G
SC-37002-S	06/04/1999	THORIUM-230	0.84	0.65	PCI/G
SC-37002-S	06/04/1999	URANIUM-238	1.27	2.54	PCI/G
SC-37002-S-01	10/22/1999	PCB	0	41	UG/KG
SC-37002-S-01	10/22/1999	ARSENIC	6.9	0.42	UG/G
SC-37002-S-01	10/22/1999	PAH	0	18	UG/KG
SC-37002-S-01	10/22/1999	CHROMIUM	19.4	0.2	UG/G
SC-37002-S-01	10/22/1999	LEAD	15.7	0.37	UG/G
SC-37002-S-01	10/22/1999	RADIUM-226	0.82	0.25	PCI/G
SC-37002-S-01	10/22/1999	RADIUM-228	1.13	0.45	PCI/G
SC-37002-S-01	10/22/1999	THALLIUM	1.8	0.67	UG/G
SC-37002-S-01	10/22/1999	THORIUM-230	1.09	0.64	PCI/G
SC-37002-S-01	10/22/1999	URANIUM-238	1.285	2.57	PCI/G
SC-37003-S	06/04/1999	PCB	0	36	UG/KG
SC-37003-S	06/04/1999	ARSENIC	8.3	0.39	UG/G
SC-37003-S	06/04/1999	PAH	0	16	UG/KG
SC-37003-S	06/04/1999	CHROMIUM	20	0.35	UG/G
SC-37003-S	06/04/1999	LEAD	12.7	0.26	UG/G
SC-37003-S	06/04/1999	RADIUM-226	0.79	0.33	PCI/G
SC-37003-S	06/04/1999	RADIUM-228	0.445	0.89	PCI/G
SC-37003-S	06/04/1999	THALLIUM	1.7	0.61	UG/G
SC-37003-S	06/04/1999	THORIUM-230	2.08	0.65	PCI/G
SC-37003-S	06/04/1999	URANIUM-238	1.26	2.52	PCI/G
SC-37003-S-01	10/22/1999	PCB	0	40	UG/KG
SC-37003-S-01	10/22/1999	ARSENIC	10.2	0.41	UG/G
SC-37003-S-01	10/22/1999	PAH	0	18	UG/KG

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37003-S-01	10/22/1999	CHROMIUM	20 4	0 19	UG/G
SC-37003-S-01	10/22/1999	LEAD	14.9	0 36	UG/G
SC-37003-S-01	10/22/1999	RADIUM-226	0.78	0 31	PCI/G
SC-37003-S-01	10/22/1999	RADIUM-228	0.48	0 96	PCI/G
SC-37003-S-01	10/22/1999	THALLIUM	2.1	0 65	UG/G
SC-37003-S-01	10/22/1999	THORIUM-230	1 43	0.64	PCI/G
SC-37003-S-01	10/22/1999	URANIUM-238	1.47	2.94	PCI/G
SC-37004-C	06/04/1999	PCB	0	40	UG/KG
SC-37004-C	06/04/1999	ARSENIC	7.4	0 43	UG/G
SC-37004-C	06/04/1999	PAH	0	18	UG/KG
SC-37004-C	06/04/1999	CHROMIUM	19 3	0 39	UG/G
SC-37004-C	06/04/1999	LEAD	10.7	0.29	UG/G
SC-37004-C	06/04/1999	RADIUM-226	0 85	0 29	PCI/G
SC-37004-C	06/04/1999	RADIUM-228	1	0 48	PCI/G
SC-37004-C	06/04/1999	THALLIUM	1 4	0 67	UG/G
SC-37004-C	06/04/1999	THORIUM-230	1 24	0 64	PCI/G
SC-37004-C	06/04/1999	URANIUM-238	1 32	2 64	PCI/G
SC-37004-S	06/04/1999	PCB	0	40	UG/KG
SC-37004-S	06/04/1999	ARSENIC	12 5	0 44	UG/G
SC-37004-S	06/04/1999	PAH	0	18	UG/KG
SC-37004-S	06/04/1999	CHROMIUM	20.7	0 39	UG/G
SC-37004-S	06/04/1999	LEAD	14.9	0 3	UG/G
SC-37004-S	06/04/1999	RADIUM-226	1.04	0 38	PCI/G
SC-37004-S	06/04/1999	RADIUM-228	1.34	0 55	PCI/G
SC-37004-S	06/04/1999	THALLIUM	2 3	0 69	UG/G
SC-37004-S	06/04/1999	THORIUM-230	1.39	0 62	PCI/G
SC-37004-S	06/04/1999	URANIUM-238	1 085	2 17	PCI/G
SC-37004-S-01	10/22/1999	PCB	0	40	UG/KG
SC-37004-S-01	10/22/1999	ARSENIC	11.8	0 41	UG/G
SC-37004-S-01	10/22/1999	PAH	0	18	UG/KG
SC-37004-S-01	10/22/1999	CHROMIUM	22.9	0 19	UG/G
SC-37004-S-01	10/22/1999	LEAD	31.5	0 36	UG/G
SC-37004-S-01	10/22/1999	RADIUM-226	0 92	0 27	PCI/G
SC-37004-S-01	10/22/1999	RADIUM-228	1 1	0.42	PCI/G
SC-37004-S-01	10/22/1999	THALLIUM	1 9	0 65	UG/G
SC-37004-S-01	10/22/1999	THORIUM-230	1.29	0 64	PCI/G
SC-37004-S-01	10/22/1999	URANIUM-238	1 325	2 65	PCI/G
SC-37005-S	06/04/1999	PCB	0	40	UG/KG
SC-37005-S	06/04/1999	ARSENIC	10 7	0 44	UG/G
SC-37005-S	06/04/1999	PAH	0	18	UG/KG
SC-37005-S	06/04/1999	CHROMIUM	23 6	0 39	UG/G
SC-37005-S	06/04/1999	LEAD	10.9	0 3	UG/G
SC-37005-S	06/04/1999	RADIUM-226	1	0 31	PCI/G
SC-37005-S	06/04/1999	RADIUM-228	1.21	0 46	PCI/G
SC-37005-S	06/04/1999	THALLIUM	1.4	0 69	UG/G
SC-37005-S	06/04/1999	THORIUM-230	1.55	0 65	PCI/G
SC-37005-S	06/04/1999	URANIUM-238	1.335	2.67	PCI/G
SC-37007-C	06/04/1999	PCB	0	39	UG/KG
SC-37007-C	06/04/1999	ARSENIC	12.4	0 43	UG/G
SC-37007-C	06/04/1999	PAH	0	18	UG/KG
SC-37007-C	06/04/1999	CHROMIUM	16.9	0 38	UG/G
SC-37007-C	06/04/1999	LEAD	17.8	0 28	UG/G
SC-37007-C	06/04/1999	RADIUM-226	1.21	0 34	PCI/G
SC-37007-C	06/04/1999	RADIUM-228	0.49	0.98	PCI/G
SC-37007-C	06/04/1999	THALLIUM	1 7	0.66	UG/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37007-C	06/04/1999	THORIUM-230	1.25	0.65	PCI/G
SC-37007-C	06/04/1999	URANIUM-238	1.355	2.71	PCI/G
SC-37007-S	06/04/1999	PCB	200	39	UG/KG
SC-37007-S	06/04/1999	ARSENIC	8.9	0.42	UG/G
SC-37007-S	06/04/1999	PAH	0	18	UG/KG
SC-37007-S	06/04/1999	CHROMIUM	17	0.38	UG/G
SC-37007-S	06/04/1999	LEAD	27.6	0.28	UG/G
SC-37007-S	06/04/1999	RADIUM-226	1.07	0.27	PCI/G
SC-37007-S	06/04/1999	RADIUM-228	0.88	0.39	PCI/G
SC-37007-S	06/04/1999	THALLIUM	0.33	0.66	UG/G
SC-37007-S	06/04/1999	THORIUM-230	1.62	0.65	PCI/G
SC-37007-S	06/04/1999	URANIUM-238	2.49	2.22	PCI/G
SC-37008-S	06/04/1999	PCB	0	39	UG/KG
SC-37008-S	06/04/1999	ARSENIC	7.9	0.42	UG/G
SC-37008-S	06/04/1999	PAH	0	17	UG/KG
SC-37008-S	06/04/1999	CHROMIUM	15.6	0.38	UG/G
SC-37008-S	06/04/1999	LEAD	11.8	0.28	UG/G
SC-37008-S	06/04/1999	RADIUM-226	1.79	0.4	PCI/G
SC-37008-S	06/04/1999	RADIUM-228	0.48	0.96	PCI/G
SC-37008-S	06/04/1999	THALLIUM	1	0.66	UG/G
SC-37008-S	06/04/1999	THORIUM-230	1.93	0.65	PCI/G
SC-37008-S	06/04/1999	URANIUM-238	1.46	2.92	PCI/G
SC-37009-S	06/04/1999	PCB	0	40	UG/KG
SC-37009-S	06/04/1999	ARSENIC	13.4	0.44	UG/G
SC-37009-S	06/04/1999	PAH	0	18	UG/KG
SC-37009-S	06/04/1999	CHROMIUM	21.7	0.39	UG/G
SC-37009-S	06/04/1999	LEAD	16.3	0.29	UG/G
SC-37009-S	06/04/1999	RADIUM-226	1.01	0.32	PCI/G
SC-37009-S	06/04/1999	RADIUM-228	0.93	0.42	PCI/G
SC-37009-S	06/04/1999	THALLIUM	1.2	0.68	UG/G
SC-37009-S	06/04/1999	THORIUM-230	1.58	0.64	PCI/G
SC-37009-S	06/04/1999	URANIUM-238	1.35	2.7	PCI/G
SC-37010-S	06/04/1999	PCB	0	40	UG/KG
SC-37010-S	06/04/1999	ARSENIC	12.6	0.44	UG/G
SC-37010-S	06/04/1999	PAH	0	18	UG/KG
SC-37010-S	06/04/1999	CHROMIUM	17	0.39	UG/G
SC-37010-S	06/04/1999	LEAD	22.5	0.29	UG/G
SC-37010-S	06/04/1999	RADIUM-226	1.04	0.24	PCI/G
SC-37010-S	06/04/1999	RADIUM-228	1.11	0.34	PCI/G
SC-37010-S	06/04/1999	THALLIUM	1	0.68	UG/G
SC-37010-S	06/04/1999	THORIUM-230	1.44	0.62	PCI/G
SC-37010-S	06/04/1999	URANIUM-238	1.005	2.01	PCI/G
SC-37011-S	06/04/1999	PCB	0	40	UG/KG
SC-37011-S	06/04/1999	ARSENIC	14.1	0.43	UG/G
SC-37011-S	06/04/1999	PAH	0	18	UG/KG
SC-37011-S	06/04/1999	CHROMIUM	23.1	0.39	UG/G
SC-37011-S	06/04/1999	LEAD	16.1	0.29	UG/G
SC-37011-S	06/04/1999	RADIUM-226	0.96	0.3	PCI/G
SC-37011-S	06/04/1999	RADIUM-228	1.35	0.42	PCI/G
SC-37011-S	06/04/1999	THALLIUM	0.77	0.68	UG/G
SC-37011-S	06/04/1999	THORIUM-230	1.21	0.65	PCI/G
SC-37011-S	06/04/1999	URANIUM-238	1.375	2.75	PCI/G
SC-37012-C	10/26/1999	PCB	0	42	UG/KG
SC-37012-C	10/26/1999	ARSENIC	13.6	0.43	UG/G
SC-37012-C	10/26/1999	PAH	130	19	UG/KG

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37012-C	10/26/1999	CHROMIUM	25	0.2	UG/G
SC-37012-C	10/26/1999	LEAD	15.8	0.38	UG/G
SC-37012-C	10/26/1999	RADIUM-226	0.85	0 3	PCI/G
SC-37012-C	10/26/1999	RADIUM-228	0.99	0 39	PCI/G
SC-37012-C	10/26/1999	THALLIUM	3	0 69	UG/G
SC-37012-C	10/26/1999	THORIUM-230	1 26	0 64	PCI/G
SC-37012-C	10/26/1999	URANIUM-238	1.325	2.65	PCI/G
SC-37013-S	10/26/1999	PCB	0	43	UG/KG
SC-37013-S	10/26/1999	ARSENIC	12.6	0.44	UG/G
SC-37013-S	10/26/1999	PAH	900	19	UG/KG
SC-37013-S	10/26/1999	CHROMIUM	26	0.21	UG/G
SC-37013-S	10/26/1999	LEAD	23 5	0.39	UG/G
SC-37013-S	10/26/1999	RADIUM-226	0.32	0.64	PCI/G
SC-37013-S	10/26/1999	RADIUM-228	0 52	1 04	PCI/G
SC-37013-S	10/26/1999	THALLIUM	3 4	0.7	UG/G
SC-37013-S	10/26/1999	THORIUM-230	0.97	0.64	PCI/G
SC-37013-S	10/26/1999	URANIUM-238	1 3	2 6	PCI/G
SC-37014-S	10/26/1999	PCB	0	40	UG/KG
SC-37014-S	10/26/1999	ARSENIC	11 8	0 42	UG/G
SC-37014-S	10/26/1999	PAH	0	18	UG/KG
SC-37014-S	10/26/1999	CHROMIUM	18 7	0.2	UG/G
SC-37014-S	10/26/1999	LEAD	32	0 37	UG/G
SC-37014-S	10/26/1999	RADIUM-226	0.66	0 3	PCI/G
SC-37014-S	10/26/1999	RADIUM-228	1.03	0 46	PCI/G
SC-37014-S	10/26/1999	THALLIUM	2.8	0 66	UG/G
SC-37014-S	10/26/1999	THORIUM-230	2 54	0 7	PCI/G
SC-37014-S	10/26/1999	URANIUM-238	1 355	2 71	PCI/G
SC-37015-C	10/26/1999	PCB	0	40	UG/KG
SC-37015-C	10/26/1999	ARSENIC	8 8	0 41	UG/G
SC-37015-C	10/26/1999	PAH	0	18	UG/KG
SC-37015-C	10/26/1999	CHROMIUM	20 5	0 19	UG/G
SC-37015-C	10/26/1999	LEAD	10 9	0 36	UG/G
SC-37015-C	10/26/1999	RADIUM-226	0 325	0 65	PCI/G
SC-37015-C	10/26/1999	RADIUM-228	1 13	0 66	PCI/G
SC-37015-C	10/26/1999	THALLIUM	2 3	0 65	UG/G
SC-37015-C	10/26/1999	THORIUM-230	1.14	0 64	PCI/G
SC-37015-C	10/26/1999	URANIUM-238	1.225	2 45	PCI/G
SC-37015-S	10/26/1999	PCB	370	40	UG/KG
SC-37015-S	10/26/1999	ARSENIC	9 3	0 41	UG/G
SC-37015-S	10/26/1999	PAH	78	18	UG/KG
SC-37015-S	10/26/1999	CHROMIUM	18.7	0 19	UG/G
SC-37015-S	10/26/1999	LEAD	15.9	0 36	UG/G
SC-37015-S	10/26/1999	RADIUM-226	0.84	0.31	PCI/G
SC-37015-S	10/26/1999	RADIUM-228	1 15	0 54	PCI/G
SC-37015-S	10/26/1999	THALLIUM	2.3	0 65	UG/G
SC-37015-S	10/26/1999	THORIUM-230	1 4	0.64	PCI/G
SC-37015-S	10/26/1999	URANIUM-238	1.36	2.72	PCI/G
SC-37016-S	10/26/1999	PCB	0	39	UG/KG
SC-37016-S	10/26/1999	ARSENIC	8 9	0 4	UG/G
SC-37016-S	10/26/1999	PAH	0	18	UG/KG
SC-37016-S	10/26/1999	CHROMIUM	21.4	0 19	UG/G
SC-37016-S	10/26/1999	LEAD	15 8	0 35	UG/G
SC-37016-S	10/26/1999	RADIUM-226	0 76	0 33	PCI/G
SC-37016-S	10/26/1999	RADIUM-228	0 49	0 98	PCI/G
SC-37016-S	10/26/1999	THALLIUM	2	0.63	UG/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37016-S	10/26/1999	THORIUM-230	1.08	0.64	PCI/G
SC-37016-S	10/26/1999	URANIUM-238	1.38	2.76	PCI/G
SC-37017-S	10/26/1999	PCB	0	41	UG/KG
SC-37017-S	10/26/1999	ARSENIC	12.4	0.43	UG/G
SC-37017-S	10/26/1999	PAH	0	19	UG/KG
SC-37017-S	10/26/1999	CHROMIUM	24.7	0.2	UG/G
SC-37017-S	10/26/1999	LEAD	14.2	0.38	UG/G
SC-37017-S	10/26/1999	RADIUM-226	1.05	0.31	PCI/G
SC-37017-S	10/26/1999	RADIUM-228	1.35	0.37	PCI/G
SC-37017-S	10/26/1999	THALLIUM	2.4	0.68	UG/G
SC-37017-S	10/26/1999	THORIUM-230	1.08	0.64	PCI/G
SC-37017-S	10/26/1999	URANIUM-238	1.325	2.65	PCI/G
SC-37020-C	10/26/1999	PCB	1800	390	UG/KG
SC-37020-C	10/26/1999	ARSENIC	8.4	0.4	UG/G
SC-37020-C	10/26/1999	PAH	0	18	UG/KG
SC-37020-C	10/26/1999	CHROMIUM	17.9	0.19	UG/G
SC-37020-C	10/26/1999	LEAD	15.4	0.36	UG/G
SC-37020-C	10/26/1999	RADIUM-226	0.84	0.4	PCI/G
SC-37020-C	10/26/1999	RADIUM-228	0.495	0.99	PCI/G
SC-37020-C	10/26/1999	THALLIUM	1.4	0.64	UG/G
SC-37020-C	10/26/1999	THORIUM-230	1.34	0.64	PCI/G
SC-37020-C	10/26/1999	URANIUM-238	1.425	2.85	PCI/G
SC-37022-C	10/26/1999	PCB	470	36	UG/KG
SC-37022-C	10/26/1999	ARSENIC	5.2	0.37	UG/G
SC-37022-C	10/26/1999	PAH	0	16	UG/KG
SC-37022-C	10/26/1999	CHROMIUM	15.1	0.18	UG/G
SC-37022-C	10/26/1999	LEAD	8.6	0.33	UG/G
SC-37022-C	10/26/1999	RADIUM-226	0.82	0.31	PCI/G
SC-37022-C	10/26/1999	RADIUM-228	1.03	0.34	PCI/G
SC-37022-C	10/26/1999	THALLIUM	1.1	0.59	UG/G
SC-37022-C	10/26/1999	THORIUM-230	1.02	0.64	PCI/G
SC-37022-C	10/26/1999	URANIUM-238	1.295	2.59	PCI/G
SC-37024-C	10/26/1999	PCB	0	42	UG/KG
SC-37024-C	10/26/1999	ARSENIC	14.2	0.42	UG/G
SC-37024-C	10/26/1999	PAH	55	19	UG/KG
SC-37024-C	10/26/1999	CHROMIUM	22.4	0.2	UG/G
SC-37024-C	10/26/1999	LEAD	16.1	0.38	UG/G
SC-37024-C	10/26/1999	RADIUM-226	0.68	0.32	PCI/G
SC-37024-C	10/26/1999	RADIUM-228	0.475	0.95	PCI/G
SC-37024-C	10/26/1999	THALLIUM	2.3	0.68	UG/G
SC-37024-C	10/26/1999	THORIUM-230	1.43	0.64	PCI/G
SC-37024-C	10/26/1999	URANIUM-238	1.2	2.4	PCI/G
SC-37101-C	06/04/1999	PCB	0	40	UG/KG
SC-37101-C	06/04/1999	ARSENIC	8.5	0.43	UG/G
SC-37101-C	06/04/1999	PAH	0	18	UG/KG
SC-37101-C	06/04/1999	CHROMIUM	19.7	0.38	UG/G
SC-37101-C	06/04/1999	LEAD	12	0.29	UG/G
SC-37101-C	06/04/1999	RADIUM-226	1.14	0.28	PCI/G
SC-37101-C	06/04/1999	RADIUM-228	1.41	0.43	PCI/G
SC-37101-C	06/04/1999	THALLIUM	0.95	0.67	UG/G
SC-37101-C	06/04/1999	THORIUM-230	0.89	0.65	PCI/G
SC-37101-C	06/04/1999	URANIUM-238	1.24	2.48	PCI/G
SC-37101-S	06/04/1999	PCB	0	40	UG/KG
SC-37101-S	06/04/1999	ARSENIC	8.8	0.45	UG/G
SC-37101-S	06/04/1999	PAH	0	18	UG/KG

