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Revised 8/4/98

CORRES. CONTROL
OUTGOING LTR NO

DOE ORDER #4700 1

98-RF-04872

DIST	LT	EN
ANDERSON, SCOTT		
ARCHIBALD, JIM.	X	
BROWN, CHARLES		
CROWE, STEVE		
DORR, KENT (2)	X	X
ERVIN, PAT		
FERRERA, KENNETH		
FLOERKE, JAMES		
FULTON, JOHN		
GEIS, JOHN		
GUTHRIE, vER	X	
HEDAHL, TIM	X	
JOHNSTON, BRAD		
KITCHEN, WILLIAM		
KNUDSON, ROBERT		
LAHOUD, RUSS		
MATHIS, BRIAN	X	
MEYER, GREG		
PARKER, ALAN	X	
PATTERSON, J.	X	
ROGERS, ALAN		
SANFORD, PETE		
STEVENS, JEFF		
SNYDER, DUKE		
WALKER, RANDALL		
WIEMELT, K.		
WHITING, JOHN		
[illegible] L	X	X
[illegible] D	X	X
[illegible] P	X	X
COR. CONTROL	X	X
ADMN. RECORD	X	X
TRAFFIC		
PATS/T130G		
CLASSIFICATION.		
UCNI		
UNCLASSIFIED	✓	✓
CONFIDENTIAL		
SECRET		

AUTHORIZED CLASSIFIER SIGNATURE

9/28/98

Date

IN REPLY TO RFP CC NO

ACTION ITEM STATUS

[ ] PARTIAL/OPEN

[ ] CLOSED

LTR APPROVALS

ORIG & TYPIST INITIALS
KAD:tld

Revised 8/4/1998

KAISER • HILL
COMPANY

September 28, 1998

98-RF-04872

Norma I Castaneda
Environmental Restoration/Waste Management
Closure Projects
DOE, RFFO

DATA SUMMARY REPORT AND INDIVIDUAL HAZARDOUS SUBSTANCE SITE (1HSS) RANKING PRIORITIZATION REPORT FOR BUILDING 123 - KAD-051-98

The purpose of this correspondence is to transmit to your office the Environmental Restoratio ranking of the facility (Attachment 1), and the Final Pre-Remedial Investigation of (IHSS) 121 and 148 at Building 123 Data Summary Report, (Enclosure 2)

The data within the enclosed report was used by Environmental Restoration (ER) to support the Under Building Contamination (UBC) scoring and ranking of the Building 123 site (Enclosure 1, see status number 46)

By completing the ranking and prioritization of the Building 123 site by September 28, 1998, Kaiser-Hill (K H) has completed the Rocky Flats Cleanup Agreement (RFCA) Milestone M8, (Work Breakdown Structure (WBS) No 1 1 05 02 04 03) which was scheduled for completion September 30, 1998

Please contact me at extension 6034 if you have any questions concerning this matter

Kent A Dorr
Closure Projects

tld

Original and 1 cc – N I Castaneda

Enclosure(s)
As Stated

cc
Joe Legare w/o Enc
Reginald Tyler w/o Enc
William Fitch w/o Enc

ADMIN RECO
IA-B123-A-00097

Rev 9/98

ER Ranking

Total Surface Soil	Total Chemical Score	ALF Score	SW Impact Score Multiplier	Potential for Further Release Multiplier	Professional Judgement Multiplier	Total Priority Score	Exceeds Tier I AL	General Comments
<1	33681	10	2	3	1	60	yes	Source removed
<1	27713	10	2	3	1	60	yes	Source removed
n	26179	10	2	3	1	60	yes	Source removed
<1	11091	9	1	3	2	54	yes	FY98 source removed, treatment and trench fill in FY99
1	19071	9	3	2	1	54	yes	Source of Mound Plume, removed
108	42983	10	2	2	1	40	yes	Characterization in FY98/FY99 remediation planned for FY2001
	26105	10	3	1	1	30	yes	Impact on surface water in the S Walnut Creek drainage
2	50003521	10	1 5	2	1	30	yes	Tank 10 source removed Carbon Tet Plume Source
	19067	9	3	1	1	27	yes	Groundwater collection and treatment system in place
<1	3570	7	1	3	1	21	yes	Source removed, tank foamed and stabilized
n	1453	7	1	3	1	21	yes	Source removed, tank foamed and stabilized
29	1050	7	1	3	1	21	yes	Tank foamed and stabilized PAHs in surface soil and groundwater
n	1000	6	1	3	1	18	yes	Source removed, tank foamed and stabilized
14	2417	7	2	1	1	14	yes	HHRA 10-4 to 10-6, groundwater from 118 1 not used in ranking
	2403	7	2	1	1	14	yes	Plume due to NO_3, impacts surface water in N Walnut Creek
	73365	10	1	1	1	10	yes	No impact to surface water in the Woman Creek drainage
n	50000000	10	1	1	1	10	yes	IHSS 118 1 is suspected source/DNAPL present
n	9167	8	1	1	1	8	yes	No impact on surface water in the Woman Creek drainage
n	2615	7	1	1	1	7	yes	No known impact on surface water
4110	4125	7	1	2	0 5	7	yes	New 1995 data-PAHs in surface soil
	553	6	1	1	1	6	no	Source not present
1	579	6	1	1	1	6	yes	Paved
1	419	5	1	1	1	5	no	Paved
	257	5	1	1	1	5	no	Source may be due to UBC at B881
n	264	5	1	1	1	5	yes	No pathway known
31	446	5	2	1	0 5	5	no	Compliance, presumptive remedy for closure
	415	5	2	1	0 5	5	no	
18	18	1	2	1	2	4		Process knowledge of probable influent liquids
<1	128	4	1	1	1	4	yes	Score includes newly discovered sample data
14	229	4	2	1	0 5	4	yes	HHRA, less than 10-6, metals
2	2	1	1	3	1	3	no	Tank foamed and stabilized tank not breached
<1	<1	1	1	3	1	3		
<1	96	3	1	1	1	3	no	Organics in groundwater
64	64	2	1	1	1	2	no	Contamination due to B779
59	59	2	1	1	1	2	no	PAHs in surface soil
3	49	2	1	1	1	2	no	
26	26	2	1	1	1	2	no	
4	4	1	1	2	1	2	no	
2	46	2	1	1	1	2	no	HHRA 10E 4 to 10-6
<1	46	2	1	1	1	2	no	HHRA, 10E 4 to 10-6
<1	46	2	1	1	1	2	no	HHRA, 10E-4 to 10-6
<1	44	2	1	1	1	2	no	HHRA, 10E 4 to 10-6
	174	4	1	1	0 5	2	no	HHRA, 10E-4 to 10-6 Action required due to physical hazard
27	199	4	1	1	0 5	2	no	HHRA, 10E-4 to 10-6
<1	12	1	1	1	1	1	no	Evaluate using approved NA/NFA process
1	14	1	1	1	1	1	no	Building removed to the slab in FY98
20	20	1	1	1	1	1	no	Contamination probably from 400 Complex
16	16	1	1	1	1	1	no	
13	13	1	1	1	1	1	no	
5	10	1	1	1	1	1	no	
5	7	1	1	1	1	1	no	PCB hit above AL, listed under PCB 9
6	6	1	1	1	1	1	no	

n = data not available

V.A. [signature] UNU

Total Surface Soil	Total Chemical Score	ALF Score	SW Impact Score Multiplier	Potential for Further Release Multiplier	Professional Judgement Multiplier	Total Priority Score	Exceeds Tier I AL	General Comments
4	4	1	1	1	1	1	no	
4	4	1	1	1	1	1	no	
2	2	1	1	1	1	1	no	
n	6	1	1	1	1	1	no	Investigation done for B440 expansion
2	2	1	1	1	1	1	no	PCB hit above AL
<1	44	2	1	1	0 5	1	no	HHRA, 10E-4 to 10-6
3	32	2	1	1	0 5	1	no	CAD/ROD amendment pending
19	19	1	1	1	0 5	0 5	no	PAHs in surface soil
19	19	1	1	1	0 5	0 5	no	PAHs in surface soil
1	1	1	1	1	0 5	0 5	no	
n	<1	0	1	1	1	0	no	Remediate with Mound Site, in PA fence
<1	<1	0	1	1	1	0	no	
<1	<1	0	1	1	1	0	no	
<1	<1	0	1	1	1	0	no	
<1	<1	0	1	1	1	0	no	
n	<1	0	1	1	1	0	no	
<1	<1	0	1	1	1	0	no	
<1	<1	0	1	1	1	0	no	
<1	<1	0	1	1	1	0	no	
<1	<1	0	1	1	1	0	no	
<1	<1	0	1	1	1	0	no	
tbd	<1	0	1	1	1	0	no	
n	0	0	1	1	1	0	no	
<1	0	0	1	1	1	0	no	Evaluate using approved NA/NFA process
n	0	0	1	1	1	0		Evaluate using approved NA/NFA process
n	0	0	1	1	1	0		Evaluate using approved NA/NFA process
n	0	0	1	1	1	0		Evaluate using approved NA/NFA process
n	0	0	1	1	1	0		Evaluate using approved NA/NFA process
n	0	0	1	1	1	0		Evaluate using approved NA/NFA process
n	0	0	1	1	1	0		Evaluate using approved NA/NFA process
n	0	0	1	1	1	0		Evaluate using approved NA/NFA process
<1	0	0	1	1	1	0		Evaluate using approved NA/NFA process
n	0	0	1	1	1	0	no	Evaluate using approved NA/NFA process
<1	0	0	1	1	1	0		Evaluate using approved NA/NFA process
<1	0	0	1	1	1	0		Evaluate using approved NA/NFA process
<1	0	0	1	1	1	0		Evaluate using approved NA/NFA process
<1	0	0	1	1	1	0		Evaluate using approved NA/NFA process
n	0	0	1	1	1	0		Evaluate using approved NA/NFA process
<1	0	0	1	1	1	0		Evaluate by NA/NFA process/tie B335 D&D
<1	0	0	1	1	1	0		Evaluate by NA/NFA process/tie B335 D&D
<1	0	0	1	1	1	0		Evaluate with NA/NFA/PCB Hot Spot only
<1	0	0	1	1 -	0 5	0		Removed during PA construction verify only
<1	134	4	1	2	2	16	no	Empirical data indicates free product present
<1	156	4	1	1	2	8		Known contaminant plume
<1	0	1	1	1	2	2		Many known spills
n	1013	7	1	1	2	14	yes	IHSS 121 includes the following italicized IHSSs
								Not characterized, probably highly contaminated
								Not characterized, probably highly contaminated
								Not characterized, probably highly contaminated
								Not characterized, probably highly contaminated

n = data not available

Tank ents	Total Ground Water	Total Subsurface Soil	Total Surface Soil	Total Chemical Score	ALF Score	SW Impact Score Multiplier	Potential for Further Release Multiplier	Professional Judgement Multiplier	Total Priority Score	Exceeds Tier I AL	General Comments
	1013	n	n	1013	7	1	1	2	14	yes	IHSS 121 includes the following italicized IHSSs
											Not characterized, probably highly contaminated
											Not characterized, probably highly contaminated
	n	n	n	0	0	1	1	2	0		Tanks removed, 1971 rad data exceeded Tier I levels
	n	n	<1	0	0	1	1	1	0		Paved, old data exists
	n	n	<1	0	0	1	1	1	0		Paved old data exists
	n	n	<1	0	0	1	1	2	0		Suspected source-known buried material-PU&D yard
	n	n	<1	0	0	1	1	2	0		Waste staging area-lack of data
	651	n	<1	651	6	1	1	1	6	yes	Source
	<1	n	<1	0	0	1	1	1	0		Tied to Building 335 D&D Project
	n	n	<1	0	0	1	1	1	0		Rad Screens only
	n	n	<1	0	0	1	1	1	0		HPGe Survey
	n	n	n	0	0	1	1	1	0		Active Storage Unit not sampled
	n	n	<1	0	0	1	1	1	0		
	n	n	<1	0	0	1	1	1	0		
	n	n	<1	0	0	1	1	1	0		
	n	n	<1	0	0	1	1	1	0		
	n	n	<1	0	0	1	1	0 5	0		Spills cleaned up at time
	n	n	<1	0	0	1	1	0 5	0		Spills cleaned up at time
	n	n	<1	0	0	1	1	0 5	0		Unconfirmed-no location found
	n	n	<1	0	0	1	1	0 5	0		Spills cleaned up at time
	n	3	n	3	1	1	1	0 5	0 5		
	2	n	<1	2	1	1	1	0 5	0 5	no	Evaluated using approved NA/NFA process
	n	n	12	12	1	1	1	0 5	0 5	no	Investigation in FY98 determined no source above Tier I pres
	n	n	<1	0	0	1	1	1	0		Evaluated using approved NA/NFA process
	n	n	<1	0	0	1	1	1	0		Evaluated using approved NA/NFA process
	n	n	<1	0	0	1	1	1	0		Evaluated using approved NA/NFA process
	n	n	<1	0	0	1	1	1	0		Evaluated using approved NA/NFA process
	n	n	<1	0	0	1	1	1	0		Evaluated using approved NA/NFA process
	n	n	<1	0	0	1	1	1	0		Evaluated using approved NA/NFA process
	n	n	<1	0	0	1	1	1	0	no	No source found
	n	n	<1	0	0	1	1	1	0		Evaluated using approved NA/NFA process
	n	n	<1	0	0	1	1	1	0		Evaluated using approved NA/NFA process
	n	n	n	0	0	1	1	1	0		Evaluated using approved NA/NFA process
	n	n	<1	0	0	1	1	1	0		Evaluated using approved NA/NFA process
	n*	n	<1	0	0	1	1	1	0		PPRG ratio less than 1, *2 downgradient wells
	n*	n	<1	0	0	1	1	1	0		PPRG ratio less than 1 *2 downgradient wells
	n	<1	<1	0	0	1	1	0 5	0		HHRA, 10E-4 to 10-6
	n	<1	<1	0	0	1	1	0 5	0		HHRA, 10E-4 to 10-6
	<1	n	<1	0	0	2	1	0 5	0		HHRA, less than 10-6
	n	<1	<1	0	0	1	1	0 5	0		HHRA, 10E 4 to 10-6 w/pond data
	n	<1	<1	0	0	1	1	0 5	0		HHRA, less than 10-6 Includes pond & sediments
	n	<1	<1	0	0	1	1	0 5	0		HHRA, less than 10-6 Includes pond & sediments
	<1	<1	<1	0	0	1	1	0 5	0		Passed CDPHE screen
	n	<1	<1	0	0	1	1	0 5	0		HHRA, 10E-4 to 10-6 w/pond data
	n	<1	<1	0	0	1	1	0 5	0		HHRA 10E-4 to 10-6 w/pond data
	<1	<1	<1	0	0	1	1	0 5	0		Passed CDPHE screen w/ pond and sediment data
	n	<1	<1	0	0	1	1	1	0		HHRA, 10E-4 to 10-6 w/pond & sediment data
	n	<1	<1	0	0	1	1	1	0		HHRA, 10E 4 to 10-6 w/pond & sediment data
	n	<1	<1	0	0	1	1	1	0		HHRA 10E 4 to 10-6 w/pond & sediment data
	n	<1	<1	0	0	1	1	1	0		HHRA 10E 4 to 10-6 w/pond & sediment data

n = data not ava

ce	Total Surface Soil	Total Chemical Score	ALF Score	SW Impact Score Multiplier	Potential for Further Release Multiplier	Professional Judgement Multiplier	Total Priority Score	Exceeds Tier I AL	General Comments
	<1	0	0	1	1	1	0		Passed CDPHE screen w/ pond and sediment data
	n	0	0	1	1	1	0		Evaluated using approved NA/NFA process
	<1	0	0	1	1	1	0		HHRA, less than 10-6
	n	0	0	1	1	0 5	0		Passed CDPHE screen
	n	0	0	1	1	0 5	0		Passed CDPHE screen
	n	0	0	1	1	0 5	0		Passed CDPHE screen
	<1	0	0	1	1	0 5	0		HHRA, less than 10-6
	<1	0	0	1	1	0 5	0		HHRA, 10E-4 to 10-6
	<1	0	0	1	1	0 5	0		Focused HHRA, 10E-4 to 10-6
	n	0	0	1	1	0 5	0		Evaluated using approved NA/NFA process
	n	0	0	1	1	0 5	0		Evaluated using approved NA/NFA process
	n	0	0	1	1	0 5	0		Evaluated using approved NA/NFA process
	<1	0	0	1	1	0 5	0		Evaluated using approved NA/NFA process
	<1	0	0	1	1	0 5	0		Passed CDPHE screen
	<1	0	0	1	1	0 5	0		Passed CDPHE screen
	<1	0	0	1	1	0 5	0		Passed CDPHE screen
	<1	<1	0	2	1	0 5	0		HHRA, less than 10-6
	<1	<1	0	2	1	0 5	0		HHRA less than 10-6
	<1	10	4	2	1	0 5	4	yes	HHRA, less than 10-6
	<1	0	0	2	1	0 5	0		HHRA, less than 10-6
	<1	0	0	2	1	0 5	0		HHRA, less than 10-6
	<1	0	0	2	1	0 5	0		HHRA, less than 10-6
	<1	0	0	2	1	0 5	0		HHRA, less than 10-6
	<1	9	1	2	1	0 5	1	no	HHRA less than 10-6
	<1	34	2	2	1	0 5	2	yes	HHRA, less than 10-6
	<1	0	0	2	1	0 5	0		HHRA, less than 10-6
	<1	0	0	1	1	0 5	0		HHRA, 10E-4 to 10-6 No groundwater issues
	<1	0	0	1	1	0 5	0		HHRA, 10E-4 to 10-6, plus sediment samples
	<1	0	0	1	1	0 5	0		Passed CDPHE screen
	<1	0	0	1	1	0 5	0		Passed CDPHE screen
	<1	190	4	1	1	0 5	2	no	Passed CDPHE screen-CAD/ROD complete
	n	0	0	1	1	0 5	0		No source found-CAD/ROD complete
	n	0	0	1	1	0 5	0		RCRA Clean Closure CAD/ROD complete
	n	0	0	1	1	0 5	0		RCRA Clean Closure CAD/ROD complete
	n	0	0	1	1	0 5	0		RCRA Clean Closure CAD/ROD complete
	n	0	0	1	1	0 5	0		No source found CAD/ROD Complete
	n	0	0	1	1	0 5	0		No source found-CAD/ROD Complete
	n	0	0	1	1	0 5	0		No source found-CAD/ROD Complete
	n	3	1	1	1	0 5	0 5	no	Evaluated using approved NA/NFA process
	n	0	0	1	1	0 5	0		No source found-CAD/ROD Complete
	n	0	0	1	1	0 5	0		No source found-CAD/ROD Complete
	n	0	0	1	1	0 5	0		No source found-CAD/ROD Complete

n = data not available

RMRS Rocky Mountain Remediation Services, L.L C.
protecting the environment

RF/RMRS-98-255.UN

Final Pre-Remedial Investigation of Individual Hazardous Substance Sites (IHSS) 121 and 148 at Building 123 Data Summary Report

Rocky Mountain Remediation Services, L.L.C.

REVISION 0

SEPTEMBER 1998

K A Dorr (UNU)
9/28/98

TABLE OF CONTENTS

TABLES

TABLES (continued)

FIGURES

APPENDICES

ATTACHMENTS

ACRONYMS

ALF	Action Level Framework
Am	Americium
Be	Beryllium
BTEX	Benzene, toluene, ethylbenezene, and xylene
$C_{2a}H_4O_2$	Acetic acid
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Resource, Compensation, and Liability Act
Cm	Curium
DNAPL	Dense Non-aqueous Phase Liquid
DOE	Department of Energy
EMD	Environmental Management Department
ER	Environmental Restoration
FIDLER	Field Instrument for the Detection of Low Energy Radiation
GC/MS	Gas Chromatography/Mass Spectrometry
GPR	Ground Penetrating Surveys
GPS	Global Positioning System
H_2SO_4	Sulfuric acid
HCl	Hydrochloric acid
$HClO_4$	Perchloric acid
HF	Hydrofluoric acid
HNO_3	Nitric acid
HPGe	High Purity Germanium
HRR	Historical Release Report
IHSS	Individual Hazardous Substance Sites
LNAPL	Light Non-aqueous Phase Liquid
mg/kg	milligram per kilogram
NaOH	Sodium Hydroxide
NAPL	Non-aqueous Phase Liquid
NH_4OH	Ammonium hydroxide
OPWLs	Original Process Waste Lines
OU	Operable Unit
PACs	Potential Areas of Contamination
PAM	Proposed Action Memorandum
PCB	Polychlorinated Biphenyls
pCi/g	picocuries per gram
pCi/l	picocuries per liter
PCE	Tetrachloroethene
PID	Photo ionization detector
PPM	parts per million
Pu	Plutonium
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RFI	RCRA Facility Investigation
RI	Remedial Investigation
RWP	Radiological Work Package
TCFM	Trichlorofluoromethane
U	Uranium
UBC	Under Building Contamination
ug/Kg	microgram per kilogram
ug/l	microgram per liter
VOA	Volatile organic analysis
VOCs	Volatile Organic Compounds

FINAL PRE-REMEDIAL INVESTIGATION OF IHSS 121 AND 148 DATA SUMMARY REPORT

1.0 INTRODUCTION

A pre-remedial field investigation was conducted in June and July 1998 to identify and delineate the extent of the Under Building Contamination (UBC) from Individual Hazardous Substance Sites (IHSS) 121 and 148 and to further characterize these IHSS The purpose of the sampling was to characterize the presence or absence of hazardous and/or radioactive contamination in the soil beneath the Building 123 concrete slab, leaks adjacent to selected sumps, process waste lines and pits, localized spills and the general condition of the surrounding grounds The goal of the field investigation was to determine the presence of contamination in the soil to support the decontamination and demolition of Building 123 and fulfill criteria defined by the *Proposed Action Memorandum (PAM) for the Decommissioning of Building 123* (RMRS 1997a) The data will be used to score under building contamination at Building 123 relative to RFCA soil action levels This score will be subsequently ranked by Environmental Restoration (ER Ranking) in relation to other sites at RFETS for remediation decisions

1 1 BACKGROUND

Building 123 is located on Central Avenue between Third and Fourth Streets at the RFETS, (Figure 1-1) The Building 123 area encompasses overlapping IHSS 121 and 148 and a portion of RCRA Unit 40 (Figure 1-2)

Four (4) associated Potential Areas of Contamination (PACs), 100-601, 100-602, 100-603, and 100-611 have been identified in the RFETS *Historical Release Report* (HRR, DOE 1992c) The PACs were established as the result of documented spill incidents

