CERTIFICATION DESIGN LETTER FOR AREA 1, PHASE IV PART THREE

FERNALD CLOSURE PROJECT
FERNALD, OHIO

MAY 2004

U.S. DEPARTMENT OF ENERGY

20730-PL-0004
REVISION A
DRAFT

TABLE OF CONTENTS

Page

List of Acronyms and Abbreviations iii
List of Figures ii
List of Tables ii

Executive Summary ES-1

1.0 Introduction 1-1
1.1 Objectives 1-1
1.2 Scope and Area Description 1-1

2.0 Historical and Precertification Data 2-1
2.1 Historical, Predesign and Excavation Control Data 2-1
2.2 Precertification Real-Time Scan Data 2-2

3.0 Area-Specific Constituents of Concern 3-1
3.1 Selection Criteria 3-1

4.0 Certification Approach 4-1
4.1 Certification Design 4-1
4.2 Analytical Methodology and Statistical Analysis 4-2

5.0 Schedule 5-1

References R-1

APPENDICES

Appendix A Post-Excavation Sample Data and Locations
Appendix B Precertification Real-Time Scan Data

LIST OF TABLES

Table 3-1	Area 1, Phase IV Part Three Secondary ASCOC List
Table 3-2	ASCOC List for A1PIV Part Three
Table A-1	Post-Excavation Sample Results
Table B-1	HPGe Results Detector Height of 31 cm
Table B-2	HPGe Results Detector Height of 15 cm

LIST OF FIGURES

Figure 1-1	Area 1, Phase IV Part Three Location Map
Figure 4-1	A1PIV Part Three CU and Sub-CU Boundary and Certification Sampling Locations
Figure A-1	A1PIV Part Three, Post-Excavation Sample Locations
Figure B-1	A1PIV Part Three, Phase 1 Total Gross Counts per Second
Figure B-2	A1PIV Part Three, Phase 1 Moisture Corrected Radium-226
Figure B-3	A1PIV Part Three, Phase 1 Moisture Corrected Thorium-232
Figure B-4	A1PIV Part Three, Phase 1 Moisture Corrected Total Uranium
Figure B-5	A1PIV Part Three, Phase 2 Moisture Corrected Radium-226
Figure B-6	A1PIV Part Three, Phase 2 Moisture Corrected Thorium-232
Figure B-7	A1PIV Part Three, Phase 2 Moisture Corrected Total Uranium

LIST OF ACRONYMS AND ABBREVIATIONS

A1PII	Area 1, Phase II
A1PIV	Area 1, Phase IV
ASCOC	area-specific constituent of concern
ASL	analytical support level
CDL	Certification Design Letter
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	constituent of concern
CRDL	contract required detection limit
CU	certification unit
DOE	U.S. Department of Energy
FCP	Fernald Closure Project
FRL	final remediation level
HPGe	high-purity germanium (detector)
MDL	minimum detection level
MEF	material evaluation form
mg/kg	milligrams per kilogram
OSDF	On-site Disposal Facility
OU5	Operable Unit 5
pCi/g	picoCuries per gram
PCB	polychlorinated biphenyl
PSP	Project Specific Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
TSCA	Toxic Substances Control Act
UCL	Upper Confidence Limit
VOC	volatile organic compound
WAC	waste acceptance criteria

EXECUTIVE SUMMARY

This Certification Design Letter (CDL) describes the certification approach for Area 1, Phase IV (A1PIV) Part Three. The following information is included:

- The boundary (Figure 1-1) and a description of the area to be certified under the guidance of this CDL;
- A presentation of historical data from the area proposed for certification;
- A discussion of the area-specific constituent of concern (ASCOC) selection process and list of ASCOCs assigned to A1PIV Part Three;
- A presentation of the certification unit (CU) boundaries and proposed sampling strategy;
- The analytical requirements and the statistical methodology that will be employed; and
- The proposed schedule for the certification activities.

The scope of this CDL is limited to A1PIV Part Three, which, as shown on Figure 1-1, is the area located just north of Building 82. This area, which has been previously considered part of the Area 7 Administrative Side, will be impacted by the On-site Disposal Facility (OSDF) Cell 8 construction activities, specifically construction of Valve House 8. Due to its proximity to A1PIV as well as the impact on this area for OSDF Cell 8 construction activities, A1PIV Part Three is being incorporated into A1PIV. The entire area has been characterized through previous sampling investigations and remediation was completed in May 2004, thus initiating the certification process described in this CDL. The Excavation Plan for Area 1, Phase IV (DOE 2003) describes some of the remediation activities that were necessary. The scope of this CDL includes details of certification sampling, analysis and validation that will take place in A1PIV Part Three. Field sampling of A1PIV Part Three is scheduled to begin immediately following excavation and precertification.

The certification design presented in this CDL follows the general approach outlined in Section 3.4 of the Sitewide Excavation Plan (SEP, DOE 1998). The selection of A1PIV Part Three ASCOCs was accomplished using constituent of concern (COC) lists in the Operable Unit 5 Record of Decision (DOE 1996), previous investigation data, and process knowledge. One certification unit (CU) has been defined for this CDL. Total uranium, thorium-228, thorium-232, radium-226, and radium-228 (the sitewide primary radiological COCs) are considered ASCOCs in the CU. Secondary COCs will include polychlorinated biphenyls (PCBs) and dieldrin.

1.0 INTRODUCTION

This Certification Design Letter (CDL) describes the certification approach for demonstrating that soil in Area 1, Phase IV (A1PIV) Part Three meets the final remediation levels (FRLs) for all area-specific constituents of concern (ASCOCs). The format of this CDL follows guidelines presented in the Sitewide Excavation Plan (SEP, DOE 1998). Accordingly, this CDL consists of six sections:

1.0 Introduction - Presentation of the purpose, objectives, and scope of this CDL

2.0 Historical and Precertification Data - Presentation and discussion of historical soil data and precertification from A1PIV Part Three

3.0 Area-Specific Constituents of Concern - Discussion of selection criteria and ASCOCs for A1PIV Part Three

4.0 Certification Approach - Presentation of design, sampling and analytical methodologies

5.0 Schedule

References

1.1 OBJECTIVES

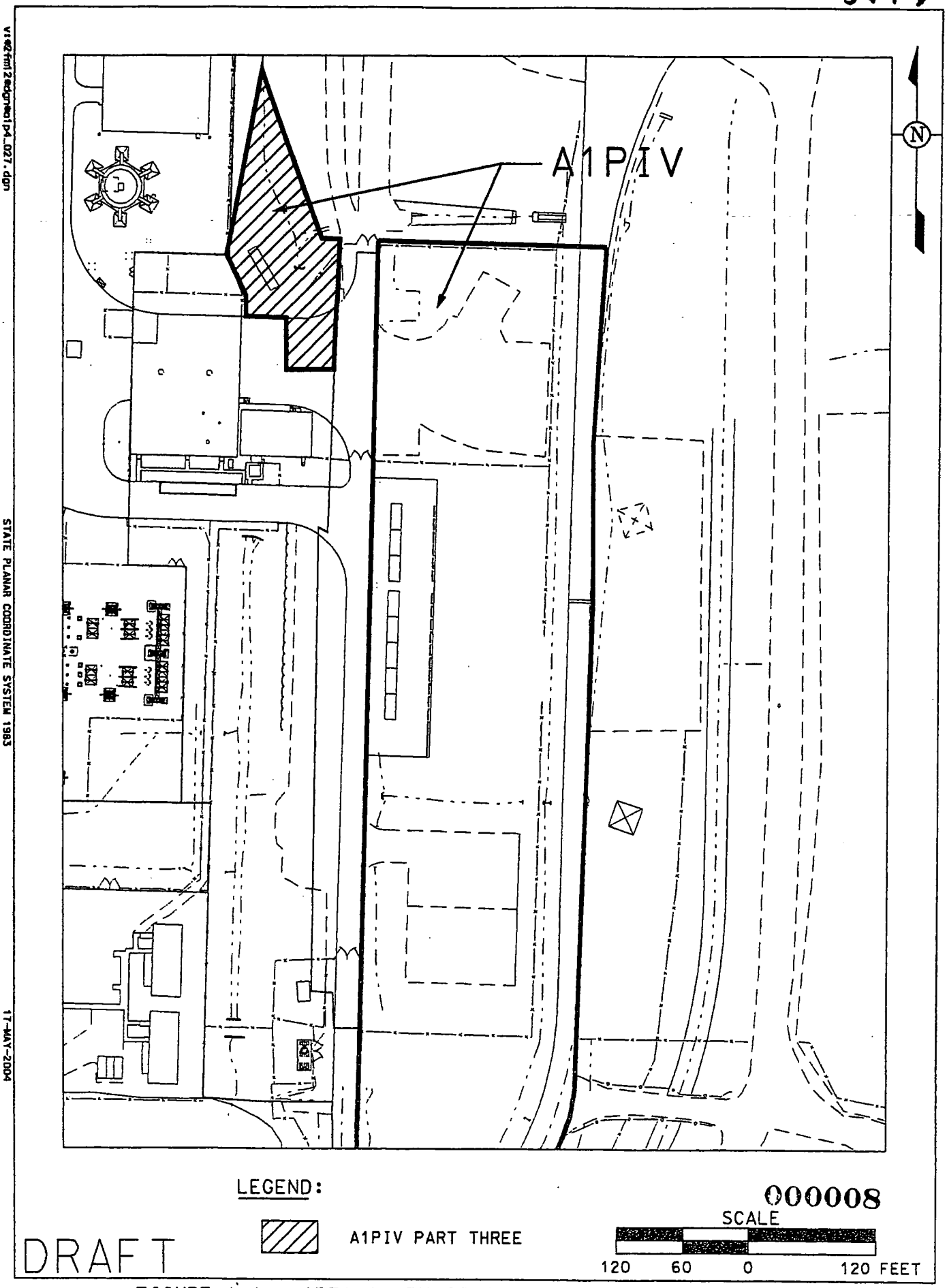
The primary objectives of this document are to:

