DRAFT

VOLUME II: APPENDICES

RCRA FACILITY INVESTIGATION FOR SOLID WASTE MANAGEMENT UNITS 17, 31, 48, AND 54 AT RADFORD ARMY AMMUNITION PLANT, VIRGINIA

PREPARED FOR:

U. S. ARMY ENVIRONMENTAL CENTER

Aberdeen Proving Ground, Maryland

PREPARED BY:

PARSONS ENGINEERING SCIENCE, INC.

10521 Rosehaven Street
Fairfax, Virginia 22030

JANUARY 1996

RCRA FACILITY INVESTIGATION REPORT
VOLUME II
RADFORD ARMY AMMUNITION PLANT
RADFORD, VIRGINIA

TABLE OF CONTENTS

LIST OF APPENDICES

APPENDIX A

ACRONYMS AND ABBREVIATIONS

LIST OF ACRONYMS AND ABBREVIATIONS

ACD	Air Curtain Destructor
ACL	Alternate Concentration Limit
ACO	Administrative Contracting Officer
ARARs	Applicable or Relevant and Appropriate Requirements
ASTM	American Society for Testing and Materials
atm-m^3/mole	Atmosphere - cubic meter per mole
BCF	Bioconcentration Factor
BCM	Betz-Converse-Murdock, Inc.
bgs	Below Ground Surface
BTU	British Thermal Unit
CAA	Clean Air Act
CBC	Complete Blood Count
CL	Silty Clay
CIH	Certified Industrial Hygienist
CMS	Corrective Measures Study
COC	Chain of Custody
COD	Chemical Oxygen Demand
CRAVE	Carcinogenic Risk Assessment Verification Endeavor
CTM	Charles T. Main of Virginia, Inc.
CWA	Clean Water Act
dBA	Decibel
DCL	Data Chem Laboratories
DNT	Dinitrotoluene
E	Exposure Level
EM	Electromagnetic
EP	Extract Procedure
FAL	Fly Ash Landfill
FLFA	Former Lead Furnace Area
Fm.	Formation
FVC	Forced Vial Capacity
FWQC	Federal Water Quality Criteria
GCMS	Gas Chromatograph Mass Spectrometer
GM	Silty Gravel
GOCO	Government-owned, Contractor-operated
GW	Groundwater
HBN	Health-based Number
HEAST	Health Effects Assessment Summary Tables
HI	Hazard Index
HMX	High melting point explosive
HSP	Health and Safety Plan
HSWA	Hazardous and Solid Waste Amendments
ID	Identification Number
IR	Installation Restoration
IRDMIS	Installation Restoration Data Management Information System
IRFDS	Inhalation Reference Doses
ISF	Inhalation Slope Factor
IVR	Inhalation Unit Risks
KCl	Potassium Chloride
KoC	Organic Carbon (soils) Partition Coefficient
KoW	Octanol/water Partition Coefficient
LQAC	Laboratory QA Coordinator
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goals
MDL	Method Detection Limits
mg/kg	Milligrams Per Kilogram
mg/L	Milligrams Per Liter

LIST OF ACRONYMS AND ABBREVIATIONS

mgd	Million Gallons Per Day
ML	Sandy Silt
mm-Hg	Millimeters of Mercury
mph	Miles Per Hour
MSDS	Material Safety Data Sheet
msl	Mean Sea Level
MTBE	Methyl Tertiary Butyl Ether
MW	Monitoring Well
NBS	National Bureau of Standards
NC	Nitrocellulose
ND	Nondetect
NEIC	National Enforcement Investigation Center
NG	Nitroglycerin
NIST	National Institute of Standards and Technology
NROW	New River Ordnance Works
NRVPDC	New River Valley Planning District Commission
Parsons ES	Parsons Engineering Science, Inc.
PAHs	Polynuclear Aromatic Hydrocarbons
PC	Personal Computer
PEF	Particulate Emission Factor
PID	Photoionization Detector
PNA	Polynuclear Aromatic Hydrocarbons
PPE	Personal Protective Equipment
PQL	Practical Quantification Limit
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
QA	Quality Assurance
QAP	Quality Assurance Plan
QAPP	Quality Assurance Project Plan
QC	Quality Control
RAAP	Radford Army Ammunition Plant
RAGS	Risk Assessment Guidance for Superfund
RBC	Risk Based Concentration
RCRA	Resource Conservation and Recovery Act
RfC	Reference Concentration
RfD	Reference Dose
RFI	RCRA Facility Investigation
RL	Reporting Limit
RME	Reasonable Maximum Exposure
ROW	Radford Ordnance Works
RPD	Relative Percent Difference
RW	Drilling/Rinse Water
SB	Soil Boring
SCS	Soil Conservation Service
SE	Sediment
SES	Safety and Environmental Service
SF	Slope Factor
SM	Silty Sand
SO	Soil
SOP	Standard Operating Procedure
SS	Surface Soil
SVOC	Semivolatile Organic Compound
SW	Surface Water
SWMU	Solid Waste Management Unit
TAL	Target Analyte List

LIST OF ACRONYMS AND ABBREVIATIONS

TBC	To Be Considered
TBD	To Be Determined
TCE	Trichloroethene
TCLP	Toxic Characteristic Leaching Procedure
TEFs	Toxicity Equivalency Factors
TIC	Tentatively Identified Compound
TNT	Trinitrotoluene
TOC	Top of Well Casing or Total Organic Carbon
TOX	Total Organic Halogens
TPH	Total Petroleum Hydrocarbon
μgg	Micrograms Per Gram
μg/L	Micrograms Per Liter
USAEC	U.S. Army Environmental Center
USAEHA	U.S. Army Environmental Hygiene Agency
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USCS	Unified Soil Classification System
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
UST	Underground Storage Tank
VDMR	Virginia Division of Mineral Resources
VI	Verification Investigation
VOC	Volatile Organic Compound
VPI&SU	Virginia Polytechnic Institute and State University
WQC	Walter Quality Criteria