Unconfirmed reports of contaminant spills have been indicated in interviews with building employees In the late 1960's or early 1970's a cesium-contaminated liquid was spilled on the concrete floor in Room 109C (Figure 1-2) The floor was immediately sealed to immobilize the contamination No further action was initiated to address consequences of the spill

1.2 PRIOR INVESTIGATIONS

IHSS 121 consists of RCRA Unit 40 underground Original Process Waste Lines (OPWLs) P-1, P-2, and P-3, which were designated in the *Final Phase I RCRA Facility Investigation/Remedial Investigation (RFI/RI) Work Plan For Operable Unit 9* (DOE 1992a) The area has also been identified as PAC 000-121 in the HRR The OPWL system constitutes former Operable Unit No 9 (OU 9) and RCRA Unit 40, the plant-wide process waste system comprised of tank and underground pipelines constructed to transport and temporarily store process wastes from point of origin to on-site treatment and discharge points

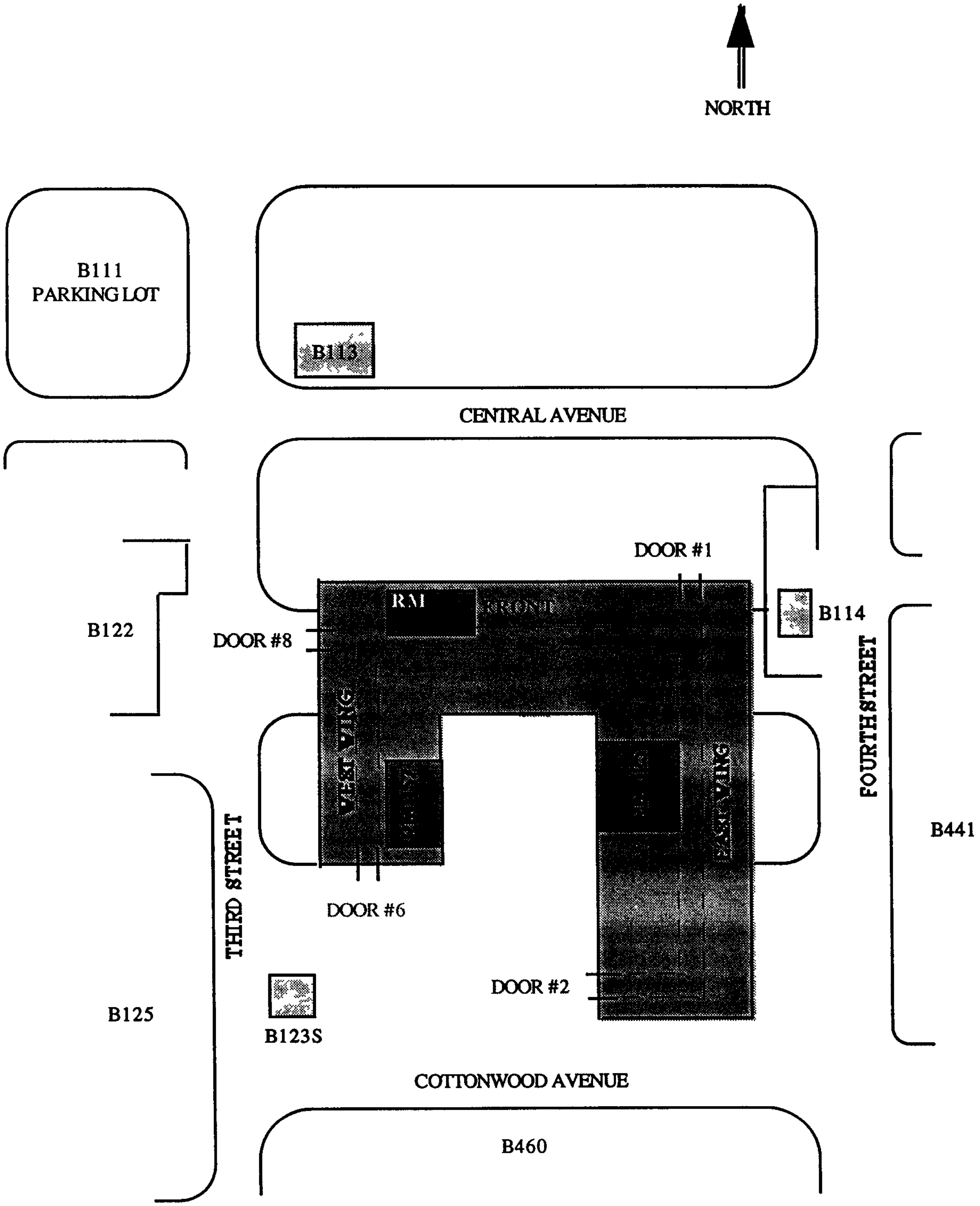

Figure 1-1 Building 123 Site Location

All process waste generated from 1952 to 1968 was transferred from Building 123 to Building 441 through Line P-2, which ran below the west side of the east wing before exiting at the southeast corner of the building In 1968, the east wing was extended about fifty (50) feet to the south Prior to the building addition, two manholes (MH-2 and MH-3, Figure 1-2) were constructed and the line was extended south to MH-2, then east to MH-3, and North to MH-4, before assuming the original path at P-2 The extension was designated as P-3 One manhole was abandoned and covered by the building addition In 1972, a west wing was constructed, extending south from the northwest corner of the original building Prior to construction of the wing, Line P-1 was installed to transfer waste to Manhole MH-1, then east to a junction with P-3 at MH-2 (Figure 1-2) The lines transferred the following process waste from Building 123

- Acids nitric acid (HNO_3), hydrofluoric acid (HF), sulfuric acid (H_2SO_4), hydrochloric acid (HCl), acetic acid (Hydrochloric acid ($HClO_4$),
- Bases ammonium hydroxide (NH_4OH) and sodium hydroxide (NaOH),
- Solvents acetone, alcohols, cyclohexane, toluene, xylene, trisooctomine, and ether,
- Radionuclides various isotopes of plutonium (Pu), americium (Am), uranium (U), and curium (Cm),
- Metals beryllium (Be) (trace amounts), and
- Others ammonium thiocyanate, ethylene glycol, and possible trace amounts of polychlorinated biphenyls (PCBs) (DOE 1992a)

In 1982, P-2 and P-3 were abandoned and plugged with cement In 1989, the process waste transfer system was upgraded, including removal of the east-west section of P-1 between MH-2 and MH-3 The north-south section of P-1 between Building 123 and MH-1 was converted to the new process system Three large, interconnected concrete sump pit areas were installed in Rooms 156, 157, and 158 to accommodate process waste system backup Pipe was installed connecting MH-1 to Valve Vault 18 A second building addition was also made to the south end of the east wing, partially overlying Line P-3 (Figure 1-2)

Currently, all process waste throughout Building 123 is collected in floor sumps Each sump collects and temporarily stores liquid waste which is then pumped through overhead lines into a main floor sump in Room 158 The waste is then gravity-fed through P-1 to Valve Vault 18, then to underground Tank T-2 (Tank 853) at Building 428, and finally to Building 374 for treatment (Figure 1-2)

A detailed characterization of former Operable Unit No 13 (OU 13) was conducted from September 1993 to February 1995 as part of a Phase I RCRA RFI/RI The characterization included high-purity germanium (HPGe) surveys, vertical soil profiles, surface soil sampling and soil gas surveys The investigation identified an area of reported small spills of nitrate-bearing wastes along the east side of Building 123 and a potential for soil contamination beneath the building due to possible leaks in OPWL P-2 The area was established as IHSS 148 and detailed in the *Final Phase I RFI/RI Work Plan for Operable Unit 13* (DOE 1992b). The area has also been identified as UBC 123 and PAC 100-148 in the HRR

Thirty-four (34) analytes were detected in the surface soil survey, including twenty-six (26) inorganic compounds and eight (8) radionuclides Eleven (11) analytes exceeded background limits at a minimum of one sample location throughout IHSS 148 Constituents that exceeded minimum detection levels or activities are indicated in Table 1-2

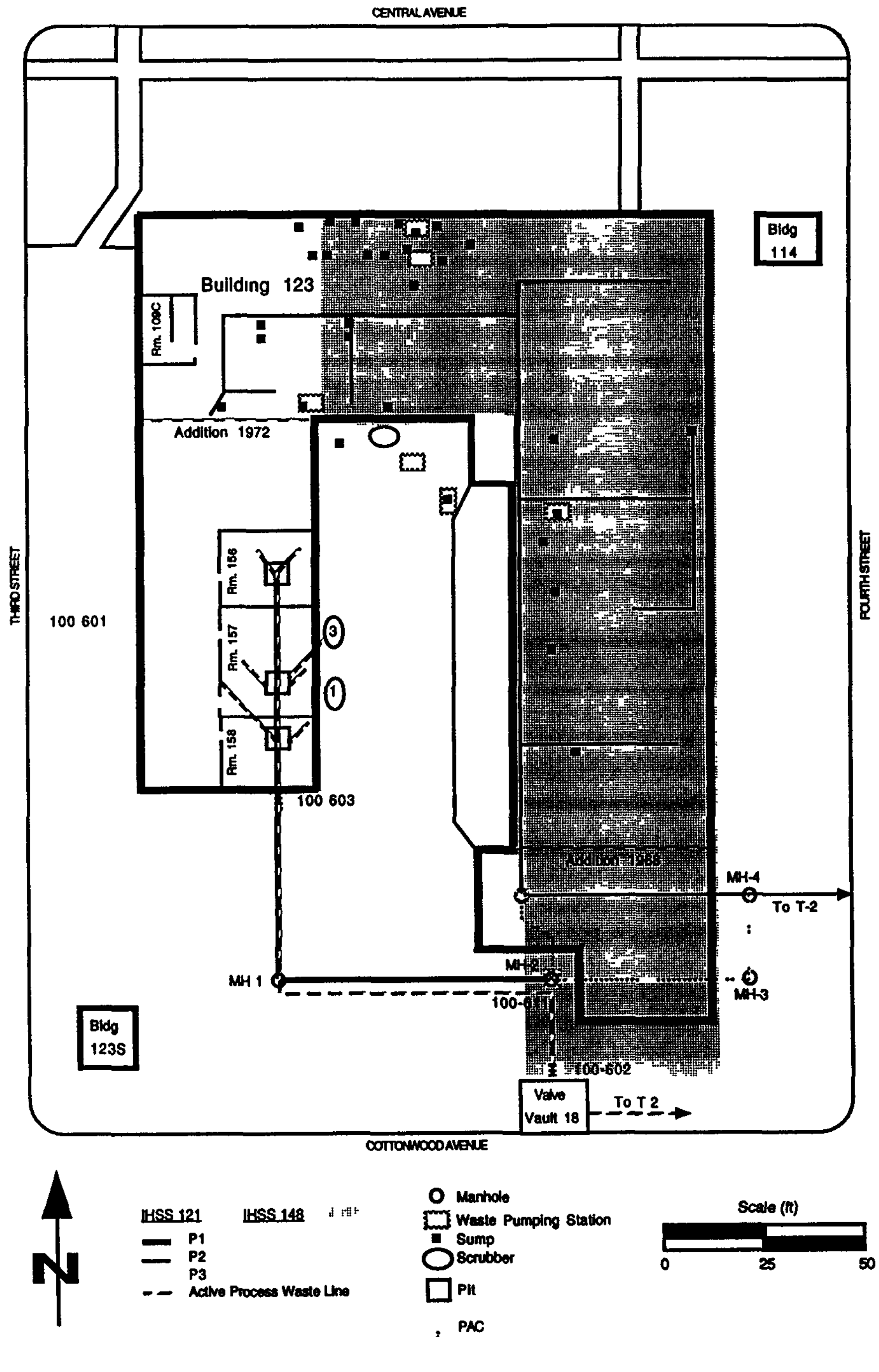

Figure 1-2 Building 123 and IHSS 121 and 148

Table 1-2 Constituents Detected above Minimum Detection Levels or Activities in Soil Samples Collected during Surface Soil Survey at IHSS 148

Constituents Detected Above Minimum Detection Levels or Activities	Maximum Concentration	Background Limits[a] 99/99 UTL[e]	Tier II Soil Action Levels[b]
Chromium	95 6 mg/kg [c]	22 21 mg/kg [c]	4860 mg/kg [d]
Cobalt	28 7 mg/kg	14 22 mg/kg	123,000 mg/kg
Copper	43 4 mg/kg	22 75 mg/kg	81,800 mg/kg
Lead	165 mg kg	73 87 mg/kg	1000 mg/kg
Nickel	52 4 mg/kg	19 74 mg/kg	40,900 mg/kg
Strontium	94 7 mg/kg	67 92 mg/kg	>1,000,000 mg/kg
Zinc	1,220 mg/kg	95 92 mg/kg	>1,000,000 mg/kg
Americium^{241}	0 197 ± 0 032 pCi/g	0 037 pCi/g	38 pCi/g
Plutonium $^{239/240}$	0 169 ± 0 04 pCi/g	0 084 pCi/g	252 pCi/g
Uranium $^{233/234}$	2 04 ± 0 396 pCi/g	3 31 pCi/g	307 pCi/g
Uranium ^{238}	2 14 ± 0 309 pCi/g	2 83 pCi/g	103 pCi/g

[a] Source DOE 1995, *Geochemical Characterization of Background Surface Soils. Background Soils Characterization Program,* May
[b] Source DOE 1996, *Final Rocky Flats Cleanup Agreement,* July Metal analyte action levels are based on office worker exposure to soil, radionuclide action levels are based on annual dose limits
[c] Result indicates total chromium (chromium III + chromium VI)
[d] Result indicates chromium VI only Action level for chromium III is >1,000,000 mg/kg
All UTLs calculated assuming a normal distribution

The soil-gas survey was conducted on a 25-foot grid in accordance with the 0413 RFI/RF (DOE 1992b) work plan Samples were analyzed in the field using Gas Chromatography/Mass Spectrometry (GC/MS) Sixty-four (64) soil-gas locations were sampled during the survey Thirteen (13) samples contained volatile organic compound (VOC) levels in excess of the one µg/ L method detection limit Benzene, toluene, ethylbenzene, and xylene (BTEX) fuel constituents were detected in samples collected from the perimeter of Building 123 and within the east and west wings of the building Trichlorofluoromethane (TCFM) was detected in nine samples distributed throughout the IHSS 148 area at levels up to 2 6 µg/ L Tetrachloroethene (PCE) was detected at 1 5 µg/ L in a sample collected to the east of Building 123 The presence of organic extraction constituents is consistent with unconfirmed reports that such liquids used in radionuclide analyses were occasionally disposed onto the soil surface outside of Building 123 and allowed to evaporate Analyses results indicate that subsurface infiltration precluded full evaporation

1 2.1 Resource Conservation and Recovery Act (RCRA) Unit 40

The Building 123 area encompasses a portion of RCRA Unit 40, which includes all active overhead and underground and process waste lines in and around Building 123 No other RCRA unit exists within the Building 123 area A plan for partial closure of RCRA Unit 40 will be written to characterize and manage all active OPWLs associated with Building 123, as all abandoned lines were properly decommissioned prior to implementation of RCRA regulations

1.2.2 Potential Areas of Contamination (PACs)

PACs 100-601, 100-602, 100-603, and 100-611 were identified in the HRR, and involve potential impact to the soils surrounding Building 123 All of the four (4) PACs are located in Figure 1-2 The following outlines the nature of each PAC by describing the occurrence, constituents released, and response to the occurrence

PAC 100-601, Phosphoric Acid Spill

On April 13, 1989, two five-gallon plastic containers of phosphoric acid, which were among other containers of waste chemicals awaiting disposal in a storage cabinet outside of Building 123, deteriorated and leaked a portion of the contents onto the paved ground surface Approximately one gallon of 1, 2 ethylhexyl phosphoric acid leaked from the containers At the time the release was detected, approximately eight ounces of the liquid were present on the ground within the vicinity of the cabinet The spill was contained and the remaining liquid was properly disposed No further action was required to address consequences of the spill

PAC 100-602, Process Waste Line Break

On April 13, 1989, Valve Vault 17, located on Cottonwood Avenue between Building 443 and 444, was found to be flooded with approximately 1,200 gallons of aqueous waste. Subsequent investigation indicated that the source of the waste was a break in the active portion of P-1 in Manhole MH-1 (Figure 1-2) Leakage from the break had migrated into bedding material surrounding the pipe and ultimately reached Valve Vault 17 through either pipe bedding materials (i e , soils) or a PVC electrical conduit The release also migrated into a section of the OPWL network Discharge of Building 123 process waste into the broken line was discontinued on April 18, 1989, five days after the initial detection of release at Valve Vault 17 The potentially affected area includes the active process waste line between MH-2 and Valve Vault 18; the process waste line between Valve Vault 18 and Valve Vault 17, soils surrounding Valve Vault 18 and Valve Vault 17, and OPWL P-3 between MH-2 and MH-3 In July 1989, groundwater containing blue dye used several months earlier to trace the release was observed seeping into excavations around Valve Vault 18

The release consisted of Building 123 process waste An estimate was made of types and quantities of materials released to the environment during the five-day period between detection of the release and diversion of Building 123 wastes from the broken line The estimate was based on typical daily quantities of wastes discharged from Building 123 The wastes listed below would have been diluted in approximately 2,000 gallons of tap water

- 25 gallons urine,
- 12 5 gallons nitric acid (concentration unknown),
- 20 gallons hydrochloric acid (concentration unknown),
- 1 5 lbs ammonium thiocyanate,
- 1 0 lbs ammonium iodide, and

- 2 5 lbs ammonium hydroxide (concentration unknown)

Minor amounts of naturally-occurring uranium were detected in soil and water samples collected after the release Alpha activity up to 140 pCi/L was recorded in samples of the waste from Valve Vault 17 One water sample from MH-2 also contained eight percent ethylene glycol Soil sampling was conducted to determine the source and extent of the release (See Section 1.2.2) A temporary surface line was installed, and a replacement underground line was installed in 1989 as part of the process line upgrades. Since the affected areas were located near existing IHSS scheduled for investigation and remediation activities, no cleanup was initiated Water and soil samples collected for several weeks after the release indicated that contamination levels (nitrates, chlorides and pH) decreased steadily after the broken line was bypassed

PAC 100-603, Bioassay Waste Spill

On June 9, 1989, OPWL P-1 was under excavation and replacement due to a break in the line (PAC 100-602) The excavated end of the broken line was temporarily capped with a plastic bag, and Building 123 process waste was rerouted to bypass the broken line A pump used to reroute the waste failed and allowed the waste to overflow into the broken line A portion of the waste leaked around the plastic bag and into the excavation The release was confined to the excavation

The release consisted of bioassay waste containing hydrochloric acid and nitric acid The waste exhibited a pH of approximately one The waste may also have contained urine, and up to a combined total of 1 5 gallons of ammonium thiocyanate, ammonium iodide and ammonium hydroxide The estimated maximum volume of the spill was 30 gallons The released material commingled with rainwater in the excavation

Potential flow from the excavation was contained with earthen berms Approximately 100 gallons of rainwater contaminated by the spill were neutralized, pumped from the excavation, and transferred to the process system for treatment in Building 374 Samples were collected to evaluate the spread of contamination Results indicated that contamination was restricted to the excavation within eight feet of Building 123 No further action has been initiated

PAC 100-611, Building 123 Scrubber Solution Spill

On November 7, 1989, an inoperative pump in the Building 123 process waste transfer system caused the Building 123 Scrubbers 1 and 3 to overflow, spill scrubbing solution into a bermed area outside of the building and into three sump pits in Rooms 156, 157, and 158 (Figure 1-2). All of this solution was contained within secondary containment structures, and none of the solution was believed to have impacted the environment The pits were pumped out and the concrete liners properly sealed The transfer pump failure was determined to be the result of blockage caused by glass filtering wool

The scrubbing solution consisted primarily of water and was used to scrub acids and salts used in Building 123 Approximately 50 gallons were released to the bermed area, and several hundred gallons were contained in the three sump pits Analysis indicated that the solution contained in the bermed area exhibited a pH of 1 6, the solution in the three pits indicated a pH of 6 0 All spilled materials were contained and transferred into the Building 123 process waste transfer for eventual treatment at Building 374

1.3 GEOLOGY

The local geologic setting includes an industrial area that has been gradually developed The natural soils have been disturbed and replaced by fill during installation of the OPWLs and covered by pavement and structures including Building 123 The soils, fill, pavement, and structures are underlain by Rocky Flats Alluvium which averages about 38 feet in thickness and is composed of poorly to moderately sorted clay, silt, sand, and gravel The Cretaceous Arapahoe Formation underlies the superficial material and is mainly claystone and silty claystone with sandstone bodies present Groundwater exists below the site at a depth of approximately 12-17 feet and flows in a generally eastward direction

2.0 RECENT INVESTIGATION

Historical information detailed in Section 1 2 provided general indications of the types of compounds anticipated at each IHSS, and was used to develop a systematic sampling strategy for this investigation The sampling rationale was based on historical data Sample points were selected at biased locations and randomly at other areas Preliminary sampling was restricted to soils underlying and surrounding Building 123

The following conditions were considered in the development of the sampling strategy

- The operating history of Building 123 suggests that contaminants may have been released into the environment,
- The physical and chemical properties of the contaminants suggest a chronic presence if released into the environment, and
- Historical data indicated the presence of contaminants in quantities above the maximum background concentrations defined by Site Procedure 4-U50-REP-1006, *Radiological Characterization of Bulk or Volume Materials* and the *Background Geochemical Characterization Report* (DOE 1993)

The conceptual models of contaminant migration involve percolation downward through the vadose zone (generally less than 10 feet thick) to the water table The groundwater flow in this area is predominantly to the northeast Contaminants may volatilize or biodegrade before reaching the shallowest groundwater zone Contaminant concentrations are also reduced by dispersion during migration through the porous Rocky Flats Alluvium Paved portions of the Building 123 area provide an additional impedance to contaminant migration, as precipitation is diverted to the storm water drainage system instead of percolating through the ground surface (DOE 1992b)

2.1 PLANNED INVESTIGATION

The sampling event focused on the soils underlying and surrounding Building 123 as indicated in Table 2-1 Subsurface soils were proposed to be sampled to a total depth of six (6) feet as described in Section 2 3 as historical data indicated that the presence of contaminants below this depth is unlikely (DOE 1992b)

Forty-eight (48) locations were planned (Figure 2-1) in the area of the Building 123 slab six (6) were to be collected immediately beneath the building slab at a depth of approximately one foot, twenty (20) were to be located underneath the building slab at a depth of approximately six feet, and twenty-two (22) were to be located in areas surrounding Building) Locations were determined with respect to underground OPWLs and paved and unpaved areas The investigation focused on the following areas