- Define the boundary of the area to be certified under the guidance of this CDL;
- Present maps for newly acquired real-time data;
- Define the ASCOC selection process and list the selected A1PIV Part Three ASCOCs;
- Present the certification unit (CU) boundary and proposed certification sampling strategy;
- Summarize the analytical requirements and the statistical methodology that will be employed; and
- Present the proposed schedule for the certification activities.

1.2 SCOPE AND AREA DESCRIPTION

Due to the timing of subsequent On-Site Disposal Facility (OSDF) construction work in A1PIV, it has been necessary to break certification activities in A1PIV into multiple parts. Each certification effort in A1PIV will be covered in separate CDL and Project Specific Plan (PSP) submittals.

The scope of this CDL is limited to A1PIV Part Three, which, as shown on Figure 1-1, is the area located just north of Building 82. This area, which has been previously considered part of the Area 7 Administrative Side, will be impacted by OSDF Cell 8 construction activities, specifically construction of Valve House 8. Due to its proximity to A1PIV as well as the impact on this area for OSDF Cell 8 construction activities, A1PIV Part Three is being incorporated into A1PIV. The area is a radiologically clean area (not radiologically controlled). The Excavation Plan for Area 1, Phase IV (DOE 2003) describes some of the remediation activities that will be completed in A1PIV. The scope of this CDL includes details of certification sampling, analysis and validation that will take place in A1PIV Part Three.



000008

FIGURE 1-1. AREA 1, PHASE IV PART THREE LOCATION MAP

2.0 HISTORICAL AND PRECERTIFICATION DATA

In accordance with the SEP, prior to conducting precertification and certification activities, all soil demonstrated to contain contamination above the associated FRLs or other applicable action levels must be evaluated for remedial actions. Before initiating the certification process, all historical soil data within the A1PIV certification area were pulled from the Sitewide Environmental Database (SED).

Based on the results of sampling and scanning activities summarized in section 2.1, it has been determined that no further remedial actions are necessary to remove above-FRL or above-waste acceptance criteria (WAC) soil prior to certification of A1PIV Part Three. Excavation activities in A1PIV Part Three were driven by the utility removal, as required in the Excavation Plan for Area 1, Phase IV (DOE 2003), as well as the removal of above-FRL thorium, PCB, and dieldrin.

2.1 HISTORICAL, PREDESIGN AND EXCAVATION CONTROL DATA

A review of the data from samples collected from A1PIV Part Three as part of the Remedial Investigation/Feasibility Study (RI/FS) showed one location with elevated thorium at 5 to 5.5 feet. During sampling to bound the thorium, additional locations were sampled due to the limited amount of sampling in the area. Since A1PIV Part Three was previously considered part of the Area 7, the samples were analyzed for various Area 7 ASCOCs. Each sample was analyzed for the total uranium, radium-228, thorium-228, thorium-230, thorium-232, technetium-99, PCBs, dieldrin, arsenic, beryllium, manganese, and lead. All samples were below FRL except for three surface samples that were above-FRL for PCBs. One of those samples was also above-FRL for dieldrin. Following excavation of the above-FRL locations, samples were collected to confirm that all above-FRL soil had been removed. The post excavation sample results and a map of those locations are provided in Appendix A.

2.2 PRECERTIFICATION REAL-TIME SCAN DATA

According to guidelines established in Section 3.3.3 of the SEP, precertification activities were conducted to evaluate residual radiological contamination patterns. A1PIV Part Three was also scanned with a magnetometer to determine if residual debris remained following excavation activities. Minor occurrences of metallic objects were located and hand picked from the area.

Phase 1 and Phase 2 real-time scans were conducted in May 2004. For the precertification real-time data collected, results showed all total uranium, radium-226 and thorium-232 were below the target levels [three times (3x) FRL for total uranium and thorium-232; 7x FRL for radium-226]. These mapped results are provided on Figures B-1 through B-7 and the high-purity germanium detector (HPGe) results are provided in Table B-1, all which is located in Appendix B.

3.0 AREA-SPECIFIC CONSTITUENTS OF CONCERN

In the Operable Unit 5 (OU5) Record of Decision (ROD, DOE 1996), there are 80 soil COCs with established FRLs. These COCs were retained for further investigation based on a screening process that considered the presence of the constituent in site soil and the potential risk to a receptor exposed to soil containing this contaminant. In spite of the conservative nature of this COC retention process, many of the COCs with established FRLs have a limited distribution in site soil or the presence of the COC is based on high contract required detection limits (CRDLs). When FRLs were established for these COCs in the OU5 ROD, the FRLs were initially screened against site data presented on spatial maps to establish a picture of potential remediation areas.

By reviewing existing RI/FS data presented on spatial distribution maps, the sitewide list of soil COCs in the OU5 ROD was reduced from 80 to 30. This reduction was possible because the majority of the COCs with FRLs listed in the OU5 ROD have no detections above their corresponding FRL, thus eliminating them from further consideration. The 30 remaining sitewide COCs account for over 99 percent of the combined risk to a site receptor model, and they comprise the list from which all of the remediation ASCOCs are drawn. When planning certification for a remediation area, additional selection criteria are used to derive a subset of these 30 COCs. This subset of COCs is passed along to the certification process.

3.1 SELECTION CRITERIA

The selection process for retaining ASCOCs for a remediation area is driven by applying a set of decision criteria. A soil contaminant will be retained as an ASCOC if:

- It is listed as a soil COC in the OU5 ROD, and it is listed as an ASCOC in Table 2-7 of the SEP for the Remediation Area of interest;
- It can be traced to site use in the remediation area of interest, either through process knowledge or known release of the constituent to the environment;
- Analytical results indicate that a contaminant is present above its FRL, and the above-FRL concentrations are not attributable to false positives or elevated CRDLs;
- Physical characteristics of the contaminant, such as degradation rate and volatility, indicate it is likely to persist in the soil between time of release and remediation; or
- The contaminant is one of the sitewide primary COCs (total uranium, radium-226, radium-228, thorium-238, and thorium-232).

The area that now represents A1PIV Part Three has previously been a part of the Area 7 Administrative Side. In addition to using the above process and the data presented in Table 3-1, the complete list of primary and secondary COCs presented in Table 2-7 of the SEP for remediation Area 7 has been focused for the A1PIV Part Three certification effort. Table 3-1 also includes a column with justification for the decision on retaining or eliminating the ASCOC. The final list of ASCOCs selected for A1PIV Part Three is provided in Table 3-2.