APPENDIX B

GROUNDWATER USAGE - WELL INVENTORY

PROPERTY OWNERS WITHIN 1 MILE OF RAAP WITH PRIVATE WATER WELL SUPPLIES

LONGSHOP-McCOY AREA RESIDENTS

Michael Graham*
Route 3, Box 1304-A
Blacksburg, VA 24060

Richard Hinkson*
2065 Aviation Yacht Club Road
Mechanicsville, MD 20659
(residence at 4918 McCoy Road)

Ronnie and Ella Roop*
1500 Staples Street
Radford, VA 24141
(owners of Prices Fork property)

Douglas H. Frey
Route 3, Box 488
Blacksburg, VA 24060

David S. Rowe
3198 Mathews Lane
Blacksburg, VA 24060

Vivian Vyule
4760 Prices Fork Road
Blacksburg, VA 24060

Carmon M. Smith
3928 McCoy Road
Blacksburg, VA 24060

James V. Noonkester
Route 2, Box 450
Blacksburg, VA 24060

Steve Graham*
4513 Mount Zion Road
Blacksburg, VA 24060

Mode A. Johnson
609 N. Main Street, #1
Blacksburg, VA 24060

Charles R. Sheppard
Route 2, Box 341
Blacksburg, VA 24060

Edward A. Mullins
Route 2, Box 329
Blacksburg, VA 24060

Charles E. Snow*
Route 2, Box 551
Blacksburg, VA 24060

Freddie L. Oliver
3611 McCoy Road
Blacksburg, VA 24060

Ira Long
3870 Prices Fork Road
Blacksburg, VA 24060

*** GW-2 Waterwell Completion reports available.**

PROPERTY OWNERS WITHIN 1 MILE OF RAAP WITH PRIVATE WATER WELL SUPPLIES (Continued)

RIVER BLUFFS SUBDIVISION RESIDENTS

Kenneth R. Church P.O. Box 3279 Radford, VA 24143	Section III, Lot 6
J.R. and Judy Willoughly Route 2, Box 366 Radford, VA 24143	Section II, Lot 40
Clanston Tickle Route 2, Box 261 Radford, VA 24143	Section II, Lot 45
Cheryl Austin Route 2 Radford, VA 24143	Section III, Lot 17 (extended)
Philip Mabe Route 2 Radford, VA 24143	Section II, Lot 51A
Gary Hughes Route 2 Radford, VA 24143	Section II, Lot 43
D.L. Dalton Route 2, Box 356 Radford, VA 24143	Section II, Lot 55
Terry St. Clair Route 2 Radford, VA 24143	Section II, Lots 21, 22
David Wright Route 2 Radford, VA 24143	Section II, Lot 42
Jo Ann Bingham Route 2 Radford, VA 24143	Section I, Lot 1

PROPERTY OWNERS WITHIN 1 MILE OF RAAP WITH PRIVATE WATER WELL SUPPLIES (Continued)

RIVER BLUFFS SUBDIVISION RESIDENTS

Perry and Norma Boone Route 2 Radford, VA 24143	Section II, Lot 54
Roger D. King Route 2 Radford, VA 24143	Section II, Lot 56
Allen Wiley Route 2 Radford, VA 24143	Section II, Lot 32
Curtis Lawson Route 2 Radford, VA 24143	Section I, Lot 7
Ronnie Dalton Route 2 Radford, VA 24143	Section II, Lot 16
Jessee White Route 2 Radford, VA 24143	Section II, Lot 5
Benton Miller Route 2 Radford, VA 24143	Section II, Lot 8 (extended)
Lloyd Loftas Route 2 Radford, VA 24143	Section II, Lot 10

PROPERTY OWNERS WITHIN 1 MILE OF RAAP WITH PRIVATE WATER WELL SUPPLIES (Continued)

GATE TEN ROAD RESIDENTS

Robert Pannell
Route 2
Radford, VA 24143

Ms. Thaddus Lee
Route 2
Radford, VA 24143

Bob Hosp
Route 2
Radford, VA 24143

PUBLIC WATER SUPPLY WELLS IN THE VICINITY OF RAAP

PULASKI COUNTY

Location	Description	Number of Public Wells
Eagleview Trailer Park	1 1/2 miles SW of RAAP; along Route 600	2
Trigg Trailer Park	2 1/2 miles SW of RAAP; near town of New River	2
River Bend Subdivision	1/2 mile SW of RAAP; west of Pepper, VA, along Route 114	1
Sunset Terrace Apartment Complex	3/4 mile SW of RAAP; west of Pepper, VA, along Route 114	1
River Bend Trailer Park	1 mile SW of RAAP; west of Pepper, VA, along Route 114	2
Polyester Trailer Park	2 miles south of RAAP; in meander loop of New River	2

PUBLIC WATER SUPPLY WELLS IN THE VICINITY OF RAAP (Continued)

MONTGOMERY COUNTY

Location	Description	Number of Public Wells
Phillips Acres Subdivision	2 1/2 miles east of RAAP; 1 mile east of Prices Fork	1
Prices Fork Area	1 1/2 miles east of RAAP; 1/2 mile south of Prices Fork	2
Vicker Heights Subdivision	3 miles east of RAAP; 1/4 mile south of Route 114	1