- Unpaved areas along the east side of Building 123, to further characterize potential areas of volatile organic constituent contamination,
- Underground OPWLs beneath and to the south of Building 123,
- Points at which the overhead waste process lines enter the subsurface at the south end of the west wing of Building 123,
- PACs, and
- Locations of process waste sumps, waste pumping stations, and OPWL junctions and elbows

Random samples were to be used to characterize the remainder of the Building 123 area West side) According to *Final Phase I RFI/RI Work Plan for Operable Unit 13, 100 Area* (DOE 1992) and personnel interviews, no contaminant spills or leaks have been reported in these areas, therefore, boreholes were to be drilled at 50 foot intervals along the west boundary of the building

Table 2-1 Sampling Requirements

Area of Concern	Reason	# of Samples	Depth/Interval
Unpaved Areas	Potential VOC contamination	3	6 feet
OPWLs	Potential contamination	14	6 feet
Underground Process waste lines	Potential contamination	3	1 foot
PACs	Potential contamination	3	6 feet
Sumps, pump stations, junctions, elbows	Potential contamination	10 3	6 feet 1 foot
Random sampling (west side)	Potential contamination	10	6 feet

Sampling was planned at each location, which consisted of one VOC grab sample and the remaining samples were a composite of the entire core. Figure 2-1 indicates total planned depths of each core Locations outside of Building 123 were planned to be sampled to a total depth of six (6) feet Locations within the Building 123 perimeter near waste pumping stations, sumps, and junctions were planned to be sampled to a depth of six (6) feet, as building as-built drawings indicated that the pipelines exist at a maximum depth of five (5) feet, and leaks associated with underground lines characteristically migrate downward All remaining locations were planned to be sampled immediately beneath the building slab (approximately one foot below slab surface) in areas near sumps and sites of historical spills to address potential migration of the process wastes through concrete

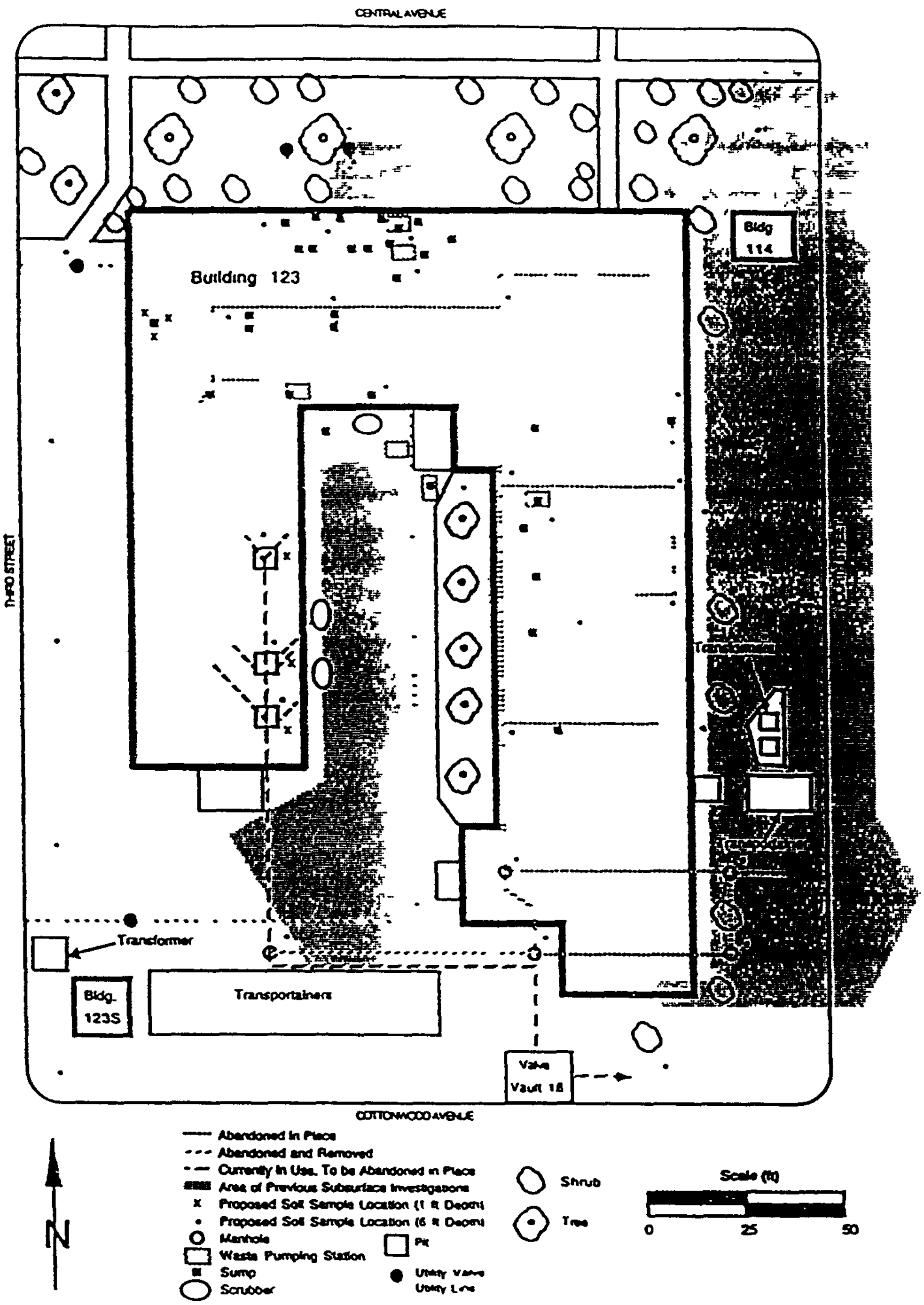

Figure 2-1 Planned Soil Sampling Locations

Sample depths were planned to be reached using a Geoprobe© truck-mounted hydraulic ram in accordance with Site Procedure 5-21000-ER-OPS-GT 39, *Push Subsurface Soil Sampling* Soil cores were to be recovered continuously in two-foot increments using a 1-inch diameter by 24-inch long stainless steel-lined California core barrel Recovered soil was to be placed into a stainless steel bucket until the desired depthwas reached, at which time the soil was to be composited by hand using a stainless steel trowel VOC samples were to be collected as grab samples and not composited Cores were planned to be monitored in the field with a Flame Ionization Detector (FID) or a Photoionization Detector (PID) in accordance with Site Procedure 5-21000-OPS-FO 15, *Photoionization Detectors and Flame Ionization Detectors* for health and safety purposes

Locations beneath the building slab were planned to be sampled by coring through the slab with a hand-held, rotary-type concrete corer to access the underlying soils The procedures used for coring are outlined in RF/RMRS-97-125 UN, *Concrete Sampling and Analysis Plan to Characterize the Building 123 Slab* This plan was modified to describe sampling through the slab prior to sampling activities taking place Resulting holes were to be properly back-filled with granular bentonite

A Radiological Control Technician (RCT) was to scan each sample with a Field Instrument for the Detection of Low Energy Radiation (FIDLER) Equipment was to be monitored for radiological contamination during sampling activities All sampling equipment was planned to be decontaminated with an liquinox solution, and rinsed with deionized water, in accordance with Environmental Management Department (EMD) Operating Procedure 5-21000-OPS-FO 03, *General Equipment Decontamination, Section 5 3 1, Cleaning Steel or Metal Sampling Equipment Without Steam in the Field* All other sampling equipment was to include standard items such as chain of custody seals and forms, logbooks, etc The cores were planned to be visibly inspected for signs of contaminant staining, then visually logged by the field geologist as per Site Procedure 5-21000-ER-OPS-GT 01, *Logging Alluvial and Bedrock Material* Additional samples were to be collected if cores exhibited visible evidence (staining, odors, etc) of contamination at shallower depths

Three (3) field duplicates were to be collected to represent at least 5% of the sample batch to provide adequate information on sample variability, as defined in *Guidance for Data Quality Objectives Process* (EPA 1994)

Sample points were planned to be surveyed for location and elevation using geometric/location survey equipment to ensure accuracy in data plotting (Appendix E)

2.2 IMPLEMENTED INVESTIGATION

Of the forty-eight soil sampling locations planned, thirty-four could not be drilled where initially located due to conflicts with utilities, process waste lines and offsets due to refusal (insubstantial retrieval, i e voids and rocks) However, the revised sample locations were adequate to conduct the investigation, and viable information was obtained Fourteen planned locations (9, 10, 11, 14, 15, 16, 17, 24-2, 25-3, 37-15, 38-16, 39-17, 41-19 and 47-25) were relocated to keep RFETS procedure (1-B37-HSP-12 08), which states a ten foot minimum distance kept between excavation work (sampling in this case) and process waste lines and/or utilities Twenty planned locations (4, 5, 7, 8, 11, 12, 14, 16, 17, 18, 20, 23-1, 27-5, 29-7, 30-8, 31-9, 33-11, 35-13, 42-20 and 43-21) were offset to obtain adequate soils for analysis Of these thirty-four locations, four locations (11, 14, 16 and 17), were first relocated due to utilities and then offset due to inadequate retrieval

Six locations (23-1, 24-2, 27-5, 29-7, 30-8 and 31-9) were initially planned to core at a total depth of one foot, but an adequate sample could not be obtained and depth was increased to six feet Of these six locations, three planned locations situated around a cesium well in former Room 109B could not be drilled due to voids under the building slab in excess of six feet However, the revised locations (29-7, 30-8 and 31-9), were positioned as close to the planned locations per GPR (ground penetrating radar) surveys This enabled adequate sample to be retrieved within the proposed vicinity

One planned Location 42-20, revealed elevated fixed alpha readings at 780 dpm after the concrete core was pulled from the concrete slab to access underlying soils An offset was performed due to refusal at two feet and revealed elevated fixed alpha readings at 240 dpm Neither of the elevated readings exceeded suspension guidelines on the radiological work permit (RWP), geoprobing proceeded, adequate soils were obtained and it was determined after the alpha decayed (less than 48 hours) that a radon pocket was the cause of elevated readings For all locations, original or offset, no elevated VOC (volatile organic compounds) were observed with a PID (photo ionization detector)

2.3 INVESTIGATION RESULTS

Each sample location was split into two continuous cores (first core from ground surface to two feet below ground surface, second core from two feet below ground surface to six feet below ground surface), and the cores were visually inspected and logged Total depth at each location did not exceed six feet For each coring location, the first two feet of soils were utilized to obtain a VOA (volatile organic analysis) sample The unused portion of the sample was then placed into a stainless steel bowl The second/final sample-core (from two feet below ground surface to six feet below ground surface) was composited into the stainless steel bowl and utilized for the remaining parameters (i e , isotopics, gross alpha/gross beta)

Core recovery varied for each sample location due to the nature of the fill material and alluvium Alluvial deposits and fill material consisted of sandy-silty clays, gravely to sandy clay with occasional iron stained sands and clays mixed within samples The similar properties between the fill material and alluvium made interpretation between the two difficult Asphalt fragments, sandstone pebbles, gravel lenses and rock fragments were noted for Locations 1, 3, 4, 6, 7, 10, 11, 12, 13, 14, 15, 16, 17, and 21 (Note for the previously mentioned locations, pre-drilling and/or coring through asphalt was required and the asphalt was removed out of the sample prior to compositing samples for analysis) Sandstone pebbles, gravel lenses, and fragments were noted in the fill material throughout the investigation area Much of the core that was not recovered was probably loose, course material which tends to fall out of core barrels Offsets were often a result of pushing a large rock greater than three inches in diameter and/or hitting refusal so that the core could not be pushed into the soils When this occurred, locations were moved until substantial recovery could be utilized for analysis (i e , twenty locations from Section 2 2)

While coring the fill material, loose material often sloughed into the borehole between core runs Usually this material was easy to identify due to its disrupted appearance Loose gravel present in disrupted clays could also be in-place and required careful examination of the core After the core was examined and logged in the field, samples were composited and utilized for analysis

Bedrock and groundwater (located on average at a depth of 10-15 feet) were not encountered throughout the investigation area due to the maximum coring depth of six feet

2 4 FIELD SAMPLING SUMMARY

Following is a description of the investigation and summary for each soil sampling location according to the drilling sequence A map of the actual soil sampling locations/boreholes can be found in Attachment 1 At Location 1, the first core (from ground surface to four feet below) consisted of a one (1) inch coring barrel It was determined at this location that the remaining locations would be sampled using a three (3) inch macro-coring barrel to obtain maximum retrieval and efficiency Soils for Location 1 were light brown in color, sandy-silty clays with sandstone pebbles and rock fragments Some iron staining clays were present There were no elevated readings detected with an electra and/or PID A total depth of 5 8 feet was cored

Locations 2 and 3 were similar in description Soils were predominantly light brown in color, containing sandy-silty clays with sandstone pebbles and rock fragments. Some light gray and yellowish staining within the samples did exist There were no odors and no elevated readings with an electra and/or PID A total depth of 6 feet was cored for Locations 2 and 3

At Location 4, an offset had to be performed due to refusal at 4 feet (large rock). The offset was placed 1 foot east of the planned location Adequate sample was retrieved and the coring was completed Soils were light brown, sandy-silty clays with sandstone pebbles and rock fragments There were no odors and no elevated readings with electra and/or PID A total depth of 6 feet was cored at the offset

At Location 5, refusal was hit at approximately five feet An offset was utilized one foot north of the planned location and re-coring was completed Soils were light brown, sandy-silty clays with sandstone pebbles and rock fragments There were no odors, no staining and no elevated readings detected with an electra and/or PID A total depth of six feet was cored at the offset

Location 6 consisted of light brown sandy-silty clays with sandstone pebbles and rock fragments Some iron staining sands and clays were mixed within the sample There were no odors and no elevated readings with an electra and/or PID A maximum depth of 5 8 feet was cored for this location

At Location 7, coring was completed at the planned location to a depth of six feet When the soils were composited it was determined by the field geologist in conjunction with the sample team that inadequate soils were retrieved due to an abundant quantity of rock and fragments. An offset was performed one foot west of the planned location Coring was completed and adequate sample was retrieved Soils were light brown, sandy-silty clays with some sandstone pebbles and fragments There were no odors, no staining and no elevated readings detected with an electra and/or PID A total depth of six feet was cored at the offset

At Location 8, a second offset was needed due to refusal (coarse material at two feet) at the planned location and the first offset (one foot west of the planned location) The second offset (two feet west of the planned location) was completed and adequate retrieval was obtained for analysis The completed core contained light brown, sandy-silty clays with sandstone pebbles and rock fragments There were no odors, no staining and no elevated readings with an electra and/or PID A total depth of 5 7 feet was cored at the second offset

Location 9 was moved approximately 12 feet north from its planned location due to underground utilities The soils for this location were light brown, sandy-silty clays, some iron staining within the clays, sandstone pebbles, gravel lenses and fragments There were no odors, no elevated readings with an electra and/or PID A total depth of six feet was cored

Location 10 was moved approximately 12 feet south from its planned location to keep RFETS 10 foot minimum distance from process waste lines The moved location was adequate for coring and viable information was obtained The soils were light brown, sandy-silty clays with sandstone pebbles and fragments There were no odors, no staining and no elevated readings with an electra and/or PID The total core depth was 5 2 feet below ground surface

Location 11 first needed to be relocated to keep RFETS 10 foot minimum distance from process waste lines, then two offsets were needed due to refusal (coarse material at three feet) at the moved location and the first offset (one foot north of the planned location) The final offset (one foot south of the moved location) was completed and sufficient soils were collected for analysis The soils at the final offset were light brown, sandy-silty clays with sandstone pebbles, gravel lenses and rock fragments There were no odors, no staining and no elevated readings with an electra and/or PID A total coring depth of five feet was obtained for the final offset

At Location 12, an offset was performed to obtain sufficient retrieval for analysis Soils were light brown with gray staining, sandy-silty clays with pebbles and rock fragments There were no odors and no elevated readings with an electra and/or PID A total coring depth of 5 6 feet was completed

Sample Location 13 (within the B123 courtyard) was positioned on top of a sand/gravel fill (approximately 1 5 feet in depth) The fill was situated on a bed of asphalt (8 inches thick) The geoprobe was pushed to asphalt and with a new coring barrel re-entered into the "pilot" hole and pushed through the asphalt When the soil was retrieved, the asphalt was separated out of the sample prior to preparing the composite The soils for Location 13 were light brown, sandy-silty clays with sandstone pebbles, gravel lenses and rock fragments There were no odors, no staining and no elevated readings with an electra and/or PID The total coring depth was five feet before refusal was encountered

Location 14 was first moved to keep RFETS 10 foot minimum distance from utilities, then an offset was performed a foot south of the moved location At the moved location, refusal was reached at 4 feet below ground surface, but sufficient sample was obtained for analysis Soils were light brown sandy-silty clays with sandstone pebbles, gravel lenses and fragments with iron stained clays mixed within There were no odors present and no elevated readings with an electra and/or PID Total coring depth was four feet

Location 15 was first moved to keep RFETS 10 foot minimum distance from utilities and then cored Sample consisted of soils that were light brown, sandy silty clays with sandstone pebbles, gravel lenses and rock fragments No odors were present and no visible staining existed within the core There were no elevated readings with an electra and/or PID Total coring depth was 4 5 feet before refusal was encountered

Location 16 was first moved from its planned location to keep RFETS 10 foot minimum distance from utilities and then an offset was required due to refusal at three feet The offset was positioned one foot east of the moved location Soils from the offset were light brown, sandy-silty clays with sandstone pebbles, gravel lenses and rock fragments There were no odors, no visible staining and no elevated readings with an electra and/or PID Total core depth at the offset was five feet

Location 17 was required to keep RFETS 10 foot minimum distance from utilities and two offsets were required to obtain sufficient sample At the final offset, soils were light brown, sandy silty clays with sandstone pebbles, gravel lenses and rock fragments There were no odors, no apparent staining and no elevated readings with an electra and/or PID Total core depth was 5 4 feet prior to encountering refusal

Location 18 was completed after an offset was utilized The soils were light brown, sandy silty clays with sandstone pebbles, gravel lenses and rock fragments There were no odors, no apparent staining and no elevated readings with an electra and/or PID Total core depth was six feet

At Location 19, soils were light brown, sandy silty clays with sandstone pebbles, gravel lenses and rock fragments There were no apparent odors or stains and no elevated readings with an electra and/or PID The total coring depth was 5 7 feet

Location 20 was moved approximately 25 feet south of its planned location due to refusal (concrete walkway) below the B123 courtyard fill material Fill material at Location 20 was 1 5 feet on top of ground surface The fill material was placed within the courtyard after demolition of the building to create one plane from east to west wings Once ground surface was reached, a clean core barrel was positioned into the "pilot" hole and coring was completed Soils were light brown in color, moist sandy-silty clays with sandstone pebbles, gravel lenses and rock fragments Within the coring sample were decomposing organics (roots and grass from trees and lawn which existed prior to demolition and fill placement) There were no odors or staining and no elevated readings with an electra and/or PID The total coring depth was six feet

Similar to Location 20, Location 21 was cored after the fill material above ground surface was pre-drilled The sample from Location 21 contained an abundance of gravel and rock fragment material Adequate sample was obtained, but it was noted that a large amount of the core contained gravel The soils within the core were light brown sandy silty clays with sandstone pebbles, gravel and rock fragments There were no apparent odors or stains and no elevated readings with an electra and/or PID Total coring depth was four feet

At Location 22, soils were light brown, sandy silty clays with sandstone pebbles, gravel lenses and rock fragments There were no apparent odors or staining and no elevated readings with an electra and/or PID Total coring depth was six feet below ground surface

The remaining sampling locations were situated on the Building 123 pad and concrete coring was necessary to access soils beneath the slab Each concrete core was approximately eight inches in depth and three inches in diameter

At Location 23-1, an offset was needed due to refusal at the planned location The offset was positioned 1 foot east of the planned location Soils at the offset were light brown, sandy silty clays with sandstone pebbles, gravel lenses and rock fragments. There were no apparent odors or staining and no elevated readings with an electra and/or PID Total coring depth at the offset was 5 6 feet

Locations 24-2, 25-3, 26-4 and 28-6 were all completed at the planned locations Soils for the four locations were identical, light brown, sandy silty clays with sandstone pebbles, gravel lenses and rock fragments There were no apparent odors or staining and no elevated readings with an electra and/or PID Total coring depth for each location was six feet

At Location 27-5, a rock was pushed from one foot to three feet below ground surface An offset was performed one foot east of the planned location Soils from the offset were light brown, sandy silty clays with sandstone pebbles, gravel lenses and rock fragments There were no apparent odors or staining and no elevated readings with an electra and/or PID Total coring depth at the offset was five feet

Locations 29-7, 30-8, and 31-9 were planned around a cesium well in former Room 109B Due to voids in excess of 6 feet, the sampling points were relocated to access sufficient soils for analysis These three locations were positioned adjacent to the cesium well, as close as possible to the planned locations All three locations had similar soil descriptions soils were light brown with some iron stained sandy silty clays, sandstone pebbles, gravel lenses and rock fragments There were no apparent odors and no elevated readings with an electra and/or PID Total coring depth for each location was six feet

Location 32-10 contained soils that were light brown, sandy silty clays with sandstone pebbles, gravel lenses and rock fragments There were no apparent odors or staining and no elevated readings with an electra and/or PID Total coring depth at the offset was five feet

At Location 33-11, two offsets were performed On the final offset (1 5 feet south of the planned location) adequate soils were obtained for analysis Soils were light brown, moist clays with some iron stained sands, sandstone pebbles, gravel lenses and rock fragments There were no apparent odors and no elevated readings with an electra and/or PID Total coring depth was six feet

Location 34-12 contained light brown, moist clays with some iron stained sands, sandstone pebbles, gravel lenses and rock fragments There were no apparent odors and no elevated readings with an electra and/or PID Total coring depth was 5 4 feet

At Location 35-13, two offsets were performed due to voids at three to six feet at the planned location and first offset (two feet west of the planned location) The final offset was positioned three feet north and three feet west of the planned location At the final offset, adequate soils were obtained for analysis Soils were light brown, sandy silty clays with sandstone pebbles, gravel lenses and rock fragments There were no apparent odors or staining and no elevated readings with an electra and/or PID Total coring depth at the final offset was 5 10 feet

Location 36-14 was sampled at the planned location Soils were light brown, moist clays with some iron stained sands, sandstone pebbles, gravel lenses and rock fragments There were no apparent odors and no elevated readings with an electra and/or PID Total coring depth was six feet