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37101-S	06/04/1999	CHROMIUM	22 7	0.4	UG/G
SC-37101-S	06/04/1999	LEAD	10 1	0 3	UG/G
SC-37101-S	06/04/1999	RADIUM-226	1 15	0 32	PCI/G
SC-37101-S	06/04/1999	RADIUM-228	1 07	0.47	PCI/G
SC-37101-S	06/04/1999	THALLIUM	0.88	0.69	UG/G
SC-37101-S	06/04/1999	THORIUM-230	1 61	0.64	PCI/G
SC-37101-S	06/04/1999	URANIUM-238	1.395	2 79	PCI/G
SC-37102-S	06/04/1999	PCB	0	41	UG/KG
SC-37102-S	06/04/1999	ARSENIC	10.9	0.45	UG/G
SC-37102-S	06/04/1999	PAH	0	18	UG/KG
SC-37102-S	06/04/1999	CHROMIUM	25	0.4	UG/G
SC-37102-S	06/04/1999	LEAD	14 6	0 3	UG/G
SC-37102-S	06/04/1999	RADIUM-226	0.88	0 33	PCI/G
SC-37102-S	06/04/1999	RADIUM-228	1 11	0 74	PCI/G
SC-37102-S	06/04/1999	THALLIUM	0.76	0 69	UG/G
SC-37102-S	06/04/1999	THORIUM-230	1.47	0 62	PCI/G
SC-37102-S	06/04/1999	URANIUM-238	1 315	2.63	PCI/G
SC-37103-C	10/26/1999	PCB	0	42	UG/KG
SC-37103-C	10/26/1999	ARSENIC	9 4	0 43	UG/G
SC-37103-C	10/26/1999	PAH	0	19	UG/KG
SC-37103-C	10/26/1999	CHROMIUM	21 6	0 2	UG/G
SC-37103-C	10/26/1999	LEAD	14 2	0 38	UG/G
SC-37103-C	10/26/1999	RADIUM-226	0 62	0 3	PCI/G
SC-37103-C	10/26/1999	RADIUM-228	1 17	0 39	PCI/G
SC-37103-C	10/26/1999	THALLIUM	1.7	0.68	UG/G
SC-37103-C	10/26/1999	THORIUM-230	0 87	0.64	PCI/G
SC-37103-C	10/26/1999	URANIUM-238	1 275	2.55	PCI/G
SC-37103-S	10/26/1999	PCB	0	42	UG/KG
SC-37103-S	10/26/1999	ARSENIC	8 5	0.42	UG/G
SC-37103-S	10/26/1999	PAH	0	19	UG/KG
SC-37103-S	10/26/1999	CHROMIUM	17 8	0.2	UG/G
SC-37103-S	10/26/1999	LEAD	13 4	0.38	UG/G
SC-37103-S	10/26/1999	RADIUM-226	0.71	0 34	PCI/G
SC-37103-S	10/26/1999	RADIUM-228	0 45	0.9	PCI/G
SC-37103-S	10/26/1999	THALLIUM	1 8	0 68	UG/G
SC-37103-S	10/26/1999	THORIUM-230	1 11	0 64	PCI/G
SC-37103-S	10/26/1999	URANIUM-238	1 285	2 57	PCI/G
SC-37104-S	10/26/1999	PCB	0	42	UG/KG
SC-37104-S	10/26/1999	ARSENIC	12 1	0 43	UG/G
SC-37104-S	10/26/1999	PAH	0	19	UG/KG
SC-37104-S	10/26/1999	CHROMIUM	22.6	0 2	UG/G
SC-37104-S	10/26/1999	LEAD	30.6	0 38	UG/G
SC-37104-S	10/26/1999	RADIUM-226	1.28	0 3	PCI/G
SC-37104-S	10/26/1999	RADIUM-228	1 33	0 47	PCI/G
SC-37104-S	10/26/1999	THALLIUM	2 8	0.68	UG/G
SC-37104-S	10/26/1999	THORIUM-230	11.42	0.64	PCI/G
SC-37104-S	10/26/1999	URANIUM-238	1.44	2 88	PCI/G
SC-37104-S-RS	11/03/1999	THORIUM-230	1.14	0.64	PCI/G
SC-37105-C	04/14/1999	PCB	0	40	UG/KG
SC-37105-C	04/14/1999	ARSENIC	11 2	0 44	UG/G
SC-37105-C	04/14/1999	PAH	0	18	UG/KG
SC-37105-C	04/14/1999	CHROMIUM	18 4	0 39	UG/G
SC-37105-C	04/14/1999	LEAD	17.2	0.29	UG/G
SC-37105-C	04/14/1999	RADIUM-226	1 12	0 636	PCI/G
SC-37105-C	04/14/1999	RADIUM-228	1 93	1 04	PCI/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37105-C	04/14/1999	THALLIUM	2.5	0.68	UG/G
SC-37105-C	04/14/1999	THORIUM-228	0.536	0.113	PCI/G
SC-37105-C	04/14/1999	THORIUM-230	0.714	0.094	PCI/G
SC-37105-C	04/14/1999	THORIUM-232	0.557	0.104	PCI/G
SC-37105-C	04/14/1999	URANIUM-238	2.06	4.12	PCI/G
SC-37105-S	04/14/1999	PCB	0	44	UG/KG
SC-37105-S	04/14/1999	ARSENIC	7.7	0.49	UG/G
SC-37105-S	04/14/1999	PAH	0	20	UG/KG
SC-37105-S	04/14/1999	CHROMIUM	17.8	0.43	UG/G
SC-37105-S	04/14/1999	LEAD	12.3	0.32	UG/G
SC-37105-S	04/14/1999	RADIUM-226	0.893	0.436	PCI/G
SC-37105-S	04/14/1999	RADIUM-228	1.18	0.97	PCI/G
SC-37105-S	04/14/1999	THALLIUM	1.8	0.76	UG/G
SC-37105-S	04/14/1999	THORIUM-228	0.373	0.153	PCI/G
SC-37105-S	04/14/1999	THORIUM-230	1.94	0.06	PCI/G
SC-37105-S	04/14/1999	THORIUM-232	0.685	0.103	PCI/G
SC-37105-S	04/14/1999	URANIUM-238	2.61	5.68	PCI/G
SC-37106-S	07/31/1999	PCB	0	38	UG/KG
SC-37106-S	07/31/1999	ARSENIC	6.7	0.44	UG/G
SC-37106-S	07/31/1999	PAH	0	17	UG/KG
SC-37106-S	07/31/1999	CHROMIUM	20.7	0.16	UG/G
SC-37106-S	07/31/1999	LEAD	13.1	0.3	UG/G
SC-37106-S	07/31/1999	RADIUM-226	0.78	0.3	PCI/G
SC-37106-S	07/31/1999	RADIUM-228	1.01	0.36	PCI/G
SC-37106-S	07/31/1999	THALLIUM	0.9	0.79	UG/G
SC-37106-S	07/31/1999	THORIUM-230	1.43	0.62	PCI/G
SC-37106-S	07/31/1999	URANIUM-238	1.3	2.6	PCI/G
SC-37107-S	06/04/1999	PCB	0	41	UG/KG
SC-37107-S	06/04/1999	ARSENIC	13.9	0.45	UG/G
SC-37107-S	06/04/1999	PAH	0	19	UG/KG
SC-37107-S	06/04/1999	CHROMIUM	22.7	0.4	UG/G
SC-37107-S	06/04/1999	LEAD	16.9	0.3	UG/G
SC-37107-S	06/04/1999	RADIUM-226	0.91	0.31	PCI/G
SC-37107-S	06/04/1999	RADIUM-228	1.42	0.35	PCI/G
SC-37107-S	06/04/1999	THALLIUM	0.87	0.71	UG/G
SC-37107-S	06/04/1999	THORIUM-230	2.74	0.64	PCI/G
SC-37107-S	06/04/1999	URANIUM-238	1.325	2.65	PCI/G
SC-37108-S	10/26/1999	PCB	0	42	UG/KG
SC-37108-S	10/26/1999	ARSENIC	12.7	0.44	UG/G
SC-37108-S	10/26/1999	PAH	0	19	UG/KG
SC-37108-S	10/26/1999	CHROMIUM	23.7	0.2	UG/G
SC-37108-S	10/26/1999	LEAD	15.3	0.38	UG/G
SC-37108-S	10/26/1999	RADIUM-226	1.2	0.32	PCI/G
SC-37108-S	10/26/1999	RADIUM-228	0.525	1.05	PCI/G
SC-37108-S	10/26/1999	THALLIUM	1.9	0.69	UG/G
SC-37108-S	10/26/1999	THORIUM-230	1.12	0.64	PCI/G
SC-37108-S	10/26/1999	URANIUM-238	1.29	2.58	PCI/G
SC-37109-S	10/26/1999	PCB	0	43	UG/KG
SC-37109-S	10/26/1999	ARSENIC	13.6	0.44	UG/G
SC-37109-S	10/26/1999	PAH	0	20	UG/KG
SC-37109-S	10/26/1999	CHROMIUM	23.6	0.21	UG/G
SC-37109-S	10/26/1999	LEAD	18.7	0.39	UG/G
SC-37109-S	10/26/1999	RADIUM-226	1.1	0.36	PCI/G
SC-37109-S	10/26/1999	RADIUM-228	1.38	0.41	PCI/G
SC-37109-S	10/26/1999	THALLIUM	2.6	0.71	UG/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37109-S	10/26/1999	THORIUM-230	8 69	0 64	PCI/G
SC-37109-S	10/26/1999	URANIUM-238	1 49	2 98	PCI/G
SC-37109-S-RS	11/03/1999	THORIUM-230	1.09	0 65	PCI/G
SC-37110-S	06/06/2000	PCB	0	42	UG/KG
SC-37110-S	06/06/2000	ARSENIC	6 7	0.56	UG/G
SC-37110-S	06/06/2000	PAH	0	19	UG/KG
SC-37110-S	06/06/2000	CHROMIUM	14	0 28	UG/G
SC-37110-S	06/06/2000	LEAD	9.6	0.71	UG/G
SC-37110-S	06/06/2000	RADIUM-226	0.93	0.25	PCI/G
SC-37110-S	06/06/2000	RADIUM-228	0.365	0 73	PCI/G
SC-37110-S	06/06/2000	THALLIUM	1.1	0 76	UG/G
SC-37110-S	06/06/2000	THORIUM-230	1 08	0 64	PCI/G
SC-37110-S	06/06/2000	URANIUM-238	1.135	2.27	PCI/G
SC-37111-S	07/31/1999	PCB	0	38	UG/KG
SC-37111-S	07/31/1999	ARSENIC	2 3	0 44	UG/G
SC-37111-S	07/31/1999	PAH	0	17	UG/KG
SC-37111-S	07/31/1999	CHROMIUM	2.5	0 16	UG/G
SC-37111-S	07/31/1999	LEAD	3.3	0 3	UG/G
SC-37111-S	07/31/1999	RADIUM-226	0.31	0 19	PCI/G
SC-37111-S	07/31/1999	RADIUM-228	0.215	0 43	PCI/G
SC-37111-S	07/31/1999	THALLIUM	0.39	0 78	UG/G
SC-37111-S	07/31/1999	THORIUM-230	1 27	0.64	PCI/G
SC-37111-S	07/31/1999	URANIUM-238	0.84	1 68	PCI/G
SC-37112-C	07/31/1999	PCB	0	39	UG/KG
SC-37112-C	07/31/1999	ARSENIC	7 9	0 45	UG/G
SC-37112-C	07/31/1999	PAH	0	18	UG/KG
SC-37112-C	07/31/1999	CHROMIUM	16 6	0 17	UG/G
SC-37112-C	07/31/1999	LEAD	19	0 31	UG/G
SC-37112-C	07/31/1999	RADIUM 226	0.92	0 3	PCI/G
SC-37112-C	07/31/1999	RADIUM-228	0.99	0 39	PCI/G
SC-37112-C	07/31/1999	THALLIUM	1 1	0 8	UG/G
SC-37112-C	07/31/1999	THORIUM-230	1.12	0 64	PCI/G
SC-37112-C	07/31/1999	URANIUM-238	1 345	2 69	PCI/G
SC-37112-S	07/31/1999	PCB	0	39	UG/KG
SC-37112-S	07/31/1999	ARSENIC	4.9	0 44	UG/G
SC-37112-S	07/31/1999	PAH	57	17	UG/KG
SC-37112-S	07/31/1999	CHROMIUM	11.8	0 16	UG/G
SC-37112-S	07/31/1999	LEAD	13 9	0 3	UG/G
SC-37112-S	07/31/1999	RADIUM-226	0 295	0 59	PCI/G
SC-37112-S	07/31/1999	RADIUM-228	0.435	0 87	PCI/G
SC-37112-S	07/31/1999	THALLIUM	1 3	0.79	UG/G
SC-37112-S	07/31/1999	THORIUM-230	1.13	0 62	PCI/G
SC-37112-S	07/31/1999	URANIUM-238	1.33	2 66	PCI/G
SC-37113-S	10/26/1999	PCB	0	44	UG/KG
SC-37113-S	10/26/1999	ARSENIC	12 7	0 45	UG/G
SC-37113-S	10/26/1999	PAH	89	20	UG/KG
SC-37113-S	10/26/1999	CHROMIUM	26.4	0.21	UG/G
SC-37113-S	10/26/1999	LEAD	27.7	0.39	UG/G
SC-37113-S	10/26/1999	RADIUM-226	0.76	0 33	PCI/G
SC-37113-S	10/26/1999	RADIUM-228	0 49	0 98	PCI/G
SC-37113-S	10/26/1999	THALLIUM	4.2	0.71	UG/G
SC-37113-S	10/26/1999	THORIUM-230	1 96	0 64	PCI/G
SC-37113-S	10/26/1999	URANIUM-238	3 41	2.92	PCI/G
SC-37114-S	10/26/1999	PCB	0	41	UG/KG
SC-37114-S	10/26/1999	ARSENIC	15 1	0 43	UG/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37114-S	10/26/1999	PAH	0	18	UG/KG
SC-37114-S	10/26/1999	CHROMIUM	22.1	0.2	UG/G
SC-37114-S	10/26/1999	LEAD	19	0.38	UG/G
SC-37114-S	10/26/1999	RADIUM-226	0.96	0.32	PCI/G
SC-37114-S	10/26/1999	RADIUM-228	1.31	0.38	PCI/G
SC-37114-S	10/26/1999	THALLIUM	3	0.68	UG/G
SC-37114-S	10/26/1999	THORIUM-230	2.68	0.64	PCI/G
SC-37114-S	10/26/1999	URANIUM-238	1.36	2.72	PCI/G
SC-37115-S	10/26/1999	PCB	0	39	UG/KG
SC-37115-S	10/26/1999	ARSENIC	8.6	0.4	UG/G
SC-37115-S	10/26/1999	PAH	230	18	UG/KG
SC-37115-S	10/26/1999	CHROMIUM	15.2	0.19	UG/G
SC-37115-S	10/26/1999	LEAD	15.6	0.35	UG/G
SC-37115-S	10/26/1999	RADIUM-226	0.335	0.67	PCI/G
SC-37115-S	10/26/1999	RADIUM-228	1.51	0.38	PCI/G
SC-37115-S	10/26/1999	THALLIUM	2	0.64	UG/G
SC-37115-S	10/26/1999	THORIUM-230	4.48	0.64	PCI/G
SC-37115-S	10/26/1999	URANIUM-238	1.495	2.99	PCI/G
SC-37116-S	06/06/2000	PCB	0	40	UG/KG
SC-37116-S	06/06/2000	ARSENIC	9.5	0.54	UG/G
SC-37116-S	06/06/2000	PAH	0	18	UG/KG
SC-37116-S	06/06/2000	CHROMIUM	16.6	0.27	UG/G
SC-37116-S	06/06/2000	LEAD	19.3	0.68	UG/G
SC-37116-S	06/06/2000	RADIUM-226	0.77	0.25	PCI/G
SC-37116-S	06/06/2000	RADIUM-228	0.81	0.39	PCI/G
SC-37116-S	06/06/2000	THALLIUM	1.5	0.73	UG/G
SC-37116-S	06/06/2000	THORIUM-230	1.38	0.64	PCI/G
SC-37116-S	06/06/2000	URANIUM-238	1.14	2.28	PCI/G
SC-37117-S	07/30/1999	PCB	100	34	UG/KG
SC-37117-S	07/30/1999	ARSENIC	4.4	0.38	UG/G
SC-37117-S	07/30/1999	PAH	198	15	UG/KG
SC-37117-S	07/30/1999	CHROMIUM	6.8	0.14	UG/G
SC-37117-S	07/30/1999	LEAD	6.7	0.26	UG/G
SC-37117-S	07/30/1999	RADIUM-226	2.12	0.36	PCI/G
SC-37117-S	07/30/1999	RADIUM-228	0.505	1.01	PCI/G
SC-37117-S	07/30/1999	THALLIUM	0.345	0.69	UG/G
SC-37117-S	07/30/1999	THORIUM-230	27.1	0.64	PCI/G
SC-37117-S	07/30/1999	URANIUM-238	1.61	3.22	PCI/G
SC-37117-S-RS	06/06/2000	THORIUM-230	1.47	0.64	PCI/G
SC-37118-S	07/30/1999	PCB	0	33	UG/KG
SC-37118-S	07/30/1999	ARSENIC	6.6	0.39	UG/G
SC-37118-S	07/30/1999	PAH	0	15	UG/KG
SC-37118-S	07/30/1999	CHROMIUM	5.3	0.15	UG/G
SC-37118-S	07/30/1999	LEAD	5.7	0.27	UG/G
SC-37118-S	07/30/1999	RADIUM-226	1.09	0.32	PCI/G
SC-37118-S	07/30/1999	RADIUM-228	0.405	0.81	PCI/G
SC-37118-S	07/30/1999	THALLIUM	0.355	0.71	UG/G
SC-37118-S	07/30/1999	THORIUM-230	20.6	0.64	PCI/G
SC-37118-S	07/30/1999	URANIUM-238	1.325	2.65	PCI/G
SC-37118-S-RS	06/06/2000	THORIUM-230	1.73	0.64	PCI/G
SC-37120-C	10/26/1999	PCB	0	41	UG/KG
SC-37120-C	10/26/1999	ARSENIC	13.6	0.42	UG/G
SC-37120-C	10/26/1999	PAH	52	18	UG/KG
SC-37120-C	10/26/1999	CHROMIUM	21.2	0.2	UG/G
SC-37120-C	10/26/1999	LEAD	15.1	0.37	UG/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37120-C	10/26/1999	RADIUM-226	1.04	0.3	PCI/G
SC-37120-C	10/26/1999	RADIUM-228	1 06	0.5	PCI/G
SC-37120-C	10/26/1999	THALLIUM	3	0 66	UG/G
SC-37120-C	10/26/1999	THORIUM-230	1 62	0 64	PCI/G
SC-37120-C	10/26/1999	URANIUM-238	1 31	2 62	PCI/G
SC-37122-C	07/30/1999	PCB	0	38	UG/KG
SC-37122-C	07/30/1999	ARSENIC	7.8	0.44	UG/G
SC-37122-C	07/30/1999	PAH	0	17	UG/KG
SC-37122-C	07/30/1999	CHROMIUM	15 1	0 16	UG/G
SC-37122-C	07/30/1999	LEAD	18.7	0.3	UG/G
SC-37122-C	07/30/1999	RADIUM-226	0.95	0.3	PCI/G
SC-37122-C	07/30/1999	RADIUM-228	0.81	0 45	PCI/G
SC-37122-C	07/30/1999	THALLIUM	0.87	0 79	UG/G
SC-37122-C	07/30/1999	THORIUM-230	1 43	0 62	PCI/G
SC-37122-C	07/30/1999	URANIUM-238	1 295	2 59	PCI/G
SC-37124-C	07/30/1999	PCB	0	38	UG/KG
SC-37124-C	07/30/1999	ARSENIC	11 6	0 44	UG/G
SC-37124-C	07/30/1999	PAH	0	17	UG/KG
SC-37124-C	07/30/1999	CHROMIUM	15 4	0 16	UG/G
SC-37124-C	07/30/1999	LEAD	20.5	0.3	UG/G
SC-37124-C	07/30/1999	RADIUM-226	0 82	0.32	PCI/G
SC-37124-C	07/30/1999	RADIUM-228	0.99	0 52	PCI/G
SC-37124-C	07/30/1999	THALLIUM	1 3	0 78	UG/G
SC-37124-C	07/30/1999	THORIUM-230	1.36	0 62	PCI/G
SC-37124-C	07/30/1999	URANIUM-238	1.51	3 02	PCI/G
SC-37202-C	06/07/2000	PCB	0	38	UG/KG
SC-37202-C	06/07/2000	ARSENIC	12.9	0.51	UG/G
SC-37202-C	06/07/2000	PAH	0	17	UG/KG
SC-37202-C	06/07/2000	CHROMIUM	13.8	0 25	UG/G
SC-37202-C	06/07/2000	LEAD	23 7	0 64	UG/G
SC-37202-C	06/07/2000	RADIUM-226	0 88	0.3	PCI/G
SC-37202-C	06/07/2000	RADIUM-228	0 42	0.84	PCI/G
SC-37202-C	06/07/2000	THALLIUM	1.7	0 69	UG/G
SC-37202-C	06/07/2000	THORIUM-230	1.49	0 64	PCI/G
SC-37202-C	06/07/2000	URANIUM-238	1 71	2 5	PCI/G
SC-37202-S	06/07/2000	PCB	0	42	UG/KG
SC-37202-S	06/07/2000	ARSENIC	12 3	0 55	UG/G
SC-37202-S	06/07/2000	PAH	0	19	UG/KG
SC-37202-S	06/07/2000	CHROMIUM	24 4	0 28	UG/G
SC-37202-S	06/07/2000	LEAD	20.1	0 71	UG/G
SC-37202-S	06/07/2000	RADIUM-226	0.74	0.26	PCI/G
SC-37202-S	06/07/2000	RADIUM-228	0.98	0.31	PCI/G
SC-37202-S	06/07/2000	THALLIUM	2.1	0.76	UG/G
SC-37202-S	06/07/2000	THORIUM-230	0.99	0.64	PCI/G
SC-37202-S	06/07/2000	URANIUM-238	1 135	2.27	PCI/G
SC-37203-C	04/06/2000	PCB	0	41	UG/KG
SC-37203-C	04/06/2000	ARSENIC	13.9	0 55	UG/G
SC-37203-C	04/06/2000	PAH	230	19	UG/KG
SC-37203-C	04/06/2000	CHROMIUM	21 4	0.28	UG/G
SC-37203-C	04/06/2000	LEAD	16	0.7	UG/G
SC-37203-C	04/06/2000	RADIUM-226	0.97	0.25	PCI/G
SC-37203-C	04/06/2000	RADIUM-228	1.11	0 41	PCI/G
SC-37203-C	04/06/2000	THALLIUM	0.43	0 86	UG/G
SC-37203-C	04/06/2000	THORIUM-230	1 16	0 62	PCI/G
SC-37203-C	04/06/2000	URANIUM-238	1 165	2 33	PCI/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37203-S	06/07/2000	PCB	0	38	UG/KG
SC-37203-S	06/07/2000	ARSENIC	13.1	0.51	UG/G
SC-37203-S	06/07/2000	PAH	0	17	UG/KG
SC-37203-S	06/07/2000	CHROMIUM	15.8	0.25	UG/G
SC-37203-S	06/07/2000	LEAD	23.3	0.65	UG/G
SC-37203-S	06/07/2000	RADIUM-226	1.12	0.27	PCI/G
SC-37203-S	06/07/2000	RADIUM-228	1.18	0.4	PCI/G
SC-37203-S	06/07/2000	THALLIUM	1.2	0.69	UG/G
SC-37203-S	06/07/2000	THORIUM-230	3.3	0.62	PCI/G
SC-37203-S	06/07/2000	URANIUM-238	1.155	2.31	PCI/G
SC-37204-S	04/06/2000	PCB	0	41	UG/KG
SC-37204-S	04/06/2000	ARSENIC	11.8	0.55	UG/G
SC-37204-S	04/06/2000	PAH	0	19	UG/KG
SC-37204-S	04/06/2000	CHROMIUM	18	0.27	UG/G
SC-37204-S	04/06/2000	LEAD	19.1	0.7	UG/G
SC-37204-S	04/06/2000	RADIUM-226	1.04	0.29	PCI/G
SC-37204-S	04/06/2000	RADIUM-228	1.09	0.4	PCI/G
SC-37204-S	04/06/2000	THALLIUM	0.375	0.75	UG/G
SC-37204-S	04/06/2000	THORIUM-230	19.5	0.62	PCI/G
SC-37204-S	04/06/2000	URANIUM-238	1.155	2.31	PCI/G
SC-37204-S-RS	04/27/2000	THORIUM-230	9.46	0.64	PCI/G
SC-37204-S-RS2	04/29/2000	THORIUM-230	0.91	0.62	PCI/G
SC-37206-S	06/07/2000	PCB	0	40	UG/KG
SC-37206-S	06/07/2000	ARSENIC	16.1	0.53	UG/G
SC-37206-S	06/07/2000	PAH	0	18	UG/KG
SC-37206-S	06/07/2000	CHROMIUM	15.4	0.26	UG/G
SC-37206-S	06/07/2000	LEAD	32.8	0.67	UG/G
SC-37206-S	06/07/2000	RADIUM-226	0.99	0.28	PCI/G
SC-37206-S	06/07/2000	RADIUM-228	1.07	0.31	PCI/G
SC-37206-S	06/07/2000	THALLIUM	1.7	0.72	UG/G
SC-37206-S	06/07/2000	THORIUM-230	0.94	0.64	PCI/G
SC-37206-S	06/07/2000	URANIUM-238	1.29	2.58	PCI/G
SC-37207-S	06/07/2000	PCB	0	40	UG/KG
SC-37207-S	06/07/2000	ARSENIC	11.2	0.53	UG/G
SC-37207-S	06/07/2000	PAH	0	18	UG/KG
SC-37207-S	06/07/2000	CHROMIUM	14.3	0.26	UG/G
SC-37207-S	06/07/2000	LEAD	23.1	0.67	UG/G
SC-37207-S	06/07/2000	RADIUM-226	1	0.24	PCI/G
SC-37207-S	06/07/2000	RADIUM-228	0.82	0.42	PCI/G
SC-37207-S	06/07/2000	THALLIUM	1	0.72	UG/G
SC-37207-S	06/07/2000	THORIUM-230	2.43	0.62	PCI/G
SC-37207-S	06/07/2000	URANIUM-238	1.185	2.37	PCI/G
SC-37208-S	04/06/2000	PCB	0	43	UG/KG
SC-37208-S	04/06/2000	ARSENIC	12.3	0.57	UG/G
SC-37208-S	04/06/2000	PAH	0	20	UG/KG
SC-37208-S	04/06/2000	CHROMIUM	25.1	0.29	UG/G
SC-37208-S	04/06/2000	LEAD	19.9	0.73	UG/G
SC-37208-S	04/06/2000	RADIUM-226	1.1	0.23	PCI/G
SC-37208-S	04/06/2000	RADIUM-228	1.06	0.4	PCI/G
SC-37208-S	04/06/2000	THALLIUM	0.39	0.78	UG/G
SC-37208-S	04/06/2000	THORIUM-230	2.28	0.64	PCI/G
SC-37208-S	04/06/2000	URANIUM-238	1.175	2.35	PCI/G
SC-37209-C	06/07/2000	PCB	0	41	UG/KG
SC-37209-C	06/07/2000	ARSENIC	7.2	0.54	UG/G
SC-37209-C	06/07/2000	PAH	0	19	UG/KG