APPENDIX C

LITHOLOGIC LOGS/WELL CONSTRUCTION RECORDS

CONTRACTOR: CT & E

GEOLOGIST: BACHOVCHIN/GLENNIE

DRILLING METHOD: HSA

DTW FROM TOC: NA

DATE/TIME: NA

PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO.: 722843

BORING NO: 17ASB1

LOCATION: SWMU 17A

WEATHER: COLD, 30° F

DATE/TIME START: 12/12/94 1600

DATE/TIME FINISH: 12/12/94 1800

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	WELL COMPLETION
0								SAND AND SILT (FILL), BLACK, DRY	SURFACE ELEVATION 1872.4' (MSL)
6	1A*	30	5/6 7/10	0.0	SS	SS 5'-7'	SM		
9	2*	50	6/4 3/2	0.0	SS	SS 8'-10'			
13								SILT, SOME CLAY, LITTLE SAND, YELLOW-BROWN, QUARTZ PEBBLES, GRAVEL, WET AT 15 FEET	
14	3*	80	7/10 15/17	0.0	SS	SS 13'-15'	ML		
18								CLAY, SOME SILT, YELLOW-BROWN, GRAVEL	
19	4*	65	15/19 14/13	0.0	SS	SS 18'-20'	CL		
21	5*	50	15/15 REF.	0.0	SS	SS 21'-22'		GRADING INTO TAN DOLOMITE AT 21.5 FEET (REFUSAL)	
22								END OF BORING AT 22 FEET	

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.

SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE

BH = BORE HOLE
GS = GRAB SAMPLE

HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

16

CONTRACTOR: CT & E

GEOLOGIST: BACHOVCHIN/GLENNIE

DRILLING METHOD: HSA

DTW FROM TOC: NA

DATE/TIME: NA

PARSONS ENGINEERING-SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO.: 722843

BORING NO: 17ASB2

LOCATION: SWMU 17A

WEATHER: COLD, 20° F

DATE/TIME START: 12/13/94 0840

DATE/TIME FINISH: 12/13/94 1000

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FT)
0–1								SILT, SOME CLAY, TRACE SAND, YELLOW-BROWN		SURFACE ELEVATION 1874.4' (MSL)	1
4	1*	75	6/16 18/30	0.0	SS	SS 3'-5'					4
9	2*	85	10/16 20/25	0.7	SS	SS 8'-10'	ML				9
10.5				0.3	BH						
14	3*	90	13/15 7/4	0.0	SS	SS 13'-15'					14
15								CLAY, SOME SILT, LIGHT BROWN, DAMP			15
15.5				1.4	HS						
21	4A*	50	4/6 7/8	1.2	HS	SS 20'-22'	CL				21
24	5*	90	3/6 12/18	1.3	HS	SS 23'-25'	DLMT	DOLOMITE, TAN, REFUSAL			24
25								END OF BORING AT 25 FEET			25
26											26

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

17

CONTRACTOR: CT & E GEOLOGIST: BACHOVCHIN/GLENNIE DRILLING METHOD: HSA DTW FROM TOC: NA DATE/TIME: NA	PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD PROJECT NAME: RAAP CLIENT: US AEC PROJECT NO.: 722843	BORING NO: 17ASB3 LOCATION: SWMU 17A WEATHER: COLD, 20° F DATE/TIME START: 12/13/94 1030 DATE/TIME FINISH: 12/13/94 1130

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FT)
0–1								SILT AND CLAY, DARK YELLOW-BROWN		SURFACE ELEVATION 1873.9' (MSL)	
4	1*	80	4/3 4/12	2.0	SS	SS 3'-5'					4
9	2*	90	5/6 5/5	0.0	HS	SS 8'-10'	ML				9
13								DAMP CLAY AT 13 FEET			13
14	3*	85	24/16 6/50	0.0	HS	SS 13'-15'		DOLOMITE, WHITE-TAN, VERY WEATHERED			14
19	4*	25	80/ 6"	0.0	HS	SS 18'-20'	DLMT				19
24	5*	25	100/ 6"	0.0	HS	SS 23'-25'					24
25								END OF BORING AT 25 FEET			25
26											26

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

18

CONTRACTOR: CT & E GEOLOGIST: BACHOVCHIN/GLENNIE DRILLING METHOD: HSA DTW FROM TOC: NA DATE/TIME: NA	PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD PROJECT NAME: RAAP CLIENT: US AEC PROJECT NO.: 722843	BORING NO: 17CSB1 LOCATION: SWMU 17C WEATHER: COLD, 20° F DATE/TIME START: 12/13/94 1250 DATE/TIME FINISH: 12/13/94 1330

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FT)
0–1							GM	GRAVEL AND SILT (FILL)		SURFACE ELEVATION 1866.3' (MSL)	
1–8								SILT AND CLAY, ORANGE-BROWN, SOME FILL			
4	1*	85	6/16 25/36	0.0	HS	SS 3'-5'	ML				4
8–12.7								CLAY AND SILT, DARK YELLOW-BROWN			
9	2*	65	6/6 6/6	0.0	HS	SS 8'-10'	CL				9
12.5	3*	40	100/6	0.0	HS	SS 13'-13'	DLMT	DOLOMITE, GRAY, WEATHERED			
								END OF BORING AT 12.7 FEET			

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

19

CONTRACTOR: CT & E

GEOLOGIST: BACHOVCHIN/GLENNIE

DRILLING METHOD: HSA

DTW FROM TOC: NA

DATE/TIME: NA

PARSONS ENGINEERING-SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO.: 722843