Locations 37-15, 38-16 and 39-17 were relocated to keep RFETS 10 foot minimum distance from utilities and then cored All three samples consisted of soils that were light brown with some iron stained sandy silty clays, sandstone pebbles, gravel lenses and rock fragments. There were no apparent odors and no elevated readings with an electra and/or PID Total coring depth for each location was six feet

Locations 40-18 and 41-19 were similar in description, except Location 41-19 was relocated to keep RFETS 10 foot minimum distance from utilities Soils for both locations consisted of soils that were light brown with some iron stained sandy silty clays, sandstone pebbles, gravel lenses and rock fragments There were no apparent odors and no elevated readings with an electra and/or PID Total coring depth for each location was six feet

At Location 42-20, after the first two feet of soil was pulled from the ground, refusal was encountered When the geoprobe was removed from the ground, the location was monitored and revealed fixed alpha readings detected at 780 dpm The soils extracted, the geoprobe coring barrel and equipment did not have elevated readings contained within and/or on its surfaces Soils were placed back into the hole and sampling was stopped per radiological operations instructions It was discussed that the offset needed to complete this location would not be performed until the final day of sampling (three days later) When the offset was completed (located six inches north of the original location), it revealed elevated alpha readings at 240 dpm Sampling continued until adequate sample was retrieved for analysis When adequate soils were obtained for analysis, the alpha readings dropped down to background levels or below detection limit The geoprobe equipment and composited soils in the stainless steel bowls did not have elevated readings on its surfaces It was then determined that a radon pocket was the cause of the elevated readings The soils utilized for analysis at the offset were light brown, sandy silty clays with sandstone pebbles, gravel lenses and rock fragments. There were no apparent odors and no elevated readings once samples were being prepared for jarring Total depth at the offset was six feet

The soil descriptions for Locations 43-21, 44-22, 45-23, 46-24, 47-25 and 48-26 were identical, although an offset was needed for 43-21 and Location 47-25 was moved to keep RFETS 10 foot minimum distance from utilities Soils at these locations were light brown, sandy silty clays with sandstone pebbles, gravel lenses and rock fragments There were no apparent odors or staining and no elevated readings with an electra and/or PID Total coring depth at these locations were six feet

3.0 QUALITY ASSURANCE/DATA USABILITY EVALUATION

This section provides the preliminary results of Environmental Restoration Management's Procedure 2-G32-ER-ADM-08 02, *Evaluation of ERM Data for Usability in Final Reports*, hereafter referenced as the data usability procedure The data usability procedure was implemented to determine the usability of analytical results generated from the subsuperficial soil sampling program implemented at Building 123 The analytical results will be used to score under building contamination at Building 123 relative to RFCA soil action levels This score will be subsequently ranked (ER Ranking) in relation to other sites at the RFETS for remediation prioritization The data evaluated by this procedure include subsurface soil samples analyzed for radionuclides, volatiles, and semi-volatiles that were collected in support of the *Soil Sampling and Analysis Plan to Characterize Individual Hazardous Substance Sites (IHSS) 121 and 148 at Building 123*, Revision 1, May 1998

This evaluation was conducted with preliminary analytical results available as of August 25, 1998, therefore a complete data set was not evaluated Deviations in performing data usability procedure consist of performing the procedure on data provided to RMRS by K-H Analytical Services Division in facsimile preliminary hardcopy format Therefore, these data were not acquired from the Soil Water Database (SWD) as required in the data usability procedure and these data were neither verified nor validated In addition, the data usability procedure was initiated without a complete data set (i e , preliminary results were not available from all samples collected), therefore, completeness, and comparability could not be evaluated at this time Precision, accuracy, and representativeness were evaluated as part of the data usability evaluation

3 1 PRECISION, ACCURACY, REPRESENTATIVENESS, COMPLETENESS, AND COMPARABILITY (PARCC)

3.1.1 Precision

Precision is a quantitative measure of data quality that refers to the reproducibility or degree of agreement among replicate of duplicate measurements of a parameter The closer the numerical values of the measurements are to each other, the lower the relative percent difference (RPD) and the greater the precision The RPD for results of duplicate and replicate samples was tabulated according to matrix and analytical suites to compare for compliance with established DQOs

Use of soil sample field duplicates was the primary method of evaluation for overall precision for the Building 123 under building characterization program One field duplicate collected for each 20 real samples collected was the frequency requirement for the evaluation of precision Forty-eight (48) real soil samples were collected in support of the Building 123 project (Attachment 1) Based on this number of samples, three duplicate samples were required to meet the duplicate sample collection frequency identified in the SAP Three duplicate soil samples were collected from Locations BH-20, BH 30-8 and BH 40-18

For radionuclide analyses, the normalized absolute difference between the real sample and field duplicate is evaluated to determine if the results differ significantly when compared to their respective total propagated uncertainty If the normalized absolute difference is greater than 1.96, results are qualified as estimated Appendix G provides the results of the precision evaluation on radiochemical analyses All values were below the 1 96 threshold and are therefore not qualified

Volatile and semi-volatile results were available from all three duplicate and associated real samples with the exception of volatile results at Location BH 20. The data quality objective for field duplicate samples for non-radionuclides is ≤40% RPD for soils RPDs were calculated for analytes with results above their respective detection limits Summary results are provided in Appendix H

Overall, the RPDs of less than or equal to 40% for VOC samples were based on analytical data available at the time of this evaluation Duplicate results for Borehole 20 were not available when performing this evaluation resulting in only 66% overall precision compliance for VOC analyses

Duplicate and real sample results for two semi-VOA analyses were below the required detection limits for all analytes RPDs could not be calculated for these two samples However, qualitatively the sample results may be interpreted to represent precision RPDs of 150% and 122% for Phenanthrene and Pyrene respectively were calculated from Semi-VOA results from samples collected at Borehole 20 These results appear to represent hetrogeneity of the sample material These exceedences resulted in only two of three duplicate samples meeting RPD thresholds for a 66% overall precision compliance of Semi-VOA analyses Table 3-1 presents the overall precision compliance of the sampling program

Table 3-1 Building 123 Subsurface Soils - Overall Precision Compliance Results

Analyte	Media	Total # Real Samples Collected	Total # Duplicates Collected	Number of Duplicates within DER/RPD	Overall Precision Compliance
Am-241	Soil	48	3	3	100%
Curium-243/244	Soil	48	3	3	100%
Pu-239/240	Soil	48	3	3	100%
U-234/235	Soil	48	3	3	100%
U-235	Soil	48	3	3	100%
U-238	Soil	48	3	3	100%
Analysis					
VOCs[1]	Soils	48	3	2	66%
Semi-VOCs[2]	Soils	48	3	2	66%

1) VOC results were not available for Location BH 20 at the time of the evaluation
2) Semi-VOC results were below the detection limit for two samples, and therefore RPDs were not calculated Precision was qualitatively attained for these two samples

3.1.2 Accuracy

<u>SAP vs Actual Method Detection Limit Evaluation</u>

Accuracy is a quantitative measure of data quality that refers to the degree of difference between measured or calculated values and the true value of a parameter The closer the measurement to the true value, the more accurate the measurement The actual analytical method and detection limits were compared with the required analytical method detection limits for VOC, semi-VOCs, and Radiochemical methods The results of the detection limit comparisons are provided in Table 3-2

Radiochemical analytical methods were performed utilizing alpha spectroscopy methods as outlined in the K-H ASD Isotopic Determination by Alpha Spectrometry Module, RC01-B 3 VOCs were determined by SW-846 Method 8260A, Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS) Capillary Column Technique Semi-VOCs were determined by SW-846 Method 8270B, Semi-volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS) Capillary Column Technique The TCLP target analyte list was selected for both the VOC and Semi-VOC analyses

Table 3-2 Building 123 Subsurface Soils – Analytical Detection Limits

Analyte	Required Analytical Method (RDL)	Actual Analytical Method	Required Detection Limit (pCi/g)	K-H ASD RDL	Actual Detection Limit (pCi/g)
^{241}Am	Alpha Spectrometry	K-H ASD Alpha Spec	Not Specified	0 3 pCi/g	0 3 pCi/g
$^{239/240}$Pu	Alpha Spectrometry	K-H ASD Alpha Spec	Not Specified	0 3 pCi/g	0 3 pCi/g
$^{233/234}$U	Alpha Spectrometry	K-H ASD Alpha Spec	Not Specified	1 0 pCi/g	1 0 pCi/g
^{235}U	Alpha Spectrometry	K-H ASD Alpha Spec	Not Specified	1 0 pCi/g	1 0 pCi/g
^{238}U	Alpha Spectrometry	K-H ASD Alpha Spec	Not Specified	1 0 pCi/g	1 0 pCi/g
Volatile Organic Compounds	EPA 8260A	EPA 8260A CLP List	Not Specified	5 ug/kg (most analytes)	5 ug/kg (most analytes)
Semi-volatile Organic Compounds	EPA 8270B	EPA 8270B CLP List	Not Specified	660 ug/kg (most analytes)	660 ug/kg (most analytes)

[1]Guidance Provided in Environmental Monitoring Support Laboratory (EMSSL)-LV 0539-17, Radiological and Chemical Analytical Procedures for Analysis of Environmental Samples, March 1979

Actual detection limits for alpha spectroscopy, VOCs and Semi-VOCs performed are acceptable for these data's intended use of scoring the under building contamination in relation to RFCA soil action levels and subsequent site ranking

3 1.3 Representativeness

Representativeness is a qualitative characteristic of data quality defined by the degree to which the data absolutely and exactly represent the characteristics of a population Reproducibility is accomplished by obtaining an adequate number of samples from appropriate spatial locations within the medium of interest

3.1 4 Completeness

Completeness is a qualitative measure of data quality expressed as a percentage of validated or acceptable data obtained from a measurement system A completeness goal of 90% was set for the Building 123 SAP Real samples and QC samples are to be reviewed for data usability and achievement of internal DQO usability goals Completeness could not be evaluated on the Building 123 data because only a partial data set was available at the time the usability evaluation was conducted

3.1.5 Comparability

Comparability is a qualitative measure defined by the confidence with which one data set can be compared to another Comparability is to be attained through consistent use of industry standards (e g SW- 846) and standard operating procedures, both in the field and in the laboratories Comparability could not be evaluated at this time because only a partial data set was available However, based on analytical results at the time of this evaluation, specific analytical methods were maintained for each analysis

The actual sample location depths were compared with those stated in the SAP and organized by area of concern Deviations were identified and provided in Table 3-3 below Justification for deviations are discussed and provided in Section 2 2

Table 3-3 Comparison of Borings Proposed and Borings Completed

Area of Concern	Reason	Number of Borings Proposed	[illegible]	[illegible] Borings [illegible]	[illegible]	[illegible]
Unpaved Areas	Potential VOC Contamination	3	0-6 feet	8	0-6 feet	+5 Borings
OPWLs	Potential Contamination	14	0-6 feet	16	0-6 feet	+2 Borings
Underground Process Waste Lines	Potential Contamination	3	0-1 foot	3	0-6 feet	Sampled collected from 0-6 feet
PACs	Potential Contamination	3	0-6 feet	2	0-6 feet	-1 Boring
Sumps, pump stations, junctions, elbows	Potential Contamination	10 3	0-6 feet 0-1 foot	13	0-6 feet	Sampled collected from 0-6 feet
Random Sampling (West Side)	Potential Contamination	10	6 feet	6	0-6 feet	-4 Borings

It should be noted that boreholes originally intended to characterize the OPWLs and Underground Process Waste Lines could not be completed within the pipeline trench due to conflict with Site Procedure 1-B37-HSP-12 08 This procedure required the relocation of the boring a minimum of 10 feet away from the pipeline and therefore sample results may not be representative of actual contaminant concentrations within the pipeline trench It is assumed that the pipeline was constructed of bedding material, which has a higher permeability than natural soils at the site Contaminants would preferentially migrate within the bedding material to low points or to the manhole excavation Borings completed 10 feet away from the excavation may not encounter contamination originating from the pipeline

3.2 EQUIPMENT RINSATE BLANK EVALUATION

Equipment rinsate samples associated with the real samples must also be evaluated to determine if accuracy was affected (biased toward false positives) by cross-contamination during sampling or shipment Results for alpha spectrometry, volatile and semi-volatile organic compounds from three equipment blanks (RINs 98A5067, 98A5178, and 98A5145) were available at the time of this evaluation

Radionuclide Equipment Rinsate Blank Results – Results for all three rinsate blank samples indicated that 241Am, 239/240Pu, 233/234U, 235U, 238U, and 238U were all below their respective RDLs Qualifiers were not available for these data at the time of this evaluation Therefore, at this time, it appears no radionuclides were detected in rinsate samples

VOC Equipment Rinsate Blank Results – Acetone was detected at 7 23 ug/L in the equipment rinsate sample collected for RIN 98A5178 Acetone is a common laboratory contaminant The EPA states that positive sample results should be reported unless the concentration of the compound in the sample is less than or equal to 10 times (10x) the amount in any blank for the common volatile laboratory contaminants (methylene chloride, acetone, and 2-butonone), or five times (5x) the amount of other volatile compounds Based on this guidance, sample results for acetone in RIN 98A5178 less than 72 3 ug/l may be qualified by elevating the quantitation limit to the concentration found in the sample Samples analyzed for acetone under other RINs exceed acetone results in RIN 98A5178 and would be used to score the Site However, raising the quantitation limit for acetone results in RIN 98A5178 would have no effect on the outcome of the scoring, and therefore was not conducted All results were treated as detects

Semi-VOC Equipment Rinsate Blank Results - Phenol, Diethylphalate, Di-n-butylphthalate, bis (2-Ethylhexyl) phthalate were detected in equipment blanks Diethylphalate, Di-n-butylphthalate, bis (2-Ethylhexyl) phthalate are known to be common laboratory contaminants Positive sample results are to be reported unless the concentration of the compound in the sample is less than or equal to 10 times the amount in any blank for common phthalate contaminants, or 5 times the amount for other compounds

Phenol was detected in three soil samples at 49 0, 50 59, and 64 ug/L Sample results are greater than five times the blank results for all real samples and therefore, the results remain as positive sample results Maximum concentrations of Diethylphalate, Di-n-butylphthalate, and bis (2-Ethylhexyl) phthalate in soil samples also exceeded ten times the concentrations in blanks and therefore would remain as positive sample results Qualifying results less than ten times the concentration in blanks would not impact the scoring of the Building 123 site because only the maximum result is used for scoring Therefore soil samples with phthalate results below ten times the concentration in blanks were not qualified and treated as detects Table 3-4 presents equipment rinsate results

Table 3-4 Equipment Rinsate Sample Results

RIN	98A5067-001		98A5178-014		98A5145-012	
Borehole	1		42-20		23-1	
Analyte	Results (ug/L)	Qualifier	Results (ug/L)	Qualifier	Results (ug/L)	Qualifier
VOCs	All VOCs	U			All VOCs	U
Acetone(V)			7 23			
Semi-VOCs						
Phenol (SV)			3 19	J	5 0	J
Diethylphalate (SV)			1 57	J	2 0	J
Di-n-butylphthalate (SV)			1 51	J		
bis (2-Ethylhexyl) phthalate	59 0		34 01		11 0	JB
Radionuclides	Results (ug/L)	Qualifier	Results (ug/L)	Qualifier	Results (ug/L)	Qualifier
Am-241	1 67E-02	NA	5 27E-03	NA	2 42E-02	NA
Pu-239/240	6 91E-02	NA	1 03E-01	NA	1 11E-02	NA
Uranium-233/234	4 14E-02	NA	5 75E-02	NA	7 14E-02	NA
Uranium-235	8 19E-03	NA	5 65E-03	NA	3 35E-02	NA
Uranium-238	2 51E-03	NA	4 27E-02	NA	3 34E-02	NA

NA = Not available

4.0 CONCLUSION

Preliminary results indicate that DQOs specific to the original work plans were met with respect to accuracy, and precision with the exception of accuracy for semi-volatile compounds Fundamental quality controls on the radiochemistry and organic compound analyses have produced data which appear to be adequate to allow use within the context of their representative three-dimensional locations, and with respect to current RFCA action levels (Tier I or II) However, borings designed to characterize the OPWLs and Underground Process Waste Lines were not constructed within the pipeline trench and therefore sample results do not represent the condition of the pipelines but may be used to characterize under building contamination, unpaved areas and random areas west of Building 123

5.0 RESULTS

The following tables represent the maximum activities detected for all Radionuclides, VOCs, Semi-VOCs, Metals and Nitrates sampled and analyzed from the Building 123 area These values will be utilized by Environmental Restoration for the ranking/evaluation of the UBC at Building 123

Tables with complete analytical results from subsurface soils at Building 123 can be found in Appendix A through E of this document

Table 5-1 Radionuclides - Maximum Activities Detected

Analyte	CAS No	RIN	Location	Sample Depth (ft)	Results (pCi/g)	Qualifier
Americium-241	14596-10-2	98A5145-002	22	0-6	9 87E-02	J
Curium-243/244		98A5145-002	22	0-6	4 62E-01	
Plutonium-239/240	10-12-8	98A5145-004	24-2	0-6	2 13E-01	NA
Plutonium-242		98A5178-005	46-24	0-6	2 39E+00	
Uranium-232	7440-61-1	98A5080-005	6	0-5 8	5 67E-02	NA
Uranium-233/234	11-08-5	98A5178-008	42-20	0-6	1 23E+00	
Uranium-235	11-08-5	98A5110-002	12	0-5 6	1 98E-01	NA
Uranium-238	15117-96-1	98A5110-007	17	0-5 4	7 94-01	J
Strontium-89/90	11-10-9	98A5080-005	6	0-5 8	1 31E+00	NA

NA - Qualifier not available from preliminary data sheet

Table 5-2 Volatile Organic Compounds - Maximum Concentration Detected

Analyte	CAS No	RIN	Borehole	Sample Depth (ft)	Results (ug/Kg)	Qualifier
Methylene chloride	75-09-2	98A5110-003 003	13	0 5-1 5	34	B
Acetone	67-64-1	98A5110-010 003	20	0 5-1 5	86 24	
Carbon disulfide	75-15-0	98A5178-004 003	45-23	0 5-1 5	4 93	J
Chloroform	67-66-3	98A5178-005 003	46-24	0 5-1 5	2 47	J
2-Butanone	78-93-3	98A5110-003 003	13	0 5-1 5	72	
Carbon tetrachloride	56-23-5	98A5110-003 003	13	0 5-1 5	11	
Trichloroethene	79-01-6	98A5163-010 003	40-18	0 5-1 5	5 23	
4-Methyl-2-pentanone	108-10-1	98A5178-005 003	46-24	0 5-1 5	2 16	J
Tetrachloroethene	127-18-4	98A5110-002 003	12	0 5-1 5	5	J
Toluene	108-88-3	98A5110-003 003	13	0 5-1 5	5	J
Ethylbenzene	100 5-1 51-4	98A5110-003 003	13	0 5-1 5	1	J
Xylene (total)	1330-20-7	98A5163-007 003	37-15	0 5-1 5	8 86	
m,p-Xylenes	13-302-07	98A5163-007 003	37-15	0 5-1 5	5 92	
o-Xylene	95-47-6	98A5163-007 003	37-15	0 5-1 5	2 58	
Naphthalene	91-20-3	98A5110-003 003	13	0 5-1 5	16	
1,2,3-Trichlorobenzene	87-61-6	98A5110-003 003	13	0 5-1 5	7	
1,2,4-Trichlorobenzene	120-82-1	98A5110-003 003	13	0 5-1 5	6	
1,2,4-Trimethylbenzene	95-63-6	98A5178-005 003	46-24	0 5-1 5	6 01	
1,1,2-Trichlorotrifluorethane	76-13-1	98A5110-003 003	13	0 5-1 5	1	J

Table 5-3 Semi-Volatile Organic Compounds - Maximum Concentration Detected

Analyte	CAS No	RIN	Borehole	Sample Depth (ft)	Results (ug/Kg)	Qualifier
Phenol	108-95-2	5145-009 004	29-7	0-6	65	J
2-Chlorophenol	95-57-8	5145-009 004	29-7	0-6	68	J
Benzoic Acid	65-85-0	5163-003 004	33-11	0-6	236 75	J
Naphthalene	91-20-3	5110-008 004	18	0-6	230	J
4-Chloro-3-methylphenol	59-50-7	5145-009 004	29-7	0-6	58	J
2-Methylnaphthalene	91-57-6	5110-006 004	16	0-5	280	J
Acenaphthene	83-32-9	5110-006 004	16	0-5	340	J
4-Nitrophenol	100-02-7	5163-004 004	34-12	0-5 4	196 19	J
Dibenzofuran	132-64-9	5110-008 004	18	0-6	140	J
Diethylphthalate	84-66-2	5067-001 004	1	0-5 8	38	J
Fluorene	86-73-7	5110-008 004	18	0-6	280	J
Pentachlorophenol	87-86-5	5145-007 004	27-5	0-5	36	J
Phenanthrene	85-01-8	5110-006 004	16	0-5	1,500	
Anthracene	120-12-7	5110-008 004	18	0-6	470	
Di-n-butylphthalate	84-74-2	5067-001 004	1	0-5 8	55	J
Fluoranthene	206-44-0	5110-006 004	16	0-5	1,500	
Pyrene	129-00-0	5110-006 004	16	0-5	1,300	
Butylbenzylphthalate	85-68-7	5163-004 004	34-12	0-5 4	37 62	J
Benzo(a)anthracene	56-55-3	5110-006 004	16	0-5	570	
Chyrsene	218-01-9	5110-006 004	16	0-5	660	
bis(2-Ethylhexyl)phthalate	117-81-7	5145-004 004	24-2	0-6	350	J
Benzo(b)fluoranthene	205-99-2	5110-006 004	16	0-5	670	
Benzo(k)fluoranthene	207-08-9	5110-006 004	16	0-5	520	
Benzo(a)pyrene	50-32-8	5110-006 004	16	0-5	760	
Indeno(1,2,3-cd)pyrene	193-39-5	5110-006 004	16	0-5	500	
Dibenz(a,h)anthracene	53-70-3	5110-006 004	16	0-5	300	J
Benzo(g,h,i)perylene	191-24-2	5110-006 004	16	0-5	550	