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37209-C	06/07/2000	CHROMIUM	16.9	0.27	UG/G
SC-37209-C	06/07/2000	LEAD	14 6	0 69	UG/G
SC-37209-C	06/07/2000	RADIUM-226	0.81	0 24	PCI/G
SC-37209-C	06/07/2000	RADIUM-228	1 04	0.3	PCI/G
SC-37209-C	06/07/2000	THALLIUM	1 2	0 74	UG/G
SC-37209-C	06/07/2000	THORIUM-230	1.74	0 64	PCI/G
SC-37209-C	06/07/2000	URANIUM-238	1 09	2 18	PCI/G
SC-37209-S	07/31/1999	PCB	0	38	UG/KG
SC-37209-S	07/31/1999	ARSENIC	6 5	0 43	UG/G
SC-37209-S	07/31/1999	PAH	0	17	UG/KG
SC-37209-S	07/31/1999	CHROMIUM	15 8	0 16	UG/G
SC-37209-S	07/31/1999	LEAD	11	0 29	UG/G
SC-37209-S	07/31/1999	RADIUM-226	0 58	0 27	PCI/G
SC-37209-S	07/31/1999	RADIUM-228	0 69	0.42	PCI/G
SC-37209-S	07/31/1999	THALLIUM	0 385	0 77	UG/G
SC-37209-S	07/31/1999	THORIUM-230	1.56	0 62	PCI/G
SC-37209-S	07/31/1999	URANIUM-238	1 18	2 36	PCI/G
SC-37210-C	06/07/2000	PCB	0	38	UG/KG
SC-37210-C	06/07/2000	ARSENIC	2 3	0 52	UG/G
SC-37210-C	06/07/2000	PAH	0	17	UG/KG
SC-37210-C	06/07/2000	CHROMIUM	18 2	0 26	UG/G
SC-37210-C	06/07/2000	LEAD	9 4	0 66	UG/G
SC-37210-C	06/07/2000	RADIUM-226	1 05	0.27	PCI/G
SC-37210-C	06/07/2000	RADIUM-228	0.89	0 45	PCI/G
SC-37210-C	06/07/2000	THALLIUM	0 355	0 71	UG/G
SC-37210-C	06/07/2000	THORIUM-230	1 06	0.64	PCI/G
SC-37210-C	06/07/2000	URANIUM-238	1 235	2 47	PCI/G
SC-37210-S	06/07/2000	PCB	0	39	UG/KG
SC-37210-S	06/07/2000	ARSENIC	12	0 51	UG/G
SC-37210-S	06/07/2000	PAH	0	18	UG/KG
SC-37210-S	06/07/2000	CHROMIUM	21 9	0 26	UG/G
SC-37210-S	06/07/2000	LEAD	18 2	0 65	UG/G
SC-37210-S	06/07/2000	RADIUM-226	0.99	0 22	PCI/G
SC-37210-S	06/07/2000	RADIUM-228	1.02	0 35	PCI/G
SC-37210-S	06/07/2000	THALLIUM	1 9	0 7	UG/G
SC-37210-S	06/07/2000	THORIUM-230	1 42	0 64	PCI/G
SC-37210-S	06/07/2000	URANIUM-238	1 17	2 34	PCI/G
SC-37211-S	06/07/2000	PCB	0	39	UG/KG
SC-37211-S	06/07/2000	ARSENIC	13.3	0 53	UG/G
SC-37211-S	06/07/2000	PAH	0	18	UG/KG
SC-37211-S	06/07/2000	CHROMIUM	21 4	0 26	UG/G
SC-37211-S	06/07/2000	LEAD	14 6	0 67	UG/G
SC-37211-S	06/07/2000	RADIUM-226	0.96	0.25	PCI/G
SC-37211-S	06/07/2000	RADIUM-228	0 9	0.5	PCI/G
SC-37211-S	06/07/2000	THALLIUM	1 4	0 72	UG/G
SC-37211-S	06/07/2000	THORIUM-230	1 74	0 62	PCI/G
SC-37211-S	06/07/2000	URANIUM-238	1 16	2 32	PCI/G
SC-37212-S	06/07/2000	PCB	0	43	UG/KG
SC-37212-S	06/07/2000	ARSENIC	14	0 57	UG/G
SC-37212-S	06/07/2000	PAH	0	20	UG/KG
SC-37212-S	06/07/2000	CHROMIUM	19 1	0 29	UG/G
SC-37212-S	06/07/2000	LEAD	22	0 73	UG/G
SC-37212-S	06/07/2000	RADIUM-226	1 23	0 27	PCI/G
SC-37212-S	06/07/2000	RADIUM-228	0.85	0 46	PCI/G
SC-37212-S	06/07/2000	THALLIUM	1 2	0 78	UG/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37212-S	06/07/2000	THORIUM-230	2.32	0.64	PCI/G
SC-37212-S	06/07/2000	URANIUM-238	1.215	2.43	PCI/G
SC-37213-S	04/06/2000	PCB	0	42	UG/KG
SC-37213-S	04/06/2000	ARSENIC	16.6	0.56	UG/G
SC-37213-S	04/06/2000	PAH	0	19	UG/KG
SC-37213-S	04/06/2000	CHROMIUM	26.1	0.28	UG/G
SC-37213-S	04/06/2000	LEAD	28	0.71	UG/G
SC-37213-S	04/06/2000	RADIUM-226	0.82	0.29	PCI/G
SC-37213-S	04/06/2000	RADIUM-228	1	0.44	PCI/G
SC-37213-S	04/06/2000	THALLIUM	0.5	1	UG/G
SC-37213-S	04/06/2000	THORIUM-230	1.56	0.64	PCI/G
SC-37213-S	04/06/2000	URANIUM-238	1.095	2.19	PCI/G
SC-37214-S	07/31/1999	PCB	0	42	UG/KG
SC-37214-S	07/31/1999	ARSENIC	11.7	0.48	UG/G
SC-37214-S	07/31/1999	PAH	114	19	UG/KG
SC-37214-S	07/31/1999	CHROMIUM	22.4	0.18	UG/G
SC-37214-S	07/31/1999	LEAD	15.8	0.33	UG/G
SC-37214-S	07/31/1999	RADIUM-226	0.78	0.33	PCI/G
SC-37214-S	07/31/1999	RADIUM-228	1.17	0.46	PCI/G
SC-37214-S	07/31/1999	THALLIUM	1.5	0.86	UG/G
SC-37214-S	07/31/1999	THORIUM-230	1.24	0.64	PCI/G
SC-37214-S	07/31/1999	URANIUM-238	1.275	2.55	PCI/G
SC-37215-S	06/07/2000	PCB	0	38	UG/KG
SC-37215-S	06/07/2000	ARSENIC	11.4	0.5	UG/G
SC-37215-S	06/07/2000	PAH	0	17	UG/KG
SC-37215-S	06/07/2000	CHROMIUM	15.6	0.25	UG/G
SC-37215-S	06/07/2000	LEAD	24.8	0.64	UG/G
SC-37215-S	06/07/2000	RADIUM-226	0.99	0.26	PCI/G
SC-37215-S	06/07/2000	RADIUM-228	1.02	0.37	PCI/G
SC-37215-S	06/07/2000	THALLIUM	0.95	0.68	UG/G
SC-37215-S	06/07/2000	THORIUM-230	1.58	0.62	PCI/G
SC-37215-S	06/07/2000	URANIUM-238	1.215	2.43	PCI/G
SC-37216-S	06/07/2000	PCB	0	39	UG/KG
SC-37216-S	06/07/2000	ARSENIC	11	0.53	UG/G
SC-37216-S	06/07/2000	PAH	0	18	UG/KG
SC-37216-S	06/07/2000	CHROMIUM	15.7	0.26	UG/G
SC-37216-S	06/07/2000	LEAD	21.8	0.67	UG/G
SC-37216-S	06/07/2000	RADIUM-226	1.06	0.26	PCI/G
SC-37216-S	06/07/2000	RADIUM-228	1.06	0.34	PCI/G
SC-37216-S	06/07/2000	THALLIUM	1	0.72	UG/G
SC-37216-S	06/07/2000	THORIUM-230	1.52	0.64	PCI/G
SC-37216-S	06/07/2000	URANIUM-238	1.215	2.43	PCI/G
SC-37217-S	06/07/2000	PCB	0	41	UG/KG
SC-37217-S	06/07/2000	ARSENIC	17.7	0.54	UG/G
SC-37217-S	06/07/2000	PAH	0	18	UG/KG
SC-37217-S	06/07/2000	CHROMIUM	24.1	0.27	UG/G
SC-37217-S	06/07/2000	LEAD	24.6	0.69	UG/G
SC-37217-S	06/07/2000	RADIUM-226	1.06	0.27	PCI/G
SC-37217-S	06/07/2000	RADIUM-228	0.45	0.9	PCI/G
SC-37217-S	06/07/2000	THALLIUM	1.9	0.74	UG/G
SC-37217-S	06/07/2000	THORIUM-230	1.68	0.64	PCI/G
SC-37217-S	06/07/2000	URANIUM-238	1.15	2.3	PCI/G
SC-37218-S	04/06/2000	PCB	0	41	UG/KG
SC-37218-S	04/06/2000	ARSENIC	11	0.55	UG/G
SC-37218-S	04/06/2000	PAH	0	19	UG/KG