TABLE 3-1
AREA 1, PHASE IV PART THREE SECONDARY ASCOC LIST [a]

A1PIV Part Three Secondary ASCOC	Retained as ASCOC?	Justification
Aroclor-1254 and 1260	Yes	Above FRL results in the area
Dieldrin	Yes	Above FRL results in the area
Arsenic	No	No above FRL results in the area
Beryllium	No	No above FRL results in the area
Lead	No	No above FRL results in the area
Manganese	No	No above FRL results in the area
Cesium-137	No	Not associated with this area of the site
Lead-210	No	Not associated with this area of the site
Technetium-99	No	No above FRL results in the area
Thorium-230	No	No above FRL results in the area

[a]Secondary ASCOCs as listed in Table 2-7 of the SEP for Area 7

TABLE 3-2
ASCOC LIST FOR A1PIV PART THREE

ASCOC	FRL	Type of ASCOC	Where Retained
Total Uranium	82 mg/kg	Primary ASCOC	A1PIV Part Three CU 4
Radium-226	1.7 pCi/g	Primary ASCOC	A1PIV Part Three CU 4
Radium-228	1.8 pCi/g	Primary ASCOC	A1PIV Part Three CU 4
Thorium-228	1.7 pCi/g	Primary ASCOC	A1PIV Part Three CU 4
Thorium-232	1.5 pCi/g	Primary ASCOC	A1PIV Part Three CU 4
Aroclor-1254	0.13 mg/kg	Secondary ASCOC	A1PIV Part Three CU 4
Aroclor-1260	0.13 mg/kg	Secondary ASCOC	A1PIV Part Three CU 4
Dieldrin	0.015 mg/kg	Secondary ASCOC	A1PIV Part Three CU 4

4.0 CERTIFICATION APPROACH

4.1 CERTIFICATION DESIGN

The certification design for A1PIV Part Three follows the general approach outlined in Section 3.4 of the SEP. The CU design and the sample locations are depicted in Figure 4-1. As discussed in Section 3.0 of this document, the five primary ASCOCs (total uranium, radium-226, radium-228, thorium 228, and thorium-232) will be retained in the CU. PCBs and dieldrin will also be retained as secondary COCs.

4.1.1 Certification Unit Design

Factors such as historical land use, proximity to other areas of the site, and residual COC data were used to determine the boundaries for each CU. A1PIV Part Three will consist of one Group 1 CU (A1PIV CU 4) to allow for more concentrated sampling and ensure excavation activities had no effect on the soil.

The certification sample locations were generated according to Section 3.4.2 of the SEP. The CU was first divided into 16 approximately equal sub-CUs. Sample locations were then generated by randomly selecting an easting and northing coordinate within the boundaries of each sub-CU, then testing those locations against the minimum distance criteria for the CU. If the minimum distance criteria were not met, an alternative random location was selected for that sub-CU, and all the locations were re-tested. This process continued, until all 16 random locations met the minimum distance criteria. All sub-CUs and planned A1PIV Part Three certification sampling locations are shown on Figure 4-1. Four of the 16 sample locations (one location from each quadrant of the CU) are designated with a "V," indicating archive sample locations. One sample location in the CU is designated with a "D," indicating a field duplicate sample collection location.

Prior to commencement of certification sampling field activities, all certification sample locations will be surveyed and field verified to make sure no surface obstacles prevent collection at the planned location. Locations may be moved if a subsurface obstacle prevents collection. Requirements for moving a certification sample location will be discussed in the PSP for A1PIV Part Three Certification Sampling (DOE 2004c). Samples will be collected for analysis from 0 to 6 inches at 12 of the 16 locations in each CU. The four samples designated as "archive" will not be collected unless they are needed for additional analysis.

4.2 ANALYTICAL METHODOLOGY AND STATISTICAL ANALYSIS

Laboratory analysis of certification samples will be conducted using an approved analytical method, as discussed in Appendix H of the SEP. Analyses will be conducted to Analytical Support Level (ASL) D or E, where all requirements for ASL E are the same as ASL D except the minimum detection level for the selected analytical method must be at least 10 percent of the FRL. All results will be validated to validation support level (VSL) D. Samples rejected during validation will be re-analyzed, or an archive sample will be submitted for analysis. Once data are validated, results will be entered into the Sitewide Environmental Database (SED) and a statistical analysis will be performed to evaluate the pass/fail criteria for the CU. The statistical approach is discussed in Section 3.4.3 and Appendix G of the SEP, and will be the same for A1PIV Part Three as for previous certification efforts.

Two criteria must be met for the CU to pass certification. If the data distribution is normal or lognormal, the first criterion compares the 95 percent Upper Confidence Limit (UCL) on the mean of each primary ASCOC to its FRL. On an individual CU basis, any ASCOC with the 95 percent UCL above the FRL results in that CU failing certification. If the data distribution is not normal or lognormal, the appropriate nonparametric approach discussed in Appendix G of the SEP will be used to evaluate the second criterion. The second criterion is related to individual samples. An individual sample cannot be greater than two times the FRL or three times the FRL, based on the area size (see Section 3.4.6 and Figure 3-11 of the SEP for further details). When the given UCL on the mean for each ASCOC is less than its FRL, and the hot spot criterion is met, the CU has met both criteria and will be considered certified.

There are three conditions that could result in a CU failing certification: 1) high variability in the data set, 2) localized contamination, and 3) widespread contamination. Details on the evaluation and responses to these possible outcomes are provided in Section 3.4.5 of the SEP. When all CUs within the scope of this CDL have passed certification, a certification report will be issued. The certification report will be submitted to the EPA and OEPA to receive acknowledgement that the pertinent operable unit remedial actions were completed and the individual CUs are certified to be released for interim or final land use. Section 7.4 of the SEP provides additional details and describes the required content of the certification report.

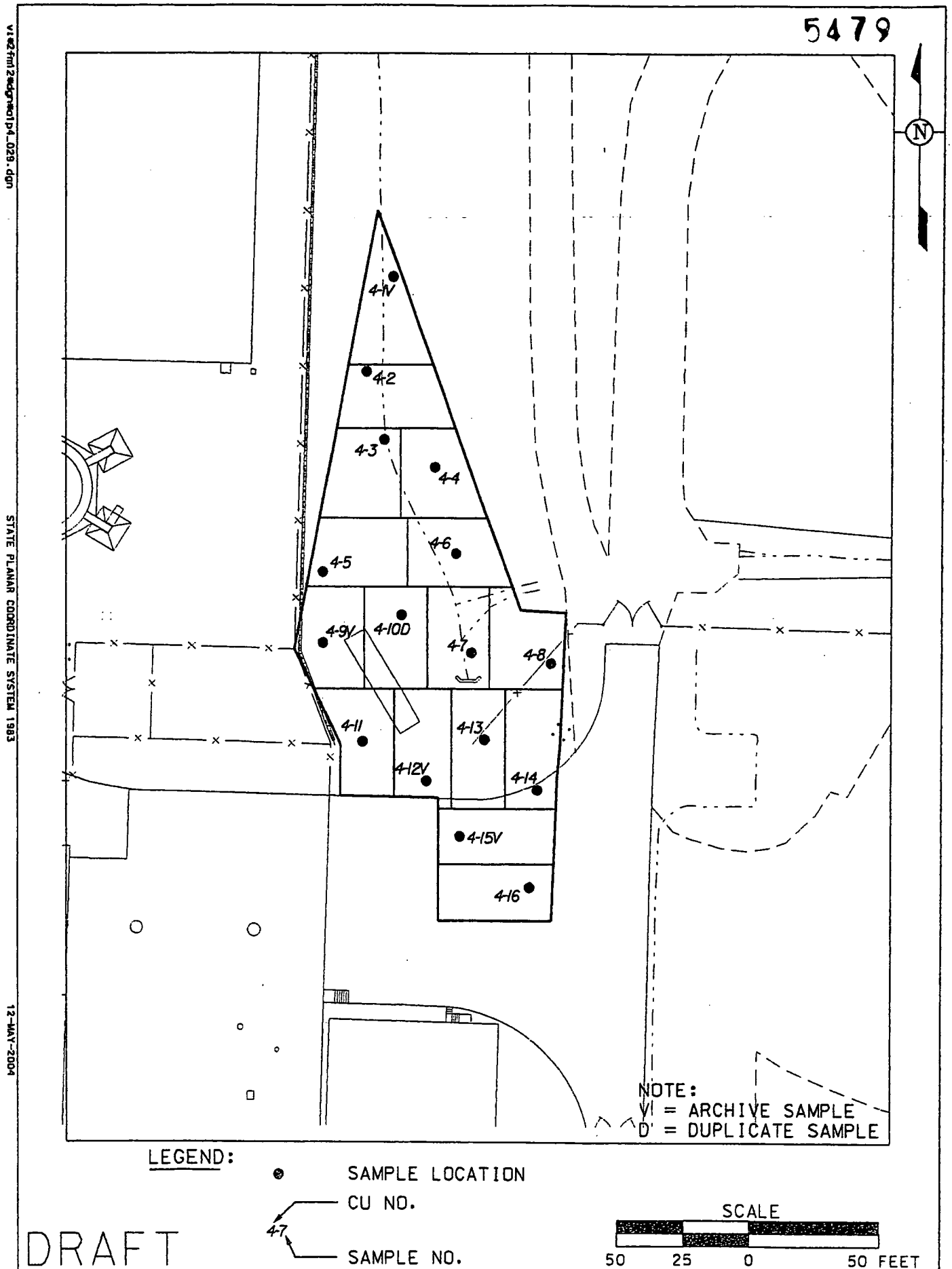


FIGURE 4-1. A1PIV PART THREE CU AND SUB-CU BOUNDARY AND CERTIFICATION SAMPLING LOCATIONS

5.0 SCHEDULE

The following draft schedule shows key activities for the completion of the work within the scope of this CDL. Implementation of this schedule is pending funding availability. If necessary, an extension will be requested.