Table 5-4 Metals - Maximum Concentration Detected

Analyte	CAS No	RIN	Borehole	Sample Depth (ft)	Results (mg/Kg)	Qualifier
Aluminum	7429-90-5	98A5080-001 002	2	0- 6	22,700	
Antimony	7440-36-0	98A5178-008 002	42-20	0-6	6 7	B
Arsenic	7440-38-2	98A5178-008 002	42-20	0-6	14	B
Barium	7440-39-3	98A5110-007 002	17	0-5 4	102	
Beryllium	7440-41-7	98A5163-001 002	31-9	0-6	1 7	
Cadmium	7440-43-9	98A5178-004 002	45-23	0-6	1 2	
Calcium	7440-70-2	98A5110-006 002	16	0-5	22,500	
Chromium	7440-47-3	98A5178-008 002	42-20	0-6	36	
Cobalt	7440-48-4	98A5163-004 002	34-12	0-5 4	21 1	
Copper	7440-50-8	98A5178-005 002	46-24	0-6	19 3	
Iron	7439-89-6	98A5178-006 002	47-25	0-6	21,800	
Lead	7439-92-1	98A5178-006 002	47-25	0-6	122	
Lithium	7439-93-2	98A5178-007 002	48-26	0-6	14 4	B
Magnesium	7439-95-4	98A5110-008 002	18	0-6	3,250	
Manganese	7439-96-5	98A5145-005 002	25-3	0-6	234	
Mercury	7439-97-6	98A5163-003 002	33-11	0-6	49	
Molybdenum	7439-98-7	98A5178-005 002	46-24	0-6	8 2	B
Nickel	7440-02-0	98A5178-006 002	47-25	0-6	18 5	
Potassium	7440-09-7	98A5178-005 002	46-24	0-6	2,160	
Selenium	7782-49-2	98A5178-008 002	42-20	0-6	94	B
Silver	7440-22-4	98A5163-007 002	37-15	0-6	1 8	
Sodium	7440-23-5	98A5178-006 002	47-25	0-6	9,750	
Strontium	7440-24-6	98A5110-008 002	18	0-6	49 3	
Thallium	7440-28-0	98A5163-003 002	33-11	0-6	1	B
Tin	7440-31-5	98A5178-006 002	47-25	0-6	3 1	B
Uranium	7440-62-2	98A5110-010 002	20	0-6	1 3	B
Vanadium	7440-62-2	98A5110-010 002	20	0-6	54 6	
Zinc	7440-66-6	98A5178-005 002	46-24	0-6	46 9	

Table 5-5 Nitrates - Maximum Concentration Detected

Analyte	CAS No	RIN	Borehole	Sample Depth (ft)	Result (ug/Kg)	Qualifier
Nitrate/Nitrite as N	1-005	98A5163-002 005	32-10	0-5	66 6	

6.0 REFERENCES

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Appendix A

Building 123 Subsurface Soils - Radionuclide Results

APPENDIX A

Building 123 Subsurface Soils
Radionuclide Results

[illegible]		98A5067-001		98A5080-001		98A5080-002		98A5080-003		98A5080-004		98A5080-005		98A5080-006		98A5080-007	
Borehole		1		2		3		4		5		6		7		8	
Depth (ft)		0-5.8		0-6		0-6		0-6		0-6		0-5.8		0-6		0-5.7	
Analyte	CAS No.	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier
Americium-241	14596-10-2	2 82E-03	NA	6 16E-03	NA	2 83E-02	NA	1 70E-02	NA	6 92E-02	NA	-3 60E-03	NA	-1 11E-02	NA	2 88E-02	NA
Curium-243/244		1 31E-02	NA	3 89E-02	NA	4 81E-02	NA	3 44E-02	NA	4 20E-02	NA	2 16E-02	NA	2 33E-02	NA	3 41E-02	NA
Plutonium-239/240	10-12-8	3 48E-02	NA	1 62E-02	NA	2 85E-02	NA	1 68E-02	NA	1 17E-02	NA	2 72E-02	NA	2 67E-02	NA	7 39E-02	NA
Plutonium-242		6 41E-03	NA	-1 94E-02	NA	1 26E-02	NA	5 76E-03	NA	1 86E-02	NA	6 86E-02	NA	5 03E-03	NA	8 13E-02	NA
Uranium-232	7440-61 1	1 06E-02	NA	3 56E-03	NA	-3 75E-02	NA	1 10E-02	NA	-1 32E-02	NA	5 67E-02	NA	4 79E-03	NA	1 03E-03	NA
Uranium-233/234	11-08-5	5 70E-01	NA	5 04E-01	NA	6 65E-01	NA	6 26E-01	NA	4 51E-01	NA	5 72E-01	NA	7 84E 01	NA	5 43E-01	NA
Uranium-235	11-08-5	3 40E-02	NA	3 05E-02	NA	5 82E-02	NA	4 67E-02	NA	4 22E-02	NA	5 29E-02	NA	2 91E-02	NA	3 45E-02	NA
Uranium-238+D	15117-96-1	6 85E-01	NA	5 04E-01	NA	6 35E-01	NA	6 09E-01	NA	4 35E-01	NA	5 72E-01	NA	7 29E-01	NA	6 56E-01	NA
Strontium-89/90	11-10-9	2 38E-02	NA	-8 54E-02	NA	2 53E-01	NA	2 52E-01	NA	-2 62E-01	NA	1 31E+00	NA	1 09E+00	NA	9 19E-01	NA

NA not available from preliminary data

APPENDIX A
Building 123 Subsurface Soils
Radionuclide Results

[illegible] Borehole Depth (ft)		98A5080-008 9 0-6		98A5080-009 10 0-5 2		98A5110-001.006 11 0-5		98A5110-002.006 12 0-5.5		98A5110-003.006 13 0-5		98A5110-004 14 0-4		98A5110-005 15 0-4.5		98A5110-006 16 0-5	
Analyte	CAS No.	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier
Americium-241	14596-10-2	5 54E-04	NA	-5 18E-03	NA	6 00E-03	NA	3 98E-03	NA	5 69E-03	NA	1 05E-02	U	8 69E-04	U	4 27E-03	U
Curium-243/244		4 55E-02	NA	2 82E-02	NA	2 89E-02	NA	1 15E-02	NA	1 88E-02	NA	1 07E-02	J	3 10E-02	J	1 27E-02	U
Plutonium-239/240	10-12 8	7 63E-03	NA	1 72E-02	NA	2 00E-02	NA	1 91E-02	NA	1 59E-02	NA	2 41E-02	U	2 12E-02	U	2 13E-02	U
Plutonium-242		1 17E-02	NA	3 90E-02	NA	1 66E 02	NA	1 09E-02	NA	1 45E-02	NA	2 19E-02	U	2 11E-02	U	7 92E 03	U
Uranium-232	7440-61 1	1 96E-02	NA	8 63E-03	NA	1 14E-02	NA	2 46E-02	NA	1 13E-02	NA	2 17E-02	U	1 49E-02	U	1 27E-02	U
Uranium-233/234	11-08-5	4 77E-01	NA	6 48E-01	NA	7 39E-01	NA	7 38E-01	NA	6 38E-01	NA	6 17E-01	J	6 87E-01	J	5 63E-01	J
Uranium-235	11-08-5	1 45E-02	NA	3 50E-02	NA	3 31E-02	NA	1 98E-01	NA	1 07E-01	NA	4 13E-02	J	3 85E-02	U	2 94E-02	U
Uranium-238+D	15117-96-1	5 51E-01	NA	6 10E-01	NA	7 68E-01	NA	5 99E-01	NA	7 58E-01	NA	7 26E-01	J	8 89E-01	J	6 54E-01	J
Strontium-89/90	11-10-9	-6 92E-02	NA	1 94E-01	NA	2 65E-01	NA	5 98E-02	NA	-2 58E-01	NA	-1 04E-01	U	5 04E-02	U	-3 53E-02	U

NA - not available from preliminary data

APPENDIX A

Building 123 Subsurface Soils
Radionuclide Results

RIN		98A5110-007		98A5110-008		98A5110-009		98A5110-010		98A5145-001		98A5145-002		98A5145-003		98A5145-004	
Borehole		17		18		19		20		21		22		23-1		24-2	
Depth (ft)		0-5.4		0-5		0-6.7		0-5		0-4		0-6		0-5.6		0-6	
Analyte	CAS No.	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier
Americium-241	14596-10-2	1 80E-03	U	-8 49E-01	U	2 36E-02	U	9 32E-03	U	-8 78E-03	U	9 87E-02	J	2 27E-02	U	2 17E+00	NA
Curium-243/244		5 04E-02	J	3 39E-02	U	1 65E-02	U	3 10E-02	U	1 26E-02	U	4 62E-01		1 25E-02	U	2 04E-02	NA
Plutonium-239/240	10-12-8	2 48E-02	J	9 15E-02	J	6 23E-02	U	4 07E-02	U	1 33E-01	J	1 22E-02	U	7 18E-02	U	2 13E-01	NA
Plutonium-242		1 29E-02	U	4 80E-02	U	2 94E-04	U	1 90E-02	U	-1 11E-02	U	1 22E-02	U	1 03E-02	U	5 00E-03	NA
Uranium-232	7440-61 1	1 17E-02	U	5 63E-02	J	2 17E-02	U	2 78E-02	U	1 34E-02	U	1 36E-02	U	1 92E-02	U	1 54E-02	NA
Uranium-233/234	11-08-5	7 18E-01	J	7 16E-01	J	8 64E-01	J	8 40E-01	J	5 73E-01	J	4 72E-01	J	7 09E-01	J	8 81E-01	NA
Uranium-235	11-08-5	6 97E-02	J	2 53E-02	U	6 35E-02	J	2 24E-02	U	1 02E-01	J	2 44E-02	J	6 24E-02	J	7 38E-02	NA
Uranium-238+D	15117-96-1	7 94-01	J	7 82E-01	J	7 98E-01	J	6 62E-01	J	7 48E-01	J	5 48E-01	J	6 94E-01	J	9 26E-01	NA
Strontium-89/90	11 10-9	1 30E-01	U	9 60E-03	U	1 81E-01	U	-1 22E-01	U	-6 18E-02	U	1 48E-01	U	7 44E-02	NA	1 46E-01	NA

NA - not available from preliminary data

APPENDIX A
Building 123 Subsurface Soils
Radionuclide Results

RIN Borehole Depth (ft)		98A5145-005 25-3 0-6		98A5145-006 26-4 0-6		98A5145-007 27-5 0-6		98A5145-008 28-6 0-6		98A5145-009 29-7 0-6		98A5145-010 30-8 0-6		98A5163-001 31-9 0-6		98A5163-002 32-10 0-6	
Analyte	CAS No.	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier
Americium-241	14596-10-2	1 12E-02	NA	-3 75E-03	NA	6 56E-03	NA	-6 03E-03	NA	1 23E-02	NA	2 83E-03	NA	4 17E-03	U	1 11E-02	U
Curium-243/244		3 15E-02	NA	1 93E-02	NA	2 82E-03	NA	0 00E+00	NA	0 00E+00	NA	1 93E-02	NA	3 01E-02	U	-2 04E-03	U
Plutonium-239/240	10-12 8	2 05E-02	NA	6 20E-02	NA	2 13E-02	NA	4 66E-03	NA	1 13E 01	NA	-1 12E-02	NA	7 59E-02	U	8 49E 02	J
Plutonium-242		2 31E-02	NA	3 14E-02	NA	7 10E-03	NA	1 97E-02	NA	2 87E-02	NA	1 21E 02	NA	2 09E 02	U	8 49E-02	J
Uranium-232	7440-61-1	1 03E-03	NA	2 98E-03	NA	8 54E-03	NA	5 79E-03	NA	2 69E 03	NA	1 91E-04	NA	-6 22E 03	U	2 16E-02	J
Uranium-233/234	11-08-5	7 91E-01	NA	7 46E-01	NA	9 31E-01	NA	6 95E-01	NA	5 24E-01	NA	5 01E-01	NA	6 96E-01	J	7 84E-01	J
Uranium-235	11-08-5	4 18E 02	NA	4 44E-02	NA	4 82E-02	NA	3 54E-02	NA	5 30E-02	NA	2 88E-02	NA	3 89E-02	J	6 01E-02	J
Uranium-238+D	15117 96-1	8 51E-01	NA	6 46E-01	NA	9 49E-01	NA	7 49E-01	NA	5 28E-01	NA	5 37E-01	NA	7 32E-01	J	8 61E-01	J
Strontium-89/90	11 10-9	-1 93E-01	NA	2 32E-02	NA	-4 42E-02	NA	-8 86E-02	NA	7 77E-02	NA	9 40E-03	NA	-1 26E-01	U	2 76E-01	U

NA not available from preliminary data

APPENDIX A
Building 123 Subsurface Soils
Radionuclide Results

[illegible] Location Depth (ft)	[illegible]	98A5163-003 33-11 0-3?		98A5163-004 34-12 [illegible]		98A5163-005 35-13 [illegible]		98A5163-006 36-14 0-6?		98A5163-007 37-15 0-5?		98A5163-008 38-16 [illegible]		98A5163-009 39-17 0-6?		98A5163-010 40-18 0-6	
Analyte	CAS No	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier	Result (pCi/g)	Qualifier
Americium-241	14596-10-2	1 39E-02	U	3 17E-03	U	3 67E-03	U	3 77E-02	J	9 03E-03	U	1 64E-02	U	3 63E-03	U	8 60E-03	U
Curium-243/244		3 18E-02	J	3 97E-02	J	2 02E-02	U	1 21E-02	U	3 01E-02	U	3 49E-02	U	4 40E-02	J	6 99E-03	U
Plutonium-239/240	10-12-8	2 76E-03	U	1 68E-02	U	-5 60E-03	U	1 26E-02	U	0 00E+00	U	1 10E-02	U	-4 21E-03	U	1 85E-02	U
Plutonium-242		2 02E-02	U	2 95E-04	U	2 11E-02	U	1 77E-02	U	0 00E+00	U	4 06E-03	U	-8 42E-03	U	-5 04E-03	U
Uranium-232	7440-61 1	1 30E-03	U	-2 45E-02	U	7 58E-03	U	8 91E-03	U	9 78E-04	U	4 97E-03	U	9 30E-03	U	2 93E-03	U
Uranium-233/234	11-08-5	6 44E-01	J	5 54E-01	J	7 85E-01	J	6 12E-01	J	7 76E-01	J	7 99E-01	J	5 04E-01	J	8 14E-01	J
Uranium-235	11-08-5	5 20E-02	J	7 36E-02	J	4 63E-02	J	2 21E-02	J	2 96E-02	U	3 50E-02	J	6 89E-02	J	3 32E-02	U
Uranium-238+D	15117-96-1	6 44E-01	J	6 49E-01	U	7 83E-01	J	4 69E-01	J	6 98E-01	J	8 73E-01	J	6 48E-01	J	9 22E-01	J
Strontium-89/90	11 10-9	-2 18E-02	U	2 17E-01	U	9 30E-01	U	1 08E-01	U	8 53E-02	U	1 80E 01	U	5 21E-02	U	3 20E 01	U

NA not available from preliminary data

APPENDIX A
Building 123 Subsurface Soils
Radionuclide Results

RIN / Location / Depth (ft) / Analyte	CAS No.	98A5178-001 41-19 0-6 Result (pCi/g)	Qualifier	98A5178-008 42-20 0-6 Result (pCi/g)	Qualifier	98A5178-002 43-21 0-6 Result (pCi/g)	Qualifier	98A5178-003 44-22 0-6 Result (pCi/g)	Qualifier	98A5178-004 45-23 0-6 Result (pCi/g)	Qualifier	98A5178-005 46-24 0-6 Result (pCi/g)	Qualifier	98A5178-006 47-25 0-6 Result (pCi/g)	Qualifier	98A5178-007 48-26 0-6 Result (pCi/g)	Qualifier
Americium-241	14596-10-2	9 03E-03	U	2 31E-03	U	1 10E-02	U	-6 71E-03	U	1 14E-02	U	1 88E-02	U	5 94E-02	U	3 75E 03	U
Curium-243/244		9 25E-03	U	1 65E-03	U	3 49E-02	U	3 39E-02	J	3 74E-02	J	3 78E-02	J	9 44E-02	J	3 14E-02	U
Plutonium-239/240	10-12 8	1 67E-02	U	4 44E-03	U	2 11E-02	U	1 18E-02	U	3 74E-03	U	4 14E-03	U	1 19E-02	J	8 00E-03	U
Plutonium-242		2 41E-02	U	2 35E+00		4 34E-03	U	1 18E-02	U	1 44E-02	U	2 39E+00		2 38E+00		2 33E+00	
Uranium-232	7440-61 1	1 25E-02	U	7 19E-03	U	1 29E-02	U	3 06E-02	U	2 55E 02	U	7 10E-03	U	6 77E-03	U	1 39E-03	J
Uranium-233/234	11-08-5	7 16E-01	J	1 23E+00		6 71E-01	J	7 27E-01	J	6 99E-01	J	8 60E-01	J	7 02E-01	J	7 45E-01	J
Uranium-235	11-08-5	3 72E-02	J	6 34E-02	J	5 34E-02	J	5 36E-02	J	2 80E-02	U	7 51E-02	J	4 50E-02	J	6 52E-02	J
Uranium-238+D	15117 96-1	6 47E-01	J	1 00E+00		8 59E-01	J	9 99E-01	J	7 27E-01	J	9 98E-01	J	8 26E-01	J	8 15E-01	J
Strontium-89/90	11 10-9	1 17E-01	U	4 49E-02	U	6 13E-02	U	3 80E-02	U	1 02E-01	U	5 80E-02	U	8 08E 02	U	3 74E-02	U

NA not available from preliminary data

Appendix B

Building 123 Subsurface Soils - VOC Results

APPENDIX B
Building 123 Subsurface Soils
Volatile Organic Compound Results - Detects Only

Chloromethane	74-87-3																
Bromomethane	74-83-9																
Vinyl chloride	75-01-4																
Chloroethane	75-00-3																
Methylene chloride	75-09-2	6						3 87	J	4 74	J			4 13	J		
Acetone	67-64-1																
Carbon disulfide	75-15-0							3 75	J	2 49	J						
1 1-Dichloroethene	75-35-4																
1 1-Dichloroethane	75-34-3																
Chloroform	67-66-3																
1,2-Dichloroethane	107-06-2																
2-Butanone	78-93-3																
1 1 1-Trichloroethane	71-55-6																
Carbon tetrachloride	56-23-5																
Bromodichloromethane	75-27-4																
1,2-Dichloropropane	78-87-5																
cis-1 3-Dichloropropene	10061-01-5																
Trichloroethene	79-01-6																
Dibromochloromethane	124-48-1																
1 1 2-Trichloroethane	79-00 5-1 5																
Benzene	71-43-2																
trans-1 3-Dichloropropene	10061-02-6																
Bromoform	75-25-2																
4-Methyl-2-pentanone	108-10-1																
2-Hexanone	591 78-6																
Tetrachloroethene	127 18-4																
Toluene	108-88-3																
1 1,2,2-Tetrachloroethane	79-34-5																
Chlorobenzene	108-90-7																
Ethylbenzene	100 5-1 51-4																
Stryene	100 5-1 52 5																
Xylene (total)	1330-20-7																
m,p-Xylenes	13-302-07																
o-Xylene	95-47-6																
1,2-Dibromo-3-chloropropane	96-12-8																
1,2-Dichlorobenzene	95-50-1																
1,3-Dichlorobenzene	541-73-1																
1 4-Dichlorobenzene	106-46-7																
Hexachlorobutadiene	87-68-3																
Naphthalene	91-20-3																
1,2,3-Trichlorobenzene	87-61-6																
1,2,4-Trichlorobenzene	120-82-1																
1,2,4-Trimethylbenzene	95-63-6																
1 1,2-Trichlorotrifluorethane	76-13-1																

APPENDIX B

Building 123 Subsurface Soils

Volatile Organic Compound Results - Detects Only

Chloromethane	74-87-3														
Bromomethane	74-83-9														
Vinyl chloride	75-01-4														
Chloroethane	75-00-3														
Methylene chloride	75-09-2			2 82	J	1	JB	24	B	34	B	3 27	J	2 82	J
Acetone	67-64-1					30		69		71	D	12 4		3 22	J
Carbon disulfide	75-15-0							2	J	2	J				
1 1 Dichloroethene	75-35-4														
1 1-Dichloroethane	75-34-3														
Chloroform	67-66-3									1	J				
1,2-Dichloroethane	107-06-2														
2-Butanone	78-93-3									72					
1 1 1-Trichloroethane	71 55-6														
Carbon tetrachloride	56-23-5									11					
Bromodichloromethane	75-27-4														
1 2-Dichloropropane	78-87-5														
cis-1,3-Dichloropropene	10061-01-5														
Trichloroethene	79-01-6							3	J						
Dibromochloromethane	124-48-1														
1 1 2 Trichloroethane	79-00 5-1 5														
Benzene	71-43-2														
trans-1 3-Dichloropropene	10061-02-6														
Bromoform	75-25-2														
4-Methyl-2-pentanone	108-10-1														
2-Hexanone	591-78-6														
Tetrachloroethene	127 18-4							5	J						
Toluene	108-88-3									5	J				
1 1,2,2-Tetrachloroethane	79-34-5														
Chlorobenzene	108-90-7														
Ethylbenzene	100 5-1 51-4									1	J				
Stryene	100 5-1 52 5														
Xylene (total)	1330-20-7									5	J				
m p-Xylenes	13-302-07														
o-Xylene	95-47-6														
1,2-Dibromo-3-chloropropane	96-12-8														
1 2-Dichlorobenzene	95-50-1														
1 3-Dichlorobenzene	541-73-1														
1 4-Dichlorobenzene	106-46-7														
Hexachlorobutadiene	87-68-3														
Naphthalene	91-20-3					13		13		16					
1,2 3-Trichlorobenzene	87-61-6							7		7					
1,2 4-Trichlorobenzene	120-82-1							6		6					
1,2 4-Trimethylbenzene	95-63-6														
1,1,2-Trichlorotrifluoroethane	76-13-1							1	J	1	J				

APPENDIX B
Building 123 Subsurface Soils
Volatile Organic Compound Results - Detects Only