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37218-S	04/06/2000	CHROMIUM	21 7	0.28	UG/G
SC-37218-S	04/06/2000	LEAD	12 5	0 7	UG/G
SC-37218-S	04/06/2000	RADIUM-226	1 05	0 27	PCI/G
SC-37218-S	04/06/2000	RADIUM-228	1.15	0.33	PCI/G
SC-37218-S	04/06/2000	THALLIUM	0.375	0.75	UG/G
SC-37218-S	04/06/2000	THORIUM-230	1.18	0.64	PCI/G
SC-37218-S	04/06/2000	URANIUM-238	1.14	2 28	PCI/G
SC-37219-S	07/31/1999	PCB	0	39	UG/KG
SC-37219-S	07/31/1999	ARSENIC	11.1	0 45	UG/G
SC-37219-S	07/31/1999	PAH	128	18	UG/KG
SC-37219-S	07/31/1999	CHROMIUM	16.1	0 16	UG/G
SC-37219-S	07/31/1999	LEAD	21 1	0 31	UG/G
SC-37219-S	07/31/1999	RADIUM-226	0.99	0.31	PCI/G
SC-37219-S	07/31/1999	RADIUM-228	1.05	0 4	PCI/G
SC-37219-S	07/31/1999	THALLIUM	0.4	0 8	UG/G
SC-37219-S	07/31/1999	THORIUM-230	1.92	0 64	PCI/G
SC-37219-S	07/31/1999	URANIUM-238	1.36	2 72	PCI/G
SC-37220-S	06/07/2000	PCB	0	39	UG/KG
SC-37220-S	06/07/2000	ARSENIC	13.5	0 52	UG/G
SC-37220-S	06/07/2000	PAH	0	18	UG/KG
SC-37220-S	06/07/2000	CHROMIUM	17.2	0 26	UG/G
SC-37220-S	06/07/2000	LEAD	21.7	0 66	UG/G
SC-37220-S	06/07/2000	RADIUM-226	0.96	0 26	PCI/G
SC-37220-S	06/07/2000	RADIUM-228	1.06	0 35	PCI/G
SC-37220-S	06/07/2000	THALLIUM	1 1	0 71	UG/G
SC-37220-S	06/07/2000	THORIUM-230	0 87	0.64	PCI/G
SC-37220-S	06/07/2000	URANIUM-238	1.155	2 31	PCI/G
SC-37221-S	06/07/2000	PCB	0	43	UG/KG
SC-37221-S	06/07/2000	ARSENIC	14 2	0 57	UG/G
SC-37221-S	06/07/2000	PAH	0	19	UG/KG
SC-37221-S	06/07/2000	CHROMIUM	18 3	0.28	UG/G
SC-37221-S	06/07/2000	LEAD	29 7	0.73	UG/G
SC-37221-S	06/07/2000	RADIUM-226	0 92	0 24	PCI/G
SC-37221-S	06/07/2000	RADIUM-228	0.395	0 79	PCI/G
SC-37221-S	06/07/2000	THALLIUM	1 1	0 78	UG/G
SC-37221-S	06/07/2000	THORIUM-230	1 33	0 62	PCI/G
SC-37221-S	06/07/2000	URANIUM-238	1 085	2 17	PCI/G
SC-37222-C	04/17/2000	PCB	0	39	UG/KG
SC-37222-C	04/17/2000	ARSENIC	12.3	0 52	UG/G
SC-37222-C	04/17/2000	PAH	0	18	UG/KG
SC-37222-C	04/17/2000	CHROMIUM	21	0 26	UG/G
SC-37222-C	04/17/2000	LEAD	16.4	0 66	UG/G
SC-37222-C	04/17/2000	RADIUM-226	0.76	0 25	PCI/G
SC-37222-C	04/17/2000	RADIUM-228	1 31	0 34	PCI/G
SC-37222-C	04/17/2000	THALLIUM	0.76	0.71	UG/G
SC-37222-C	04/17/2000	THORIUM-230	1.91	0.62	PCI/G
SC-37222-C	04/17/2000	URANIUM-238	1.17	2 34	PCI/G
SC-37222-S	06/07/2000	PCB	0	39	UG/KG
SC-37222-S	06/07/2000	ARSENIC	11 4	0 51	UG/G
SC-37222-S	06/07/2000	PAH	0	18	UG/KG
SC-37222-S	06/07/2000	CHROMIUM	13 6	0 26	UG/G
SC-37222-S	06/07/2000	LEAD	20 5	0 65	UG/G
SC-37222-S	06/07/2000	RADIUM-226	1.01	0 29	PCI/G
SC-37222-S	06/07/2000	RADIUM-228	1 18	0 37	PCI/G
SC-37222-S	06/07/2000	THALLIUM	0 8	0 7	UG/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37222-S	06/07/2000	THORIUM-230	2.7	0.64	PCI/G
SC-37222-S	06/07/2000	URANIUM-238	1.21	2.42	PCI/G
SC-37223-C	04/17/2000	RADIUM-226	0.94	0.29	PCI/G
SC-37223-C	04/17/2000	RADIUM-228	1.1	0.4	PCI/G
SC-37223-C	04/17/2000	THORIUM-230	1.99	0.62	PCI/G
SC-37223-C	04/17/2000	URANIUM-238	1.115	2.23	PCI/G
SC-37223-S	04/17/2000	PCB	0	33	UG/KG
SC-37223-S	04/17/2000	ARSENIC	9.5	0.65	UG/G
SC-37223-S	04/17/2000	PAH	55	11	UG/KG
SC-37223-S	04/17/2000	CHROMIUM	20.5	0.13	UG/G
SC-37223-S	04/17/2000	LEAD	12.5	0.51	UG/G
SC-37223-S	04/17/2000	RADIUM-226	0.92	0.28	PCI/G
SC-37223-S	04/17/2000	RADIUM-228	1.22	0.37	PCI/G
SC-37223-S	04/17/2000	THALLIUM	0.415	0.83	UG/G
SC-37223-S	04/17/2000	THORIUM-230	1.13	0.62	PCI/G
SC-37223-S	04/17/2000	URANIUM-238	1.18	2.36	PCI/G
SC-37224-C	06/07/2000	PCB	0	41	UG/KG
SC-37224-C	06/07/2000	ARSENIC	11.9	0.54	UG/G
SC-37224-C	06/07/2000	PAH	0	19	UG/KG
SC-37224-C	06/07/2000	CHROMIUM	19.1	0.27	UG/G
SC-37224-C	06/07/2000	LEAD	19	0.69	UG/G
SC-37224-C	04/17/2000	RADIUM-226	1.01	0.28	PCI/G
SC-37224-C	04/17/2000	RADIUM-228	1.03	0.48	PCI/G
SC-37224-C	06/07/2000	THALLIUM	0.99	0.74	UG/G
SC-37224-C	04/17/2000	THORIUM-230	3.64	0.7	PCI/G
SC-37224-C	04/17/2000	URANIUM-238	3.57	2.45	PCI/G
SC-37226-C	06/07/2000	PCB	0	39	UG/KG
SC-37226-C	06/07/2000	ARSENIC	11.3	0.52	UG/G
SC-37226-C	06/07/2000	PAH	0	18	UG/KG
SC-37226-C	06/07/2000	CHROMIUM	13	0.26	UG/G
SC-37226-C	06/07/2000	LEAD	22.3	0.66	UG/G
SC-37226-C	04/17/2000	RADIUM-226	1.05	0.25	PCI/G
SC-37226-C	04/17/2000	RADIUM-228	1.27	0.34	PCI/G
SC-37226-C	06/07/2000	THALLIUM	0.355	0.71	UG/G
SC-37226-C	04/17/2000	THORIUM-230	1.26	0.64	PCI/G
SC-37226-C	04/17/2000	URANIUM-238	1.18	2.36	PCI/G
SC-37301-C	07/17/1999	PCB	0	38	UG/KG
SC-37301-C	07/17/1999	ARSENIC	5.9	0.44	UG/G
SC-37301-C	07/17/1999	PAH	0	17	UG/KG
SC-37301-C	07/17/1999	CHROMIUM	15.8	0.16	UG/G
SC-37301-C	07/17/1999	LEAD	11.6	0.3	UG/G
SC-37301-C	07/17/1999	RADIUM-226	0.55	0.31	PCI/G
SC-37301-C	07/17/1999	RADIUM-228	1.04	0.33	PCI/G
SC-37301-C	07/17/1999	THALLIUM	2.4	0.79	UG/G
SC-37301-C	07/17/1999	THORIUM-230	1.18	0.62	PCI/G
SC-37301-C	07/17/1999	URANIUM-238	1.165	2.33	PCI/G
SC-37302-S	07/17/1999	PCB	0	40	UG/KG
SC-37302-S	07/17/1999	ARSENIC	8.5	0.45	UG/G
SC-37302-S	07/17/1999	PAH	0	18	UG/KG
SC-37302-S	07/17/1999	CHROMIUM	16.6	0.17	UG/G
SC-37302-S	07/17/1999	LEAD	15.7	0.31	UG/G
SC-37302-S	07/17/1999	RADIUM-226	0.79	0.25	PCI/G
SC-37302-S	07/17/1999	RADIUM-228	0.445	0.89	PCI/G
SC-37302-S	07/17/1999	THALLIUM	3.2	0.81	UG/G
SC-37302-S	07/17/1999	THORIUM-230	1.68	0.62	PCI/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37302-S	07/17/1999	URANIUM-238	1.205	2 41	PCI/G
SC-37303-S	07/17/1999	PCB	0	42	UG/KG
SC-37303-S	07/17/1999	ARSENIC	5 2	0 48	UG/G
SC-37303-S	07/17/1999	PAH	0	19	UG/KG
SC-37303-S	07/17/1999	CHROMIUM	14.2	0.18	UG/G
SC-37303-S	07/17/1999	LEAD	11 2	0.33	UG/G
SC-37303-S	07/17/1999	RADIUM-226	0.73	0.32	PCI/G
SC-37303-S	07/17/1999	RADIUM-228	1.03	0 35	PCI/G
SC-37303-S	07/17/1999	THALLIUM	1.5	0.85	UG/G
SC-37303-S	07/17/1999	THORIUM-230	1.17	0.62	PCI/G
SC-37303-S	07/17/1999	URANIUM-238	1.345	2 69	PCI/G
SC-37304-S	07/17/1999	PCB	0	42	UG/KG
SC-37304-S	07/17/1999	ARSENIC	18.7	0 48	UG/G
SC-37304-S	07/17/1999	PAH	0	19	UG/KG
SC-37304-S	07/17/1999	CHROMIUM	14 4	0 18	UG/G
SC-37304-S	07/17/1999	LEAD	46	0 33	UG/G
SC-37304-S	07/17/1999	RADIUM-226	0.93	0 31	PCI/G
SC-37304-S	07/17/1999	RADIUM-228	1.06	0.51	PCI/G
SC-37304-S	07/17/1999	THALLIUM	3.8	0.87	UG/G
SC-37304-S	07/17/1999	THORIUM-230	7.09	0.65	PCI/G
SC-37304-S	07/17/1999	URANIUM-238	1.33	2.66	PCI/G
SC-37306-S	07/17/1999	PCB	0	39	UG/KG
SC-37306-S	07/17/1999	ARSENIC	6 5	0 45	UG/G
SC-37306-S	07/17/1999	PAH	0	18	UG/KG
SC-37306-S	07/17/1999	CHROMIUM	14.3	0 17	UG/G
SC-37306-S	07/17/1999	LEAD	16	0 31	UG/G
SC-37306-S	07/17/1999	RADIUM-226	0.78	0 28	PCI/G
SC-37306-S	07/17/1999	RADIUM-228	1	0 48	PCI/G
SC-37306-S	07/17/1999	THALLIUM	2.4	0 8	UG/G
SC-37306-S	07/17/1999	THORIUM-230	0.94	0.64	PCI/G
SC-37306-S	07/17/1999	URANIUM-238	1.34	2 68	PCI/G
SC-37307-S	07/17/1999	PCB	0	42	UG/KG
SC-37307-S	07/17/1999	ARSENIC	7.8	0 48	UG/G
SC-37307-S	07/17/1999	PAH	0	19	UG/KG
SC-37307-S	07/17/1999	CHROMIUM	16 6	0 18	UG/G
SC-37307-S	07/17/1999	LEAD	11 4	0 33	UG/G
SC-37307-S	07/17/1999	RADIUM-226	0 76	0 34	PCI/G
SC-37307-S	07/17/1999	RADIUM-228	0.455	0 91	PCI/G
SC-37307-S	07/17/1999	THALLIUM	3 2	0 86	UG/G
SC-37307-S	07/17/1999	THORIUM-230	0 96	0 62	PCI/G
SC-37307-S	07/17/1999	URANIUM-238	1 18	2 36	PCI/G
SC-37308-C	07/17/1999	PCB	0	41	UG/KG
SC-37308-C	07/17/1999	ARSENIC	7.7	0 47	UG/G
SC-37308-C	07/17/1999	PAH	0	18	UG/KG
SC-37308-C	07/17/1999	CHROMIUM	15 4	0 17	UG/G
SC-37308-C	07/17/1999	LEAD	14 1	0 32	UG/G
SC-37308-C	07/17/1999	RADIUM-226	0.83	0 28	PCI/G
SC-37308-C	07/17/1999	RADIUM-228	1 28	0 4	PCI/G
SC-37308-C	07/17/1999	THALLIUM	2.5	0.84	UG/G
SC-37308-C	07/17/1999	THORIUM-230	1.51	0.62	PCI/G
SC-37308-C	07/17/1999	URANIUM-238	1.28	2.56	PCI/G
SC-37308-S	07/17/1999	PCB	0	40	UG/KG
SC-37308-S	07/17/1999	ARSENIC	7 4	0 46	UG/G
SC-37308-S	07/17/1999	PAH	0	18	UG/KG
SC-37308-S	07/17/1999	CHROMIUM	17 1	0 17	UG/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37308-S	07/17/1999	LEAD	12.6	0.31	UG/G
SC-37308-S	07/17/1999	RADIUM-226	1.01	0.28	PCI/G
SC-37308-S	07/17/1999	RADIUM-228	1.02	0.45	PCI/G
SC-37308-S	07/17/1999	THALLIUM	2.4	0.82	UG/G
SC-37308-S	07/17/1999	THORIUM-230	1.61	0.65	PCI/G
SC-37308-S	07/17/1999	URANIUM-238	1.365	2.73	PCI/G
SC-37309-C	07/17/1999	PCB	0	41	UG/KG
SC-37309-C	07/17/1999	ARSENIC	9.2	0.47	UG/G
SC-37309-C	07/17/1999	PAH	33	18	UG/KG
SC-37309-C	07/17/1999	CHROMIUM	18	0.17	UG/G
SC-37309-C	07/17/1999	LEAD	15.9	0.32	UG/G
SC-37309-C	07/17/1999	RADIUM-226	0.84	0.28	PCI/G
SC-37309-C	07/17/1999	RADIUM-228	1.29	0.46	PCI/G
SC-37309-C	07/17/1999	THALLIUM	2.6	0.84	UG/G
SC-37309-C	07/17/1999	THORIUM-230	1.23	0.64	PCI/G
SC-37309-C	07/17/1999	URANIUM-238	1.295	2.59	PCI/G
SC-37310-S	07/17/1999	PCB	0	41	UG/KG
SC-37310-S	07/17/1999	ARSENIC	3.8	0.47	UG/G
SC-37310-S	07/17/1999	PAH	0	18	UG/KG
SC-37310-S	07/17/1999	CHROMIUM	13	0.17	UG/G
SC-37310-S	07/17/1999	LEAD	9.8	0.32	UG/G
SC-37310-S	07/17/1999	RADIUM-226	0.87	0.36	PCI/G
SC-37310-S	07/17/1999	RADIUM-228	0.475	0.95	PCI/G
SC-37310-S	07/17/1999	THALLIUM	1.1	0.83	UG/G
SC-37310-S	07/17/1999	THORIUM-230	2.27	0.62	PCI/G
SC-37310-S	07/17/1999	URANIUM-238	1.17	2.34	PCI/G
SC-37311-S	07/17/1999	PCB	0	40	UG/KG
SC-37311-S	07/17/1999	ARSENIC	7.6	0.46	UG/G
SC-37311-S	07/17/1999	PAH	0	18	UG/KG
SC-37311-S	07/17/1999	CHROMIUM	15.6	0.17	UG/G
SC-37311-S	07/17/1999	LEAD	15	0.31	UG/G
SC-37311-S	07/17/1999	RADIUM-226	0.85	0.29	PCI/G
SC-37311-S	07/17/1999	RADIUM-228	1.26	0.43	PCI/G
SC-37311-S	07/17/1999	THALLIUM	2.2	0.82	UG/G
SC-37311-S	07/17/1999	THORIUM-230	1.02	0.62	PCI/G
SC-37311-S	07/17/1999	URANIUM-238	1.295	2.59	PCI/G
SC-37312-S	07/17/1999	PCB	0	40	UG/KG
SC-37312-S	07/17/1999	ARSENIC	7.5	0.47	UG/G
SC-37312-S	07/17/1999	PAH	0	18	UG/KG
SC-37312-S	07/17/1999	CHROMIUM	16.1	0.17	UG/G
SC-37312-S	07/17/1999	LEAD	12.4	0.32	UG/G
SC-37312-S	07/17/1999	RADIUM-226	0.66	0.33	PCI/G
SC-37312-S	07/17/1999	RADIUM-228	0.54	1.08	PCI/G
SC-37312-S	07/17/1999	THALLIUM	3.1	0.84	UG/G
SC-37312-S	07/17/1999	THORIUM-230	1.32	0.65	PCI/G
SC-37312-S	07/17/1999	URANIUM-238	1.445	2.89	PCI/G
SC-37314-S	07/17/1999	PCB	0	41	UG/KG
SC-37314-S	07/17/1999	ARSENIC	7.5	0.47	UG/G
SC-37314-S	07/17/1999	PAH	0	19	UG/KG
SC-37314-S	07/17/1999	CHROMIUM	15.7	0.17	UG/G
SC-37314-S	07/17/1999	LEAD	20.6	0.33	UG/G
SC-37314-S	07/17/1999	RADIUM-226	0.86	0.32	PCI/G
SC-37314-S	07/17/1999	RADIUM-228	1.13	0.39	PCI/G
SC-37314-S	07/17/1999	THALLIUM	2.9	0.85	UG/G
SC-37314-S	07/17/1999	THORIUM-230	1.35	0.64	PCI/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37314-S	07/17/1999	URANIUM-238	1.31	2.62	PCI/G
SC-37315-S	07/17/1999	PCB	0	41	UG/KG
SC-37315-S	07/17/1999	ARSENIC	8.6	0 47	UG/G
SC-37315-S	07/17/1999	PAH	0	18	UG/KG
SC-37315-S	07/17/1999	CHROMIUM	16 2	0 17	UG/G
SC-37315-S	07/17/1999	LEAD	20	0 32	UG/G
SC-37315-S	07/17/1999	RADIUM-226	1 03	0 32	PCI/G
SC-37315-S	07/17/1999	RADIUM-228	1.06	0 5	PCI/G
SC-37315-S	07/17/1999	THALLIUM	2 9	0.84	UG/G
SC-37315-S	07/17/1999	THORIUM-230	1 83	0 62	PCI/G
SC-37315-S	07/17/1999	URANIUM-238	1 24	2 48	PCI/G
SC-37316-C	07/17/1999	PCB	0	39	UG/KG
SC-37316-C	07/17/1999	ARSENIC	7.1	0.44	UG/G
SC-37316-C	07/17/1999	PAH	0	17	UG/KG
SC-37316-C	07/17/1999	CHROMIUM	15.6	0 16	UG/G
SC-37316-C	07/17/1999	LEAD	12 7	0 3	UG/G
SC-37316-C	07/17/1999	RADIUM-226	0 87	0 22	PCI/G
SC-37316-C	07/17/1999	RADIUM-228	1 06	0.44	PCI/G
SC-37316-C	07/17/1999	THALLIUM	2.2	0 79	UG/G
SC-37316-C	07/17/1999	THORIUM-230	1 54	0.62	PCI/G
SC-37316-C	07/17/1999	URANIUM-238	1 33	2 66	PCI/G
SC-37316-S	07/17/1999	PCB	0	40	UG/KG
SC-37316-S	07/17/1999	ARSENIC	3	0 46	UG/G
SC-37316-S	07/17/1999	PAH	0	18	UG/KG
SC-37316-S	07/17/1999	CHROMIUM	14 8	0 17	UG/G
SC-37316-S	07/17/1999	LEAD	6 6	0 32	UG/G
SC-37316-S	07/17/1999	RADIUM-226	0 77	0 37	PCI/G
SC-37316-S	07/17/1999	RADIUM-228	1 18	0 52	PCI/G
SC-37316-S	07/17/1999	THALLIUM	0 98	0 83	UG/G
SC-37316-S	07/17/1999	THORIUM-230	1 45	0 65	PCI/G
SC-37316-S	07/17/1999	URANIUM-238	1.265	2 53	PCI/G
SC-37317-C	07/17/1999	PCB	0	40	UG/KG
SC-37317-C	07/17/1999	ARSENIC	7 9	0 46	UG/G
SC-37317-C	07/17/1999	PAH	41	18	UG/KG
SC-37317-C	07/17/1999	CHROMIUM	17 4	0 17	UG/G
SC-37317-C	07/17/1999	LEAD	12	0 32	UG/G
SC-37317-C	07/17/1999	RADIUM-226	0 79	0.27	PCI/G
SC-37317-C	07/17/1999	RADIUM-228	0 365	0 73	PCI/G
SC-37317-C	07/17/1999	THALLIUM	2 4	0 82	UG/G
SC-37317-C	07/17/1999	THORIUM-230	1 5	0 62	PCI/G
SC-37317-C	07/17/1999	URANIUM-238	1.29	2 58	PCI/G
SC-37318-S	07/17/1999	PCB	0	42	UG/KG
SC-37318-S	07/17/1999	ARSENIC	10 6	0 49	UG/G
SC-37318-S	07/17/1999	PAH	0	19	UG/KG
SC-37318-S	07/17/1999	CHROMIUM	18 7	0.18	UG/G
SC-37318-S	07/17/1999	LEAD	13 5	0.33	UG/G
SC-37318-S	07/17/1999	RADIUM-226	0 7	0 35	PCI/G
SC-37318-S	07/17/1999	RADIUM-228	0.475	0.95	PCI/G
SC-37318-S	07/17/1999	THALLIUM	2 9	0 87	UG/G
SC-37318-S	07/17/1999	THORIUM-230	1.21	0 65	PCI/G
SC-37318-S	07/17/1999	URANIUM-238	1.34	2.68	PCI/G
SC-37319-S	07/17/1999	PCB	0	40	UG/KG
SC-37319-S	07/17/1999	ARSENIC	7 2	0 47	UG/G
SC-37319-S	07/17/1999	PAH	0	18	UG/KG
SC-37319-S	07/17/1999	CHROMIUM	15 2	0 17	UG/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37319-S	07/17/1999	LEAD	12.9	0.32	UG/G
SC-37319-S	07/17/1999	RADIUM-226	1.06	0.3	PCI/G
SC-37319-S	07/17/1999	RADIUM-228	1.2	0.4	PCI/G
SC-37319-S	07/17/1999	THALLIUM	3.1	0.84	UG/G
SC-37319-S	07/17/1999	THORIUM-230	1.11	0.64	PCI/G
SC-37319-S	07/17/1999	URANIUM-238	1.295	2.59	PCI/G
SC-37320-S	07/17/1999	PCB	0	39	UG/KG
SC-37320-S	07/17/1999	ARSENIC	4.8	0.45	UG/G
SC-37320-S	07/17/1999	PAH	0	17	UG/KG
SC-37320-S	07/17/1999	CHROMIUM	11	0.16	UG/G
SC-37320-S	07/17/1999	LEAD	9.2	0.31	UG/G
SC-37320-S	07/17/1999	RADIUM-226	0.84	0.34	PCI/G
SC-37320-S	07/17/1999	RADIUM-228	0.475	0.95	PCI/G
SC-37320-S	07/17/1999	THALLIUM	2.7	0.8	UG/G
SC-37320-S	07/17/1999	THORIUM-230	1.82	0.62	PCI/G
SC-37320-S	07/17/1999	URANIUM-238	1.165	2.33	PCI/G
SC-37322-S	07/17/1999	PCB	0	38	UG/KG
SC-37322-S	07/17/1999	ARSENIC	7.9	0.44	UG/G
SC-37322-S	07/17/1999	PAH	17	17	UG/KG
SC-37322-S	07/17/1999	CHROMIUM	13.5	0.16	UG/G
SC-37322-S	07/17/1999	LEAD	17.1	0.3	UG/G
SC-37322-S	07/17/1999	RADIUM-226	0.98	0.28	PCI/G
SC-37322-S	07/17/1999	RADIUM-228	0.99	0.46	PCI/G
SC-37322-S	07/17/1999	THALLIUM	3.1	0.79	UG/G
SC-37322-S	07/17/1999	THORIUM-230	1.56	0.62	PCI/G
SC-37322-S	07/17/1999	URANIUM-238	4	2.13	PCI/G
SC-37323-S	07/17/1999	PCB	0	36	UG/KG
SC-37323-S	07/17/1999	ARSENIC	6.2	0.41	UG/G
SC-37323-S	07/17/1999	PAH	0	16	UG/KG
SC-37323-S	07/17/1999	CHROMIUM	14.9	0.15	UG/G
SC-37323-S	07/17/1999	LEAD	13.4	0.28	UG/G
SC-37323-S	07/17/1999	RADIUM-226	0.85	0.31	PCI/G
SC-37323-S	07/17/1999	RADIUM-228	0.96	0.49	PCI/G
SC-37323-S	07/17/1999	THALLIUM	3.2	0.74	UG/G
SC-37323-S	07/17/1999	THORIUM-230	1.9	0.65	PCI/G
SC-37323-S	07/17/1999	URANIUM-238	1.265	2.53	PCI/G
SC-37324-C	07/17/1999	PCB	0	39	UG/KG
SC-37324-C	07/17/1999	ARSENIC	2.6	0.44	UG/G
SC-37324-C	07/17/1999	PAH	0	17	UG/KG
SC-37324-C	07/17/1999	CHROMIUM	16.5	0.16	UG/G
SC-37324-C	07/17/1999	LEAD	8.6	0.3	UG/G
SC-37324-C	07/17/1999	RADIUM-226	0.98	0.27	PCI/G
SC-37324-C	07/17/1999	RADIUM-228	1.06	0.46	PCI/G
SC-37324-C	07/17/1999	THALLIUM	1.4	0.79	UG/G
SC-37324-C	07/17/1999	THORIUM-230	1.33	0.64	PCI/G
SC-37324-C	07/17/1999	URANIUM-238	1.325	2.65	PCI/G
SC-37324-S	07/17/1999	PCB	0	37	UG/KG
SC-37324-S	07/17/1999	ARSENIC	4.9	0.43	UG/G
SC-37324-S	07/17/1999	PAH	0	17	UG/KG
SC-37324-S	07/17/1999	CHROMIUM	20.3	0.16	UG/G
SC-37324-S	07/17/1999	LEAD	7.6	0.3	UG/G
SC-37324-S	07/17/1999	RADIUM-226	0.96	0.31	PCI/G
SC-37324-S	07/17/1999	RADIUM-228	1.32	0.44	PCI/G
SC-37324-S	07/17/1999	THALLIUM	3.6	0.77	UG/G
SC-37324-S	07/17/1999	THORIUM-230	1.92	0.62	PCI/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37324-S	07/17/1999	URANIUM-238	1.335	2 67	PCI/G
SC-37401-S	07/17/1999	PCB	0	43	UG/KG
SC-37401-S	07/17/1999	ARSENIC	8	0 49	UG/G
SC-37401-S	07/17/1999	PAH	0	19	UG/KG
SC-37401-S	07/17/1999	CHROMIUM	15 7	0 18	UG/G
SC-37401-S	07/17/1999	LEAD	18.9	0 33	UG/G
SC-37401-S	07/17/1999	RADIUM-226	0 8	0.34	PCI/G
SC-37401-S	07/17/1999	RADIUM-228	0 475	0 95	PCI/G
SC-37401-S	07/17/1999	THALLIUM	2.8	0.87	UG/G
SC-37401-S	07/17/1999	THORIUM-230	1 09	0.62	PCI/G
SC-37401-S	07/17/1999	URANIUM-238	1 265	2.53	PCI/G
SC-37402-S	07/17/1999	PCB	0	41	UG/KG
SC-37402-S	07/17/1999	ARSENIC	6 6	0 47	UG/G
SC-37402-S	07/17/1999	PAH	0	18	UG/KG
SC-37402-S	07/17/1999	CHROMIUM	14 4	0 17	UG/G
SC-37402-S	07/17/1999	LEAD	11 7	0.32	UG/G
SC-37402-S	07/17/1999	RADIUM-226	0 88	0 25	PCI/G
SC-37402-S	07/17/1999	RADIUM-228	1.22	0 43	PCI/G
SC-37402-S	07/17/1999	THALLIUM	2 8	0 85	UG/G
SC-37402-S	07/17/1999	THORIUM-230	1 14	0 62	PCI/G
SC-37402-S	07/17/1999	URANIUM-238	1 355	2 71	PCI/G
SC-37403-C	07/17/1999	PCB	0	38	UG/KG
SC-37403-C	07/17/1999	ARSENIC	6.5	0 43	UG/G
SC-37403-C	07/17/1999	PAH	0	17	UG/KG
SC-37403-C	07/17/1999	CHROMIUM	12 8	0 16	UG/G
SC-37403-C	07/17/1999	LEAD	16 1	0 29	UG/G
SC-37403-C	07/17/1999	RADIUM-226	0.64	0 27	PCI/G
SC-37403-C	07/17/1999	RADIUM-228	1 11	0 48	PCI/G
SC-37403-C	07/17/1999	THALLIUM	2.4	0 77	UG/G
SC-37403-C	07/17/1999	THORIUM-230	1 15	0.62	PCI/G
SC-37403-C	07/17/1999	URANIUM-238	1 18	2.36	PCI/G
SC-37403-S	07/17/1999	PCB	0	41	UG/KG
SC-37403-S	07/17/1999	ARSENIC	7 2	0 47	UG/G
SC-37403-S	07/17/1999	PAH	0	18	UG/KG
SC-37403-S	07/17/1999	CHROMIUM	13 4	0 17	UG/G
SC-37403-S	07/17/1999	LEAD	13 3	0 32	UG/G
SC-37403-S	07/17/1999	RADIUM-226	1.02	0 28	PCI/G
SC-37403-S	07/17/1999	RADIUM-228	0 84	0 39	PCI/G
SC-37403-S	07/17/1999	THALLIUM	2 3	0 83	UG/G
SC-37403-S	07/17/1999	THORIUM-230	1 27	0 65	PCI/G
SC-37403-S	07/17/1999	URANIUM-238	1 25	2 5	PCI/G
SC-37404-S	07/17/1999	PCB	0	41	UG/KG
SC-37404-S	07/17/1999	ARSENIC	7 3	0 47	UG/G
SC-37404-S	07/17/1999	PAH	0	18	UG/KG
SC-37404-S	07/17/1999	CHROMIUM	15 7	0 17	UG/G
SC-37404-S	07/17/1999	LEAD	14 7	0 32	UG/G
SC-37404-S	07/17/1999	RADIUM-226	0 97	0.33	PCI/G
SC-37404-S	07/17/1999	RADIUM-228	1 27	0 47	PCI/G
SC-37404-S	07/17/1999	THALLIUM	3.5	0.84	UG/G
SC-37404-S	07/17/1999	THORIUM-230	1 37	0.64	PCI/G
SC-37404-S	07/17/1999	URANIUM-238	1 24	2.48	PCI/G
SC-37405-S	07/17/1999	PCB	0	39	UG/KG
SC-37405-S	07/17/1999	ARSENIC	7 3	0.45	UG/G
SC-37405-S	07/17/1999	PAH	0	18	UG/KG
SC-37405-S	07/17/1999	CHROMIUM	15 3	0 17	UG/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37405-S	07/17/1999	LEAD	12.9	0.31	UG/G
SC-37405-S	07/17/1999	RADIUM-226	0.87	0.28	PCI/G
SC-37405-S	07/17/1999	RADIUM-228	1.19	0.37	PCI/G
SC-37405-S	07/17/1999	THALLIUM	3.7	0.81	UG/G
SC-37405-S	07/17/1999	THORIUM-230	1.04	0.62	PCI/G
SC-37405-S	07/17/1999	URANIUM-238	1.325	2.65	PCI/G
SC-37406-S	07/17/1999	PCB	0	39	UG/KG
SC-37406-S	07/17/1999	ARSENIC	7.1	0.45	UG/G
SC-37406-S	07/17/1999	PAH	0	18	UG/KG
SC-37406-S	07/17/1999	CHROMIUM	13.4	0.17	UG/G
SC-37406-S	07/17/1999	LEAD	13.7	0.31	UG/G
SC-37406-S	07/17/1999	RADIUM-226	0.99	0.27	PCI/G
SC-37406-S	07/17/1999	RADIUM-228	1.11	0.56	PCI/G
SC-37406-S	07/17/1999	THALLIUM	3.1	0.81	UG/G
SC-37406-S	07/17/1999	THORIUM-230	1.16	0.62	PCI/G
SC-37406-S	07/17/1999	URANIUM-238	1.37	2.74	PCI/G
SC-37407-S	07/17/1999	PCB	0	39	UG/KG
SC-37407-S	07/17/1999	ARSENIC	6.5	0.45	UG/G
SC-37407-S	07/17/1999	PAH	0	18	UG/KG
SC-37407-S	07/17/1999	CHROMIUM	13.3	0.17	UG/G
SC-37407-S	07/17/1999	LEAD	13.7	0.31	UG/G
SC-37407-S	07/17/1999	RADIUM-226	0.64	0.33	PCI/G
SC-37407-S	07/17/1999	RADIUM-228	0.98	0.42	PCI/G
SC-37407-S	07/17/1999	THALLIUM	3.4	0.81	UG/G
SC-37407-S	07/17/1999	THORIUM-230	1.25	0.65	PCI/G
SC-37407-S	07/17/1999	URANIUM-238	1.315	2.63	PCI/G
SC-37408-S	07/17/1999	PCB	0	38	UG/KG
SC-37408-S	07/17/1999	ARSENIC	6	0.44	UG/G
SC-37408-S	07/17/1999	PAH	24	17	UG/KG
SC-37408-S	07/17/1999	CHROMIUM	11.7	0.16	UG/G
SC-37408-S	07/17/1999	LEAD	8.8	0.3	UG/G
SC-37408-S	07/17/1999	RADIUM-226	1.44	0.32	PCI/G
SC-37408-S	07/17/1999	RADIUM-228	0.395	0.79	PCI/G
SC-37408-S	07/17/1999	THALLIUM	1.6	0.79	UG/G
SC-37408-S	07/17/1999	THORIUM-230	27.4	0.64	PCI/G
SC-37408-S	07/17/1999	URANIUM-238	1.41	2.82	PCI/G
SC-37408-S-RS	07/22/1999	THORIUM-230	1.33	0.62	PCI/G
SC-37409-S	07/17/1999	PCB	0	39	UG/KG
SC-37409-S	07/17/1999	ARSENIC	3.1	0.45	UG/G
SC-37409-S	07/17/1999	PAH	0	18	UG/KG
SC-37409-S	07/17/1999	CHROMIUM	10.3	0.17	UG/G
SC-37409-S	07/17/1999	LEAD	8.7	0.31	UG/G
SC-37409-S	07/17/1999	RADIUM-226	0.83	0.3	PCI/G
SC-37409-S	07/17/1999	RADIUM-228	1.18	0.37	PCI/G
SC-37409-S	07/17/1999	THALLIUM	1.8	0.8	UG/G
SC-37409-S	07/17/1999	THORIUM-230	1.67	0.62	PCI/G
SC-37409-S	07/17/1999	URANIUM-238	1.34	2.68	PCI/G
SC-37410-S	07/17/1999	PCB	0	41	UG/KG
SC-37410-S	07/17/1999	ARSENIC	7.7	0.47	UG/G
SC-37410-S	07/17/1999	PAH	0	18	UG/KG
SC-37410-S	07/17/1999	CHROMIUM	15.9	0.17	UG/G
SC-37410-S	07/17/1999	LEAD	13.2	0.32	UG/G
SC-37410-S	07/17/1999	RADIUM-226	1.01	0.35	PCI/G
SC-37410-S	07/17/1999	RADIUM-228	0.46	0.92	PCI/G
SC-37410-S	07/17/1999	THALLIUM	3.8	0.84	UG/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37410-S	07/17/1999	THORIUM-230	0 91	0.62	PCI/G
SC-37410-S	07/17/1999	URANIUM-238	1.215	2 43	PCI/G
SC-37411-S	07/17/1999	PCB	0	40	UG/KG
SC-37411-S	07/17/1999	ARSENIC	6.2	0 46	UG/G
SC-37411-S	07/17/1999	PAH	0	18	UG/KG
SC-37411-S	07/17/1999	CHROMIUM	12.5	0 17	UG/G
SC-37411-S	07/17/1999	LEAD	13.3	0.31	UG/G
SC-37411-S	07/17/1999	RADIUM-226	0 92	0 32	PCI/G
SC-37411-S	07/17/1999	RADIUM-228	1 17	0.4	PCI/G
SC-37411-S	07/17/1999	THALLIUM	2.7	0 82	UG/G
SC-37411-S	07/17/1999	THORIUM-230	5 3	0.65	PCI/G
SC-37411-S	07/17/1999	URANIUM-238	1.305	2.61	PCI/G
SC-37412-S	07/17/1999	PCB	0	40	UG/KG
SC-37412-S	07/17/1999	ARSENIC	4	0.46	UG/G
SC-37412-S	07/17/1999	PAH	0	18	UG/KG
SC-37412-S	07/17/1999	CHROMIUM	12 3	0 17	UG/G
SC-37412-S	07/17/1999	LEAD	9 3	0 31	UG/G
SC-37412-S	07/17/1999	RADIUM-226	0 74	0 33	PCI/G
SC-37412-S	07/17/1999	RADIUM-228	1 31	0 4	PCI/G
SC-37412-S	07/17/1999	THALLIUM	1 7	0 82	UG/G
SC-37412-S	07/17/1999	THORIUM-230	1 1	0.64	PCI/G
SC-37412-S	07/17/1999	URANIUM-238	1 37	2 74	PCI/G
SC-37413-S	07/17/1999	PCB	0	37	UG/KG
SC-37413-S	07/17/1999	ARSENIC	6.8	0.43	UG/G
SC-37413-S	07/17/1999	PAH	0	17	UG/KG
SC-37413-S	07/17/1999	CHROMIUM	16 3	0 16	UG/G
SC-37413-S	07/17/1999	LEAD	12.2	0 29	UG/G
SC-37413-S	07/17/1999	RADIUM-226	0 71	0 32	PCI/G
SC-37413-S	07/17/1999	RADIUM-228	1 22	0 36	PCI/G
SC-37413-S	07/17/1999	THALLIUM	3	0 76	UG/G
SC-37413-S	07/17/1999	THORIUM-230	1 71	0 62	PCI/G
SC-37413-S	07/17/1999	URANIUM-238	1 305	2 61	PCI/G
SC-37414-C	07/17/1999	PCB	0	36	UG/KG
SC-37414-C	07/17/1999	ARSENIC	6 6	0 42	UG/G
SC-37414-C	07/17/1999	PAH	0	16	UG/KG
SC-37414-C	07/17/1999	CHROMIUM	13.2	0.16	UG/G
SC-37414-C	07/17/1999	LEAD	14	0 29	UG/G
SC-37414-C	07/17/1999	RADIUM-226	0 92	0 31	PCI/G
SC-37414-C	07/17/1999	RADIUM-228	0 445	0.89	PCI/G
SC-37414-C	07/17/1999	THALLIUM	3 4	0.76	UG/G
SC-37414-C	07/17/1999	THORIUM-230	0.84	0.62	PCI/G
SC-37414-C	07/17/1999	URANIUM-238	1 36	2 72	PCI/G
SC-37414-S	07/17/1999	PCB	0	37	UG/KG
SC-37414-S	07/17/1999	ARSENIC	5 4	0.42	UG/G
SC-37414-S	07/17/1999	PAH	0	16	UG/KG
SC-37414-S	07/17/1999	CHROMIUM	12	0 16	UG/G
SC-37414-S	07/17/1999	LEAD	11.9	0.29	UG/G
SC-37414-S	07/17/1999	RADIUM-226	0 84	0.28	PCI/G
SC-37414-S	07/17/1999	RADIUM-228	1.29	0 5	PCI/G
SC-37414-S	07/17/1999	THALLIUM	2 5	0.76	UG/G
SC-37414-S	07/17/1999	THORIUM-230	0 94	0.65	PCI/G
SC-37414-S	07/17/1999	URANIUM-238	1 32	2 64	PCI/G
SC-37415-S	07/17/1999	PCB	0	37	UG/KG
SC-37415-S	07/17/1999	ARSENIC	6 6	0 42	UG/G
SC-37415-S	07/17/1999	PAH	0	17	UG/KG