Activity	Target Date
Submittal of Certification Design Letter	May 20, 2004
Start of Certification Sampling	June 30, 2004
Complete Field Work	July 1, 2004
Complete Analytical Work	August 2, 2004
Complete Data Validation and Statistical Analysis	August 6, 2004
Submit Certification Report	August 12, 2004[a]

[a]Only the date for submittal of the Certification Report is a commitment to the U.S. Environmental Protection Agency and Ohio Environmental Protection Agency. Other dates are internal target completion dates.

REFERENCES

U.S. Department of Energy, 1988, "Remedial Investigation and Feasibility Study Feed Materials Production Center Work Plan," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 1996, "Record of Decision for Remedial Action at Operable Unit 5," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 1998, "Sitewide Excavation Plan," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 2003, "Excavation Plan for Area 1, Phase IV," Final, Fernald Closure Project, DOE, Fernald Area Office, Cincinnati, Ohio.

APPENDIX A

POST-EXCAVATION SAMPLE DATA AND LOCATIONS

TABLE A-1. POST-EXCAVATION SAMPLE RESULTS

Sample ID	Northing	Easting	Parameter	Lab Res	LQ	Units
A7EAST3^1-P	480217.583	1350635.363	Aroclor-1254	10.2	UNV	ug/kg
			Aroclor-1260	10.2	UNV	ug/kg
			Dieldrin	0.818	UNV	ug/kg
A7EAST6^1-P	480196.781	1350626.143	Aroclor-1254	75.9	NV	ug/kg
			Aroclor-1260	32.6	NV	ug/kg
A7EAST17-SF^P	480298.39	1350569.96	Aroclor-1254	4.3	U	ug/kg
			Aroclor-1260	4.3	U	ug/kg
A7EAST18-SF^P	480295.75	1350573.16	Aroclor-1254	0.96	J	ug/kg
			Aroclor-1260	4.47	U	ug/kg
A7EAST19-SF^P	480301.47	1350568.22	Aroclor-1254	4.16	U	ug/kg
			Aroclor-1260	4.16	U	ug/kg
A7EAST20-SF^P	480301.44	1350575.31	Aroclor-1254	22.4		ug/kg
			Aroclor-1260	16		ug/kg
A7EAST21-SF^P	480293.45	1350575.14	Aroclor-1254	2.2	J	ug/kg
			Aroclor-1260	2.2	J	ug/kg
A7EAST22-SF^P	480293.62	1350567.49	Aroclor-1254	10.4		ug/kg
			Aroclor-1260	8		ug/kg

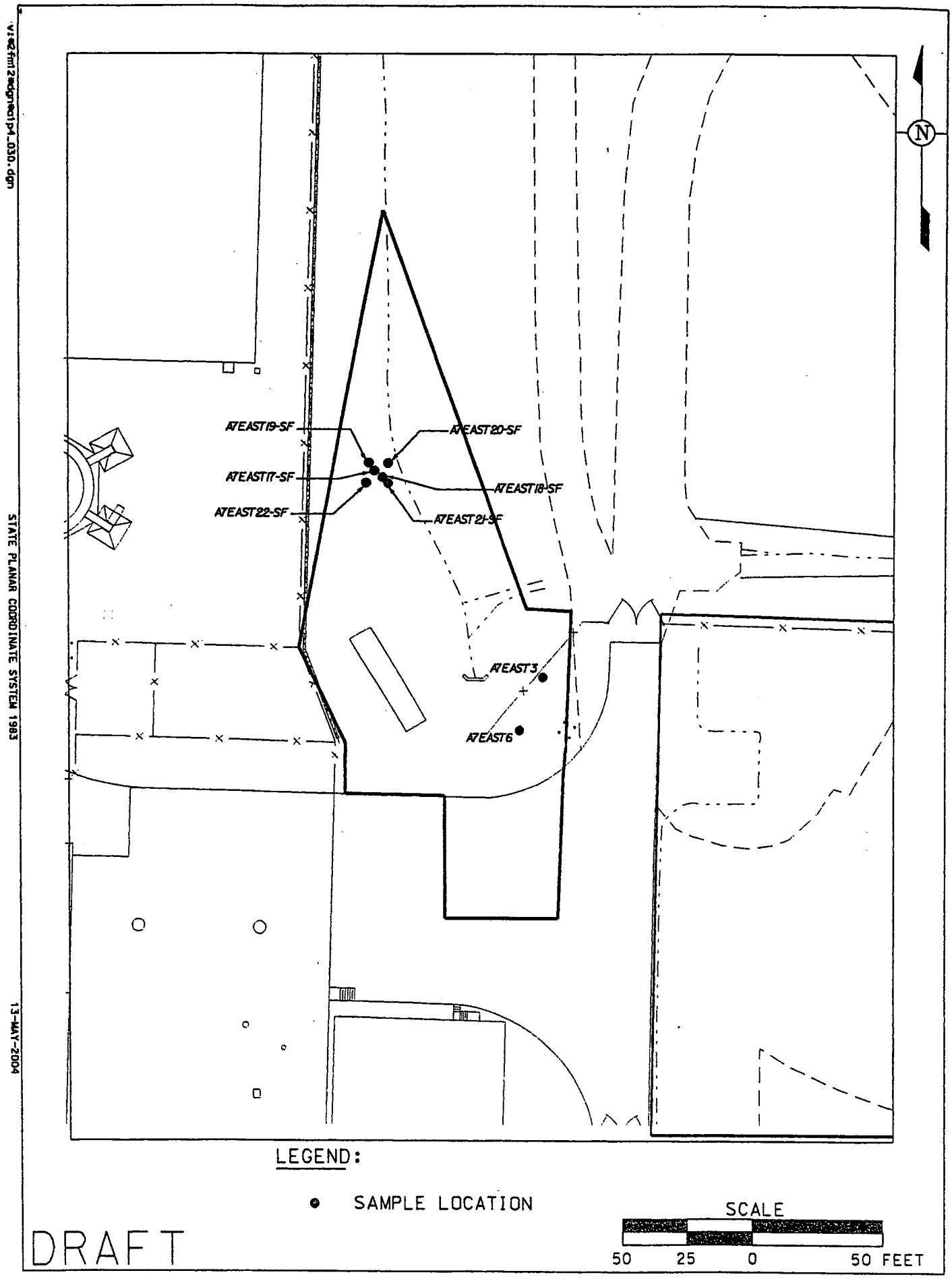


FIGURE A-1. A1PIV PART THREE, POST-EXCAVATION SAMPLE LOCATIONS

APPENDIX B

PRECERTIFICATION REAL-TIME SCAN DATA

TABLE B-1. HPGe RESULTS
DETECTOR HEIGHT OF 31 CM

Location	Date	Northing	Easting	Det. Height	Ra-226 (pCi/g)	Th-232 (pCi/g)	Total U (ppm)
A7P3-NB82-P2-10	04/07/2004	480400	1350575	31cm	0.944	0.891	39.3
A7P3-NB82-P2-11	04/07/2004	480393	1350571	31cm	0.925	1.02	39.3
A7P3-NB82-P2-12	04/29/2004	480245	1350639	31cm	1.677	1.14	19.9
A7P3-NB82-P2-12-D	04/29/2004	480245	1350639	31cm	1.608	1.09	0.0818
A7P3-NB82-P2-13	04/29/2004	480203	1350636	31cm	1.47	1.2	0
A7P3-NB82-P2-14	04/29/2004	480230	1350638	31cm	1.817	1.12	0.0847
A7P3-NB82-P2-16	05/05/2004	480127	1350597	31cm	1.2	0.739	18.2
A7P3-NB82-P2-17	05/05/2004	480178	1350614	31cm	1.3	0.85	17.2