BORING NO: 17CSB2

LOCATION: SWMU 17C

WEATHER: COLD, 20° F

DATE/TIME START: 12/13/94 1340

DATE/TIME FINISH: 12/13/94 1415

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FT)
0–1							GM	GRAVEL (FILL)			
1								SILT AND CLAY, YELLOW-BROWN		SURFACE ELEVATION 1866.2' (MSL)	1
2											2
3											3
4	1*	65	6/17 19/20	0.4	HS	SS 3'-5'					4
5											5
6							ML				6
7											7
8											8
9	2*	80	3/5 10/19	0.0	HS	SS 8'-10'					9
10								DOLOMITE, GRAY, WEATHERED			10
11											11
12							DLMT				12
13	3*	15	100/4	0.0	SS	SS 13'-14'					13
14								END OF BORING AT 13.5 FEET			14
15											15
16											16
17											17
18											18
19											19
20											20
21											21
22											22
23											23
24											24
25											25
26											26

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

CONTRACTOR: CT & E

GEOLOGIST: BACHOVCHIN/GLENNIE

DRILLING METHOD: HSA

DTW FROM TOC: NA

DATE/TIME: NA

PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO.: 722843

BORING NO: 17DSB1

LOCATION: SWMU 17D

WEATHER: COLD, 25° F

DATE/TIME START: 12/13/94 1555

DATE/TIME FINISH: 12/13/94 1720

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	WELL COMPLETION
0–3							GM	GRAVEL, SOME SILT (FILL)	SURFACE ELEVATION 1866.3' (MSL)
4	1*	100	4,6 8,11	0.7	HS	SS 3'-5'	CL	CLAY AND SILT, GRAY (FILL), THEN FILL ENDING AT APPROXIMATELY 8 FEET	
9	2*	100	10,11 12,16	2.6	SS	SS 8'-10'	CL		
10							CL	CLAY AND SILT, LIGHT BROWN, MOIST	
14	3*	100	9,9 10,16	5.0	SS	SS 13'-15'	CL		
19	4*	100	5,5 9,8	2.2	SS	SS 18'-20'	CL		
24	5*	100	3,3 6,8	1.1	SS	SS 23'-25'	CL		
25							DLMT	DOLOMITE, GRAY, ARGILLACEOUS, WEATHERED, INTERLAYERED YELLOW CLAY	
26	6*	100	2,3	2.2	HS	SS	DLMT		

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

21

CONTRACTOR: CT & E GEOLOGIST: BACHOVCHIN/GLENNIE DRILLING METHOD: HSA DTW FROM TOC: NA DATE/TIME: NA	PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD PROJECT NAME: RAAP CLIENT: US AEC PROJECT NO.: 722843	BORING NO: 17DSB1 LOCATION: SWMU 17D WEATHER: COLD, 25° F DATE/TIME START: 12/13/94 1555 DATE/TIME FINISH: 12/13/94 1720

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FT)
			3,4			25'-27'					
27											27
28											28
29								END OF BORING AT 28.5 FEET			29
30											30
31											31
32											32
33											33
34											34
35											35
36											36
37											37
38											38
39											39
40											40
41											41
42											42
43											43
44											44
45											45
46											46
47											47
48											48
49											49
50											50
51											51
52											52

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
∇ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

22

CONTRACTOR: CT & E

GEOLOGIST: BACHOVCHIN/GLENNIE

DRILLING METHOD: HSA

DTW FROM TOC: NA

DATE/TIME: NA

PARSONS ENGINEERING-SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO.: 722843

BORING NO: 17DSB2

LOCATION: SWMU 17D

WEATHER: COLD, 25° F

DATE/TIME START: 12/13/94 1430

DATE/TIME FINISH: 12/13/94 1530

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	WELL COMPLETION
0–3							GM	GRAVEL, (FILL)	SURFACE ELEVATION 1867.3' (MSL)
3–13							ML	SILT, SOME CLAY, GRAY, DARK YELLOW, MOIST	
4	1*	90	6,11 11,10	0.8	SS	SS 3'-5'			
9	2*	90	4,14 17,23	2.0	SS	SS 8'-10'			
13–21							CL	CLAY AND SILT, ORANGE-BROWN, MOIST	
14	3*	90	3,4 4,5	0.9	HS	SS 13'-15'			
19	4*	100	2,3 9,16	0.0	HS	SS 18'-20'			
21–25.5							DLMT	DOLOMITE, TAN, ARGILLACEOUS, WEATHERED	
24	5*	80	3,6 8,36	0.0	HS	SS 23'-25'			
25.5								END OF BORING AT 25.5 FEET	

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.

SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE

BH = BORE HOLE
GS = GRAB SAMPLE

HS = HEADSPACE
∇ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

CONTRACTOR: CT & E	**PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD**	BORING NO: 31MW1
GEOLOGIST: BACHOVCHIN/GLENNIE		LOCATION: SWMU 31 UPGRADIENT OF LAGOONS
DRILLING METHOD: HSA		WEATHER: COLD, 35° F
DTW FROM TOC: 42 FT (FROM SURFACE)	PROJECT NAME: RAAP	DATE/TIME START: 12/15/94 1500
	CLIENT: US AEC	
DATE/TIME: 12/16/94 1600	PROJECT NO.: 722843	DATE/TIME FINISH: 12/16/94 1630