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37415-S	07/17/1999	CHROMIUM	13.6	0.16	UG/G
SC-37415-S	07/17/1999	LEAD	12	0.29	UG/G
SC-37415-S	07/17/1999	RADIUM-226	0.83	0.31	PCI/G
SC-37415-S	07/17/1999	RADIUM-228	0.475	0.95	PCI/G
SC-37415-S	07/17/1999	THALLIUM	3.3	0.76	UG/G
SC-37415-S	07/17/1999	THORIUM-230	1.04	0.64	PCI/G
SC-37415-S	07/17/1999	URANIUM-238	1.365	2.73	PCI/G
SC-37416-S	07/17/1999	PCB	0	39	UG/KG
SC-37416-S	07/17/1999	ARSENIC	7.4	0.45	UG/G
SC-37416-S	07/17/1999	PAH	0	18	UG/KG
SC-37416-S	07/17/1999	CHROMIUM	18.3	0.17	UG/G
SC-37416-S	07/17/1999	LEAD	11.2	0.31	UG/G
SC-37416-S	07/17/1999	RADIUM-226	0.94	0.29	PCI/G
SC-37416-S	07/17/1999	RADIUM-228	1.04	0.43	PCI/G
SC-37416-S	07/17/1999	THALLIUM	4.3	0.81	UG/G
SC-37416-S	07/17/1999	THORIUM-230	1.62	0.65	PCI/G
SC-37416-S	07/17/1999	URANIUM-238	1.335	2.67	PCI/G
SC-37417-S	07/17/1999	PCB	0	38	UG/KG
SC-37417-S	07/17/1999	ARSENIC	6.7	0.43	UG/G
SC-37417-S	07/17/1999	PAH	0	17	UG/KG
SC-37417-S	07/17/1999	CHROMIUM	13.4	0.16	UG/G
SC-37417-S	07/17/1999	LEAD	12.7	0.3	UG/G
SC-37417-S	07/17/1999	RADIUM-226	1.25	0.34	PCI/G
SC-37417-S	07/17/1999	RADIUM-228	0.55	1.1	PCI/G
SC-37417-S	07/17/1999	THALLIUM	3.2	0.77	UG/G
SC-37417-S	07/17/1999	THORIUM-230	8.48	0.64	PCI/G
SC-37417-S	07/17/1999	URANIUM-238	1.47	2.94	PCI/G
SC-37418-S	07/17/1999	PCB	0	37	UG/KG
SC-37418-S	07/17/1999	ARSENIC	7.9	0.43	UG/G
SC-37418-S	07/17/1999	PAH	0	17	UG/KG
SC-37418-S	07/17/1999	CHROMIUM	14.6	0.16	UG/G
SC-37418-S	07/17/1999	LEAD	16.4	0.29	UG/G
SC-37418-S	07/17/1999	RADIUM-226	0.74	0.31	PCI/G
SC-37418-S	07/17/1999	RADIUM-228	0.92	0.44	PCI/G
SC-37418-S	07/17/1999	THALLIUM	3.3	0.77	UG/G
SC-37418-S	07/17/1999	THORIUM-230	0.93	0.62	PCI/G
SC-37418-S	07/17/1999	URANIUM-238	1.32	2.64	PCI/G
SC-37419-S	07/17/1999	PCB	0	37	UG/KG
SC-37419-S	07/17/1999	ARSENIC	4.9	0.42	UG/G
SC-37419-S	07/17/1999	PAH	0	16	UG/KG
SC-37419-S	07/17/1999	CHROMIUM	12.8	0.15	UG/G
SC-37419-S	07/17/1999	LEAD	11	0.29	UG/G
SC-37419-S	07/17/1999	RADIUM-226	0.3	0.6	PCI/G
SC-37419-S	07/17/1999	RADIUM-228	0.49	0.98	PCI/G
SC-37419-S	07/17/1999	THALLIUM	2.3	0.75	UG/G
SC-37419-S	07/17/1999	THORIUM-230	1.59	0.62	PCI/G
SC-37419-S	07/17/1999	URANIUM-238	1.3	2.6	PCI/G
SC-37420-C	07/17/1999	PCB	0	38	UG/KG
SC-37420-C	07/17/1999	ARSENIC	10.2	0.43	UG/G
SC-37420-C	07/17/1999	PAH	0	17	UG/KG
SC-37420-C	07/17/1999	CHROMIUM	15.4	0.16	UG/G
SC-37420-C	07/17/1999	LEAD	17.5	0.3	UG/G
SC-37420-C	07/17/1999	RADIUM-226	0.91	0.24	PCI/G
SC-37420-C	07/17/1999	RADIUM-228	1.09	0.41	PCI/G
SC-37420-C	07/17/1999	THALLIUM	4	0.78	UG/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37420-C	07/17/1999	THORIUM-230	1 17	0 62	PCI/G
SC-37420-C	07/17/1999	URANIUM-238	1 325	2 65	PCI/G
SC-37420-S	07/17/1999	PCB	0	39	UG/KG
SC-37420-S	07/17/1999	ARSENIC	8 6	0.45	UG/G
SC-37420-S	07/17/1999	PAH	0	18	UG/KG
SC-37420-S	07/17/1999	CHROMIUM	17 6	0 17	UG/G
SC-37420-S	07/17/1999	LEAD	18.8	0 31	UG/G
SC-37420-S	07/17/1999	RADIUM-226	0.73	0 35	PCI/G
SC-37420-S	07/17/1999	RADIUM-228	0 47	0 94	PCI/G
SC-37420-S	07/17/1999	THALLIUM	4 4	0.81	UG/G
SC-37420-S	07/17/1999	THORIUM-230	1.22	0 65	PCI/G
SC-37420-S	07/17/1999	URANIUM-238	1 395	2 79	PCI/G
SC-37421-S	07/17/1999	PCB	0	39	UG/KG
SC-37421-S	07/17/1999	ARSENIC	9.6	0 44	UG/G
SC-37421-S	07/17/1999	PAH	0	17	UG/KG
SC-37421-S	07/17/1999	CHROMIUM	13	0 16	UG/G
SC-37421-S	07/17/1999	LEAD	17 4	0 3	UG/G
SC-37421-S	07/17/1999	RADIUM-226	1 01	0 3	PCI/G
SC-37421-S	07/17/1999	RADIUM-228	0 98	0 43	PCI/G
SC-37421-S	07/17/1999	THALLIUM	2 7	0 79	UG/G
SC-37421-S	07/17/1999	THORIUM-230	2 05	0.64	PCI/G
SC-37421-S	07/17/1999	URANIUM-238	1 325	2.65	PCI/G
SC-37422-C	07/17/1999	PCB	0	39	UG/KG
SC-37422-C	07/17/1999	ARSENIC	5.2	0 45	UG/G
SC-37422-C	07/17/1999	PAH	19	18	UG/KG
SC-37422-C	07/17/1999	CHROMIUM	13 5	0 17	UG/G
SC-37422-C	07/17/1999	LEAD	12.8	0 31	UG/G
SC-37422-C	07/17/1999	RADIUM-226	0 82	0.27	PCI/G
SC-37422-C	07/17/1999	RADIUM-228	0.95	0.52	PCI/G
SC-37422-C	07/17/1999	THALLIUM	3 1	0 8	UG/G
SC-37422-C	07/17/1999	THORIUM-230	1 39	0 62	PCI/G
SC-37422-C	07/17/1999	URANIUM-238	1 315	2 63	PCI/G
SC-37422-S	07/17/1999	PCB	0	39	UG/KG
SC-37422-S	07/17/1999	ARSENIC	10.9	0 45	UG/G
SC-37422-S	07/17/1999	PAH	0	18	UG/KG
SC-37422-S	07/17/1999	CHROMIUM	16 1	0 16	UG/G
SC-37422-S	07/17/1999	LEAD	16.2	0 31	UG/G
SC-37422-S	07/17/1999	RADIUM-226	0.73	0 32	PCI/G
SC-37422-S	07/17/1999	RADIUM-228	1.12	0 38	PCI/G
SC-37422-S	07/17/1999	THALLIUM	4 3	0.8	UG/G
SC-37422-S	07/17/1999	THORIUM-230	1 36	0 62	PCI/G
SC-37422-S	07/17/1999	URANIUM-238	1 32	2 64	PCI/G
SC-37423-S	07/17/1999	PCB	0	39	UG/KG
SC-37423-S	07/17/1999	ARSENIC	13 4	0 44	UG/G
SC-37423-S	07/17/1999	PAH	0	17	UG/KG
SC-37423-S	07/17/1999	CHROMIUM	12.5	0 16	UG/G
SC-37423-S	07/17/1999	LEAD	23.6	0 3	UG/G
SC-37423-S	07/17/1999	RADIUM-226	0.94	0 33	PCI/G
SC-37423-S	07/17/1999	RADIUM-228	1	0 52	PCI/G
SC-37423-S	07/17/1999	THALLIUM	4.6	0 8	UG/G
SC-37423-S	07/17/1999	THORIUM-230	1.4	0.65	PCI/G
SC-37423-S	07/17/1999	URANIUM-238	1.265	2.53	PCI/G
SC-37424-S	07/17/1999	RADIUM-226	0.83	0.29	PCI/G
SC-37424-S	07/17/1999	RADIUM-228	1.09	0.38	PCI/G
SC-37424-S	07/17/1999	THORIUM-230	1 37	0.62	PCI/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37424-S	07/17/1999	URANIUM-238	1.385	2.77	PCI/G
SC-37425-S	07/17/1999	RADIUM-226	1.12	0.29	PCI/G
SC-37425-S	07/17/1999	RADIUM-228	1.37	0.45	PCI/G
SC-37425-S	07/17/1999	THORIUM-230	1.55	0.65	PCI/G
SC-37425-S	07/17/1999	URANIUM-238	1.365	2.73	PCI/G
SC-37426-S	07/17/1999	RADIUM-226	0.93	0.27	PCI/G
SC-37426-S	07/17/1999	RADIUM-228	1.2	0.41	PCI/G
SC-37426-S	07/17/1999	THORIUM-230	2.96	0.64	PCI/G
SC-37426-S	07/17/1999	URANIUM-238	1.26	2.52	PCI/G
SC-37427-S	07/17/1999	RADIUM-226	0.84	0.28	PCI/G
SC-37427-S	07/17/1999	RADIUM-228	0.44	0.88	PCI/G
SC-37427-S	07/17/1999	THORIUM-230	1.9	0.62	PCI/G
SC-37427-S	07/17/1999	URANIUM-238	1.275	2.55	PCI/G
SC-37428-S	07/17/1999	RADIUM-226	0.51	0.32	PCI/G
SC-37428-S	07/17/1999	RADIUM-228	1.03	0.38	PCI/G
SC-37428-S	07/17/1999	THORIUM-230	1.28	0.62	PCI/G
SC-37428-S	07/17/1999	URANIUM-238	1.24	2.48	PCI/G
SC-37429-S	07/17/1999	RADIUM-226	0.83	0.28	PCI/G
SC-37429-S	07/17/1999	RADIUM-228	0.43	0.86	PCI/G
SC-37429-S	07/17/1999	THORIUM-230	1.37	0.65	PCI/G
SC-37429-S	07/17/1999	URANIUM-238	1.43	2.86	PCI/G
SC-37430-S	07/17/1999	RADIUM-226	0.91	0.27	PCI/G
SC-37430-S	07/17/1999	RADIUM-228	1.17	0.4	PCI/G
SC-37430-S	07/17/1999	THORIUM-230	1.27	0.62	PCI/G
SC-37430-S	07/17/1999	URANIUM-238	1.26	2.52	PCI/G
SC-37431-S	07/17/1999	RADIUM-226	0.96	0.31	PCI/G
SC-37431-S	07/17/1999	RADIUM-228	0.355	0.71	PCI/G
SC-37431-S	07/17/1999	THORIUM-230	1.49	0.62	PCI/G
SC-37431-S	07/17/1999	URANIUM-238	1.32	2.64	PCI/G
SC-37432-S	07/17/1999	RADIUM-226	0.82	0.31	PCI/G
SC-37432-S	07/17/1999	RADIUM-228	0.47	0.94	PCI/G
SC-37432-S	07/17/1999	THORIUM-230	1.48	0.65	PCI/G
SC-37432-S	07/17/1999	URANIUM-238	1.25	2.5	PCI/G
SC-37433-S	07/17/1999	RADIUM-226	0.9	0.3	PCI/G
SC-37433-S	07/17/1999	RADIUM-228	1.08	0.5	PCI/G
SC-37433-S	07/17/1999	THORIUM-230	6.31	0.64	PCI/G
SC-37433-S	07/17/1999	URANIUM-238	1.325	2.65	PCI/G
SC-37434-S	07/22/1999	RADIUM-226	0.9	0.31	PCI/G
SC-37434-S	07/22/1999	RADIUM-228	1.17	0.31	PCI/G
SC-37434-S	07/22/1999	THORIUM-230	1.32	0.66	PCI/G
SC-37434-S	07/22/1999	URANIUM-238	1.31	2.62	PCI/G
SC-37435-S	07/22/1999	RADIUM-226	0.78	0.34	PCI/G
SC-37435-S	07/22/1999	RADIUM-228	0.52	1.04	PCI/G
SC-37435-S	07/22/1999	THORIUM-230	1.43	0.64	PCI/G
SC-37435-S	07/22/1999	URANIUM-238	1.415	2.83	PCI/G
SC-37436-S	07/22/1999	RADIUM-226	0.81	0.2	PCI/G
SC-37436-S	07/22/1999	RADIUM-228	0.2	0.4	PCI/G
SC-37436-S	07/22/1999	THORIUM-230	10.6	0.65	PCI/G
SC-37436-S	07/22/1999	URANIUM-238	1.035	2.07	PCI/G
SC-37437-S	07/22/1999	RADIUM-226	0.83	0.22	PCI/G
SC-37437-S	07/22/1999	RADIUM-228	1.17	0.35	PCI/G
SC-37437-S	07/22/1999	THORIUM-230	1.21	0.66	PCI/G
SC-37437-S	07/22/1999	URANIUM-238	1.72	1.74	PCI/G
SC-37438-S	07/22/1999	RADIUM-226	0.89	0.3	PCI/G
SC-37438-S	07/22/1999	RADIUM-228	0.97	0.45	PCI/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37438-S	07/22/1999	THORIUM-230	1 11	0 64	PCI/G
SC-37438-S	07/22/1999	URANIUM-238	1.345	2.69	PCI/G
SC-37501-C	04/14/1999	THORIUM-230	1.4	0.081	PCI/G
SC-37501-C	04/14/1999	URANIUM-238	2.39	4 78	PCI/G
SC-37502-S	04/14/1999	THORIUM-230	5.76	0.093	PCI/G
SC-37502-S	04/14/1999	URANIUM-238	2.65	2 43	PCI/G
SC-37504-C	04/14/1999	THORIUM-230	1 65	0.085	PCI/G
SC-37504-C	04/14/1999	URANIUM-238	2.425	4.85	PCI/G
SC-37504-S	04/14/1999	THORIUM-230	11.4	0.078	PCI/G
SC-37504-S	04/14/1999	URANIUM-238	1 73	4.69	PCI/G
SC-37504-S-RS	04/22/1999	THORIUM-230	3.4	0 62	PCI/G
SC-37505-C	04/14/1999	THORIUM-230	0.812	0.118	PCI/G
SC-37505-C	04/14/1999	URANIUM-238	2.005	4.01	PCI/G
SC-37506-S	04/14/1999	THORIUM-230	1 75	0 064	PCI/G
SC-37506-S	04/14/1999	URANIUM-238	2 65	4 51	PCI/G
SC-37508-S	04/14/1999	THORIUM-230	6.07	0.071	PCI/G
SC-37508-S	04/14/1999	URANIUM-238	2.89	3 98	PCI/G
SC-37510-C	04/14/1999	THORIUM-230	1.34	0 096	PCI/G
SC-37510-C	04/14/1999	URANIUM-238	2.125	4.25	PCI/G
SC-37510-S	04/14/1999	THORIUM-230	1 97	0 096	PCI/G
SC-37510-S	04/14/1999	URANIUM-238	4.81	4 89	PCI/G
SC-37511-C	04/14/1999	THORIUM-230	6.84	0 065	PCI/G
SC-37511-C	04/14/1999	URANIUM-238	4.32	5 09	PCI/G
SC-37511-C-RS	04/22/1999	THORIUM-230	3 35	0 7	PCI/G
SC-37512-S	04/14/1999	THORIUM-230	0.998	0 071	PCI/G
SC-37512-S	04/14/1999	URANIUM-238	1.57	3 36	PCI/G
SC-37514-C	04/14/1999	THORIUM-230	3.42	0 075	PCI/G
SC-37514-C	04/14/1999	URANIUM-238	2.66	5 32	PCI/G
SC-37514-S	04/14/1999	THORIUM-230	1.23	0.064	PCI/G
SC-37514-S	04/14/1999	URANIUM-238	3.78	3.99	PCI/G
SC-37515-S	04/14/1999	THORIUM-230	2 03	0 145	PCI/G
SC-37515-S	04/14/1999	URANIUM-238	0.26	2	PCI/G
SC-37517-S	04/14/1999	THORIUM-230	0.998	0 051	PCI/G
SC-37517-S	04/14/1999	URANIUM-238	4.9	4.19	PCI/G
SC-37518-S	04/14/1999	THORIUM-230	2.79	0.104	PCI/G
SC-37518-S	04/14/1999	URANIUM-238	2.565	5 13	PCI/G
SC-37519-C	04/14/1999	THORIUM-230	3 36	0.063	PCI/G
SC-37519-C	04/14/1999	URANIUM-238	1.64	4 63	PCI/G
SC-37520-S	04/14/1999	THORIUM-230	1.72	0.079	PCI/G
SC-37520-S	04/14/1999	URANIUM-238	2.29	4 58	PCI/G
SC-37521-S	04/14/1999	THORIUM-230	1.07	0 1	PCI/G
SC-37521-S	04/14/1999	URANIUM-238	0 48	4 37	PCI/G
SC-37522-C	06/06/2000	THORIUM-230	1.33	0 64	PCI/G
SC-37522-C	06/06/2000	URANIUM-238	1.055	2.11	PCI/G
SC-37522-S	04/14/1999	THORIUM-230	3 97	0.232	PCI/G
SC-37522-S	04/14/1999	URANIUM-238	1 685	3.37	PCI/G
SC-37524-S	04/14/1999	THORIUM-230	3.74	0.069	PCI/G
SC-37524-S	04/14/1999	URANIUM-238	2.43	3 76	PCI/G
SC-37525-S	06/06/2000	THORIUM-230	0 97	0 64	PCI/G
SC-37525-S	06/06/2000	URANIUM-238	1.105	2.21	PCI/G
SC-37526-S	04/14/1999	THORIUM-230	0.655	0.115	PCI/G
SC-37526-S	04/14/1999	URANIUM-238	2.7	5 4	PCI/G
SC-37528-C	06/06/2000	THORIUM-230	1.56	0 64	PCI/G
SC-37528-C	06/06/2000	URANIUM-238	1 06	2 12	PCI/G
SC-37601-S	06/06/2000	THORIUM-230	0 9	0 64	PCI/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37601-S	06/06/2000	URANIUM-238	1.065	2.13	PCI/G
SC-37601-U	08/10/2000	RADIUM-226	0.62	0.25	PCI/G
SC-37601-U	08/10/2000	RADIUM-228	1.04	0.37	PCI/G
SC-37601-U	08/10/2000	THORIUM-230	0.83	0.64	PCI/G
SC-37601-U	08/10/2000	URANIUM-238	1.075	2.15	PCI/G
SC-37602-U	08/10/2000	RADIUM-226	0.78	0.25	PCI/G
SC-37602-U	08/10/2000	RADIUM-228	1.3	0.36	PCI/G
SC-37602-U	08/10/2000	THORIUM-230	1.18	0.64	PCI/G
SC-37602-U	08/10/2000	URANIUM-238	1.215	2.43	PCI/G
SC-37603-S	07/21/2000	THORIUM-230	1.69	0.62	PCI/G
SC-37603-S	07/21/2000	URANIUM-238	1.2	2.4	PCI/G
SC-37605-C	06/06/2000	THORIUM-230	1.06	0.64	PCI/G
SC-37605-C	06/06/2000	URANIUM-238	1.05	2.1	PCI/G
SC-37605-S	06/06/2000	THORIUM-230	1.69	0.64	PCI/G
SC-37605-S	06/06/2000	URANIUM-238	1.16	2.32	PCI/G
SC-37606-S	06/06/2000	THORIUM-230	1.4	0.64	PCI/G
SC-37606-S	06/06/2000	URANIUM-238	1.05	2.1	PCI/G
SC-37607-S	06/06/2000	THORIUM-230	0.72	0.64	PCI/G
SC-37607-S	06/06/2000	URANIUM-238	1.15	2.3	PCI/G
SC-37608-S	06/06/2000	THORIUM-230	1.28	0.64	PCI/G
SC-37608-S	06/06/2000	URANIUM-238	1.14	2.28	PCI/G
SC-37609-S	06/06/2000	THORIUM-230	1.09	0.64	PCI/G
SC-37609-S	06/06/2000	URANIUM-238	1.155	2.31	PCI/G
SC-37610-S	05/20/2000	THORIUM-230	0.77	0.64	PCI/G
SC-37610-S	05/20/2000	URANIUM-238	1.015	2.03	PCI/G
SC-37611-S	05/20/2000	THORIUM-230	1.6	0.64	PCI/G
SC-37611-S	05/20/2000	URANIUM-238	1.145	2.29	PCI/G
SC-37612-S	05/20/2000	THORIUM-230	0.88	0.64	PCI/G
SC-37612-S	05/20/2000	URANIUM-238	1.085	2.17	PCI/G
SC-37613-S	05/20/2000	THORIUM-230	1.03	0.64	PCI/G
SC-37613-S	05/20/2000	URANIUM-238	1.14	2.28	PCI/G
SC-37614-S	07/21/2000	THORIUM-230	1.2	0.64	PCI/G
SC-37614-S	07/21/2000	URANIUM-238	1.285	2.57	PCI/G
SC-37615-S	07/21/2000	THORIUM-230	1.15	0.65	PCI/G
SC-37615-S	07/21/2000	URANIUM-238	1.215	2.43	PCI/G
SC-37616-S	07/21/2000	THORIUM-230	0.97	0.65	PCI/G
SC-37616-S	07/21/2000	URANIUM-238	1.135	2.27	PCI/G
SC-37617-S	07/21/2000	THORIUM-230	1.14	0.62	PCI/G
SC-37617-S	07/21/2000	URANIUM-238	1.255	2.51	PCI/G
SC-37618-C	03/07/2000	THORIUM-230	0.98	0.64	PCI/G
SC-37618-C	03/07/2000	URANIUM-238	1.11	2.22	PCI/G
SC-37620-C	06/06/2000	THORIUM-230	1.35	0.64	PCI/G
SC-37620-C	06/06/2000	URANIUM-238	1.15	2.3	PCI/G
SC-37621-C	06/06/2000	THORIUM-230	1.33	0.64	PCI/G
SC-37621-C	06/06/2000	URANIUM-238	1.14	2.28	PCI/G
SC-37622-C	06/06/2000	THORIUM-230	2.05	0.64	PCI/G
SC-37622-C	06/06/2000	URANIUM-238	1.155	2.31	PCI/G
SC-37623-C	05/20/2000	THORIUM-230	1.31	0.64	PCI/G
SC-37623-C	05/20/2000	URANIUM-238	1.005	2.01	PCI/G
SC-37624-C	05/20/2000	THORIUM-230	5.86	0.64	PCI/G
SC-37624-C	05/20/2000	URANIUM-238	1.43	2.26	PCI/G
SC-37625-C	05/20/2000	THORIUM-230	1.68	0.64	PCI/G
SC-37625-C	05/20/2000	URANIUM-238	1.055	2.11	PCI/G
SC-37626-S	05/20/2000	THORIUM-230	1.45	0.64	PCI/G
SC-37626-S	05/20/2000	URANIUM-238	7.02	2.38	PCI/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37627-S	07/21/2000	THORIUM-230	1.17	0 64	PCI/G
SC-37627-S	07/21/2000	URANIUM-238	1.275	2 55	PCI/G
SC-37628-S	07/21/2000	THORIUM-230	1.27	0.65	PCI/G
SC-37628-S	07/21/2000	URANIUM-238	1.195	2 39	PCI/G
SC-37629-S	07/21/2000	THORIUM-230	1.26	0 65	PCI/G
SC-37629-S	07/21/2000	URANIUM-238	1.17	2 34	PCI/G
SC-37630-S	07/21/2000	THORIUM-230	1 73	0.62	PCI/G
SC-37630-S	07/21/2000	URANIUM-238	1.2	2.4	PCI/G
SC-37631-C	05/20/2000	THORIUM-230	0.76	0.64	PCI/G
SC-37631-C	05/20/2000	URANIUM-238	1.12	2.24	PCI/G
SC-37632-C	07/21/2000	THORIUM-230	1.41	0.64	PCI/G
SC-37632-C	07/21/2000	URANIUM-238	1 06	2 12	PCI/G
SC-37701-S	07/21/2000	THORIUM-230	1.27	0.65	PCI/G
SC-37701-S	07/21/2000	URANIUM-238	1 13	2.26	PCI/G
SC-37701-U	08/10/2000	RADIUM-226	0.63	0.2	PCI/G
SC-37701-U	08/10/2000	RADIUM-228	1.25	0.34	PCI/G
SC-37701-U	08/10/2000	THORIUM-230	1.07	0 64	PCI/G
SC-37701-U	08/10/2000	URANIUM-238	1.08	2 16	PCI/G
SC-37702-S	07/21/2000	THORIUM-230	1.37	0 65	PCI/G
SC-37702-S	07/21/2000	URANIUM-238	0 97	1 94	PCI/G
SC-37702-U	08/10/2000	RADIUM-226	0.69	0 25	PCI/G
SC-37702-U	08/10/2000	RADIUM-228	1.14	0.37	PCI/G
SC-37702-U	08/10/2000	THORIUM-230	0.99	0 64	PCI/G
SC-37702-U	08/10/2000	URANIUM-238	2.15	1 93	PCI/G
SC-37703-C	07/21/2000	THORIUM-230	0.94	0 62	PCI/G
SC-37703-C	07/21/2000	URANIUM-238	1 14	2.28	PCI/G
SC-37703-S	07/21/2000	THORIUM-230	1 38	0 64	PCI/G
SC-37703-S	07/21/2000	URANIUM-238	1 13	2.26	PCI/G
SC-37704-S	07/21/2000	THORIUM-230	0.98	0 65	PCI/G
SC-37704-S	07/21/2000	URANIUM-238	1.14	2.28	PCI/G
SC-37705-S	07/21/2000	THORIUM-230	0 83	0 64	PCI/G
SC-37705-S	07/21/2000	URANIUM-238	1.055	2.11	PCI/G
SC-37706-S	07/21/2000	THORIUM-230	1.23	0 65	PCI/G
SC-37706-S	07/21/2000	URANIUM-238	1	2	PCI/G
SC-37707-S	07/21/2000	THORIUM-230	1.14	0 65	PCI/G
SC-37707-S	07/21/2000	URANIUM-238	1 145	2 29	PCI/G
SC-37708-S	07/21/2000	THORIUM-230	6 86	0 62	PCI/G
SC-37708-S	07/21/2000	URANIUM-238	1.1	2 2	PCI/G
SC-37708-S-RS	07/31/2000	THORIUM-230	1.06	0.65	PCI/G
SC-37709-S	07/19/2000	THORIUM-230	1.21	0 65	PCI/G
SC-37709-S	07/19/2000	URANIUM-238	1.05	2 1	PCI/G
SC-37710-S	07/19/2000	THORIUM-230	1.33	0 64	PCI/G
SC-37710-S	07/19/2000	URANIUM-238	1.385	2 77	PCI/G
SC-37711-S	07/21/2000	THORIUM-230	2.64	0.64	PCI/G
SC-37711-S	07/21/2000	URANIUM-238	0.975	1.95	PCI/G
SC-37712-S	07/21/2000	THORIUM-230	1.55	0.65	PCI/G
SC-37712-S	07/21/2000	URANIUM-238	0.985	1.97	PCI/G
SC-37713-S	07/21/2000	THORIUM-230	1	0.65	PCI/G
SC-37713-S	07/21/2000	URANIUM-238	1.13	2.26	PCI/G
SC-37714-S	07/21/2000	THORIUM-230	0.99	0.62	PCI/G
SC-37714-S	07/21/2000	URANIUM-238	1.15	2 3	PCI/G
SC-37715-S	07/21/2000	THORIUM-230	0.97	0 64	PCI/G
SC-37715-S	07/21/2000	URANIUM-238	1 155	2 31	PCI/G
SC-37716-S	07/21/2000	THORIUM-230	1 17	0 65	PCI/G
SC-37716-S	07/21/2000	URANIUM-238	1 12	2 24	PCI/G