cm = centimeter
pCi/g = picoCuries per gram
ppm = parts per million

000023

5479

TABLE B-1. HPGe RESULTS
DETECTOR HEIGHT OF 15 CM

Location	Date	Northing	Easting	Det. Height	Ra-226 (pCi/g)	Th-232 (pCi/g)	Total U (ppm)
A7P3-NB82-P2-TM-21	05/07/2004	480297	1350589	15 cm	1.71	1.01	54.2
A7P3-NB82-P2-TM-21-D	05/07/2004	480297	1350589	15 cm	1.56	1.06	20.3
A7P3-NB82-P2-TM-22	05/07/2004	480311	1350575	15 cm	1.81	0.962	21.6
A7P3-NB82-P2-TM-23	05/07/2004	480331	1350576	15 cm	1.6	1.05	26.7
A7P3-NB82-P2-TM-24	05/07/2004	480350	1350573	15 cm	1.99	1.09	46.1
A7P3-NB82-P2-TM-25	05/07/2004	480368	1350575	15 cm	1.35	0.923	31.5
A7P3-NB82-P2-TM-26	05/07/2004	480269	1350589	15 cm	2.05	1.08	50.7
A7P3-NB82-P2-TM-27	05/07/2004	480253	1350598	15 cm	1.75	0.935	38.4
A7P3-NB82-P2-TM-28	05/07/2004	480239	1350605	15 cm	1.98	1.07	43.6
A7P3-NB82-P2-TM-29	05/07/2004	480230	1350580	15 cm	1.09	0.954	20

cm = centimeter
pCi/g = picoCuries per gram
ppm = parts per million

000024

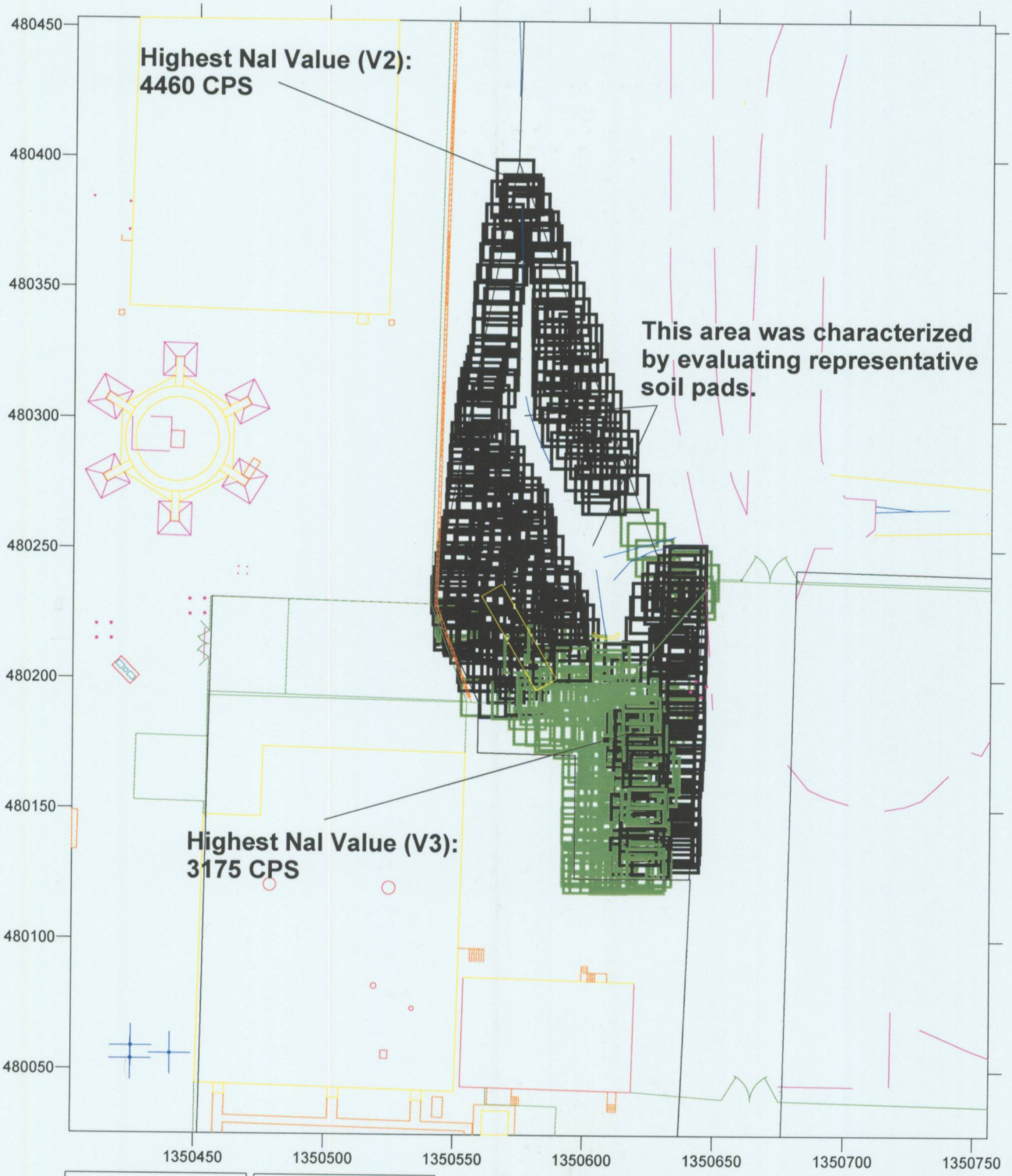
5479

Figure B-1 A1PIV Part Three, Phase 1 Total Gross Counts per Second

5478

N

Field of View to Scale
NaI Batch#: RSS1- 977, 1002, 1011, 1012
Measurement Dates: 04/07/04 - 05/05/04



NaI V2 TCPS
0 to 3000
3000 to 5000
5000 to 15000
15000 to 18000
18000 to 9999

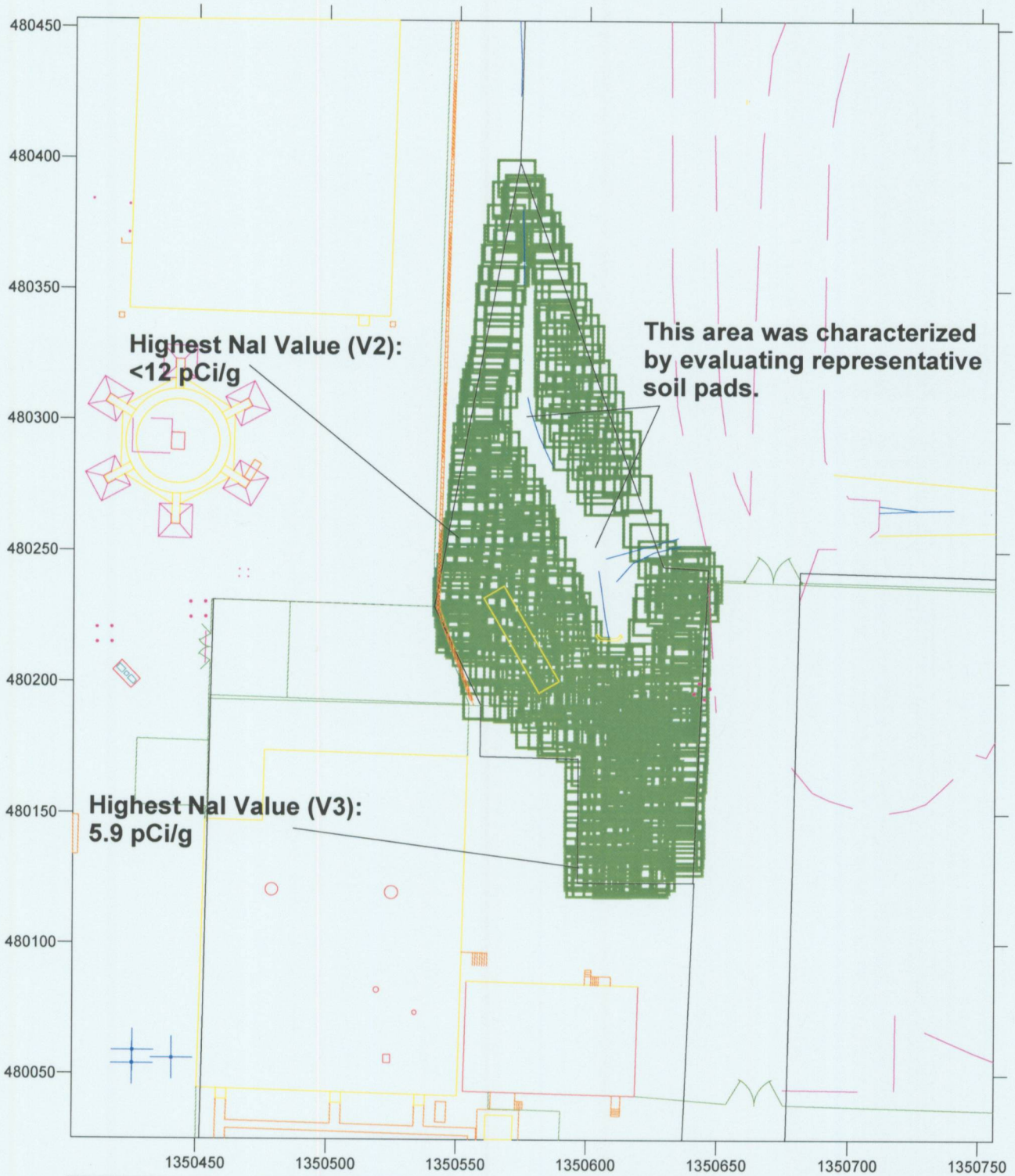
NaI V3 TCPS
0 to 3000
3000 to 5000
5000 to 15000
15000 to 18000
18000 to 99999