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	WELL COMPLETION
0–17								SILT AND CLAY, DARK BROWN	TOC 1715.04' 1.6' STICK UP
6	1	50	5,5 5,5	0.0	HS	SS 5'-7'	ML		
17–20								SAND, SOME SILT, PINK-ORANGE, GRAVEL	GROUT TO SURFACE
18	2	50	7, 100/5	7.9	SS	SS 17'-19'	SM		
19	3	25	100/6	4.3	SS	SS 19'-20'			
20								AUGER REFUSAL DUE TO GRAVEL, SWITCHED TO AIR ROTARY DRILLING AT 20 FEET	
25–26	*						GM/SM	SAND AND GRAVEL, SOME SILT, LIGHT GRAY CUTTINGS	

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
∇ = WATER LEVEL

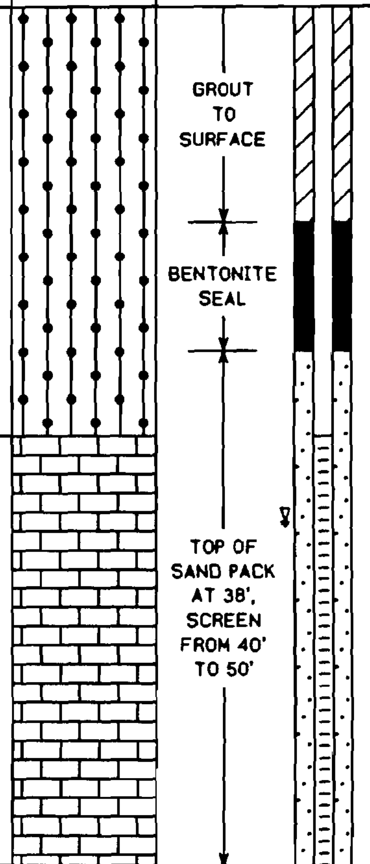
COMMENTS:
4 INCH ID PVC, SCH 40
0.01 INCH SLOT SCREEN

24

CONTRACTOR: CT & E	# PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD	BORING NO: 31MW1
GEOLOGIST: BACHOVCHIN/GLENNIE		LOCATION: SWMU 31 UPGRADIENT OF LAGOONS
DRILLING METHOD: HSA		WEATHER: COLD, 35° F
DTW FROM TOC: 42 FT (FROM SURFACE)	PROJECT NAME: RAAP	DATE/TIME START: 12/15/94 1500
DATE/TIME: 12/16/94 1600	CLIENT: US AEC	
	PROJECT NO.: 722843	DATE/TIME FINISH: 12/16/94 1630

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	DEPTH (FT)
31									31
32									32
33								SAND, BECOMING WEATHERED, CUTTINGS CHANGE COLOR TO GREEN-BROWN AT 35 FEET	33
34									34
35									35
36	*						GM/SM		36
37									37
38									38
39									39
40								LIMESTONE, GRAY, WEATHERED	40
41									41
42									42
43									43
44									44
45							LMSN	WET AT 45 FEET	45
46									46
47									47
48								DRILLING RATE (1 FOOT/2 MINUTES)	48
49									49
50								END OF BORING AT 50 FEET	50
51									51
52									52
53									53
54									54
55									55
56									56
57									57
58									58
59									59
60									60

LITHOLOGIC COLUMN / WELL COMPLETION



HSA = HOLLOW STEM AUGER	SS = SPLIT SPOON	BH = BORE HOLE	HS = HEADSPACE
CAL = CALIBRATION	A = AUGER CUTTINGS	GS = GRAB SAMPLE	
USCS = UNIFIED SOIL CLASS. SYS.	* = LAB SAMPLE		⊽ = WATER LEVEL