WSSRAP_ID	DATE_SAM	PARAMETER	CONC	DL	UNITS
SC-37717-S	07/19/2000	THORIUM-230	0.99	0.64	PCI/G
SC-37717-S	07/19/2000	URANIUM-238	1.185	2.37	PCI/G
SC-37718-S	07/19/2000	THORIUM-230	1.09	0.65	PCI/G
SC-37718-S	07/19/2000	URANIUM-238	1.105	2.21	PCI/G
SC-37719-C	07/21/2000	THORIUM-230	1.3	0.65	PCI/G
SC-37719-C	07/21/2000	URANIUM-238	1.09	2.18	PCI/G
SC-37723-C	07/21/2000	THORIUM-230	3.32	0.62	PCI/G
SC-37723-C	07/21/2000	URANIUM-238	1.115	2.23	PCI/G
SC-38401-S	07/19/2000	THORIUM-230	1.1	0.62	PCI/G
SC-38401-S	07/19/2000	URANIUM-238	1.145	2.29	PCI/G
SC-38402-S	07/19/2000	THORIUM-230	0.95	0.64	PCI/G
SC-38402-S	07/19/2000	URANIUM-238	2.39	2.5	PCI/G
SC-38403-S	07/19/2000	THORIUM-230	0.95	0.64	PCI/G
SC-38403-S	07/19/2000	URANIUM-238	1.135	2.27	PCI/G
SC-38404-S	07/11/2000	THORIUM-230	1.01	0.65	PCI/G
SC-38404-S	07/11/2000	URANIUM-238	1.1	2.2	PCI/G
SC-38405-S	07/11/2000	THORIUM-230	1	0.62	PCI/G
SC-38405-S	07/11/2000	URANIUM-238	1.115	2.23	PCI/G
SC-38406-S	07/11/2000	THORIUM-230	1.06	0.64	PCI/G
SC-38406-S	07/11/2000	URANIUM-238	1.055	2.11	PCI/G
SC-38407-S	07/19/2000	THORIUM-230	0.96	0.65	PCI/G
SC-38407-S	07/19/2000	URANIUM-238	1.105	2.21	PCI/G
SC-38408-S	07/19/2000	THORIUM-230	0.92	0.62	PCI/G
SC-38408-S	07/19/2000	URANIUM-238	1.005	2.01	PCI/G
SC-38409-C	07/11/2000	THORIUM-230	0.89	0.64	PCI/G
SC-38409-C	07/11/2000	URANIUM-238	1.195	2.39	PCI/G
SC-38409-S	07/11/2000	THORIUM-230	0.83	0.65	PCI/G
SC-38409-S	07/11/2000	URANIUM-238	1.2	2.4	PCI/G
SC-38410-S	07/11/2000	THORIUM-230	1.07	0.62	PCI/G
SC-38410-S	07/11/2000	URANIUM-238	1.2	2.4	PCI/G
SC-38411-S	07/11/2000	THORIUM-230	1.23	0.64	PCI/G
SC-38411-S	07/11/2000	URANIUM-238	1.15	2.3	PCI/G
SC-38412-S	07/11/2000	THORIUM-230	0.81	0.64	PCI/G
SC-38412-S	07/11/2000	URANIUM-238	1.16	2.32	PCI/G
SC-38413-S	07/11/2000	THORIUM-230	0.71	0.65	PCI/G
SC-38413-S	07/11/2000	URANIUM-238	1.175	2.35	PCI/G

APPENDIX C
WP-437 RU023 Sample Location Coordinates

APPENDIX C WP-437 RU023 SAMPLE LOCATION COORDINATES

WSSRAP_ID	NORTHING	EASTING	ELEVATION
SC-37002-C	1042436.62	753739.49	657.19
SC-37002-C-01	1042436.78	753739.43	656.05
SC-37002-S	1042433.78	753718.95	660.80
SC-37002-S-01	1042434.05	753719.21	655.99
SC-37003-S	1042417.70	753747.53	660.64
SC-37003-S-01	1042418.14	753747.88	657.41
SC-37004-C*	1042404.01	753796.54	659.82
SC-37004-S	1042401.90	753776.39	661.19
SC-37004-S-01	1042401.68	753776.25	657.12
SC-37005-S	1042385.79	753804.97	662.11
SC-37007-C*	1042426.45	753697.10	662.66
SC-37007-S	1042421.16	753674.70	661.39
SC-37008-S	1042405.36	753702.82	661.81
SC-37009-S	1042389.04	753731.98	662.72
SC-37010-S	1042373.21	753760.77	662.67
SC-37011-S	1042366.31	753907.05	651.35
SC-37012-C	1042410.11	753654.95	659.97
SC-37013-S	1042392.51	753658.37	660.75
SC-37014-S	1042376.64	753686.98	661.74
SC-37015-C	1042367.01	753738.30	662.69
SC-37015-S	1042361.03	753715.61	662.89
SC-37016-S	1042344.27	753744.33	663.23
SC-37017-S	1042328.39	753772.99	662.93
SC-37020-C	1042378.70	753667.83	661.43
SC-37022-C	1042344.70	753725.60	660.88
SC-37024-C	1042311.99	753782.95	663.32
SC-37101-C	1042372.38	753853.72	660.16
SC-37101-S	1042369.65	753833.57	661.88
SC-37102-S	1042353.84	753862.51	662.04
SC-37103-C*	1042339.53	753910.84	659.04
SC-37103-S	1042337.87	753890.98	658.95
SC-37104-S	1042321.25	753919.18	659.57
SC-37104-S-RS*	1042321.39	753919.51	658.46
SC-37105-C	1042307.53	753968.05	661.69
SC-37105-S	1042305.44	753948.08	663.99
SC-37106-S*	1042289.34	753976.77	662.67
SC-37107-S	1042341.01	753817.59	663.07
SC-37108-S	1042325.09	753846.50	662.74
SC-37109-S	1042309.39	753874.94	662.27
SC-37109-S-RS*	1042308.79	753874.86	661.53
SC-37110-S	1042292.89	753903.57	660.23
SC-37111-S*	1042276.74	753932.11	665.64
SC-37112-C*	1042267.01	753983.07	663.45
SC-37112-S*	1042260.71	753960.74	664.75
SC-37113-S	1042312.64	753801.64	663.47
SC-37114-S	1042296.63	753830.33	662.78
SC-37115-S	1042280.38	753858.83	663.86
SC-37116-S	1042264.15	753887.54	662.97
SC-37117-S-RS	1042248.02	753916.12	663.31
SC-37118-S-RS	1042232.16	753944.70	662.64

APPENDIX C WP-437 RU023 SAMPLE LOCATION COORDINATES

SC-37120-C	1042280.28	753840.24	663.73
SC-37122-C	1042247.67	753897.61	663.78
SC-37124-C*	1042215.68	753954.34	665.97
SC-37202-C	1042304.13	754116.48	656.57
SC-37202-S	1042298.29	754094.71	657.00
SC-37203-C	1042288.31	754145.32	654.68
SC-37203-S	1042282.83	754122.94	657.34
SC-37204-S-RS2	1042266.56	754152.23	654.44
SC-37206-S	1042269.84	754078.63	658.71
SC-37207-S	1042253.92	754107.31	658.92
SC-37208-S	1042237.97	754135.32	656.87
SC-37209-C	1042274.96	754025.21	658.69
SC-37209-S*	1042273.31	754005.40	661.89
SC-37210-C	1042260.12	754055.73	660.13
SC-37210-S	1042257.24	754034.01	660.14
SC-37211-S	1042241.15	754062.83	660.89
SC-37212-S	1042224.81	754091.14	660.27
SC-37213-S	1042208.93	754119.78	657.98
SC-37214-S*	1042244.68	753989.37	663.18
SC-37215-S	1042228.72	754017.76	661.35
SC-37216-S	1042212.59	754046.77	661.73
SC-37217-S	1042196.57	754075.45	662.08
SC-37218-S	1042180.30	754104.07	659.02
SC-37219-S*	1042216.06	753973.34	665.15
SC-37220-S	1042199.97	754001.89	662.28
SC-37221-S	1042184.07	754030.63	662.13
SC-37222-C	1042174.09	754081.58	660.42
SC-37222-S	1042168.03	754059.03	662.21
SC-37223-C	1042156.60	754100.18	659.38
SC-37223-S	1042151.78	754087.80	659.30
SC-37224-C	1042199.74	753983.13	663.18
SC-37226-C	1042167.39	754039.99	662.50
SC-37301-C*	1042608.63	754368.59	652.12
SC-37302-S	1042594.11	754373.33	654.25
SC-37303-S	1042578.42	754402.64	652.86
SC-37304-S	1042561.76	754430.04	651.46
SC-37306-S	1042565.47	754356.77	653.71
SC-37307-S	1042549.68	754385.96	649.11
SC-37308-C	1042539.84	754436.77	648.52
SC-37308-S	1042533.68	754414.66	645.84
SC-37309-C	1042556.73	754339.07	651.62
SC-37310-S	1042536.80	754341.04	653.62
SC-37311-S	1042520.80	754369.78	646.34
SC-37312-S	1042505.41	754398.36	649.03
SC-37314-S	1042508.19	754324.91	654.14
SC-37315-S	1042491.28	754354.14	648.43
SC-37316-C	1042482.49	754404.59	646.52
SC-37316-S	1042476.28	754382.50	649.11
SC-37317-C	1042499.12	754307.32	651.77
SC-37318-S	1042479.31	754308.71	654.28
SC-37319-S	1042463.80	754338.01	650.32
SC-37320-S	1042447.18	754366.17	647.01
SC-37322-S	1042450.98	754292.85	653.63

APPENDIX C WP-437 RU023 SAMPLE LOCATION COORDINATES

SC-37323-S	1042434.53	754321.79	654.46
SC-37324-C	1042425.52	754372.67	648.73
SC-37324-S	1042418.35	754350.48	653.00
SC-37401-S	1042545.66	754459.03	651.68
SC-37401-U	1042394.18	754514.08	655.79
SC-37402-S	1042530.34	754487.37	652.02
SC-37402-U	1042381.36	754512.78	655.84
SC-37403-C*	1042513.11	754534.42	656.51
SC-37403-S	1042513.93	754516.33	652.53
SC-37403-U	1042352.19	754527.47	655.93
SC-37404-S	1042497.77	754544.64	652.72
SC-37404-U	1042356.29	754538.57	656.70
SC-37405-S	1042517.39	754443.28	648.64
SC-37405-U	1042382.40	754555.21	655.14
SC-37406-S	1042501.44	754471.87	648.87
SC-37406-U	1042371.04	754534.40	655.79
SC-37407-S	1042485.46	754500.76	649.52
SC-37408-S	1042469.36	754529.25	651.72
SC-37408-S-RS	1042468.96	754529.05	649.78
SC-37409-S	1042488.81	754426.93	648.16
SC-37410-S	1042472.75	754455.69	648.67
SC-37411-S	1042456.70	754484.17	648.87
SC-37412-S	1042440.72	754512.49	650.87
SC-37413-S	1042460.03	754410.79	647.84
SC-37414-C	1042450.51	754461.83	648.61
SC-37414-S	1042444.35	754439.54	648.34
SC-37415-S	1042427.88	754468.15	649.16
SC-37416-S	1042411.41	754496.35	650.13
SC-37417-S	1042431.73	754394.89	648.13
SC-37418-S	1042415.40	754423.66	649.01
SC-37419-S	1042399.20	754452.10	650.95
SC-37420-C	1042391.39	754502.47	653.41
SC-37420-S	1042383.49	754480.88	654.22
SC-37421-S	1042402.80	754378.76	653.42
SC-37422-C	1042393.09	754430.04	651.39
SC-37422-S	1042387.02	754407.47	653.51
SC-37423-S	1042370.85	754436.33	652.87
SC-37424-S	1042407.68	754618.99	654.36
SC-37425-S	1042413.84	754603.11	654.05
SC-37426-S	1042426.69	754585.90	653.30
SC-37427-S	1042406.45	754582.48	653.87
SC-37428-S	1042430.44	754608.37	653.99
SC-37429-S	1042425.30	754634.10	654.56
SC-37430-S	1042439.25	754620.92	654.58
SC-37431-S	1042447.81	754599.67	654.23
SC-37432-S	1042444.80	754585.04	653.77
SC-37433-S	1042462.17	754580.09	653.98
SC-37434-S	1042376.12	754559.88	653.61
SC-37435-S	1042362.34	754552.54	654.39
SC-37436-S	1042358.76	754491.84	657.04
SC-37437-S	1042391.39	754502.47	653.41
SC-37438-S	1042405.63	754511.32	653.62
SC-37501-C	1042683.11	754298.16	644.77

APPENDIX C WP-437 RU023 SAMPLE LOCATION COORDINATES

SC-37502-S	1042670.65	754303.33	645.35
SC-37504-C	1042651.03	754304.69	646.11
SC-37504-S	1042641.90	754286.92	645.94
SC-37504-S-RS	1042643.12	754285.65	644.60
SC-37505-C	1042632.44	754270.65	645.00
SC-37506-S	1042613.38	754271.01	646.16
SC-37508-S	1042584.67	754254.94	646.78
SC-37510-C	1042564.48	754257.69	647.68
SC-37510-S	1042556.29	754238.98	647.47
SC-37511-C	1042546.13	754223.52	647.28
SC-37511-C-RS	1042548.27	754224.55	646.46
SC-37512-S	1042527.49	754222.93	648.38
SC-37514-C	1042505.20	754228.71	649.37
SC-37514-S	1042498.87	754207.00	649.64
SC-37515-S*	1042482.87	754235.52	650.00
SC-37517-S	1042470.28	754190.86	650.31
SC-37518-S*	1042454.25	754219.49	650.15
SC-37519-C	1042459.75	754176.74	649.79
SC-37520-S	1042441.70	754174.70	650.54
SC-37521-S	1042425.98	754203.55	652.40
SC-37522-C	1042411.38	754247.43	652.31
SC-37522-S*	1042409.59	754232.09	653.64
SC-37524-S	1042413.13	754159.00	652.14
SC-37525-S	1042397.21	754187.47	653.38
SC-37526-S*	1042380.97	754216.06	654.90
SC-37528-C	1042397.19	754168.50	650.84
SC-37601-S	1042393.60	754260.60	654.16
SC-37601-U	1042082.58	754660.95	646.32
SC-37602-U	1042056.80	754634.99	645.35
SC-37603-S	1042233.10	754547.15	657.30
SC-37605-C	1042370.58	754265.33	655.63
SC-37605-S	1042365.28	754244.89	655.76
SC-37606-S	1042347.28	754274.14	656.62
SC-37607-S	1042332.80	754302.13	656.68
SC-37608-S	1042317.08	754330.82	656.95
SC-37609-S	1042300.70	754358.96	657.52
SC-37610-S	1042284.73	754387.97	658.17
SC-37611-S	1042268.82	754416.55	658.88
SC-37612-S	1042252.50	754445.09	659.57
SC-37613-S	1042236.98	754473.69	659.51
SC-37614-S	1042220.76	754502.13	659.40
SC-37615-S	1042207.52	754531.07	658.04
SC-37616-S	1042190.42	754560.23	657.86
SC-37617-S	1042174.03	754588.69	656.74
SC-37618-C*	1042349.45	754254.77	653.82
SC-37620-C	1042317.64	754312.25	655.87
SC-37621-C	1042301.89	754340.78	657.10
SC-37622-C	1042285.95	754369.45	657.65
SC-37623-C	1042269.95	754398.15	658.46
SC-37624-C	1042254.10	754426.84	659.34
SC-37625-C	1042230.43	754452.97	659.90
SC-37626-S	1042208.18	754457.70	660.16
SC-37627-S	1042192.02	754486.32	659.86

APPENDIX C WP-437 RU023 SAMPLE LOCATION COORDINATES

SC-37628-S	1042176.10	754514.77	659.63
SC-37629-S	1042158.64	754545.62	657.84
SC-37630-S	1042145.09	754572.96	655.86
SC-37631-C	1042209.13	754442.39	660.59
SC-37632-C	1042194.75	754468.51	660.06
SC-37701-S	1042185.31	754633.04	657.39
SC-37701-U	1042108.38	754659.77	648.43
SC-37702-S	1042168.58	754663.94	656.94
SC-37702-U	1042075.75	754695.21	651.26
SC-37703-C	1042163.91	754637.35	657.72
SC-37703-S	1042158.51	754617.73	657.75
SC-37704-S	1042141.95	754645.79	658.11
SC-37705-S	1042126.46	754675.07	658.31
SC-37706-S	1042109.40	754703.45	658.94
SC-37707-S	1042090.78	754732.83	659.23
SC-37708-S	1042075.87	754759.50	659.66
SC-37708-S-RS	1042076.41	754759.88	658.40
SC-37709-S	1042060.33	754788.68	660.63
SC-37710-S	1042044.40	754817.28	660.71
SC-37711-S	1042126.31	754602.32	657.81
SC-37712-S	1042112.93	754630.08	658.56
SC-37713-S	1042097.42	754659.04	658.79
SC-37714-S	1042080.96	754687.14	658.95
SC-37715-S	1042065.27	754715.60	659.53
SC-37716-S	1042048.34	754742.44	659.65
SC-37717-S	1042031.83	754772.56	660.62
SC-37718-S	1042015.75	754801.31	660.70
SC-37719-C	1042115.26	754614.73	658.47
SC-37723-C	1042052.94	754727.66	659.87
SC-38401-S	1042028.47	754845.78	660.76
SC-38402-S	1042012.47	754875.06	660.78
SC-38403-S	1041996.45	754903.98	660.42
SC-38404-S	1041980.80	754931.96	658.82
SC-38405-S	1041964.20	754960.41	658.43
SC-38406-S	1041949.36	754988.24	656.91
SC-38407-S	1041999.93	754829.84	660.52
SC-38408-S	1041983.71	754858.36	660.32
SC-38409-C	1041974.36	754909.59	659.05
SC-38409-S	1041967.52	754887.01	659.00
SC-38410-S	1041951.70	754915.74	657.82
SC-38411-S	1041935.58	754944.32	650.03
SC-38412-S	1041919.55	754973.02	655.60
SC-38413-S	1041903.37	755001.52	648.77

* elevations taken from the final asbuilts.

APPENDIX D
Interoffice Correspondence

MORRISON KNUDSEN CORPORATION
MK-FERGUSON GROUP

INTER-OFFICE CORRESPONDENCE

DATE: April 27, 1999

TO: Dan Hoffman

FROM: Dave Cowell DC

SUBJECT: **RA-226 RECOUNTS**

In an effort to eliminate repetitive work, the on-site lab performed a study to determine if recounts 30 days after sealing sample cans was necessary for samples that have background or near background Ra-226 concentrations. As a result of the study, the lab will now only perform Ra-226 recounts for samples that fail the Radium ALARA preliminary calculation.

This calculation will involve multiplying the Ra-226 result by a correction factor of 2.27 (established in an IOC dated 11/17/95) and adding it to the Ra-228 result. If this result is greater than 5 pCi/g then that sample will be held and recounted 30 days later with the intention of reducing the final reported value.

This approach is conservative because the correction factor of 2.27 was established using samples with concentrations of up to 8 pCi/g. Samples having near background concentrations of Ra-226 do not ingrow to that level. Additionally, the correction factor was intended identify samples with Ra-226 levels that could exceed 5 pCi/g and did not account for the contribution from Ra-228, which we will include in this new calculation.

The attached page is included to illustrate the results of the study.

DC/jn

Attachment

Cc: Jim Meier
Steve Warren
Dave Hixson
John Coniglio
Melissa Lutz
Randy Thompson

Form 238-A 09/92

MORRISON KNUDSEN CORPORATION

MK-FERGUSON GROUP

INTER-OFFICE CORRESPONDENCE

DATE: November 20, 1995

TO: ALARA Committee

FROM: Richard Machado/Michelle French MF

SUBJECT: **TH232 DETERMINATION FOR SITE CONFIRMATION SAMPLES**

Th232 can occur in two forms at the site: (1) naturally and (2) processed to purify Th232. Both of these forms are subject to the same transformation equation. Given a Th232 half life of 1.39×10^{10} years and a Ra228 half life of 5.75 years, a condition known as secular equilibrium occurs. Secular equilibrium occurs when the half life of the parent is very much greater than that of the daughter. If an initially pure parent (Th232) is formed, its radioactive transformation will result in accumulation of the daughter (Ra228). Since the daughter (Ra228) decays very much faster than the parent (Th232), a point is soon reached at which the amount of parent (Th232) present is equal to that of the daughter (Ra228).