RTIMP DWG Title: A1P4_PT3_P1_TC.srf
Project Name: Gen. Char. for Site. Soil Rem.
Project #: 20300-PSP-0011
Verified By: Brian McDaniel/11058
Date Verified: 05/18/04
Support Data: A1P4_PT3_P1_NaI_V2.xls; A1P4_PT3_P1_NaI_V3.xls

0025

Figure B-2 A1PIV Part Three, Phase 1 Moisture Corrected Radium-226

Field of View to Scale
NaI Batch#: RSS1- 977, 1002, 1011, 1012
Measurement Dates: 04/07/04 - 05/05/04



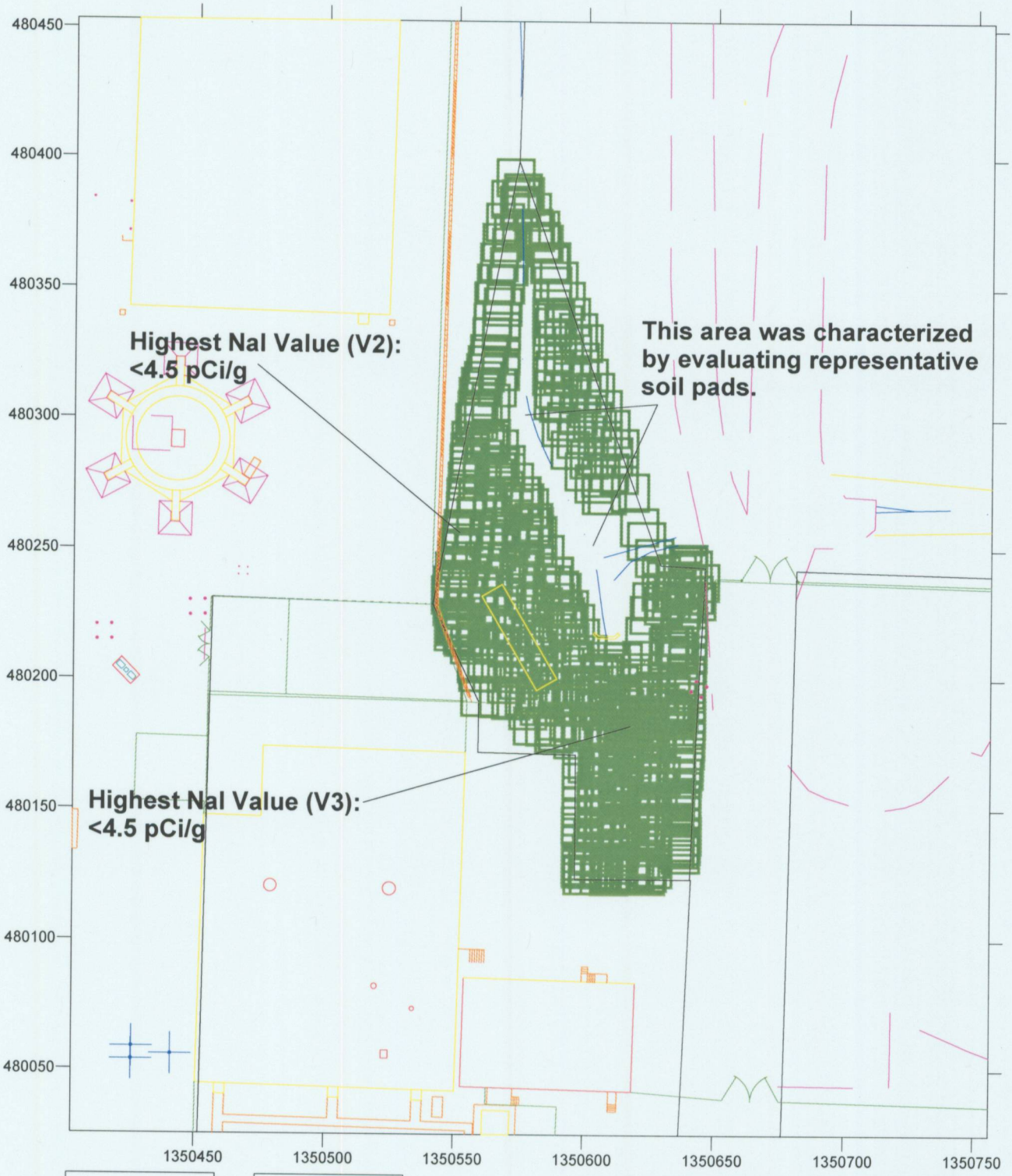
NaI V2 Ra-226 (pCi/g)	
0 to 12	
12 to 9999	

NaI V3 Ra-226 (pCi/g)	
-1 to 5.1	
5.1 to 9999	

RTIMP DWG Title: A1P4_PT3_P1_RA.srf
Project Name: Gen. Char. for Site. Soil Rem.
Project #: 20300-PSP-0011
Verified By: Brian McDaniel/11058
Date Verified: 05/18/04
Support Data: A1P4_PT3_P1_NaI_V2.xls; A1P4_PT3_P1_NaI_V3.xls

Figure B-3 A1PIV Part Three, Phase 1 Moisture Corrected Thorium-232

Field of View to Scale
NaI Batch#: RSS1- 977, 1002, 1011, 1012
Measurement Dates: 04/07/04 - 05/05/04



NaI V2 Th-232 (pCi/g)	NaI V3 Th-232 (pCi/g)
0 to 4.5	0 to 4.5
4.5 to 9999	4.5 to 9999

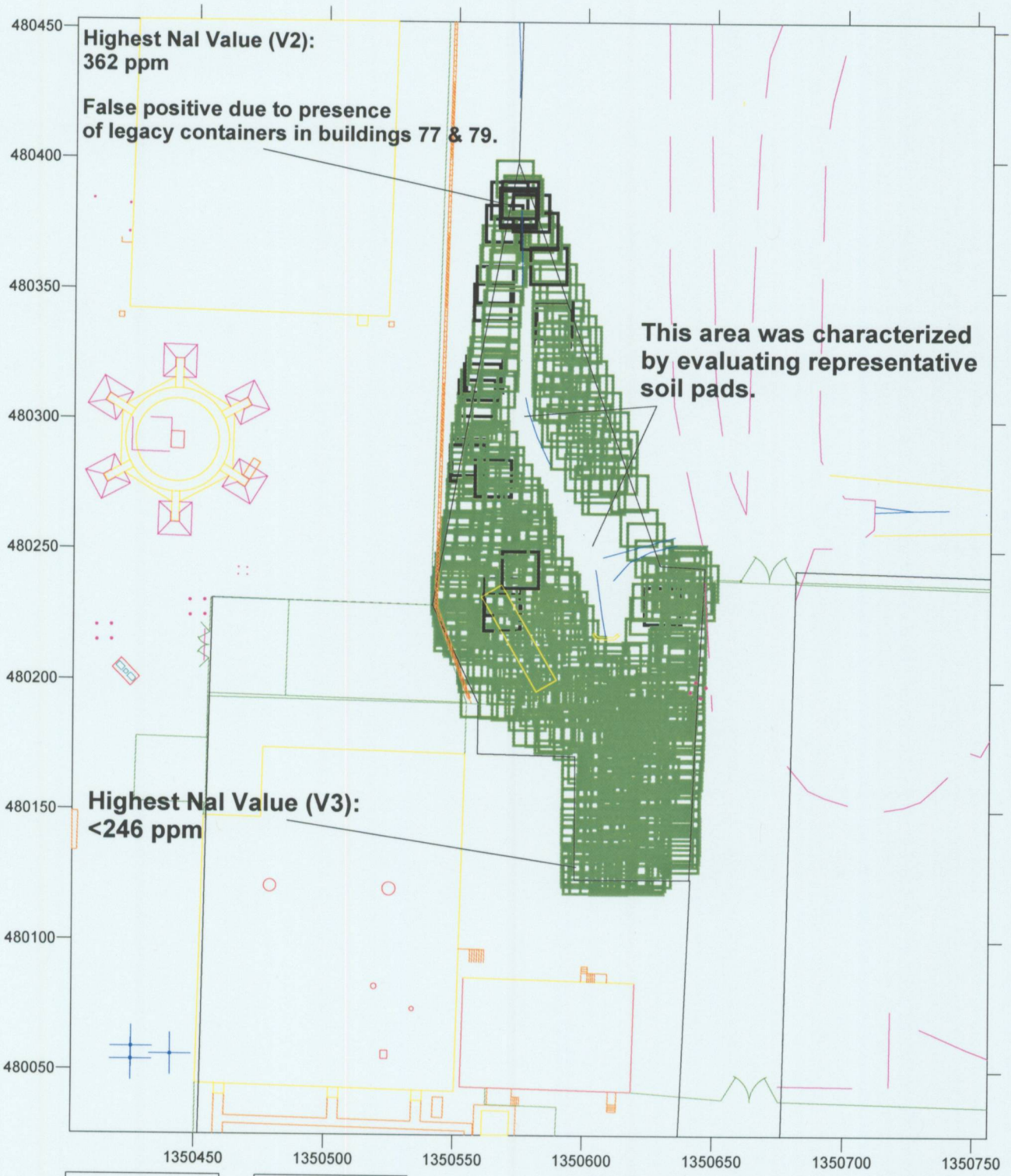
RTIMP DWG Title: A1P4_PT3_P1_TH.srf
Project Name: Gen. Char. for Site. Soil Rem.
Project #: 20300-PSP-0011
Verified By: Brian McDaniel/11058
Date Verified: 05/18/04
Support Data: A1P4_PT3_P1_NaI_V2.xls; A1P4_PT3_P1_NaI_V3.xls