COMMENTS:
4 INCH ID PVC, SCH 40
0.01 INCH SLOT SCREEN

CONTRACTOR: CT & E

GEOLOGIST: BACHOVCHIN/GLENNIE

DRILLING METHOD: HSA

DTW FROM TOC: 25 FT

DATE/TIME: 12/14/94 1530

PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO.: 722843

BORING NO: 31MW2

LOCATION: SWMU 31 NEAR EAST LAGOON

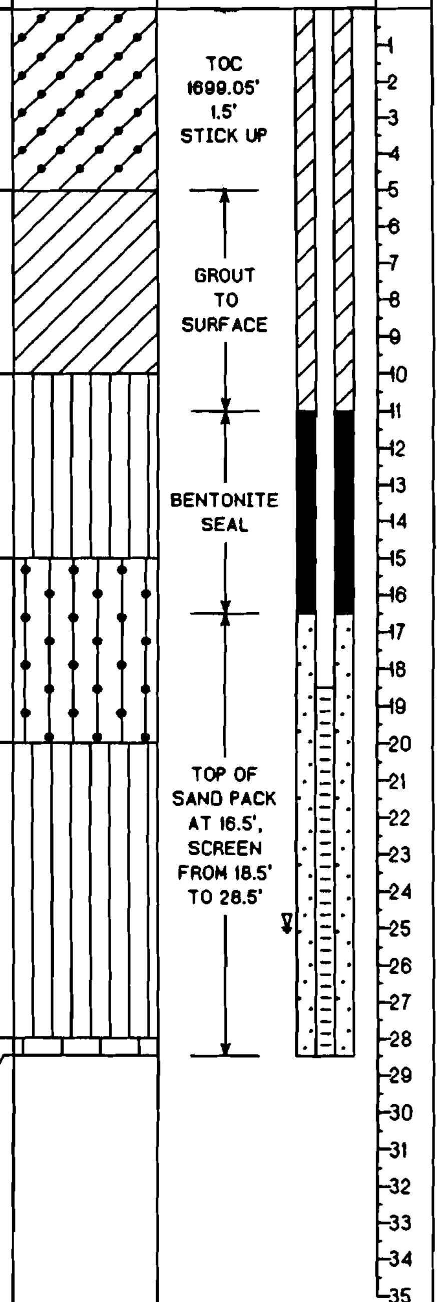
WEATHER: SHOWERS, 35° F

DATE/TIME START: 12/14/94 0920

DATE/TIME FINISH: 12/14/94 1100

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS
0–5							SM	SAND AND SILT, DARK BROWN
5–10	1	70	3,3 6,7	1.9	HS	SS 5'-7'	CL	CLAY, SOME SILT, BROWN
10–15	2*	90	5,7 6,9	4.4	HS	SS 10'-12'	ML	SILT, SOME SAND, LITTLE CLAY, BROWN-GRAY
15–20	3	25	12,11 10,9	2.8	HS	SS 15'-17'	GM/SM	SAND AND SILT, DARK BROWN, LIMESTONE PEBBLES
20–28	4*	10	6,4 4,2	2.8	HS	SS 20'-22'	ML	SILT, SOME CLAY, DARK BROWN-GRAY
	5	10	6,13 11,10	5.0	HS	SS 25'-27'		WET AT 25 FEET
28–28.5							LM/SN	LIMESTONE, GRAY, WEATHERED
								END OF BORING AT 28.5 FEET

LITHOLOGIC COLUMN / WELL COMPLETION



HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH ID PVC, SCH 40
0.01 INCH SLOT SCREEN

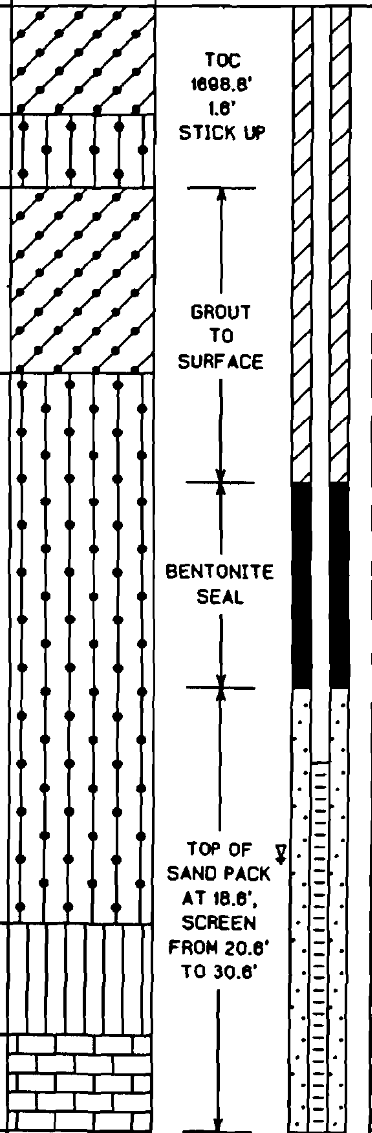
CONTRACTOR: CT & E
GEOLOGIST: BACHOVCHIN/GLENNIE
DRILLING METHOD: HSA
DTW FROM TOC: 23.18 FT
DATE/TIME: 12/15/94 0820

PARSONS ENGINEERING-SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: RAAP
CLIENT: US AEC
PROJECT NO.: 722843

BORING NO: 31MW3
LOCATION: SWMU 31 MIDDLE LAGOON
WEATHER: SHOWERS, 35° F
DATE/TIME START: 12/14/94 1330
DATE/TIME FINISH: 12/14/94 1700

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS
1–3							SM	SILT, SOME SAND, LITTLE CLAY, MICACEOUS, DARK BROWN
3	1	90	NA	8.1	HS	MOSS SPOON	GM	SILT, GRAVEL, GRAY
5–10							GM/SM	SAND AND SILT, BROWN, MICACEOUS, GRAVEL
8	2*	50	NA	4.1	HS	MOSS SPOON	GM/SM	
9								STAINING AT 9-10 FEET
10–25							GM/ML	SILT, SOME SAND, LITTLE CLAY, BROWN, MICACEOUS, GRAVEL, LIMESTONE PEBBLES
12	3	50	NA	9.5	HS	MOSS SPOON	GM/ML	
17	4*	5	NA	11.1	HS	MOSS SPOON		
26	5	65	10,11 20,27	12.3	HS	SS 25'-27'	ML	SILT, SOME CLAY, BROWN, WET
28	6	5	100/2				LM/SN	LIMESTONE, GRAY, WEATHERED
31								END OF BORING AT 30.6 FEET



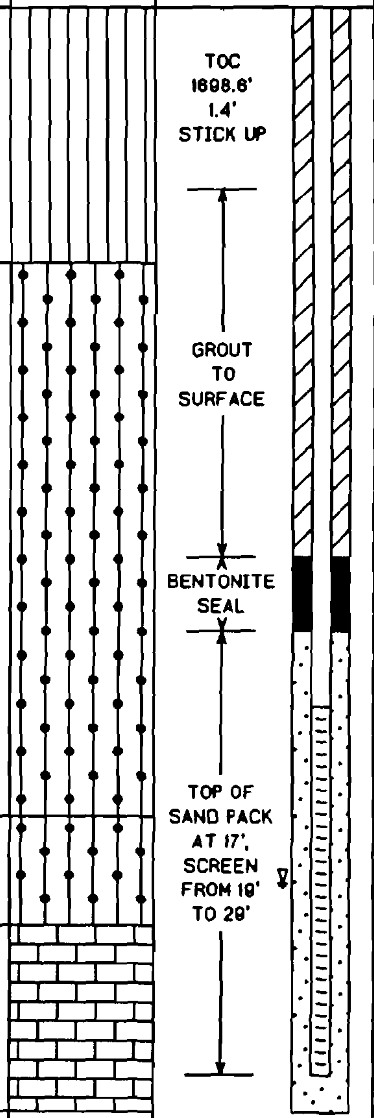
HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH ID PVC, SCH 40
0.01 INCH SLOT SCREEN