The equation that represents this condition of secular equilibrium is:

$$Q_B = Q_A (1 - e^{-\lambda_B t})$$

where Q_A=parent (Th232) activity, Q_B=daughter (Ra228) activity, t=time since placement of material, and λ_B=decay constant for daughter (Ra228). Therefore, the fraction of daughter activity to parent activity

$$\left(\frac{A(RA\text{-}228)}{A(Th\text{-}232)}\right)$$

present at the WSSRAP in 1995 can be calculated.

Assume that production ceased at the site on January 1, 1965, and that all Th232 was produced on that very last day (t=30.9 years). Given a half life for Ra228 of 5.75 years, the decay constant would equal

$$(\lambda_B = 0.121\ Y^{-1})$$

Given this information, the ratio of Ra228 activity to Th232 activity can be calculated as follows:

$$\frac{Q_B}{Q_A} = \frac{A\,(Ra\text{-}228)}{A\,(Th\text{-}232)} = 1 - e^{-\lambda_B t}$$

$$\frac{A\,(Ra228)}{A\,(Th232)} = 1 - e^{-(0.121Y^{-1})\,(30.9Y)} = 1 - 0.024 = 0.976$$

$$\therefore \frac{A\,(Ra\text{-}228)}{A\,(Th\text{-}232)} = 0.976 \quad or \quad A\,(Th\text{-}232) = 1.025\,A\,(Ra\text{-}228)$$

This representation will be true for both naturally occurring Th232 and processed Th232. The other situation to be addressed includes the circumstance when Ra228 and associated decay products were placed as a waste material after purification of Th232. In this situation, the amount of Ra228 present will be much greater than the Th232 present. This information is illustrated in a previous assessment of the ratio of Ra228 concentrations to that of Th232 in raffinate pit wastes. The average ratio was reported as 7.02 in the *Concentration Ratios of Radionuclides* in the U238, U235, and Th232 *Decay Series* (DOE/OR/21548-250), indicating that the average activity concentration for Th232 is 0.14 of the activity concentration for Ra228.

The Record of Decision states that if Th232 and Ra228 are present and not in secular equilibrium, the cleanup criteria apply for the radionuclide with the higher concentration. Thus, for determination of successful cleanup, the use of a Ra-228 ALARA goal of 4.88 pCi/g and a criteria of 6.05 pCi/g will result in removing Th232 to within 5 pCi/g (ALARA) and 6.2 pCi/g (criteria), respectively.

Given this practice, it is recommended that the on-site radiological analyses for Ra-228 concentrations in soil be used to determine attainment of Th-232 cleanup. It is also recommended that 2% of the samples (1 of every 50) that are independently analyzed via an off-site facility be used as a quality check for all radionuclides of interest (U238, Th230, Th232, Ra228, and Ra226). In addition, these numbers should be summarized in post remediation reports for each work package to support the decision to use Ra228 to determine successful cleanup of Th232.

RM/MF/jn

Distribution: ALARA Committee

Steve Warren
Ken Meyer
Ken Greenwell
Jim Meier

Alternates:
Marj Wesley
Jack Cooney
Dan Hoffman
Melissa Lutz

MORRISON KNUDSEN CORPORATION

MK-FERGUSON GROUP

INTER-OFFICE CORRESPONDENCE

DATE: November 17, 1995

TO: ALARA Committee

FROM: Michelle French/Richard Machado

SUBJECT: **RA-226 DETERMINATION FOR SITE CONFIRMATION SAMPLES**

Background

The issue surrounding Ra-226 analysis via gamma spectroscopy arises due to the fact that the Ra-226 soil concentration is determined by using the following energy peaks: 295 keV and 352 keV for Pb-214; and 609 keV, 1120 keV, and 1764 keV for Bi-214. These radionuclides are both short-lived daughters of Rn-222. The drying and grinding processes are known to drive off Rn-222 that is trapped in the soil pores and moisture held in the soil. In order to quantitatively identify Ra-226 using gamma spectroscopy, Rn-222 and its short-lived progeny must be allowed to grow into secular equilibrium following such sample preparation techniques. The following alternatives were evaluated for estimating the Ra-226 concentration in soil given gamma spectroscopy analysis within five working days of sample collection.

Alternative 1

Send all samples requiring Ra-226 analysis to an offsite laboratory. At offsite facilities, Ra-226 is typically analyzed through alpha spectroscopy which does not rely on the Ra-222 daughter products to provide a quantitative result. The minimum turnaround time that can be provided for alpha spectroscopy analysis for Ra-226 is four days. At one and two day turnaround times, the method for analysis is modified to use Gas Flow Proportional Counting for total alpha counting yielding a total radium number with no separation of isotopic contributions. Given the four day turnaround time and an estimate of 750 samples (WP-253 and WP-420), the total analytical costs will be $95,250.

The major disadvantage in this approach is the tight schedule involved with sample collection, packaging, shipping, data receipt, data review, and ALARA committee action. It may be impossible to accomplish this within five working days given the four day turnaround requirement.

Alternative 2

As stated above, the drying and grinding processes are known to drive off radon that is trapped in the soil matrix. However, the amount of radon removed from these processes is not quantified. If you were to assume that all the radon is removed during these processes and the time of final preparation was recorded, a correction factor can be applied based upon the secular equilibrium condition equation. For example, the following table summarizes the ratio of activity of Rn-222 to the activity of Ra-226.

A(Rn-222)/A(Ra-226)	Time Post Canning (Days)
0.167	1
0.306	2
0.422	3
0.665	6
0.807	9
0.888	12
0.935	15
0.963	18
0.978	21
0.987	24
0.993	27
0.996	30

Thus, if the samples were counted three days post canning, a correction factor of 0.422 would be used to determine the estimated final Ra-226 concentration. Given this approach, any concentration determined three days post preparation would be divided by 0.422 to arrive at the final concentration. For a 5 pCi/g ALARA goal, any result above 2.1 pCi/g would be rejected.

The major limitation with this approach is the assumption that the drying and grinding processes remove 100% of the radon. Samples that have been analyzed within one day of preparation have never yielded results much below expected background concentrations (0.8-1.0 pCi/g).

Thus, the use of a correction factor on the order of 0.167 could result in a very conservative approach for estimating the final Ra-226 soil concentration in background soils (in fact all samples analyzed one day after canning would equal or exceed 5 pCi/g).

Alternative 3

All samples that are collected to support confirmation can be analyzed as wet samples to virtually eliminate the radon removal that occurs during sample preparation. However, there are numerous considerations, such as sample homogeneity, particle size, moisture content variability, etc., that can produce error in such analyses. If the samples are analyzed wet, they would also be prepared and analyzed to provide final concentrations for each radionuclide of interest for the sample. This dry evaluation would require an analysis within the confirmation cleanup turnaround period and a second analysis within 20-30 days later to finalize Ra-226 concentrations to an acceptable quality level. This approach would involve three analyses of every sample. The initial wet analysis can be used to estimate the final Ra-226 concentration. However, this estimate must be made on a case by case basis through moisture corrections, etc.

The major limitation for this approach is the reduction in lab productivity as an extra canning effort would be needed to generate a wet and a dry sample for each sample and count time for each sample would increase by a factor of three.

Alternative 4

Over the last several months, the onsite radiological laboratory has been recounting samples that were analyzed during the months of April - September 1995. These reanalyses were done in order to support final analyses of SE Drainage and Quarry characterization samples. The graph on the attached page illustrates a portion of the recount results versus the initial results. The graph includes those samples that had initial Ra-226 results < 5 pCi/g. As illustrated, the background - 2.2 pCi/g sample range had 100% of all sample recounts fall less than 5 pCi/g. For those in the range of 2.2 - 3.2 pCi/g, the likelihood of exceeding 5 pCi/g was approximately 50%. All of the samples with initial results greater than 3.2 pCi/g had final Ra-226 results > 5 pCi/g.

This information can be used to establish a criteria about which samples can be said to meet the ALARA goal of 5 pCi/g within the five working day turnaround window.

Given the current study findings, it is recommended that any sample with an initial Ra-226 result > 2.2 pCi/g be expected to exceed the ALARA goal of 5 pCi/g. In addition, the estimated final Ra-226 soil concentration should be found by multiplying the initial result by 2.27 (2.2 pCi/g x 2.27 = 5 pCi/g). This correction factor is very close to the maximum increase from initial results to recount results (e.g., 2.56) in the background to 2.2 pCi/g concentration range. The average increase from initial results to recount results for this range was 1.51. However, use of a value closer to the maximum value affords less risk in exceeding expected confirmation goals. The laboratory will work to refine these numbers to further minimize the risk as they continue to recount samples collected over the last few months. The major limitation with this alternative is the potential to over excavate, increasing disposal costs.

Alternative 5

This alternative involves a combination of alternatives 3 and 4. Samples that do not have elevated direct survey results via a 2x2 NaI or a 44-9 survey should be prepared and evaluated in accordance with alternative 4. Samples that do have above background survey results will be analyzed wet and evaluated accordingly to determine the estimated final Ra-226 concentration. The sample will then be prepared and analyzed a second time to provide quality level data for the other radionuclides of interest. In addition, each prepared sample would be analyzed within 30 days after preparation to finalize the Ra-226 concentration to an acceptable quality level.

The major limitation with this approach is the loss in productivity as a result of the double canning needs and increased count times for a portion of the samples.

Recommendation

The Onsite Radiological Laboratory recommends the use of alternative 4. This alternative minimizes risk of failing to meet expected cleanup ALARA goals and provides for maximum efficiency/productivity within the laboratory. The second favorable alternative is number 5. This alternative would increase the workload in the laboratory, but would further reduce the risk of over excavation and failure to meet desired cleanup objectives.

In all of the above alternatives, the estimated final Ra-226 concentration will be used in conjunction with the measured Ra-228 concentration as follows to determine if the mixture rule for the ALARA goals as described in the Record of Decision is achieved.

$$\frac{\text{Est. Final Ra-226 (pCi/g)}}{5\ \text{pCi/g}} + \frac{\text{Ra-228 (pCi/g)}}{5\ \text{pCi/g}} = \text{Mixture Ratio}$$

If mixture ratio <= 1, then the sample meets cleanup confirmation design. If mixture ratio > 1, then the sample must be considered by the ALARA committee.

MLF/RM/pr

Attachment

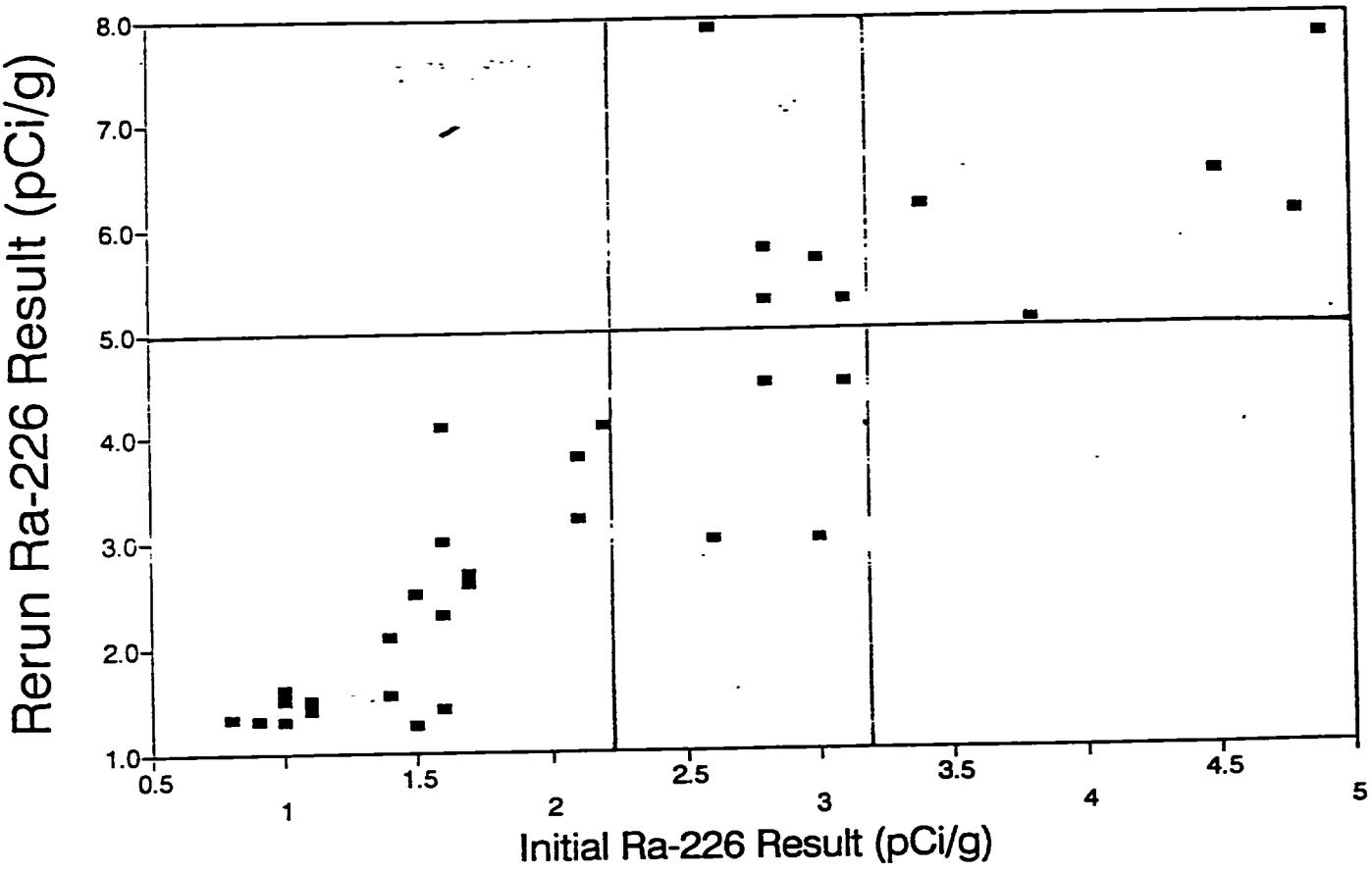
Distribution:

Ken Meyer	Alternates:	Marj Wesley
Steve Warren		Jack Cooney
Ken Greenwell		Dan Hoffman
Jim Meier		

cc: Melissa Lutz

Ra226 Concentration Range

Background - 5.0 pCi/g



APPENDIX E
Supplemental Information for CU374

CU 374 is within the footprint of the Chemical Stabilization and Solidification (CSS) Plant. This plant processed raffinate (whose primary radiological Contaminant of Concern was Th-230) and produced a contaminated grout which was pumped directly into the Disposal Cell. During remediation, it was decided that decontamination of the concrete pads associated with the CSS facility would be attempted. The concrete pads included the 5,340 ft^2 (496 m^2) mixer pad, two hydraulic pump pads of 189 ft^2 (17.5 m^2) each, and a 714 ft^2 (66 m^2) portion of the stair tower pad. For radiological survey purposes the mixer pad was subdivided into 3 sections (south, central, and north slabs) separated by drain channels transecting the entire pad from west to east. See Figure E-1 for locations and layouts of these pads.

Post-decontamination radiological surveys for total beta-gamma and total & removable alpha surface contamination were performed on these pads once they were dry and cleaned of all loose dirt and debris. Radiological surveys were performed using Geiger-Müeller (GM) (for beta-gamma activity) and alpha scintillation detectors which were calibrated and operated in accordance with WSSRAP Standard Operating Procedure ES&H 2.4.1, *Calibration and Use of Portable Radiological Survey Instruments*. Total beta-gamma and total & removable alpha surface contamination measurements were collected in accordance with WSSRAP Department Instruction ES&HDI-110, *Radiological Contamination Surveys*. Concrete surfaces were scanned for alpha and beta-gamma activity, and 1-minute fixed point measurements were obtained wherever technicians identified areas which appeared to exhibit at least: 1 count per minute (cpm) alpha activity or twice background beta-gamma activity.

The complete radiological survey report for the CSS concrete pad surface contamination survey is included in this appendix. Maximum total beta-gamma activity was 910 dpm/100 cm^2, and maximum removable alpha activity was 16 dpm/100 cm^2. Post-decontamination total alpha survey results are summarized below:

CSS Pad Area	Number of Measurements	Total Alpha (dpm/100 cm^2)		
		Min	Max	Average*
Mixer-South	50	24	402	133
Mixer-Central	43	<19	300	41
Mixer-North	53	<19	102	27
Mixer-South Drain	7	<19	210	56
Mixer-North Drain	5	<19	90	46
Hydraulic Unit A	9	<19	54	26
Hydraulic Unit B	9	<19	30	15
Stair Tower	32	<19	156	28

*: Averaged over entire area, not over 1 m^2.

After a number of decontamination and survey efforts of the CSS concrete pads, it was found that total alpha surface contamination levels were not being reduced to below the Th-230 unrestricted use release guidelines found in Table 1 of *Response to Questions and Clarification of Requirements and Processes: DOE 5400.5, Section II.5 and Chapter IV Implementation (Requirements Relating to Residual Radioactive Material)*, DOE Assistant Secretary for Environment, Safety, and Health, Office of Environmental Policy

and Assistance (EH-41), November 17, 1995†. These total and removable alpha surface contamination guidelines are:

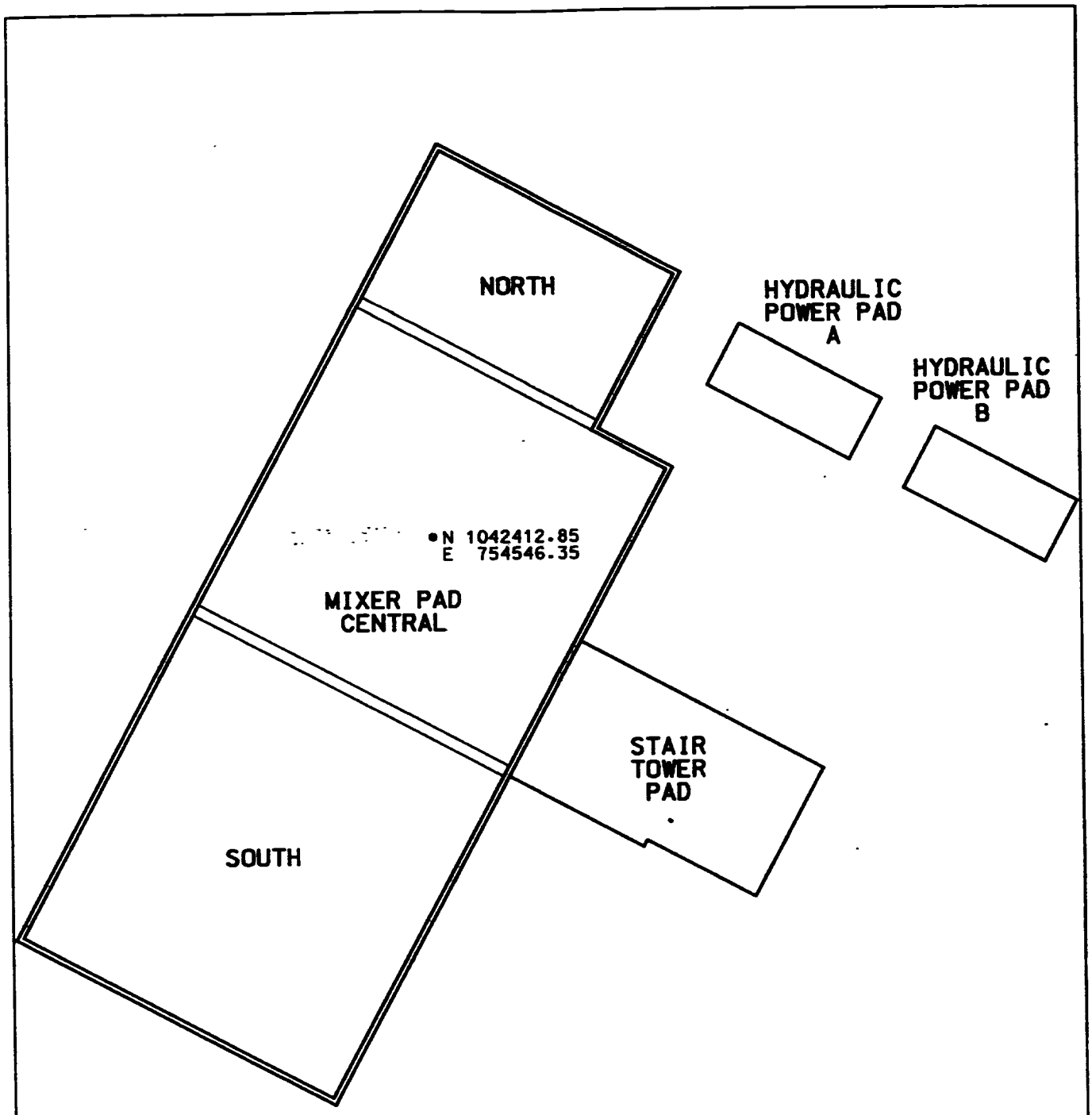
Alpha Result	Guideline (dpm/100 cm^2)	Applicable Area
Total - Average	100	Not more than 1 m^2
Total - Maximum	300	Not more than 100 cm^2
Removable	20	100 cm^2

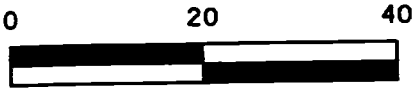
†: These guidelines are used because DOE Order 5400.5 Figure IV-1 lists Th-230 surface contamination guidelines as "Reserved".

However, radiological survey results do show that surface total and removable alpha activity on the CSS concrete pads is below the DOE 10 CFR 835 Appendix D Th-230 Surface Contamination Values. (No area would exceed the 10 CFR 835 Appendix D Th-230 average Total Surface Contamination Value, even though results were not averaged over 1 m^2, because the maximum total alpha activity found was 402 dpm/100 cm^2, which is below the required average of 500 dpm/100 cm^2 found in 10 CFR 835 Appendix D.). Radiological survey results also show total beta-gamma surface activity to be below both 10 CFR 835 Appendix D and DOE Order 5400.5 Figure IV-1 values for U-238 and associated decay products.

During an ALARA Committee meeting on July 8, 1999, the above information was presented. It was agreed that the contamination limits of 10 CFR 835 would be applied for release of material to controlled areas and that the concrete pads would remain subsurface and under a minimum of 2 ft of clean material. Additionally, it was requested that samples of the concrete be collected for additional documentation. (Six biased concrete samples were collected from areas with elevated readings. These samples were analyzed for Th-230. Results ranged between 1.90 – 3.56 pCi/g, with an average of 2.47 pCi/g). Based upon the above information, the following statements apply:

- the CSS concrete pads can not be released for unrestricted use;
- the contamination levels were only reduced to below the DOE 10 CFR 835 Appendix D Th-230 Surface Contamination Values (i.e. total average and maximum values of 500 and 1,500 dpm/100 cm^2 respectively, and removable values of 20 dpm/100 cm^2);
- the entire in-place pad surface area would remain a DOE-controlled area and would be included in the *Institutional Controls Plan for the Weldon Spring Site*.