Figure B-4 A1PIV Part Three, Phase 1 Moisture Corrected Total Uranium

5479

N

Field of View to Scale
NaI Batch#: RSS1- 977, 1002, 1011, 1012
Measurement Dates: 04/07/04 - 05/05/04



NaI V2 Total U (ppm)
-133 to 246
246 to 721
721 to 9999

NaI V3 Total U (ppm)
-120 to 246
246 to 875
875 to 9999

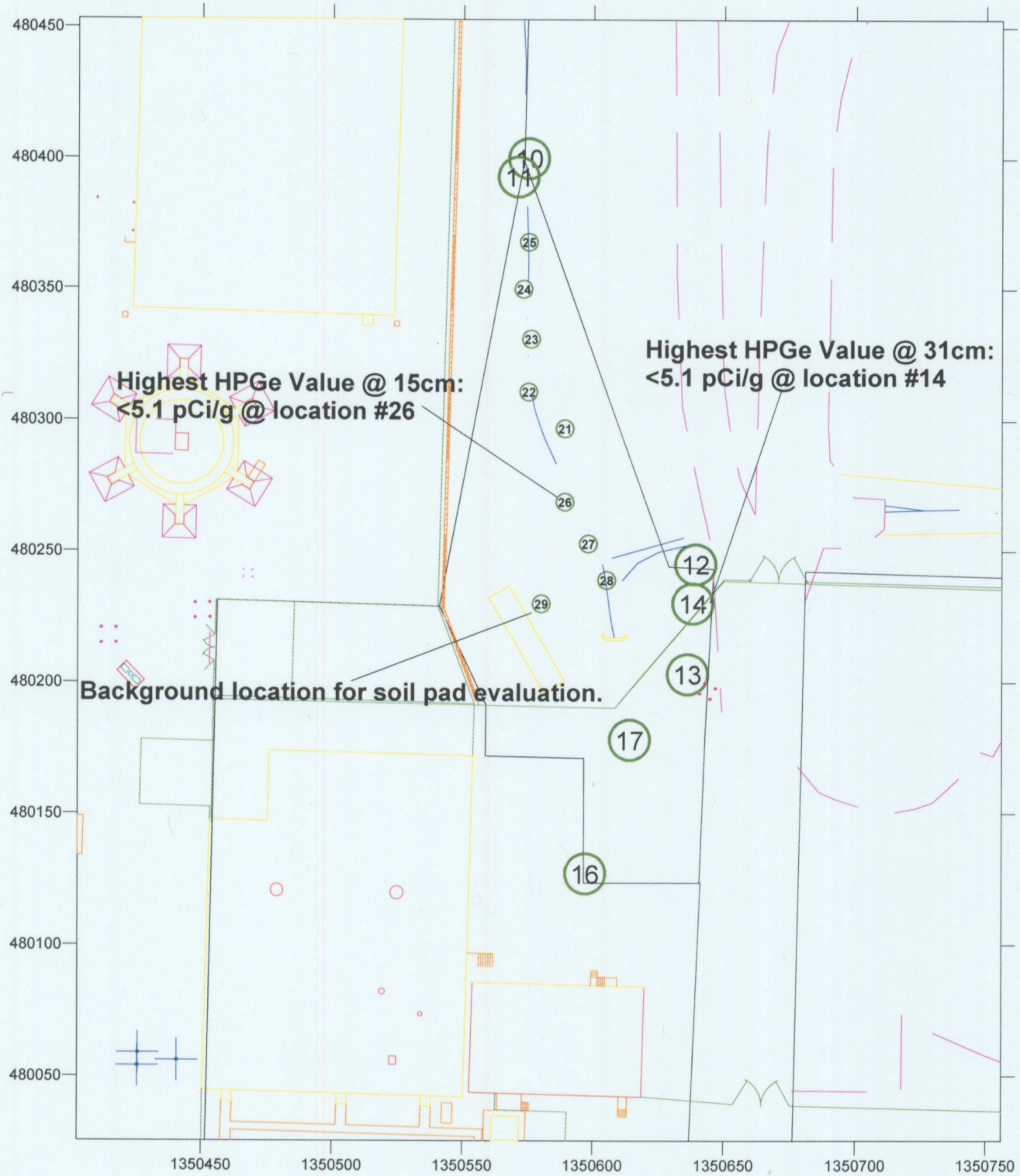
RTIMP DWG Title: A1P4_PT3_P1_TU.srf
Project Name: Gen. Char. for Site. Soil Rem.
Project #: 20300-PSP-0011
Verified By: Brian McDaniel/11058
Date Verified: 05/18/04
Support Data: A1P4_PT3_P1_NaI_V2.xls; A1P4_PT3_P1_NaI_V3.xls

Figure B-5 A1PIV Part Three, Phase 2 Moisture Corrected Radium-226

5479

N

Field of View to Scale
HPGe DET#: 30699, 31204, 31265, 40227
Measurement Dates: 03/09/04 - 05/07/04



HPGe @ 31cm Ra-226 (pCi/g)	HPGe @ 15cm Ra-226 (pCi/g)
0 to 5.1	0 to 5.1
5.1 to 9999	5.1 to 9999