27

CONTRACTOR: CT & E	PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD		BORING NO: 31MW4
GEOLOGIST: BACHOVCHIN/GLENNIE			LOCATION: SWMU 31 WEST LAGOON
DRILLING METHOD: HSA/AIR ROTARY			WEATHER: SHOWERS, 40° F
DTW FROM TOC: 23.8 FT	PROJECT NAME: RAAP		DATE/TIME START: 12/15/94 0840
DATE/TIME: 12/15/94 1320	CLIENT: US AEC		
	PROJECT NO.: 722843		DATE/TIME FINISH: 12/15/94 1200

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS
1								SILT, SOME CLAY, LITTLE SAND, DARK BROWN
3							ML	
6	1	80	5,8 7,7	0.8	HS	SS 5'-7'		
8								SILT AND CLAY, BROWN, MUCH GRAVEL
11	2*	75	37,8 8,7	1.8	HS	SS 10'-12'	GM/ML	
16	3	80	11,5 6,5	1.9	HS	SS 15'-17'		
21	4*	5	11,10 28,34	3.3	HS	SS 20'-22'		
23							GM	GRAVEL, SOME SILT, GRAY
24								AUGER REFUSAL AT 25 FEET, SWITCHED TO AIR ROTARY
26	5	5	100/5	0.0	SS	SS 25'-27'	LMSN	WET AT 25 FEET
27								LIMESTONE, GRAY, WEATHERED
30								END OF BORING AT 30 FEET



HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH ID PVC, SCH 40
0.01 INCH SLOT SCREEN

CONTRACTOR: CT & E	# PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD	BORING NO: 48SB4
GEOLOGIST: BACHOVCHIN/GLENNIE		LOCATION: SWMU 48 UPPER DISPOSAL AREA
DRILLING METHOD: HSA		WEATHER: DAMP, 40° F
DTW FROM TOC: NA	PROJECT NAME: RAAP	DATE/TIME START: 12/17/94 0850
DATE/TIME: NA	CLIENT: US AEC	
	PROJECT NO.: 722843	DATE/TIME FINISH: 12/17/94 1050

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FT)
0–2.5							GM	GRAVEL AND ASH, SOME SILT, BLACK		SURFACE ELEVATION 1830.4' (MSL)	
3	1	100	NA	1.2	HS	MOSS SPOON	CL	CLAY AND SILT, LITTLE SAND, BROWN-ORANGE, MICACEOUS AT 9 FEET			3
7.5	2	100	NA	2.9	HS	MOSS SPOON	CL				
10							SM	SAND AND SILT, LITTLE CLAY, ORANGE-BROWN			10
12	3*	75	NA	3.8	HS	MOSS SPOON	SM	HARD DRILLING AT 14 FEET DUE TO GRAVEL			12
14–15	4	10	100/4"	0.0	HS	SS 14'-16'	GM/SM	GRAVEL, SAND AND SILT, BROWN, PEBBLE TO COBBLE SIZE GRAVEL			15
17	5	0	100/2"			SS 16'-18'	GM/SM				17
18.5	6	0	46, 100/5"			SS 18'-19'	GM/SM				
20–21	7*	10	37,64 100/3"	2.0	SS	SS 20'-21'	ML	SILT, SOME SAND AND CLAY, YELLOW-BROWN			21
21								END OF BORING AT 21 FEET			

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
∇ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

PARSONS ENGINEERING-SCIENCE, INC.
DRILLING RECORD

CONTRACTOR: CT & E
GEOLOGIST: BACHOVCHIN/GLENNIE
DRILLING METHOD: HSA
DTW FROM TOC: NA
DATE/TIME: NA

PROJECT NAME: RAAP
CLIENT: US AEC
PROJECT NO.: 722843

BORING NO: 48SB5
LOCATION: SWMU 48
LOWER DISPOSAL AREA
WEATHER: DAMP, 45° F
DATE/TIME START: 12/17/94 1140
DATE/TIME FINISH: 12/17/94 1510

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION
1								SILT, SOME SAND, SOME CLAY, DARK ORANGE-BROWN		SURFACE ELEVATION 1823.5' (MSL)
3	1	100	NA	2.6	HS	MOSS SPOON				
5							ML			
7	2	75	NA	2.9	HS	MOSS SPOON				
10-11	3	25	NA	10	HS	MOSS SPOON	GM/SM	SILT AND SAND, GRAVEL, ORANGE-BROWN, HYDROCARBON ODOR AT 10.5 FEET		
11	4	10	30 100/3"	1.9	HS	SS 11'-12'				
14	5	35	75,60 19,16	131	HS	SS 13'-15'	ML	SILT AND CLAY, SOME SAND, LIGHT BROWN, STRONG HYDROCARBON ODOR, SOME GRAVEL		
16	6	0	38,74 100/2"	—	—	SS 15'-17'				
18	7*	50	43,56 18,12	213	SS	SS 17'-19'	GM/ML	SILT AND SAND, YELLOW-BROWN, GRAVEL, STRONG HYDROCARBON ODOR		
20	8	75	20,12 9,11	125	HS	SS 19'-21'	ML	SILT, SOME SAND, LITTLE CLAY, WEATHERED GREEN SILTSTONE, STRONG HYDROCARBON ODOR		
26	9	95	5,10 15,30	201	HS	SS 25'-27'		CLAY AND SILT, ORANGE, INTERBEDDED WEATHERED SILTSTONE, HYDROCARBON ODOR DECREASING TO BOTTOM, MORE COMPETENT SILTSTONE, GREEN AT 35 FEET		
31	10	95	7,12 12,14	180	HS	SS 30'-32'	CL			
36	11*	95	20,31 42,42	3.4	HS	SS 35'-37'				
37								END OF BORING AT 37 FEET		