Chloromethane	74-87 3														
Bromomethane	74-83-9														
Vinyl chloride	75-01-4														
Chloroethane	75-00-3														
Methylene chloride	75-09-2	3 26	J	2 59	J	2 96	J	2 51	J	2 86	J	2	J		
Acetone	67-64-1	5 53		7 03		3 78	J	3 74	J	86 24		5		9	
Carbon disulfide	75-15-0														
1 1-Dichloroethene	75-35-4														
1 1-Dichloroethane	75-34-3														
Chloroform	67-66-3														
1,2-Dichloroethane	107-06-2														
2-Butanone	78-93-3									12 22					
1 1 1-Trichloroethane	71 55-6														
Carbon tetrachloride	56-23-5														
Bromodichloromethane	75-27-4														
1 2-Dichloropropane	78-87-5														
cis-1 3-Dichloropropene	10061-01-5														
Trichloroethene	79-01-6														
Dibromochloromethane	124-48-1														
1 1 2-Trichloroethane	79-00 5-1 5														
Benzene	71-43-2														
trans-1 3-Dichloropropene	10061-02-6														
Bromoform	75-25-2														
4-Methyl-2-pentanone	108-10-1														
2-Hexanone	591-78-6														
Tetrachloroethene	127-18-4														
Toluene	108-88-3														
1 1 2 2-Tetrachloroethane	79-34-5														
Chlorobenzene	108-90-7														
Ethylbenzene	100 5-1 51-4														
Stryene	100 5-1 52 5														
Xylene (total)	1330-20-7														
m p-Xylenes	13-302-07														
o-Xylene	95-47-6														
1,2-Dibromo-3-chloropropane	96-12-8														
1,2-Dichlorobenzene	95-50-1														
1 3-Dichlorobenzene	541-73-1														
1 4-Dichlorobenzene	106-46-7														
Hexachlorobutadiene	87-68-3														
Naphthalene	91-20-3					7 05		9 96							
1,2 3-Trichlorobenzene	87-61-6														
1,2,4-Trichlorobenzene	120-82-1														
1,2 4-Trimethylbenzene	95-63-6														
1 1,2-Trichlorotrifluorethane	76-13-1														

APPENDIX B

Building 123 Subsurface Soils

Volatile Organic Compound Results - Detects Only

Chloromethane	74-87-3																
Bromomethane	74-83-9																
Vinyl chloride	75-01-4																
Chloroethane	75-00-3																
Methylene chloride	75-09-2	2	J	3	J	5	J							5	J		
Acetone	67-64-1	8		22		54										5	J
Carbon disulfide	75-15-0																
1 1-Dichloroethene	75-35-4																
1 1-Dichloroethane	75-34-3																
Chloroform	67-66-3	2	J														
1 2-Dichloroethane	107-06-2																
2-Butanone	78-93-3																
1 1 1-Trichloroethane	71-55-6																
Carbon tetrachloride	56-23-5																
Bromodichloromethane	75-27-4																
1,2-Dichloropropane	78-87-5																
cis-1,3-Dichloropropene	10061-01-5																
Trichloroethene	79-01-6																
Dibromochloromethane	124-48-1																
1 1,2-Trichloroethane	79-00 5-1 5																
Benzene	71-43-2																
trans-1 3-Dichloropropene	10061-02-6																
Bromoform	75-25-2																
4-Methyl-2-pentanone	108-10-1																
2-Hexanone	591-78-6																
Tetrachloroethene	127-18-4																
Toluene	108-88-3																
1 1,2,2-Tetrachloroethane	79-34-5																
Chlorobenzene	108-90-7																
Ethylbenzene	100 5-1 51-4																
Stryene	100 5-1 52-5																
Xylene (total)	1330-20-7																
m,p-Xylenes	13-302-07																
o-Xylene	95-47-6																
1 2-Dibromo-3-chloropropane	96-12-8																
1 2-Dichlorobenzene	95-50-1																
1,3-Dichlorobenzene	541-73-1																
1 4-Dichlorobenzene	106-46-7																
Hexachlorobutadiene	87-68-3																
Naphthalene	91-20-3																
1,2,3-Trichlorobenzene	87-61-6																
1,2,4-Trichlorobenzene	120-82-1																
1,2,4-Trimethylbenzene	95-63-6																
1,1,2-Trichlorotrifluorethane	76-13-1																

APPENDIX B

Building 123 Subsurface Soils

Volatile Organic Compound Results - Detects Only

Chloromethane	74-87-3														
Bromomethane	74-83-9														
Vinyl chloride	75-01-4														
Chloroethane	75-00-3														
Methylene chloride	75-09-2	30		6		15 13		24 01		20 47		20 76		8 9	
Acetone	67-64-1	22		6				6 91							
Carbon disulfide	75-15-0														
1 1-Dichloroethene	75-35-4														
1 1-Dichloroethane	75-34-3														
Chloroform	67-66-3														
1,2-Dichloroethane	107-06-2														
2-Butanone	78-93-3														
1 1 1-Trichloroethane	71-55-6														
Carbon tetrachloride	56-23-5														
Bromodichloromethane	75-27-4														
1,2-Dichloropropane	78-87 5														
cis-1 3-Dichloropropene	10061-01 5														
Trichloroethene	79-01-6														
Dibromochloromethane	124-48-1														
1 1 2 Trichloroethane	79-00 5-1 5														
Benzene	71-43-2														
trans-1 3-Dichloropropene	10061-02-6														
Bromoform	75-25-2														
4-Methyl-2-pentanone	108-10-1														
2-Hexanone	591 78-6														
Tetrachloroethene	127-18-4														
Toluene	108-88-3							3 9	J						
1 1 2 2-Tetrachloroethane	79-34-5														
Chlorobenzene	108-90-7														
Ethylbenzene	100 5-1 51-4														
Stryene	100.5-1 52-5														
Xylene (total)	1330-20-7													8 86	
m p-Xylenes	13-302-07													5 92	
o-Xylene	95-47-6													2 58	
1,2-Dibromo-3-chloropropane	96-12-8														
1,2-Dichlorobenzene	95-50-1														
1 3-Dichlorobenzene	541-73-1														
1 4-Dichlorobenzene	106-46-7														
Hexachlorobutadiene	87-68-3														
Naphthalene	91-20-3														
1,2,3-Trichlorobenzene	87-61-6														
1,2,4-Trichlorobenzene	120-82 1														
1,2 4-Trimethylbenzene	95-63-6														
1 1,2-Trichlorotrifluoroethane	76-13-1														

APPENDIX B
Building 123 Subsurface Soils
Volatile Organic Compound Results - Detects Only

Chloromethane	74-87-3																
Bromomethane	74-83-9																
Vinyl chloride	75-01-4																
Chloroethane	75-00-3																
Methylene chloride	75-09-2					2 84	J	4 41	J			4 07	J			5 49	
Acetone	67-64-1									8 44						4 68	J
Carbon disulfide	75-15-0															4 93	J
1 1-Dichloroethene	75-35-4																
1 1 Dichloroethane	75-34-3																
Chloroform	67-66-3																
1 2 Dichloroethane	107-06-2																
2-Butanone	78-93-3																
1 1 1-Trichloroethane	71-55-6																
Carbon tetrachloride	56-23-5																
Bromodichloromethane	75-27-4																
1 2-Dichloropropane	78-87-5																
cis-1 3-Dichloropropene	10061-01-5																
Trichloroethene	79-01-6					5 23											
Dibromochloromethane	124-48-1																
1 1,2-Trichloroethane	79-00 5-1 5																
Benzene	71-43-2																
trans-1 3-Dichloropropene	10061-02-6																
Bromoform	75-25-2																
4-Methyl 2-pentanone	108-10-1																
2-Hexanone	591 78-6																
Tetrachloroethene	127 18-4																
Toluene	108-88-3																
1 1,2 2 Tetrachloroethane	79-34-5																
Chlorobenzene	108-90-7																
Ethylbenzene	100 5-1 51-4																
Stryene	100 5-1 52 5																
Xylene (total)	1330-20-7																
m,p-Xylenes	13-302-07																
o-Xylene	95-47-6																
1 2-Dibromo-3-chloropropane	96-12-8																
1 2-Dichlorobenzene	95-50-1																
1 3-Dichlorobenzene	541-73-1																
1 4-Dichlorobenzene	106-46-7																
Hexachlorobutadiene	87-68-3																
Naphthalene	91 20-3																
1,2 3-Trichlorobenzene	87-61-6																
1,2 4-Trichlorobenzene	120-82-1																
1,2,4-Trimethylbenzene	95-63-6																
1 1,2-Trichlorotrifluorethane	76-13-1																

APPENDIX B

Building 123 Subsurface Soils

Volatile Organic Compound Results - Detects Only

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Chloromethane	74-87-3						
Bromomethane	74-83-9						
Vinyl chloride	75-01-4						
Chloroethane	75-00-3						
Methylene chloride	75-09-2						
Acetone	67-64-1	12 37		14 12		5 55	
Carbon disulfide	75-15-0						
1 1-Dichloroethene	75-35-4						
1 1-Dichloroethane	75-34-3						
Chloroform	67-66-3	2 47	J				
1 2 Dichloroethane	107-06-2						
2-Butanone	78-93-3						
1 1 1 Trichloroethane	71 55-6						
Carbon tetrachloride	56-23-5						
Bromodichloromethane	75-27-4						
1 2-Dichloropropane	78-87 5						
cis-1 3-Dichloropropene	10061-01 5						
Trichloroethene	79-01-6						
Dibromochloromethane	124-48-1						
1 1 2 Trichloroethane	79-00 5-1 5						
Benzene	71-43-2						
trans-1 3-Dichloropropene	10061-02-6						
Bromoform	75-25-2						
4-Methyl-2 pentanone	108-10-1	2 16	J				
2-Hexanone	591 78-6						
Tetrachloroethene	127-18-4					3 9	J
Toluene	108-88-3						
1 1 2 2 Tetrachloroethane	79-34-5						
Chlorobenzene	108-90-7						
Ethylbenzene	100 5-1 51-4						
Stryene	100 5-1 52 5						
Xylene (total)	1330-20-7						
m p-Xylenes	13-302-07						
o-Xylene	95-47-6						
1,2-Dibromo-3-chloropropane	96-12-8						
1,2-Dichlorobenzene	95-50-1						
1 3-Dichlorobenzene	541-73-1						
1 4-Dichlorobenzene	106-46-7						
Hexachlorobutadiene	87-68-3						
Naphthalene	91-20-3						
1,2 3-Trichlorobenzene	87-61-6						
1,2 4-Trichlorobenzene	120-82-1						
1,2 4-Trimethylbenzene	95-63-6	6 01					
1 1,2-Trichlorotrifluorethane	76-13-1						

Appendix C

Building 123 Subsurface Soils - Semi-VOC Results

APPENDIX C
Building 123 Subsurface Soils
Semivolatile Organic Compounds - Detects Only

Phenol	108-95-2												U						
bis(2-Chloroethyl)ether(V)	111-44-4												U						
2-Chlorophenol(V)	95-57-8												U						
1 3-Dichlorobenzene(V)	541 73-1												U						
1 4-Dichlorobenzene(V)	106-46-7												U						
Benzyl Alcohol	100-51-6												U						
1,2-Dichlorobenzene(V)	95-50-1												U						
2-Methylphenol	95-48-7												U						
bis(2-Chloroisopropyl)ether(V)	108-60-1												U						
4-Methylphenol	106-44-5												U						
n-Nitrosodipropylamine	621-64-7												U						
Hexachloroethane	67 72 1												U						
Nitrobenzene(V)	98-95-3												U						
Isophorone	78-59-1												U						
2-Nitrophenol	88-75-5												U						
2,4-Dimethylphenol(V)	105-67-9												U						
Benzoic Acid	65-85-0	200	JB	180	J			180	J				U			230	J	210	J
bis(2-Chloroethoxy)methane(V)	111-91 1												U						
2,4-Dichlorophenol	120-83-2												U						
1 2,4-Trichlorobenzene(V)	120-82 1												U						
Naphthalene(V)	91 20-3												U	170	J			230	J
4-Chloroaniline	106-47-8												U						
Hexachlorobutadiene	87-68-3												U						
4-Chloro-3-methylphenol	59-50-7												U						
2-Methylnaphthalene(V)	91-57-6												U	280	J			89	J
Hexachlorocyclopentadiene	77-47-4												U						
2,4 6-Trichlorophenol	88-06-2												U						
2,4 5-Trichlorophenol	95-95-4												U						
2-Chloronaphthalene(V)	91-58-7												U						
2-Nitroaniline	88-74-4												U						
Dimethylphthalate	131 11-3												U						
Acenaphthylene(V)	208-96-8												U						
2,6-Dinitrotoluene	606-20-2												U						
3-Nitroaniline	99-09-2												U						
Acenaphthene(V)	83-32-9			34	J								U	340	J	71	J	330	J
2,4-Dinitrotoluene	121 14-2												U						
2,4-Dinitrophenol	51 28-5												U						
4-Nitrophenol(V)	100-02 7												U						
Dibenzofuran	132-64-9												U	130	J			140	J
Diethylphthalate	84-66-2	38	J										U						
4-Chlorophenyl phenyl ether	7005-72-3												U						
Fluorene(V)	86-73-7												U	280	J	51	J	280	J
4-Nitroaniline	100-01-6												U						
4 6-Dinitro-2-methylphenol(V)	534-52-1												U						
n-Nitrosodiphenylamine(V)	86-30-6												U						
4-Bromophenyl phenyl ether	101-55-3												U						
Hexachlorobenzene	118-74-1												U						
Pentachlorophenol	87-86-5												U						
Phenanthrene(V)	85-01-8			180	J			72	J	69	J		U	1 500		400.		1 400	
Anthracene(V)	120-12 7			51	J								U	410		78	J	470	
Di-n-butylphthalate	84-74-2	55	J										U						
Fluoranthene	206-44-0			210	J			83.	J	95	J		U	1 500		370		1 200	
Pyrene	129-00-0			270	J			100	J	90	J		U	1 300		330	J	1 100	
Butylbenzylphthalate	85-68-7												U						
3,3-Dichlorobenzidine	91-94-1												U						
Benzo(a)anthracene	56-55-3			120	J					42.	J		U	570		140	J	500	
Chrysene	218-01-9			130	J					64	J		U	660		160	J	520	
bis(2-Ethylhexyl)phthalate	117-81-7					50	J	100	J	47	J		U	49	J				
Di-n-octylphthalate	117-84-0												U						
Benzo(b)fluoranthene	205-99-2			120	J					41	J		U	670		120	J	460	
Benzo(k)fluoranthene	207-08-9			89	J					61	J		U	520		160	J	480	
Benzo(a)pyrene	50-32-8			140	J					67	J		U	760		180	J	590	
Indeno(1,2,3-cd)pyrene	193-39-5			310.	J					40	J		U	500		98	J	390	
Dibenz(a,h)anthracene	53-70-3												U	300	J	66	J	230	J
Benzo(g,h,i)perylene	191-24-2			140.	J					48.	J		U	550		110	J	420	

Samples from Boreholes 2-10 exceeded sample holding time.

APPENDIX C

Building 123 Subsurface Soils

Semivolatile Organic Compounds - Detects Only

Phenol	108-95-2										U							49	J
bis(2-Chloroethyl)ether(V)	111-44-4										U								
2-Chlorophenol(V)	95-57-8										U								
1 3-Dichlorobenzene(V)	541 73-1										U								
1 4-Dichlorobenzene(V)	106-46-7										U								
Benzyl Alcohol	100-51-6										U								
1,2-Dichlorobenzene(V)	95-50-1										U								
2-Methylphenol	95-48-7										U								
bis(2-Chloroisopropyl)ether(V)	108-60-1										U								
4-Methylphenol	106-44-5										U								
n-Nitrosodipropylamine	621-64-7										U								
Hexachloroethane	67 72 1										U								
Nitrobenzene(V)	98-95-3										U								
Isophorone	78-59-1										U								
2-Nitrophenol	88-75-5										U								
2,4-Dimethylphenol(V)	105-67-9										U								
Benzoic Acid	65-85-0	200	J	220	J						U							220	JB
bis(2-Chloroethoxy)methane(V)	111-91 1										U								
2,4-Dichlorophenol	120-83-2										U								
1,2,4-Trichlorobenzene(V)	120-82 1										U								
Naphthalene(V)	91-20-3	84	J								U			48	J				
4-Chloroaniline	106-47-8										U								
Hexachlorobutadiene	87-68-3										U								
4-Chloro-3-methylphenol	59-50-7										U							43	J
2-Methylnaphthalene(V)	91-57-6										U								
Hexachlorocyclopentadiene	77-47-4										U								
2,4 6-Trichlorophenol	88-06-2										U								
2,4,5-Trichlorophenol	95-95-4										U								
2-Chloronaphthalene(V)	91-58-7										U								
2-Nitroaniline	88-74-4										U								
Dimethylphthalate	131 11-3										U								
Acenaphthylene(V)	208-96-8										U								
2,6-Dinitrotoluene	606-20-2										U								
3-Nitroaniline	99-09-2										U								
Acenaphthene(V)	83-32-9	140	J								U	45	J	130	J			69	J
2,4-Dinitrotoluene	121 14-2										U								
2,4-Dinitrophenol	51 28-5										U								
4-Nitrophenol(V)	100-02 7										U								
Dibenzofuran	132-64-9	51	J								U			55	J				
Diethylphthalate	84-66-2										U								
4-Chlorophenyl phenyl ether	7005-72-3										U								
Fluorene(V)	86-73-7	110	J								U	39	J	120	J				
4-Nitroaniline	100-01-6										U								
4 6-Dinitro-2-methylphenol(V)	534-52-1										U								
n-Nitrosodiphenylamine(V)	86-30-6										U								
4-Bromophenyl phenyl ether	101-55-3										U								
Hexachlorobenzene	118-74-1										U								
Pentachlorophenol	87-86-5										U								
Phenanthrene(V)	85-01-8	560		94	J	220	J	220	J		U	260	J	630		130	J	210	J
Anthracene(V)	120-12 7	170	J								U	63	J	200	J			50	J
Di-n-butylphthalate	84-74-2										U								
Fluoranthene	206-44-0	530		140.	J	210	J	210.	J		U	300.	J	620		150	J	210	J
Pyrene	129-00-0	470.		130.	J	220	J	190.	J		U	290	J	600		140	J	240	J
Butylbenzylphthalate	85-68-7										U								
3,3-Dichlorobenzidine	91-94-1										U								
Benzo(a)anthracene	56-55-3	200	J	62.	J	91	J	82.	J		U	120.	J	280	J	58	J	85	J
Chrysene	218-01-9	220	J	76	J	120	J	100	J		U	150	J	330	J	62	J	94	J
bis(2-Ethylhexyl)phthalate	117-81 7										U			350	J				
Di-n-octylphthalate	117-84-0										U								
Benzo(b)fluoranthene	205-99-2	180	J	79	J	90.	J	86.	J		U	100	J	210	J	40	J	250	J
Benzo(k)fluoranthene	207-08-9	220.	J	52.	J	110.	J	110.	J		U	180	J	340	J	79	J	78	J
Benzo(a)pyrene	50-32-8	250.	J	84	J	110.	J	120	J		U	160.	J	350	J	64	J	96	J
Indeno(1,2,3-cd)pyrene	193-39-5	170.	J	55.	J	67	J				U	93.	J	180	J			58.	J
Dibenz(a,h)anthracene	53-70-3	86	J			67	J				U			110	J				
Benzo(g,h,i)perylene	191-24-2	170	J	61	J	90.	J	90.	J		U	100	J	200	J	40	J	73.	J

APPENDIX C
Building 123 Subsurface Soils
Semivolatile Organic Compounds - Detects Only

Phenol	108-95-2					65	J									50 59	J				
bis(2-Chloroethyl)ether(V)	111-44-4																				
2-Chlorophenol(V)	95-57-8					68	J									52 32	J				
1 3-Dichlorobenzene(V)	541 73-1																				
1 4-Dichlorobenzene(V)	106-46-7																				
Benzyl Alcohol	100-51-6																				
1 2-Dichlorobenzene(V)	95-50-1																				
2-Methylphenol	95-48-7																				
bis(2-Chloroisopropyl)ether(V)	108-60-1																				
4-Methylphenol	106-44-5																				
n-Nitrosodipropylamine	621-64-7																				
Hexachloroethane	67 72 1																				
Nitrobenzene(V)	98-95-3																				
Isophorone	78-59-1																				
2-Nitrophenol	88-75-5																				
2,4-Dimethylphenol(V)	105-67-9																				
Benzoic Acid	65-85-0	220	JB	220	JB	220	JB	230	JB	230	JB	210	JB	236 75	J	214 98	J	220 09	J	228 35	J
bis(2-Chloroethoxy)methane(V)	111-91 1																				
2,4-Dichlorophenol	120-83-2																				
1 2,4-Trichlorobenzene(V)	120-82 1																				
Naphthalene(V)	91-20-3	49	J																		
4-Chloroaniline	106-47-8																				
Hexachlorobutadiene	87-68-3																				
4-Chloro-3-methylphenol	59-50-7	38	J			58	J									41 53	J				
2-Methylnaphthalene(V)	91-57-6																				
Hexachlorocyclopentadiene	77-47-4																				
2,4 6-Trichlorophenol	88-06-2																				
2,4 5-Trichlorophenol	95-95-4																				
2-Chloronaphthalene(V)	91-58-7																				
2-Nitroaniline	88-74-4																				
Dimethylphthalate	131 11-3																				
Acenaphthylene(V)	208-96-8																				
2,6-Dinitrotoluene	606-20-2																				
3-Nitroaniline	99-09-2																				
Acenaphthene(V)	83-32-9	150	J	37	J																
2,4-Dinitrotoluene	121 14-2																				
2,4-Dinitrophenol	51-28-5																				
4-Nitrophenol(V)	100-02 7	60	J			49	J									196 19	J				
Dibenzofuran	132-64-9	42	J																		
Diethylphthalate	84-66-2																				
4-Chlorophenyl phenyl ether	7005-72-3																				
Fluorene(V)	86-73-7	100	J																		
4-Nitroaniline	100-01-6																				
4 6-Dinitro-2-methylphenol(V)	534-52-1																				
n-Nitrosodiphenylamine(V)	86-30-6																				
4-Bromophenyl phenyl ether	101-55-3																				
Hexachlorobenzene	118-74-1																				
Pentachlorophenol	87-86-5	36	J																		
Phenanthrene(V)	85-01-8	710		210	J									51 84	J						
Anthracene(V)	120-12-7	190	J	44	J																
Di-n-butylphthalate	84-74-2			25	J											41 94	J				
Fluoranthene	206-44-0	760		250	J					38	J			42 83	J						
Pyrene	129-00-0	800		250	J					38	J			51 58	J						
Butylbenzylphthalate	85-68-7															37 62	J				
3,3-Dichlorobenzidine	91-94-1																				
Benzo(a)anthracene	56-55-3	320	J	110	J																
Chrysene	218-01-9	340	J	130	J																
bis(2-Ethylhexyl)phthalate	117-81 7	47	J	200	J					43	J	100	J	141 04	J	138 07	J	141 19	J	150 95	J
Di-n-octylphthalate	117-84-0																				
Benzo(b)fluoranthene	205-99-2	420		280	J					200	J			122 06	J						
Benzo(k)fluoranthene	207-08-9	290	J	100	J																
Benzo(a)pyrene	50-32-8	380		130	J									302.35	J						
Indeno(1,2,3-cd)pyrene	193-39-5	190	J	73	J																
Dibenz(a,h)anthracene	53-70-3	89	J	69	J																
Benzo(g,h,i)perylene	191-24-2	250	J	98	J																