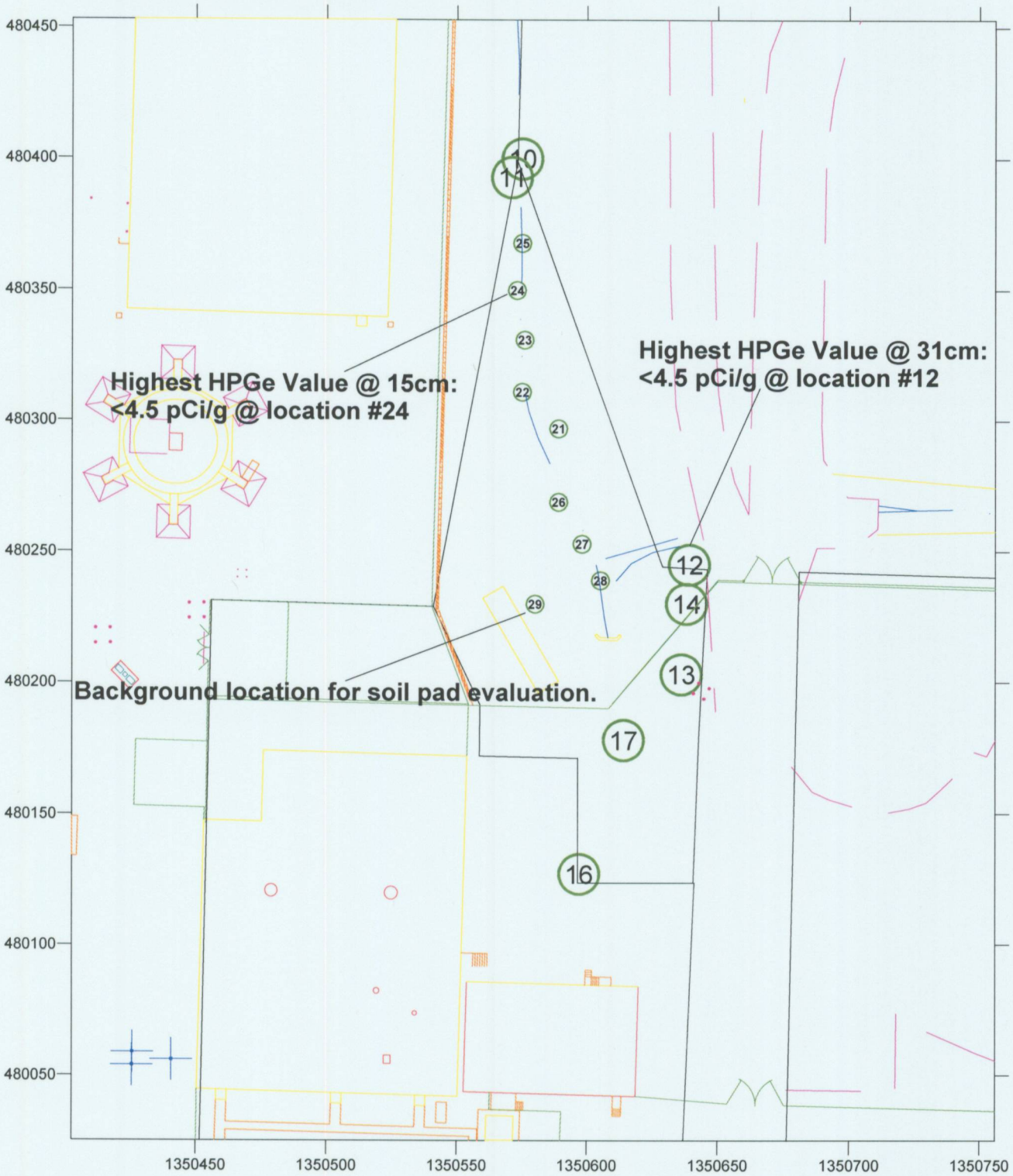
RTIMP DWG Title: A1P4_PT3_P2_RA.srf
Project Name: Gen. Char. for Site. Soil Rem.
Project #: 20300-PSP-0011
Verified By: Brian McDaniel/11058
Date Verified: 05/18/04
Support Data: A1P4_PT3_P2_HPGe_31cm_V2.xls
A1P4_PT3_P2_HPGe_31cm_V3.xls
A1P4_PT3_P2_HPGe_15cm_V3.xls

Figure B-6 A1PIV Part Three, Phase 2 Moisture Corrected Thorium-232

5479

N

Field of View to Scale
HPGe DET#: 30699, 31204, 31265, 40227
Measurement Dates: 03/09/04 - 05/07/04



HPGe @ 31cm Th-232 (pCi/g)	
0 to 4.5	
4.5 to 9999	

HPGe @ 15cm Th-232 (pCi/g)	
0 to 4.5	
4.5 to 9999	

RTIMP DWG Title: A1P4_PT3_P2_TH.srf
Project Name: Gen. Char. for Site. Soil Rem.
Project #: 20300-PSP-0011
Verified By: Brian McDaniel/11058
Date Verified: 05/18/04
Support Data: A1P4_PT3_P2_HPGe_31cm_V2.xls
A1P4_PT3_P2_HPGe_31cm_V3.xls
A1P4_PT3_P2_HPGe_15cm_V3.xls

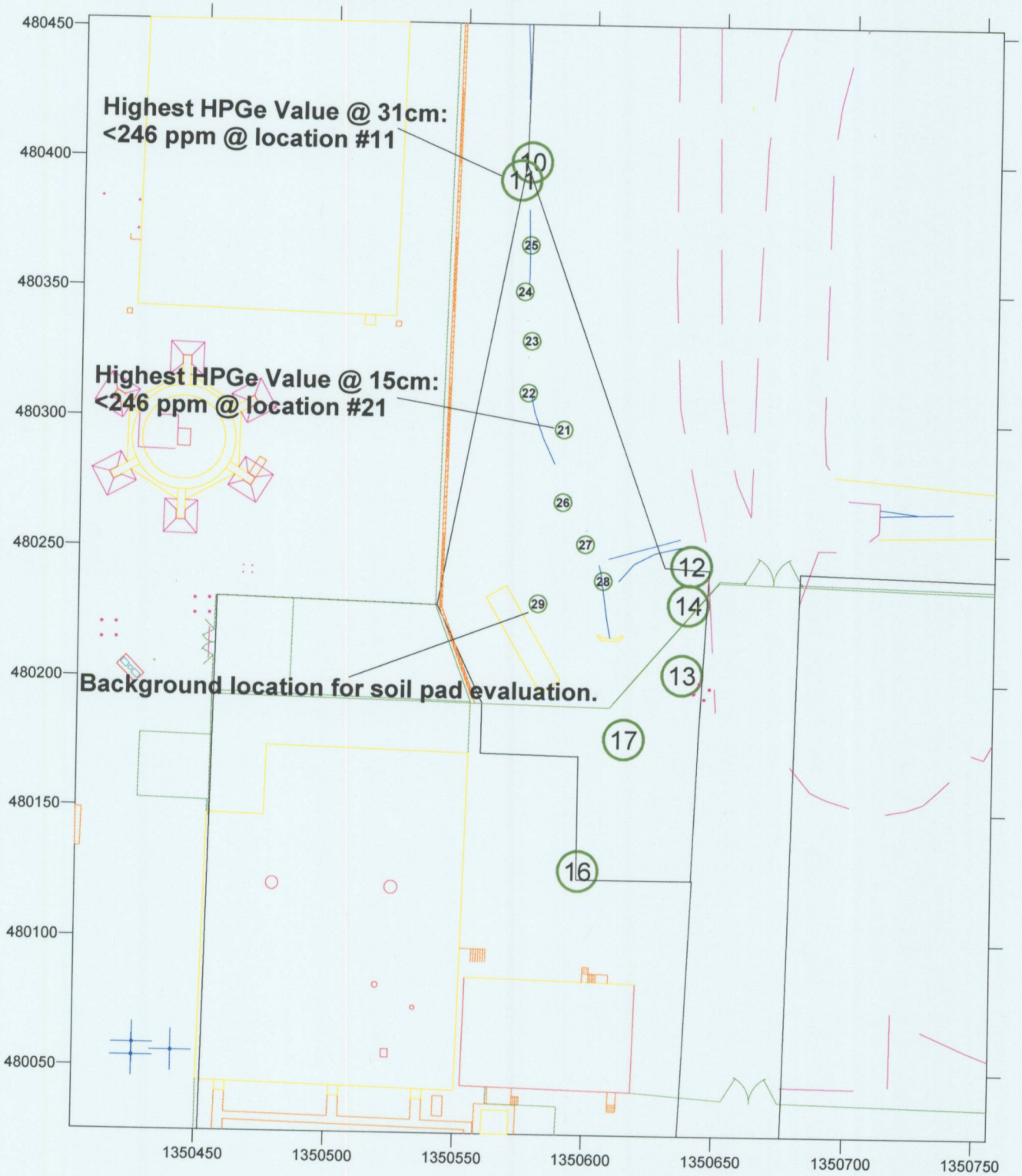
000030

Figure B-7 A1PIV Part Three, Phase 2 Moisture Corrected Total Uranium

5179

N

Field of View to Scale
HPGe DET#: 30699, 31204, 31265, 40227
Measurement Dates: 03/09/04 - 05/07/04



HPGe @ 31cm Total U (ppm)	HPGe @ 15cm Total U (ppm)
0 to 246	0 to 246
246 to 928	246 to 928
928 to 9999	928 to 9999

RTIMP DWG Title: A1P4_PT3_P2_TU.srf
Project Name: Gen. Char. for Site. Soil Rem.
Project #: 20300-PSP-0011
Verified By: Brian McDaniel/11058
Date Verified: 05/18/04
Support Data: A1P4_PT3_P2_HPGe_31cm_V2.xls
A1P4_PT3_P2_HPGe_31cm_V3.xls
A1P4_PT3_P2_HPGe_15cm_V3.xls