CSS CONCRETE FOUNDATIONS

FIGURE E-1

REPORT NO.: DOE/OR/21548-898	EXHIBIT NO.: A/RP/002/1001	
ORIGINATOR: DF	DRAWN BY: GLN	DATE: 10/26/01

WELDON SPRING SITE REMEDIAL ACTION PROJECT

RADIOLOGICAL SURVEY REPORT

DESCRIPTION: CSS Concrete Slab (See Diagram)

DATE: 7-09-99 TIME: 1000 WP No: 437

PURPOSE OF SURVEY (For Release Surveys Include Recipient): FOR

INSTRUMENT DATA

Inst. Manual(s): [ ] Eberline [X] Bicron [X] Ludlum [ ] _____ [ ] _____

Instrument Type(s): [ ] RSO-5 [ ] RO-20 [ ] µR [ ] _____

Meters: [X] 2220/2221 [X] 2000/2200 [X] Model 3/12 [ ] Model 16 [ ] 177 [ ] Model 19

Detectors: [X] 44-9 [ ] 44-40 [ ] A-50 [X] 43-90 [X] 43-10 [ ] 43-5 [ ] _____

	Serial Number:	Cal Due Date:	Designation:	Corr. Factor:
Total Activity:				
Meter:	94157	12-01-99	"EE"	35
Detector:	093978	12-31-99	Bkg: 31 cpm	
Meter:	154209	5-14-00	"K"	6
Detector:	151469	12-21-99	Bkg: 0.87 x 115 cpm	
Removable α Activity:				
Meter:	1019	8-27-99	"4198u"	4
Detector:	4198	12-10-99	Bkg: 0.26 cpm	

Dose Rate Meter Serial No.: _____ Cal Due Date _____

SURVEY RESULTS

Sample No.	Description/Location	Net CPM βγ Total	dpm/100cm² βγ Total	Net CPM α Removable	dpm/100cm² α Removable	Net CPM α Total	dpm/100cm² α Total	mrem/hr or uR/hr
1	South Slab - MIXER PAD	6	< 1000	0	< 20	34	< 500	
2	"	11	< 1000	0	< 20	51	< 500	
3	"	13	< 1000	3	< 20	21	< 500	
4	"	0	< 1000	0	< 20	37	< 500	
5	"	0	< 1000	1	< 20	36	< 500	
6	"	10	< 1000	2	< 20	24	< 500	N/A
7	"	15	< 1000	0	< 20	6	< 500	
8	"	3	< 1000	0	< 20	13	< 500	
9	"	0	< 1000	0	< 20	7	< 500	
10	"	0	< 1000	0	< 20	25	< 500	

STANDARDIZED DETECTOR EFFICIENCIES AND CORRECTION FACTORS:

44-9	44-40	A-50	43-5	43-90	43-10
Eff = 18.45%	Eff = 16.1%	Eff = 15.45%	Eff = 10.5%	Eff = 13.3%	Eff = 24.5%
CF = 35	CF = 40	CF = 13	CF = 13	CF = 6	CF = 4

REMARKS: The Central and South Slabs were released to a controlled area in accordance with 10 CFR 835 for Thorium-230, of which all points surveyed were < 500 dpm for total alpha.

TECHNICIAN(S) SIGNATURE/DATE: Jonathan Rankin / 07-09-99

REVIEWER SIGNATURE/DATE: Robert D Foley 17-14-99

WELDON SPRING SITE REMEDIAL ACTION PROJECT

RADIOLOGICAL SURVEY REPORT (Optional Supplement)

DESCRIPTION: CSS Concrete Slab (See Diagram)

DATE: 07-09-99 TIME: 1000 WP No: 437

SURVEY RESULTS

Sample No.	Description/Location	Net CPM βγ Total	dpm/100cm² βγ Total	Net CPM α Removable	dpm/100cm² α Removable	Net CPM α Total	dpm/100cm² α Total	mrem/hr or uR/hr
11	South Slab - MIXER PAD	7	< 1000	4	< 20	46	< 500	
12	"	16	< 1000	1	< 20	26	< 500	
13	"	13	< 1000	1	< 20	23	< 500	
14	"	13	< 1000	1	< 20	32	< 500	
15	"	9	< 1000	0	< 20	39	< 500	
16	"	5	< 1000	0	< 20	19	< 500	
17	"	0	< 1000	0	< 20	7	< 500	
18	"	0	< 1000	0	< 20	21	< 500	
19	"	10	< 1000	1	< 20	38	< 500	
20	"	15	< 1000	0	< 20	30	< 500	N/A
21	"	8	< 1000	3	< 20	38	< 500	
22	"	21	< 1000	0	< 20	7	< 500	
23	"	17	< 1000	0	< 20	4	< 500	
24	"	5	< 1000	0	< 20	8	< 500	
25	"	11	< 1000	2	< 20	22	< 500	
26	"	7	< 1000	2	< 20	21	< 500	
27	"	18	< 1000	2	< 20	31	< 500	
28	"	14	< 1000	0	< 20	4	< 500	
29	"	0	< 1000	0	< 20	16	< 500	
30	"	0	< 1000	0	< 20	13	< 500	
31	"	0	< 1000	1	< 20	17	< 500	
32	"	0	< 1000	1	< 20	17	< 500	
33	"	0	< 1000	3	< 20	11	< 500	

REMARKS: FOR TOTAL α ACTIVITY; $MDA = 3.3 \times CF \times \frac{\sqrt{b_{sc} + b_{sc}}}{t_{ct} \quad s_{ct}} = 3.3 \times 6 \times \frac{\sqrt{0.87 + 0.87}}{10 \quad 1}$

$= 19.4$ dpm/100cm²

TECHNICIAN(S) SIGNATURE/DATE: Jonathan Rankin 07-09-99

REVIEWER SIGNATURE/DATE: [signature] 7-14-99

WELDON SPRING SITE REMEDIAL ACTION PROJECT

RADIOLOGICAL SURVEY REPORT (Optional Supplement)

DESCRIPTION: CSS Concrete Slab (See Diagram)

DATE: 07-09-99 TIME: 1000 WP No: 437

SURVEY RESULTS

Sample No.	Description/Location	Net CPM βγ Total	dpm/100cm² βγ Total	Net CPM α Removable	dpm/100cm² α Removable	Net CPM α Total	dpm/100cm² α Total	mrem/hr or uR/hr
34	South Slab - MIXER PAD	7	< 1000	0	< 20	18	< 500	
35	"	5	< 1000	0	< 20	4	< 500	
36	"	5	< 1000	0	< 20	24	< 500	
37	"	8	< 1000	0	< 20	35	< 500	
38	"	11	< 1000	0	< 20	32	< 500	
39	"	0	< 1000	0	< 20	24	< 500	
40	"	0	< 1000	0	< 20	23	< 500	
41	"	6	< 1000	1	< 20	45	< 500	
42	"	0	< 1000	3	< 20	12	< 500	
43	"	7	< 1000	0	< 20	11	< 500	
44	"	0	< 1000	0	< 20	14	< 500	
45	"	0	< 1000	4	< 20	7	< 500	
46	"	0	< 1000	0	< 20	16	< 500	
47	"	10	< 1000	2	< 20	67	< 500	
48	" (SEE #209 FOR POST-DECON RESULT)	10	< 1000	2	< 20	92 *	< 500	552
49	" (" #210 ")	14	< 1000	1	< 20	152 *	< 500	912
50	" (" #211 ")	3	< 1000	2	< 20	212 *	< 500	1272
51	South Drain - MIXER PAD	11	< 1000	0	< 20	7	< 500	
52	"	5	< 1000	0	< 20	4	< 500	
53	"	0	< 1000	0	< 20	4	< 500	
54	"	5	< 1000	0	< 20	2	< 500	
55	"	10	< 1000	1	< 20	8	< 500	
56	"	0	< 1000	0	< 20	5	< 500	

REMARKS: _____

TECHNICIAN(S) SIGNATURE/DATE: Jonathan Hank 07-09-99

REVIEWER SIGNATURE/DATE: [illegible] 7-14-99

WELDON SPRING SITE REMEDIAL ACTION PROJECT

RADIOLOGICAL SURVEY REPORT (Optional Supplement)

DESCRIPTION: OSS Concrete Slab (See Diagram) TIME: 1000 WP No: 437

DATE: 07-09-99

SURVEY RESULTS

Sample No.	Description/Location	Net CPM βγ Total	dpm/100cm² βγ Total	Net CPM α Removable	dpm/100cm² α Removable	Net CPM α Total	dpm/100cm² α Total	mrem/hr or uR/hr
57	South Drain - MIXER PAD	0	< 1000	0	< 20	35	< 500	
58	Central Slab - MIXER PAD	10	< 1000	2	< 20	0	< 500	
59	"	5	< 1000	0	< 20	0	< 500	
60	"	14	< 1000	0	< 20	2	< 500	
61	"	15	< 1000	0	< 20	3	< 500	
62	"	8	< 1000	0	< 20	48	< 500	
63	"	21	< 1000	0	< 20	50	< 500	
64	"	16	< 1000	0	< 20	2	< 500	
65	"	0	< 1000	0	< 20	2	< 500	
66	"	7	< 1000	0	< 20	24	< 500	
67	"	0	< 1000	0	< 20	24	< 500	
68	"	0	< 1000	0	< 20	6	< 500	N/A
69	"	0	< 1000	0	< 20	7	< 500	
70	"	10	< 1000	3	< 20	2	< 500	
71	"	0	< 1000	0	< 20	6	< 500	
72	"	14	< 1000	0	< 20	4	< 500	
73	"	13	< 1000	1	< 20	4	< 500	
74	"	8	< 1000	0	< 20	8	< 500	
75	"	0	< 1000	1	< 20	7	< 500	
76	"	0	< 1000	1	< 20	6	< 500	
77	"	19	< 1000	4	< 20	2	< 500	
78	"	11	< 1000	0	< 20	2	< 500	
79	"	0	< 1000	0	< 20	0	< 500	

REMARKS:

TECHNICIAN(S) SIGNATURE/DATE: Jonathan Ramirez 07-09-99

REVIEWER SIGNATURE/DATE: [signature] 7-14-99

WELDON SPRING SITE REMEDIAL ACTION PROJECT

RADIOLOGICAL SURVEY REPORT (Optional Supplement)

DESCRIPTION: CSS Concrete Slab

DATE: 07-09-99 TIME: 1000 WP No: 437

SURVEY RESULTS

Sample No.	Description/Location	Net CPM βγ Total	dpm/100cm² βγ Total	Net CPM α Removable	dpm/100cm² α Removable	Net CPM α Total	dpm/100cm² α Total	mrem/hr or uR/hr
80	Central Slab-MIXER PAD	0	<1000	2	<20	3	<500	
81	"	0	<1000	2	<20	3	<500	
82	"	0	<1000	2	<20	4	<500	
83	"	0	<1000	1	<20	5	<500	
84	"	0	<1000	0	<20	3	<500	
85	"	6	<1000	1	<20	4	<500	
86	"	0	<1000	0	<20	2	<500	
87	"	11	<1000	0	<20	4	<500	
88	"	4	<1000	0	<20	1	<500	
89	"	5	<1000	3	<20	4	<500	
90	"	10	<1000	0	<20	1	<500	
91	"	0	<1000	2	<20	7	<500	NA
92	"	0	<1000	1	<20	3	<500	
93	"	17	<1000	1	<20	6	<500	
94	"	21	<1000	1	<20	3	<500	
95	"	12	<1000	1	<20	3	<500	
96	"	0	<1000	0	<20	2	<500	
97	"	9	<1000	0	<20	3	<500	
98	"	10	<1000	1	<20	5	<500	
99	"	10	<1000	0	<20	6	<500	
100	"	0	<1000	0	<20	10	<500	
101	East Central Slab-	16	<1000	0	<20	26	<500	
102	" STAIR TOWER PAD ~~MIXER PAD~~	7	<1000	0	<20	4	<500	

REMARKS: All areas except the Central and Southern Slabs were fully released.

TECHNICIAN(S) SIGNATURE/DATE: Jonathan Rankin 07-09-99

REVIEWER SIGNATURE/DATE: [signature] 7-14-99

WELDON SPRING SITE REMEDIAL ACTION PROJECT

RADIOLOGICAL SURVEY REPORT (Optional Supplement)

DESCRIPTION: CSS Slab (See Diagram)

DATE: 07-09-99 TIME: 1000 WP No: 437

SURVEY RESULTS

Sample No.	Description/Location	Net CPM βγ Total	dpm/100cm² βγ Total	Net CPM α Removable	dpm/100cm² α Removable	Net CPM α Total	dpm/100cm² α Total	mrem/hr or uR/hr
103	STAIR TOWER PAD East Central Slab	22	< 1000	0	< 20	9	<500	
104	" ~~STAIR PAD~~	17	< 1000	1	< 20	5	<500	
105	"	20	< 1000	2	< 20	2	<500	
106	"	10	< 1000	0	< 20	4	<500	
107	"	10	< 1000	2	< 20	6	<500	
108	"	0	< 1000	1	< 20	0	<500	
109	"	8	< 1000	1	< 20	4	<500	
110	"	11	< 1000	2	< 20	4	<500	
111	"	13	< 1000	0	< 20	2	<500	
112	"	16	< 1000	0	< 20	4	<500	
113	"	5	< 1000	3	< 20	4	<500	
114	"	10	< 1000	0	< 20	2	<500	
115	"	7	< 1000	0	< 20	11	<500	
116	"	0	< 1000	0	< 20	3	<500	
117	"	11	< 1000	0	< 20	2	<500	
118	"	17	< 1000	0	< 20	7	<500	
119	"	14	< 1000	2	< 20	4	<500	
120	"	0	< 1000	1	< 20	5	<500	
121	"	0	< 1000	1	< 20	4	<500	
122	"	5	< 1000	2	< 20	4	<500	
123	"	10	< 1000	2	< 20	4	<500	
124	"	10	< 1000	0	< 20	4	<500	
125	"	15	< 1000	0	< 20	5	<500	

REMARKS:

TECHNICIAN(S) SIGNATURE/DATE: Jonathan Hunter 07-09-99

REVIEWER SIGNATURE/DATE: [signature] 7-14-99

WELDON SPRING SITE REMEDIAL ACTION PROJECT

RADIOLOGICAL SURVEY REPORT (Optional Supplement)

DESCRIPTION: CSS Concrete Slab (See Diagram)

DATE: 07-09-99 TIME: 1000 WP No: 437

SURVEY RESULTS

Sample No.	Description/Location	Net CPM βγ Total	dpm/100cm² βγ Total	Net CPM α Removable	dpm/100cm² α Removable	Net CPM α Total	dpm/100cm² α Total	mrem/hr or uR/hr
126	East Central Slab - STAIR	12	<1000	0	<20	5	<500	
127	" TOWER PAD	10	<1000	0	<20	2	<500	
128	"	14	<1000	3	<20	1	<500	
129	"	6	<1000	0	<20	2	<500	
130	"	9	<1000	0	<20	4	<500	
131	"	0	<1000	1	<20	3	<500	
132	"	10	<1000	0	<20	3	<500	
133	North Slab - MIXER PAD	5	<1000	0	<20	2	<500	
134	"	17	<1000	1	<20	3	<500	
135	"	21	<1000	0	<20	1	<500	
136	"	26	<1000	2	<20	4	<500	
137	"	13	<1000	2	<20	9	<500	
138	"	14	<1000	2	<20	3	<500	S/A
139	"	12	<1000	3	<20	1	<500	
140	"	8	<1000	1	<20	4	<500	
141	"	0	<1000	1	<20	3	<500	
142	"	5	<1000	3	<20	3	<500	
143	"	11	<1000	0	<20	0	<500	
144	"	7	<1000	0	<20	5	<500	
145	"	6	<1000	0	<20	0	<500	
146	"	10	<1000	0	<20	3	<500	
147	"	0	<1000	0	<20	11	<500	
148	"	22	<1000	0	<20	5	<500	

REMARKS: _____

TECHNICIAN(S) SIGNATURE/DATE: [signature] 07-09-99

REVIEWER SIGNATURE/DATE: [signature] 7-14-99

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WELDON SPRING SITE REMEDIAL ACTION PROJECT

RADIOLOGICAL SURVEY REPORT (Optional Supplement)

DESCRIPTION: CSS Concrete Slab (See Diagram)

DATE: 07-09-99 TIME: 1000 WP No: 437

SURVEY RESULTS

Sample No.	Description/Location	Net CPM βγ Total	dpm/100cm² βγ Total	Net CPM α Removable	dpm/100cm² α Removable	Net CPM α Total	dpm/100cm² α Total	mrem/hr or µR/hr
149	North Slab - MIXER PAD	0	< 1000	2	< 20	6	< 500	
150	"	0	< 1000	1	< 20	2	< 500	
151	"	6	< 1000	0	< 20	3	< 500	
152	"	0	< 1000	0	< 20	8	< 500	
153	"	11	< 1000	1	< 20	7	< 500	
154	"	8	< 1000	0	< 20	2	< 500	
155	"	5	< 1000	1	< 20	2	< 500	
156	"	10	< 1000	1	< 20	5	< 500	
157	"	10	< 1000	2	< 20	12	< 500	
158	"	15	< 1000	0	< 20	17	< 500	N/A
159	"	20	< 1000	0	< 20	4	< 500	
160	"	15	< 1000	0	< 20	6	< 500	
161	"	25	< 1000	3	< 20	5	< 500	
162	"	21	< 1000	0	< 20	2	< 500	
163	"	14	< 1000	2	< 20	4	< 500	
164	"	9	< 1000	0	< 20	4	< 500	
165	"	0	< 1000	0	< 20	4	< 500	
166	"	7	< 1000	1	< 20	4	< 500	
167	"	0	< 1000	1	< 20	2	< 500	
168	"	18	< 1000	0	< 20	7	< 500	
169	"	12	< 1000	0	< 20	9	< 500	
170	"	0	< 1000	0	< 20	8	< 500	
171	"	0	< 1000	1	< 20	6	< 500	

REMARKS:

TECHNICIAN(S) SIGNATURE/DATE: [signature] 07-09-99

REVIEWER SIGNATURE/DATE: [signature] 7-14-99

WELDON SPRING SITE REMEDIAL ACTION PROJECT

RADIOLOGICAL SURVEY REPORT (Optional Supplement)

DESCRIPTION: CSS Concrete Slab - (See Diagram)

DATE: 07-09-99 TIME: 1000 WP No: 437

SURVEY RESULTS

Sample No.	Description/Locaton	Net CPM βγ Total	dpm/100cm² βγ Total	Net CPM α Removable	dpm/100cm² α Removable	Net CPM α Total	dpm/100cm² α Total	mrem/hr or uR/hr
172	North Slab - MIXER PAD	0	< 1000	0	< 20	2	< 500	
173	"	7	< 1000	1	< 20	4	< 500	
174	"	10	< 1000	1	< 20	6	< 500	
175	"	14	< 1000	1	< 20	2	< 500	
176	"	0	< 1000	2	< 20	1	< 500	
177	"	6	< 1000	0	< 20	2	< 500	
178	"	0	< 1000	0	< 20	11	< 500	
179	"	0	< 1000	0	< 20	6	< 500	
180	"	10	< 1000	2	< 20	0	< 500	
181	"	0	< 1000	2	< 20	6	< 500	
182	"	18	< 1000	0	< 20	3	< 500	
183	"	9	< 1000	0	< 20	4	< 500	
184	"	11	< 1000	0	< 20	3	< 500	
185	"	14	< 1000	0	< 20	6	< 500	
186	North Drain - MIXER PAD	23	< 1000	0	< 20	15	< 500	
187	"	9	< 1000	0	< 20	8	< 500	
188	"	12	< 1000	0	< 20	7	< 500	
189	"	0	< 1000	4	< 20	5	< 500	
190	"	0	< 1000	0	< 20	3	< 500	
191	North East Slab (A)	10	< 1000	1	< 20	1	< 500	
192	HYDRAULIC PUMP PAD A	15	< 1000	2	< 20	6	< 500	
193	"	6	< 1000	0	< 20	9	< 500	
194	"	13	< 1000	3	< 20	2	< 500	

REMARKS:

TECHNICIAN(S) SIGNATURE/DATE: Jonathan Bowles 07-09-99

REVIEWER SIGNATURE/DATE: [illegible] 7-14-99

WELDON SPRING SITE REMEDIAL ACTION PROJECT

RADIOLOGICAL SURVEY REPORT (Optional Supplement)

SCRIPTION: C55 Concrete Slab (See Diagram)

ATE: | TIME: | WP No:

SURVEY RESULTS

Sample No.	Description/Location	Net CPM βγ Total	dpm/100cm² βγ Total	Net CPM α Removable	dpm/100cm² α Removable	Net CPM α Total	dpm/100cm² α Total	mrem/hr or µR/hr
195	North East Slab (A)	16	< 1000	0	< 20	5	< 500	
196	" HYDRAULIC PUMP PAD A	9	< 1000	0	< 20	4	< 500	
197	"	11	< 1000	1	< 20	2	< 500	
198	"	7	< 1000	0	< 20	2	< 500	
199	"	22	< 1000	0	< 20	8	< 500	
200	North East Slab (B)	5	< 1000	0	< 20	2	< 500	
201	" HYDRAULIC PUMP PAD B	4	< 1000	0	< 20	2	< 500	
202	"	8	< 1000	0	< 20	3	< 500	
203	"	11	< 1000	3	< 20	3	< 500	
204	"	19	< 1000	0	< 20	5	< 500	
205	"	25	< 1000	2	< 20	2	< 500	
206	"	16	< 1000	0	< 20	3	< 500	
207	"	15	< 1000	2	< 20	2	< 500	
208	"	10	< 1000	0	< 20	1	< 500	
209	* South Slab Hot Spot					9	< 500	
210	* South Slab Hot Spot					14	< 500	
211	* South Slab Hot Spot					6	< 500	

REMARKS: * Remediated Area of the Slab. These areas were scrapped with a Excavation Blade and washed off. All these spots met release criteria.

TECHNICIAN(S) SIGNATURE/DATE: Jonathan Hayden 07-09-99

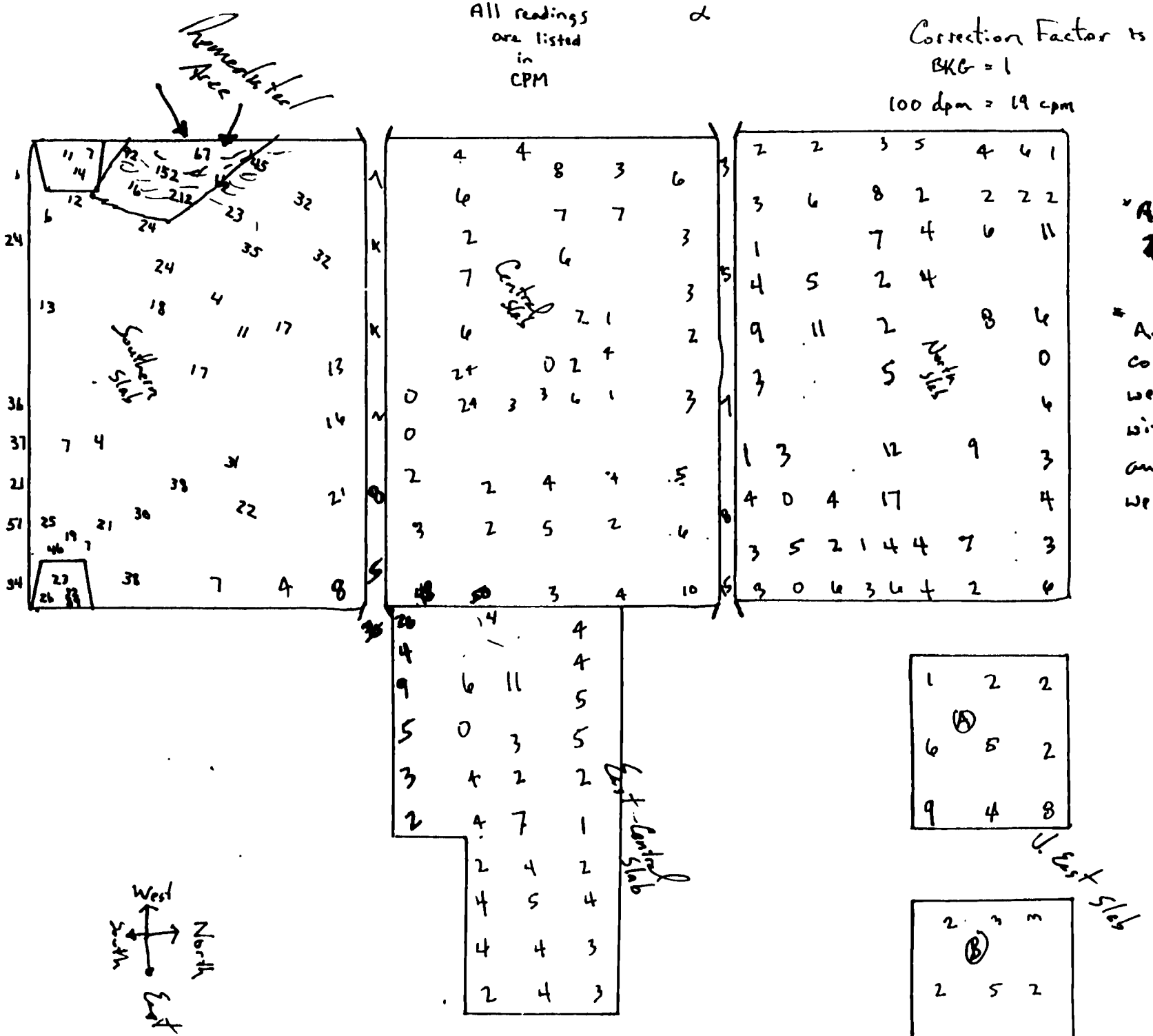
REVIEWER SIGNATURE/DATE: [signature] 7/14/99

All readings are listed in CPM

Correction Factor is 5.5

BKG = 1

100 dpm = 19 cpm



* All swipes < 20 dpm (200+ swipes taken)

* All dirt around concrete slabs were surveyed with NaI / "2x2" and all readings were < 1.5 BKG