APPENDIX C

Building 123 Subsurface Soils

Semivolatile Organic Compounds - Detects Only

Phenol	108-95-2										U								U		
bis(2-Chloroethyl)ether(V)	111-44-4										U								U		
2-Chlorophenol(V)	95-57-8			39	J						U								U		
1 3-Dichlorobenzene(V)	541 73-1										U								U		
1 4-Dichlorobenzene(V)	106-46-7										U								U		
Benzyl Alcohol	100-51-6										U								U		
1 2-Dichlorobenzene(V)	95-50-1										U								U		
2-Methylphenol	95-48-7										U								U		
bis(2-Chloroisopropyl)ether(V)	108-60-1										U								U		
4-Methylphenol	106-44-5										U								U		
n-Nitrosodipropylamine	621-64-7										U								U		
Hexachloroethane	67 72 1										U								U		
Nitrobenzene(V)	98-95-3										U								U		
Isophorone	78-59-1										U								U		
2-Nitrophenol	88-75-5										U								U		
2,4-Dimethylphenol(V)	105-67-9										U								U		
Benzoic Acid	65-85-0	225 19	J			130	J	140	J		U			130	J	140	J		U		
bis(2-Chloroethoxy)methane(V)	111-91 1										U								U		
2,4-Dichlorophenol	120-83-2										U								U		
1 2,4-Trichlorobenzene(V)	120-82 1										U								U		
Naphthalene(V)	91-20-3										U								U		
4-Chloroaniline	106-47-8										U								U		
Hexachlorobutadiene	87-68-3										U								U		
4-Chloro-3-methylphenol	59-50-7										U								U		
2-Methylnaphthalene(V)	91-57-6										U								U		
Hexachlorocyclopentadiene	77-47-4										U								U		
2,4 6-Trichlorophenol	88-06-2										U								U		
2,4 5-Trichlorophenol	95-95-4										U								U		
2-Chloronaphthalene(V)	91-58-7										U								U		
2-Nitroaniline	88-74-4										U								U		
Dimethylphthalate	131 11-3										U								U		
Acenaphthylene(V)	208-96-8										U								U		
2,6-Dinitrotoluene	606-20-2										U								U		
3-Nitroaniline	99-09-2										U								U		
Acenaphthene(V)	83-32-9										U								U		
2,4-Dinitrotoluene	121 14-2										U								U		
2,4-Dinitrophenol	51 28-5										U								U		
4-Nitrophenol(V)	100-02 7										U								U		
Dibenzofuran	132-64-9										U								U		
Diethylphthalate	84-66-2										U								U		
4-Chlorophenyl phenyl ether	7005-72-3										U								U		
Fluorene(V)	86-73-7										U								U		
4-Nitroaniline	100-01-6										U								U		
4 6-Dinitro-2-methylphenol(V)	534-52 1										U								U		
n-Nitrosodiphenylamine(V)	86-30-6										U								U		
4-Bromophenyl phenyl ether	101-55-3										U								U		
Hexachlorobenzene	118-74-1										U								U		
Pentachlorophenol	87-86-5										U								U		
Phenanthrene(V)	85-01-8										U								U	118 9	J
Anthracene(V)	120-12 7										U								U		
Di-n-butylphthalate	84-74-2										U								U		
Fluoranthene	206-44-0										U								U	113 17	J
Pyrene	129-00-0										U	37 72	J						U	117 29	J
Butylbenzylphthalate	85-68-7										U								U		
3,3-Dichlorobenzidine	91-94-1										U								U		
Benzo(a)anthracene	56-55-3										U								U	47 03	J
Chrysene	218-01-9										U								U	60 07	J
bis(2-Ethylhexyl)phthalate	117-81 7										U								U		
Di-n-octylphthalate	117-84-0										U								U		
Benzo(b)fluoranthene	205-99-2										U								U	82 48	J
Benzo(k)fluoranthene	207-08-9										U								U		
Benzo(a)pyrene	50-32-8										U								U	59 73	J
Indeno(1,2,3-cd)pyrene	193-39-5										U								U	36 59	J
Dibenz(a,h)anthracene	53-70-3										U								U		
Benzo(g,h,i)perylene	191-24-2										U								U	46 27	J

APPENDIX C
Building 123 Subsurface Soils
Semivolatile Organic Compounds - Detects Only

[redacted]					
Phenol	108-95-2				
bis(2-Chloroethyl)ether(V)	111-44-4				
2-Chlorophenol(V)	95-57-8				
1 3-Dichlorobenzene(V)	541 73-1				
1 4-Dichlorobenzene(V)	106-46-7				
Benzyl Alcohol	100-51-6				
1 2-Dichlorobenzene(V)	95-50-1				
2-Methylphenol	95-48-7				
bis(2-Chloroisopropyl)ether(V)	108-60-1				
4-Methylphenol	106-44-5				
n-Nitrosodipropylamine	621-64-7				
Hexachloroethane	67 72 1				
Nitrobenzene(V)	98-95-3				
Isophorone	78-59-1				
2-Nitrophenol	88-75-5				
2 4-Dimethylphenol(V)	105-67-9				
Benzoic Acid	65-85-0	209 27	J	186 23	J
bis(2-Chloroethoxy)methane(V)	111-91 1				
2,4-Dichlorophenol	120-83-2				
1 2,4-Trichlorobenzene(V)	120-82 1				
Naphthalene(V)	91-20-3				
4-Chloroaniline	106-47-8				
Hexachlorobutadiene	87-68-3				
4-Chloro-3-methylphenol	59-50-7				
2-Methylnaphthalene(V)	91-57-6				
Hexachlorocyclopentadiene	77-47-4				
2,4 6-Trichlorophenol	88-06-2				
2,4 5-Trichlorophenol	95-95-4				
2-Chloronaphthalene(V)	91-58-7				
2-Nitroaniline	88-74-4				
Dimethylphthalate	131 11-3				
Acenaphthylene(V)	208-96-8				
2,6-Dinitrotoluene	606-20-2				
3-Nitroaniline	99-09-2				
Acenaphthene(V)	83-32-9				
2,4-Dinitrotoluene	121 14-2				
2,4-Dinitrophenol	51-28-5				
4-Nitrophenol(V)	100-02 7				
Dibenzofuran	132-64-9				
Diethylphthalate	84-66-2				
4-Chlorophenyl phenyl ether	7005-72-3				
Fluorene(V)	86-73-7				
4-Nitroaniline	100-01-6				
4 6-Dinitro-2-methylphenol(V)	534-52-1				
n-Nitrosodiphenylamine(V)	86-30-6				
4-Bromophenyl phenyl ether	101-55-3				
Hexachlorobenzene	118-74-1				
Pentachlorophenol	87-86-5				
Phenanthrene(V)	85-01-8				
Anthracene(V)	120-12 7				
Di-n-butylphthalate	84-74-2				
Fluoranthene	206-44-0				
Pyrene	129-00-0				
Butylbenzylphthalate	85-68-7				
3,3-Dichlorobenzidine	91-94-1				
Benzo(a)anthracene	56-55-3				
Chrysene	218-01-9				
bis(2-Ethylhexyl)phthalate	117-81 7			89 25	J
Di-n-octylphthalate	117-84-0				
Benzo(b)fluoranthene	205-99-2				
Benzo(k)fluoranthene	207-08-9				
Benzo(a)pyrene	50-32-8				
Indeno(1,2,3-cd)pyrene	193-39-5				
Dibenz(a,h)anthracene	53-70-3				
Benzo(g,h,i)perylene	191-24-2				

Appendix D

Building 123 Subsurface Soils - Metals Results

APPENDIX D
Building 123 Subsurface Soils
Metal Results

Aluminum	7429-90-5	9 910		22 700		5 830		9 430		12 600		13 000		5 710	
Antimony	7440-36-0	1 7	U	1 9	U	1 6	U	1 6	U	1 7	U	1 8	U	1 6	U
Arsenic	7440-38-2	6	B	8 3	B	5 3	B	6 7	B	7	B	9 7	B	5 7	B
Barium	7440-39-3	65 7		78 9		34		51 3		58 2		73 8		36 4	
Beryllium	7440-41-7	8		1 6		64		73		86		1 1		52	
Cadmium	7440-43-9	11	B	1	B	17	B	11	B	28	B	19	B	17	B
Calcium	7440-70-2	2 760		2 790		1 480		1 840		5 790		3 940		3 510	
Chromium	7440-47-3	13 6		14 7		7 2		10 4		15 7		14		7 5	
Cobalt	7440-48-4	6 2	B	9 3	B	4 1	B	2 9	B	3 6	B	6 3	B	3 4	B
Copper	7440-50-8	9 9		7 4		6 4		6 3		8 4		9 8		9 6	
Iron	7439-89-6	12 300		15 200		7 890		9 810		11 700		14 300		8 810	
Lead	7439-92-1	10 5	B	11 7	B	7 2	B	8 1	B	18 1		14 1		12	
Lithium	7439-93-2	6 7	B	8 6	B	3 8	B	5 3	B	6 9	B	8 3	B	5	B
Magnesium	7439-95-4	1 660		1 350		798	B	1 060		1 450		1 400		1 320	
Manganese	7439-96-5	214		58 2		77 8		66 6		70 7		82 2		97 7	
Mercury	7439-97-6	04	U	04	U	04	U	03	U	04	U	04	U	03	U
Molybdenum	7439-98-7	2 2	B	68	B	62	B	51	B	1 1	B	87	B	58	B
Nickel	7440-02-0	11 7		13 8		7 8	B	7 8	B	10 7		12 4		7 3	B
Potassium	7440-09-7	950	B	848	B	604	B	850	B	1 090		1 190		786	B
Selenium	7782-49-2	43	U	47	U	41	U	4	U	42	U	44	U	41	U
Silver	7440-22-4	13	U	31	B	12	U	12	U	13	U	13	U	12	U
Sodium	7440-23-5	217	B	508	B	182	B	154	B	146	B	196	B	400	B
Strontium	7440-24-6	12 6	B	19 7	B	9 9	B	14 7	B	20 2	B	19 7	B	14 7	B
Thallium	7440-28-0	45	B	46	U	4	U	4	B	43	B	43	U	4	U
Tin	7440-31-5	1 6	B	2 2	B	1 4	B	1 6	B	2 6	B	2 2	B	1 6	B
Uranium	7440-62-2	67	U	74	U	65	U	64	U	66	U	66	U	62	U
Vanadium	7440-62-2	29 1		35 8		19 4		27		31 9		37 6		22 8	
Zinc	7440-66-6	24 5		18 3		22		15 5		32 7		25 7		28 3	

APPENDIX D
Building 123 Subsurface Soils
Metal Results

[redacted]

Aluminum	7429-90-5	10 100		9 330		8 480		6 640		6 810		5 460		8 560	
Antimony	7440-36-0	1 8	U	1 7	U	1 6	U	29	B	19	U	19	U	1 7	U
Arsenic	7440-38-2	6 5	B	6 9	B	6 1	B	3 7	B	5	B	4 9	B	7 7	B
Barium	7440-39-3	57 8		54 3		46 8		58 9		62 9		40		53 2	
Beryllium	7440-41-7	1		7		67		44		55		6		78	
Cadmium	7440-43-9	03	U	15	B	11	B	03	U	03	U	03	U	03	U
Calcium	7440-70-2	3 130		2 180		2 230		3 470		1 940		2 000		1 700	
Chromium	7440-47-3	11 2		20 3		10 6		13 5		10 9		9 7		10 6	
Cobalt	7440-48-4	5 9	B	3 2	B	5 1	B	4 6	B	7 8	B	4 6	B	3 8	B
Copper	7440-50-8	9 7		11 5		8 2		16 5		14		10 2		7 3	
Iron	7439-89-6	12 900		10 800		10 700		12 100		11 100		9 890		11 000	
Lead	7439-92-1	12 6		11 5		10 7		9 6	B	8 4	B	7 4	B	9 1	B
Lithium	7439-93-2	6 5	B	6	B	6 8	B	9 6	B	6 4	B	5 1	B	6 1	B
Magnesium	7439-95-4	1 710		1 260		1 350		2 870		2 090		1 320		952	B
Manganese	7439-96-5	95		99 4		109		206		203		136		84 4	
Mercury	7439-97-6	05	B	04	U	05	B	03	U	03	U	03	U	04	B
Molybdenum	7439-98-7	53	B	2 8	B	65	B	1 4	B	84	B	95	B	56	B
Nickel	7440-02-0	10 4		10 9		9 7		9		8 9		7 5	B	10	
Potassium	7440-09-7	1 090	B	797	B	855	B	1 610		1 580		848	B	755	B
Selenium	7782-49-2	48	B	42	U	41	U	41	U	42	U	42	U	58	B
Silver	7440-22-4	13	U	13	U	12	U	12	U	13	U	13	U	12	U
Sodium	7440-23-5	255	B	288	B	201	B	263	B	333	B	190	B	291	B
Strontium	7440-24-6	17 8	B	23 7	B	13 1	B	21 6	B	9 6	B	15 8	B	13 5	B
Thallium	7440-28-0	43	U	42	B	4	U	76	B	81	B	82	B	39	U
Tin	7440-31-5	2	B	1 7	B	1 5	B	1	B	1 1	B	86	B	1 4	B
Uranium	7440-62-2	68	U	65	U	65	U	64	U	66	U	65	U	62	U
Vanadium	7440-62-2	30 6		25 5		25 3		23 3		24 7		22 6		31	
Zinc	7440-66-6	28 3		20 9		24 5		34 5		30 5		20 7		20 2	

APPENDIX D
Building 123 Subsurface Soils
Metal Results

Aluminum	7429-90-5	2 550		10 200		11 600		9 930		8 100		10 300		2 530	
Antimony	7440-36-0	1 8	U	1 9	U	1 9	U	3 1	B	2	B	4	B	1 7	U
Arsenic	7440-38-2	2 8	B	9 7	B	8 1	B	6 2	B	7 6	B	8 3	B	2	B
Barium	7440-39-3	21 9		92 3		102		87 3		85 5		63 2		27 1	
Beryllium	7440-41-7	29		98		1		73		8		1 5		23	
Cadmium	7440-43-9	17	B	03	U	05	B	03		08	B	55	B	09	B
Calcium	7440-70-2	420		22 500		2 850		10 100	B	3 950		2 850		3 080	
Chromium	7440-47-3	3 1		10 2		13 9	B	18 1		12 6		9 5		7 6	
Cobalt	7440-48-4	2 8	B	6	B	4 3		6 1	B	4 4	B	11	B	1 9	B
Copper	7440-50-8	1 9	B	6		12 5		13 7		9 9		11 4		5 6	
Iron	7439-89-6	4 200		9 140		13 800		15 700		11 400		20 300		4 570	
Lead	7439-92-1	3 4	B	8 2	B	16 8	B	13 3		16 4		10 7	B	22 7	
Lithium	7439-93-2	3 9	B	7 5	B	8 6		11 3	B	6 9	B	5 9	B	3 5	U
Magnesium	7439-95-4	596	B	1 720		1 330		3 250		1 220		1 010	B	671	B
Manganese	7439-96-5	50 5		72 2		104	B	212		177		167		84 3	
Mercury	7439-97-6	03	U	04	U	07	B	04	U	04	U	05	B	03	U
Molybdenum	7439-98-7	2	B	65	B	47		79	B	67	B	92	B	69	B
Nickel	7440-02-0	7 9	B	10 9		10 9		12 9		8 1	B	13 4		3 8	B
Potassium	7440-09-7	139	B	1 040	B	2 980	U	1 990		1 140		556	B	545	B
Selenium	7782-49-2	42	U	46	B	45	B	43	U	64	B	89	B	41	U
Silver	7440-22-4	21	B	13	U	18	B	13	U	18	B	14	U	12	U
Sodium	7440-23-5	229	B	363	B	1 020	B	361	B	286	B	316	B	278	B
Strontium	7440-24-6	4 7	B	35 2	B	19 1	U	49 3		20 3	B	15 3	B	11 4	B
Thallium	7440-28-0	41	U	43	U	44	B	41	U	42	U	44	U	4	U
Tin	7440-31-5	1 2	B	1 2	B	1 8	B	1 5	B	1 4	B	1 9	B	1 9	B
Uranium	7440-62-2	65	U	69	U	7	U	66	U	67	U	1 3	B	64	U
Vanadium	7440-62-2	12 4		20 5		33 8		33 6		27 7		54 6		10 3	
Zinc	7440-66-6	8 6		18 8		36 1		43		26 6		29		19 3	

APPENDIX D
Building 123 Subsurface Soils
Metal Results

Aluminum	7429-90-5	6 770		6 500		6 330		11 500		8 350		11 600		4 530	
Antimony	7440-36-0	2 6	B	3 1	B	2 9	B	4 6	B	2 9	B	3 8	B	2 7	B
Arsenic	7440-38-2	5 9	B	7 1	B	5 6	B	6	B	7 3	B	6	B	3 1	B
Barium	7440-39-3	46 9		42 1		42 2		74 4		46 8		64 7		30 9	
Beryllium	7440-41-7	75		76		61		87		81		81		38	
Cadmium	7440-43-9	03	U	03	U	69	B	03	U	03	U	04	B	03	U
Calcium	7440-70-2	1 850		2 620		1 930		2 650		3 940		4 980		4 460	
Chromium	7440-47-3	9 6		19 3		9 4		20 8		13 8		11 6		7 4	
Cobalt	7440-48-4	4 1	B	7 7	B	4 2	B	5 6	B	7 6	B	11 6		7	B
Copper	7440-50-8	8 4		12 8		8 2		14 4		10 6		13 8		6 7	
Iron	7439-89-6	10 200		11 800		10 100		15 300		12 300		15 300		8 570	
Lead	7439-92-1	8 4	B	6 4	B	8 2	B	13 1		16 7		10 5	B	4 7	B
Lithium	7439-93-2	6 1	B	5 7	B	4 8	B	9 2	B	7	B	8 8	B	4 8	B
Magnesium	7439-95-4	1 270		1 090		845	B	1 750		1 270		1 720		905	B
Manganese	7439-96-5	111		181		106		234		153		227		123	
Mercury	7439-97-6	04	U	04	U	06	B	08	B	04	U	03	U	03	U
Molybdenum	7439-98-7	98	B	5 4	B	89	B	4 6	B	74	B	51	B	51	B
Nickel	7440-02-0	8 1	B	8	B	9		10 4		10 7		10 6		5 2	B
Potassium	7440-09-7	893	B	941	B	648	B	1 750		1 110	B	1 640		837	B
Selenium	7782-49-2	7	B	43	U	43	U	5	B	45	U	43	U	44	U
Silver	7440-22-4	13	U	13	U	13	U	13	U	14	B	13	U	13	U
Sodium	7440-23-5	286	B	163	B	164	B	180	B	312	B	333	B	287	B
Strontium	7440-24-6	10 6	B	12 7	B	14 8	B	5 7	B	20	B	17 7	B	10 7	B
Thallium	7440-28-0	42	U	42	U	42	U	42	U	44	U	42	U	43	U
Tin	7440-31-5	1 4	B	1 1	B	1 4	B	1 8	B	1 2	B	1 3	B	1 5	B
Uranium	7440-62-2	67	U	67	U	67	U	67	U	7	U	66	U	69	U
Vanadium	7440-62-2	24 6		25 1		23 2		31 5		30 6		32 4		17 7	
Zinc	7440-66-6	25		24 5		17 9		38 3		30 5		42 3		26 7	

APPENDIX D
Building 123 Subsurface Soils
Metal Results

Aluminum	7429-90-5	11 000		9 040		16 300		8 060		16 000		3 080		6 900	
Antimony	7440-36-0	1 9	U	3 9	B	3 9	B	2 4	B	21	U	19	U	21	U
Arsenic	7440-38-2	8 1	B	8	B	9 5	B	8 5	B	10 2	B	3 1	B	5 1	B
Barium	7440-39-3	54 9		49 7		80 1		46 2		86 2		95 5		45 6	
Beryllium	7440-41-7	1 2		87		1 7		82		1 3		36		82	
Cadmium	7440-43-9	03	U	03	U	03	U	03	U	03	U	03	U	04	U
Calcium	7440-70-2	8 010		5 750		3 910		1 560		4 710		1 470		2 060	
Chromium	7440-47-3	10 8		10 6		16 2		11 2		17 2		5 1		12	
Cobalt	7440-48-4	5 4	B	5 7	B	15 9		6 4	B	7 8	B	21 1		5 4	B
Copper	7440-50-8	7 2		6 2		6 8		7 5		10 7		6 8		7 1	
Iron	7439-89-6	11 500		10 500		15 800		11 500		16 200		5 110		8 710	
Lead	7439-92-1	5 9	B	6 5	B	10 6		14 3		12		3 6	B	6 2	B
Lithium	7439-93-2	6 9	B	6 1	B	6 9	B	5 3	B	10 4	B	3 7	U	4	B
Magnesium	7439-95-4	1 410		1 150		1 610		951	B	2 140		715	B	1 100	B
Manganese	7439-96-5	58 9		78 1		89 3		79 5		124		67 7		92 6	
Mercury	7439-97-6	04	U	07	B	1	B	08	B	49		04	B	04	U
Molybdenum	7439-98-7	1 1	B	83	B	57	B	1 1	B	66	B	61	B	2 2	B
Nickel	7440-02-0	11 9		10 4		14 3		9 7		17 2		4 9	B	9	B
Potassium	7440-09-7	950	B	796	B	797	B	741	B	1 360		509	B	756	B
Selenium	7782-49-2	45	U	46	U	61	B	41	U	75	B	43	U	77	B
Silver	7440-22-4	14	U	14	U	56	B	2	B	14	U	13	U	14	U
Sodium	7440-23-5	365	B	278	B	301	B	257	B	176	B	142	B	142	B
Strontium	7440-24-6	18	B	15 2	B	21	B	12 7	B	26 1	B	8 4	B	13 5	B
Thallium	7440-28-0	44	U	45	U	41	U	4	U	1	B	42	U	53	B
Tin	7440-31-5	1 4	B	1 6	B	1 7	B	1 3	B	1 1	B	78	B	87	B
Uranium	7440-62-2	7	U	71	U	66	U	64	U	72	U	67	U	73	U
Vanadium	7440-62-2	30 7		28 6		39 4		30 5		38 7		10 3		21 4	
Zinc	7440-66-6	19 9		13 3		16 8		16		32 7		15 1		16 2	

APPENDIX D
Building 123 Subsurface Soils
Metal Results

Analyte	[illegible]	Result (mg/kg)	Qualifier	Result (mg/kg)	Qualifier	Result (mg/kg)	Qualifier	Result (mg/kg)	Qualifier	Result (mg/kg)	Qualifier	Result (mg/kg)	Qualifier	Result (mg/kg)	Qualifier
Aluminum	7429-90-5	7 180		4 180		7 220		2 510		8 270		6 930		14 300	
Antimony	7440-36-0	19	U	2	U	2 3	B	3	B	3 7	B	2 4	B	6 7	B
Arsenic	7440-38-2	3 8	B	3	B	3	B	1 5	B	7 6	B	2 5	B	14	B
Barium	7440-39-3	48 2		38 7		42 1		71 6		52 8		39 2		84 9	
Beryllium	7440-41-7	58		34		66		26		99		64		1 3	
Cadmium	7440-43-9	05	B	62	B	25	B	03	U	03	U	03	U	06	U
Calcium	7440-70-2	3 460		2 140		1 890		1 640		2 060		1 590		1 780	
Chromium	7440-47-3	7 7		5 4		8 5		4 4		11 4		7 5		36	
Cobalt	7440-48-4	6	B	9 1	U	4	B	13 3		9 5	B	1 9	B	6 6	B
Copper	7440-50-8	10 4		14 4	B	7 8		12 3		7		4 4	B	11 7	
Iron	7439-89-6	8 750		7 310		8 720		7 440		11 700		7 030		19 000	
Lead	7439-92-1	9 3	B	8 8		17 2		3 6	B	7 5	B	3 7	B	24 2	
Lithium	7439-93-2	5 8	B	5	B	4 9	B	7	B	5 2	B	4 1	B	9 5	B
Magnesium	7439-95-4	1 590		1 050	B	1 260		980	B	1 130		989	B	1 120	B
Manganese	7439-96-5	140		119	B	88 8		120		139		37 4		121	
Mercury	7439-97-6	04	U	04		04	B	03	U	05	B	05	B		B
Molybdenum	7439-98-7	23	B	41	B	81	B	3 1	B	1 2	B	37	B	3 2	B
Nickel	7440-02-0	7 4	B	5 1	B	6 8	B	4	B	12 3		5 06	B	17 2	
Potassium	7440-09-7	1 350		1 090	B	937	B	1 190		741	B	527	B	966	B
Selenium	7782-49-2	43	U	45	U	42	U	41	U	75	B	44	U	94	B
Silver	7440-22-4	13	U	1 8		13	U	12	U	13	U	13	U	22	U
Sodium	7440-23-5	190	B	197	B	253	B	242	B	284	B	119	B	541	B
Strontium	7440-24-6	14 4	B	11 2	B	12	B	9 3	B	14 6	B	11 5	B	13 7	B
Thallium	7440-28-0	42	B	44	U	41	U	4	U	43	U	43	U	73	U
Tin	7440-31-5	74	B	1	B	1 2	B	1 3	B	1 2	B	1 6	B	2 3	B
Uranium	7440-62-2	66	U	7	U	65	U	63	U	68	U	68	U	1 2	U
Vanadium	7440-62-2	16		11 2		15 8		9 9		30 8		12 8		54 5	
Zinc	7440-66-6	27 1		28		17 6		21 7		12 8		9 5		39 5	

APPENDIX D
Building 123 Subsurface Soils
Metal Results

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aluminum	7429-90-5	2 240		8 520		4 240		10 600		19 000		5 720	
Antimony	7440-36-0	1 7	B	2 5	B	3 5	B	3 7	B	6	B	4 6	B
Arsenic	7440-38-2	1 9	B	6 2	B	3 1	B	6 7	B	10 4	B	2 3	B
Barium	7440-39-3	14 1	B	58 8		34 5		91 1		101		45 9	
Beryllium	7440-41-7	26		1		42		86		1 6		39	
Cadmium	7440-43-9	11	B	03	U	1 2		05	U	06	U	05	U
Calcium	7440-70-2	599	B	4 400		1 660		3 250		1 940		2 940	
Chromium	7440-47-3	4 6		11 5		9 7		33 4		21 4		7 4	
Cobalt	7440-48-4	2 4	B	5 2	B	6	B	7	B	7 1	B	12 7	B
Copper	7440-50-8	2 7	B	7 6		6 8		19 3		13 3		13 5	
Iron	7439-89-6	3 690		10 900		7 880		17 300		21 800		10 200	
Lead	7439-92-1	3 5	B	7 7	B	14 7		17 5		122		5 7	B
Lithium	7439-93-2	3 4	U	5 2	B	6 1	B	11 4	B	11 4	B	14 4	B
Magnesium	7439-95-4	441	B	1 320		1 090		2 340		2 070		2 620	
Manganese	7439-96-5	38 1		103		106		220		138		199	
Mercury	7439-97-6	04	B	04	B	03	U	00	B	00	U	00	U
Molybdenum	7439-98-7	55	B	7	B	1 1	B	8 2	B	1 1	B	49	B
Nickel	7440-02-0	4 3	B	10 2		6	B	13 2	B	18 5		7 2	B
Potassium	7440-09-7	237	B	870	B	800	B	2 160		1 830	B	1 750	
Selenium	7782-49-2	52	B	45	U	41	U	69	U	91	B	68	U
Silver	7440-22-4	12	U	13	U	12	U	21	U	82	B	2	U
Sodium	7440-23-5	56 7	U	179	B	142	B	245	B	9 750		479	B
Strontium	7440-24-6	3 6	B	21 1	B	9 4	B	19 3	B	15 1	B	12 1	B
Thallium	7440-28-0	39	U	44	U	4	U	67	U	79	U	66	U
Tin	7440-31-5	45	U	1	B	1 4	B	2 5	B	3 1	B	2 1	B
Uranium	7440-62-2	62	U	7	U	64	U	1 1	U	1 3	U	1	U
Vanadium	7440-62-2	8 2		28 6		15		33 3		49 2		13 8	
Zinc	7440-66-6	6 9		14 5		18 4		46 9		28 3		32 7	

Appendix E

Building 123 Subsurface Soils - Nitrate Results

APPENDIX E

Building 123 Subsurface Soils

Nitrate Results

Borehole	Depth (ft)	Rin No	Analyte	Result (mg/kg)	[illegible]
1	0-5 8	98A5067-001 021	Nitrate/Nitrite as N	1	U
2	0-6	98A5080-001 009	Nitrate/Nitrite as N	28	B
3	0-6	98A5080-002 009	Nitrate/Nitrite as N	1	U
4	0-6	98A5080-003 009	Nitrate/Nitrite as N	11	B
5	0-6	98A5080-004 009	Nitrate/Nitrite as N	1	U
6	0-5 8	98A5080-005 009	Nitrate/Nitrite as N	41	B
7	0-6	98A5080-006 009	Nitrate/Nitrite as N	54	
8	0-5 7	98A5080-007 009	Nitrate/Nitrite as N	1	U
9	0-6	98A5080-008 009	Nitrate/Nitrite as N	13	B
10	0-5 2	98A5080-009 009	Nitrate/Nitrite as N	1	U
11	0-5	98A5110-001 005	Nitrate/Nitrite as N	1	U
12	0-5 6	98A5110-002 005	Nitrate/Nitrite as N	1 2	
13	0-5	98A5110-003 005	Nitrate/Nitrite as N	1	U
14	0-4	98A5110-004 005	Nitrate/Nitrite as N	1 04	
15	0-4 5	98A5110-005 005	Nitrate/Nitrite as N	3 17	
16	0-5	98A5110-006 005	Nitrate/Nitrite as N	1 49	
17	0-5 4	98A5110-007 005	Nitrate/Nitrite as N	11 5	
18	0-6	98A5110-008 005	Nitrate/Nitrite as N	1 95	
19	0-5 7	98A5110-009 005	Nitrate/Nitrite as N	1 78	
20	0-6	98A5110-010 005	Nitrate/Nitrite as N	1	U
21	0-4	98A5145-001 005	Nitrate/Nitrite as N	1 2	
22	0-6	98A5145-002 005	Nitrate/Nitrite as N	1 4	
23-1	0-5 6	98A5145-003 005	Nitrate/Nitrite as N	2 2	
24-2	0-6	98A5145-004 005	Nitrate/Nitrite as N	1 6	
25-3	0-6	98A5145-005 005	Nitrate/Nitrite as N	3 8	
26-4	0-6	98A5145-006 005	Nitrate/Nitrite as N	7 9	
27-5	0-5	98A5145-007 005	Nitrate/Nitrite as N	5 3	
28-6	0-6	98A5145-008 005	Nitrate/Nitrite as N	3 9	
29-7	0-6	98A5145-009 005	Nitrate/Nitrite as N	2 7	
30-8	0-6	98A5145-010 005	Nitrate/Nitrite as N	16 2	
31-9	0-6	98A5163-001 005	Nitrate/Nitrite as N	8 98	
32-10	0-5	98A5163-002 005	Nitrate/Nitrite as N	66 6	
33-11	0-6	98A5163-003 005	Nitrate/Nitrite as N	3 3	
34-12	0-5 4	98A5163-004 005	Nitrate/Nitrite as N	7 8	
35-13	0-5 1	98A5163-005 005	Nitrate/Nitrite as N	6 2	
36-14	0-6	98A5163-006 005	Nitrate/Nitrite as N	3 7	
37-15	0-6	98A5163-007 005	Nitrate/Nitrite as N	10	
38-16	0-6	98A5163-008 005	Nitrate/Nitrite as N	4 5	
39-17	0-6	98A5163-009 005	Nitrate/Nitrite as N	1 9	
40-18	0-6	98A5163-010 005	Nitrate/Nitrite as N	2 98	
41-19	0-6	98A5178-001 005	Nitrate/Nitrite as N	2 39	
42-20	0-6	98A5178-008 005	Nitrate/Nitrite as N	39 6	
43-21	0-6	98A5178-002 005	Nitrate/Nitrite as N	15 9	
44-22	0-6	98A5178-003 005	Nitrate/Nitrite as N	1 56	
45-23	0-6	98A5178-004 005	Nitrate/Nitrite as N	52 9	
46-24	0-6	98A5178-005 005	Nitrate/Nitrite as N	24 4	
47-25	0-6	98A5178-006 005	Nitrate/Nitrite as N	14 5	
48-26	0-6	98A5178-007 005	Nitrate/Nitrite as N	38 8	

Appendix F

Building 123 Actual Sample Location

Survey Elevation Points

Building 123 Actual Sample Location Survey Elevation Points

Description	Northing	Easting	Elevation
1	749247 7	2081785 7	6029 7
2	749173 9	2081772 4	6033 4
3	749126 3	2081800 2	6031 1
4	749146 5	2081784 5	6032 2
5 approx	749144 9	2081772 7	6033 8
6	749048 7	2081785 2	6033 0
7	749070 5	2081792 2	6032 4
8	749101 3	2081776 9	6032 7
9	749014 8	2081754 9	6033 1
10	749028 1	2081732 0	6033 8
11	749050 3	2081663 9	6034 5
12	748994 6	2081682 4	6034 3
13	749082 1	2081682 4	6035 3
14	749065 4	2081611 8	6034 8
15	749113 6	2081610 4	6034 9
16	749165 0	2081605 6	6035 2
17	749199 6	2081607 4	6035 5
18	749232 3	2081688 2	6033 6
19	749231 4	2081725 5	6033 3
20	749117 4	2081713 0	6035 1
21	749127 2	2081682 7	6035 3
22	749004 0	2081608 6	6035 6
23-1	749087 6	2081658 9	6035 6
24-2	749100 0	2081658 1	6035 6
25-3	749112 3	2081657 4	6035 6
26-4	749095 7	2081657 2	6035 6
27-5	749138 8	2081658 0	6035 6
28-6	749147 3	2081654 7	6035 5
29-7	749202 1	2081621 9	6035 5
30-8	749202 9	2081625 3	6035 5
31-9	749194 9	2081630 3	6035 5
32-10	749187 6	2081642 4	6035 5
33-11	749171 6	2081653 2	6035 6
34-12	749214 6	2081659 8	6035 6
35-13	749206 4	2081680 1	6035 6
36-14	749213 7	2081680 8	6035 6
37-15	749217 2	2081696 5	6035 6
38-16	749214 8	2081699 6	6035 6
39-17	749208 2	2081723 0	6035 5
40-18	749175 7	2081724 8	6035 5
41-19	749164 6	2081724 9	6035 6
42-20	749181 0	2081701 9	6035 5
43-21	749189 5	2081765 5	6035 6
44-22	749169 7	2081765 7	6035 5
45-23	749142 3	2081765 6	6035 5

Project 123 Boreholes
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Coordinate Listing (State Plane)

46-24	749062 5	2081721 4	6035 6
47-25	749096 1	2081728 2	6035 4
48-26	749131 7	2081738 5	6035 6

Appendix G

Radionuclide Precision Evaluation Results

Radionuclide Precision Evaluation Results

QC Sample ID	Location	Media	Detected Analyte	QC Sample Type	Associated Real Sample ID	QC Result	Q	QC Result Error	Real Results	Q	Real Result Error	DER Value
98A5110-011	BH 20	Soil	Americium-241	Dup	98A5110-010	3 10E-04	U	1 22E-02	9 32E-03	U	1 53E-02	0 46
			Curium-243/244			1 55E-02	U	2 15E-02	3 10E-02	U	2 87E-02	0 43
			Plutonium-239/240			0 00E+00	U	0 00E+00	4 07E-02	U	4 30E-02	0 95
			Plutonium-242			3 96E-02	J	3 88E-02	1 90E-02	U	3 07E-02	0 42
			Strontium-89/90			-1 09E-01	U	1 57E-01	-1 22E-01	U	1 97E-01	0 05
			Uranium-232			-1 27E-03	U	4 53E-03	2 78E-02	U	2 98E-02	0 96
			Uranium-233/234			5 68E-01	J	1 15E-01	8 40E-01	U	1 62E-01	1 37
			Uranium-235			4 88E-02	J	3 41E-02	2 24E-02	U	2 66E-02	0 61
			Uranium-238			7 72E-01	J	1 34E-01	6 62E-01	J	1 44E-01	0 56
98A5110-011	BH 30-8	Soil	Americium-241	Dup	98A5163-010	-5 22E-03	NA	9 19E-03	2 83E-03	NA	1 28E-02	0 51
			Curium-243/244			5 36E-03	NA	1 98E-02	1 93E-02	NA	2 18E-02	0 47
			Plutonium-239/240			2 00E-02	NA	3 75E-02	-1 12E-02	NA	1 55E-02	0 77
			Plutonium-242			-2 21E-02	NA	1 64E-02	1 21E-02	NA	4 83E-02	0 67
			Uranium-232			5 04E-03	NA	1 27E-02	-1 91E-04	NA	2 34E-03	0 41
			Uranium-233/234			5 66E-01	NA	1 26E-01	5 01E-01	NA	7 83E-02	0 44
			Uranium-235			7 32E-03	NA	1 43E-02	2 88E-02	NA	1 88E-02	0 91
			Uranium-238			4 73E-01	NA	1 15E-01	5 37E-01	NA	8 13E-02	0 45
98A5163-011	BH 40-18	Soil	Americium-241	Dup	98A5163-010	2 37E-02	U	2 69E-02	8 60E-03	U	1 69E-02	0 48
			Curium-243/244			2 92E-02	U	3 16E-02	6 99E-03	U	1 37E-02	0 64
			Plutonium-239/240			-5 40E-03	U	1 06E-02	1 85E-02	U	2 95E-02	0 76
			Plutonium-242			-1 62E-02	U	1 83E-02	-5 04E-03	U	6 99E-03	1 03
			Strontium-89/90			-3 46E-02	U	1 95E-01	-3 20E-01	U	1 71E-01	1 10
			Uranium-232			6 55E-03	U	1 29E-02	-2 93E-03	U	7 97E-03	0 63
			Uranium-233/234			7 69E-01	J	1 33E-01	8 14E-01	J	1 51E-01	0 22
			Uranium-235			3 61E-02	J	2 88E-02	3 32E-02	U	3 09E-02	0 07
			Uranium-238			7 72E-01	J	1 34E-01	9 22E-01	J	1 61E-01	0 72

Appendix H

Volatile and Semi-Volatile Organics

Precision Evaluation Results

Volatile and Semi Volatile Organics Precision Evaluation Results

QC Sample ID	Location	Media	Detected Analyte	QC Sample Type	Associated Real Sample ID	QC Results	Q	Real Results	Q	RPD Value (%)
98A5110-011 004	BH 20	Soil	Phenanthrene	Dup	98A5110-010-004	660		94	J	150
			Fluoranthrene			150		140	J	7
			Pyrene			540		130	J	122
			Vols- Not Available							
98A5145-010 003	BH 30-8	Soil	Volatiles	Dup		All	U	All	U	NA
			Semi-Vols			All	U	All	U	NA
98A5163-011 003	BH 40-14	Soil	Trichloroethene	Dup	98A5163-010 003	3 50	J	5 23		40
			Semi-Vols			All	U	All	U	NA

Attachment 1

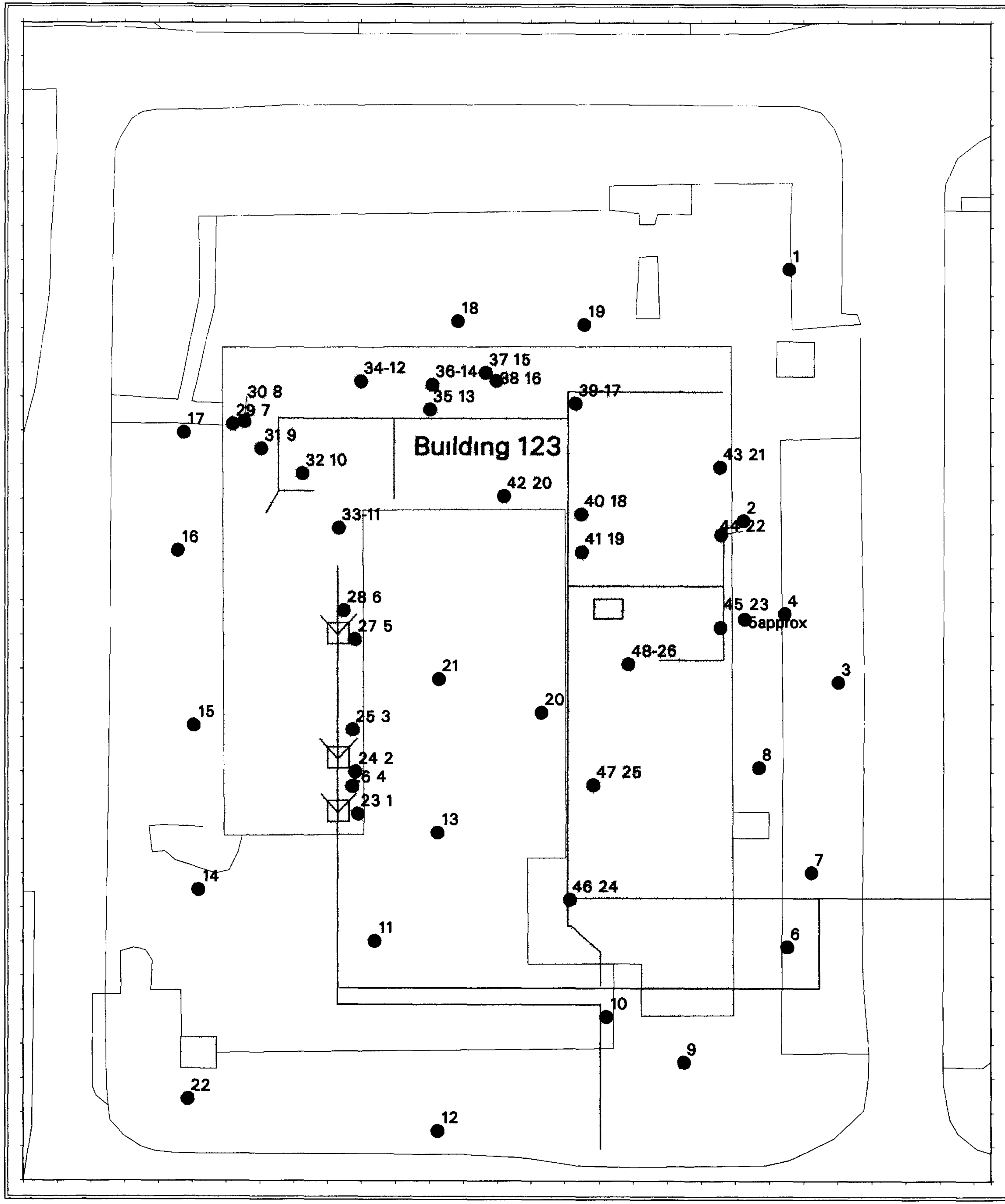
Actual Soil Sampling Locations/Borehole Map

Attachment 2

Common Data Qualifiers

Table 14 - Common Data Qualifiers

Qualifier	Description
A	This annotation is utilized to indicate that a TIC is a suspected aldol-condensation product formed during sample processing and caution should be applied in interpreting these results
B	This qualifier is used when the analyte is found in the associated blank and in the sample It indicates possible or probable blank contamination and warns the data user to use caution when applying the results of this analyte
BQL	Below Quantitation Limit (BQL) indicates the compound was not detected in the sample above the practical quantitation limit
C	Indicates that a pesticide identification has been confirmed utilizing GC/MS techniques
D	Indicates the sample extract was diluted by the factor listed due to the sample matrix and/or concentration levels All method detection limits or practical quantitation limits for the particular sample are therefore increased by this dilution factor
E	Indicates that the concentration of the specific compound exceeded the calibration range of the instrument for that particular analysis
J	Indicates an estimated value This is used either when estimating a concentration for TICs or when mass spectral data indicate the presence of a compound that meets the identification criteria but the result is less than the sample quantitation limit
MDL	The Method Detection Limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero
ND	Indicates the compound or analyte was not detected in the sample above the method detection limit or the practical quantitation limit for the particular analysis
PQL	The Practical Quantitation Limit (PQL) is the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine operating conditions
U	Indicates the compound was analyzed for but was not detected in the sample above the applicable quantitation limit



Location of Building 123 Borehole Sampling

EXPLANATION

- IHSS 121 (OPWL) Original process waste line (Approximate location)
- RCRA Unit 40 (Approximate location)
- Borehole location

Standard Map Features

- Buildings and other structures
- Paved roads
- Dirt roads

DATA SOURCE: Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over at capt red ... EG&G RSL, Las Vegas. Digitized from ... orthophotographs. /9...

Scale 1 410
1 inch represents approximately 34 feet

0 20 40ft

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD27

U S Department of Energy
Rocky Flats Environmental Technology Site

Prepared by:

RMRS Rocky Mountain Remediation Services, L.L.C.

MAP ID: 98-0251

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