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
∇ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

30

PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD

CONTRACTOR: CT & E

GEOLOGIST: BACHOVCHIN/GLENNIE

DRILLING METHOD: HSA/AIR ROTARY

DTW FROM TOC: 122 FT (FROM SURFACE)

DATE/TIME: 12/19/94 1200

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO.: 722843

BORING NO: 48MW1

LOCATION: SWMU 48
NW OF LOWER DISPOSAL AREA

WEATHER: DAMP, 45° F

DATE/TIME START: 12/17/94 1545

DATE/TIME FINISH: 12/19/94 1255

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	WELL COMPLETION
1								SILT, SOME CLAY, SOME SAND, ORANGE-BROWN	TOC 1819.95' 2.2' STICK UP
6–7	1	100	11,9 7,14	3.4	SS	SS 5'-7'	ML		
9–12								SILT AND SAND, GRAVEL, ORANGE-BROWN, SLIGHT ODOR	
11–12	2	100	3,3 4,6	3.5	HS	SS 10'-12'	GM/SM		
12								SILT AND CLAY, ORANGE-BROWN TO YELLOW-BROWN	
18								SILT BECOMING MORE COMPETENT, MORE RED, WEATHERED, LAYERED	
21–22	3*	95	11,8 7,10	4.0	HS	SS 20'-22'	ML		
24									GROUT TO SURFACE
26–27	4	95	8,7 8,10	1.1	HS	SS 25'-27'			
31–32	5	80	13,9 10,11	0.0	HS	SS 30'-32'			
36–37	6	75	9,12 9,9	4.0	HS	SS 35'-37'			
41–42	7	95	7,9 10,9	0.0	HS	SS 40'-42'			
45									

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH ID PVC, SCH 40
0.01 INCH SLOT SCREEN

CONTRACTOR: CT & E

GEOLOGIST: BACHOVCHIN/GLENNIE

DRILLING METHOD: HSA/AIR ROTARY

DTW FROM TOC: 122 FT (FROM SURFACE)

DATE/TIME: 12/19/94 1200

PARSONS ENGINEERING-SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO.: 722843

BORING NO: 48MW1

LOCATION: SWMU 48

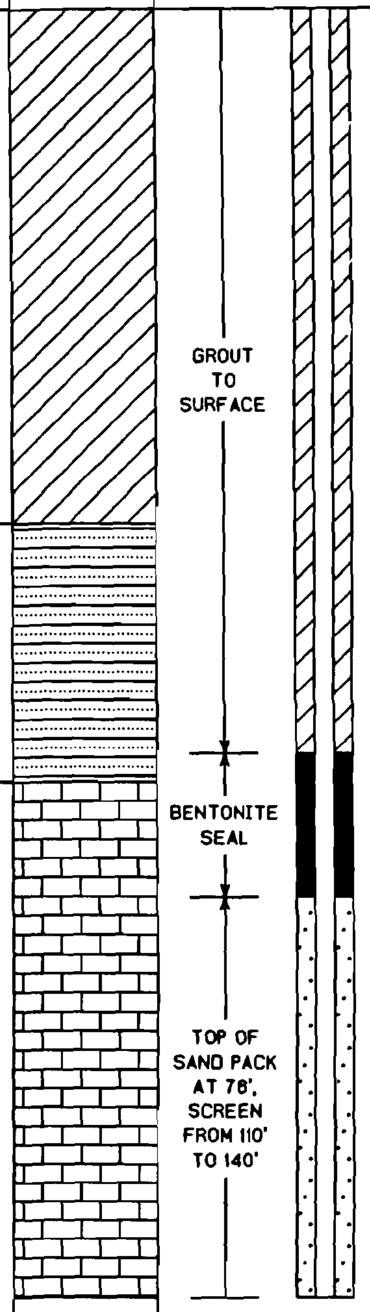
WEATHER: DAMP, 45° F

DATE/TIME START: 12/17/94 1545

DATE/TIME FINISH: 12/19/94 1255

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS
46	8	100	9,70	2.8	HS	SS		CLAY AND SILT, TRACE SAND, BROWN, SLIGHTLY DAMP AT 52 FEET, WEATHERED
47			17,16			45'-47'		
48								
49								
50								
51	9	75	9,9	6.0	HS	SS	CL	
52			9,9			50'-52'		
53	10*	75	16,8	6.0	HS	SS		
54			9,8			52'-54'		
55								
56								
57								
58								
59								
60								SWITCHED TO AIR ROTARY DRILLING AT 60 FEET
61	11	60	10,10	4.5	HS	SS		
62			10,10			60'-62'		
63								
64								SILTSTONE, GREEN-BROWN, WEATHERED, VERY DAMP AT 66 FEET
65								
66	12	100	12,28	3.9	HS	SS	SLSN	
67			31,75			65'-67'		
68								
69								
70								
71								DISTINCT CHANGE AT 72 FEET
72								
73								LIMESTONE, DARK BROWN CUTTINGS, ARGILLACEOUS
74								
75								
76								
77								
78								
79								
80							LMSN	
81								
82								
83								
84								
85								
86								
87								
88								
89								
90								

LITHOLOGIC COLUMN / WELL COMPLETION



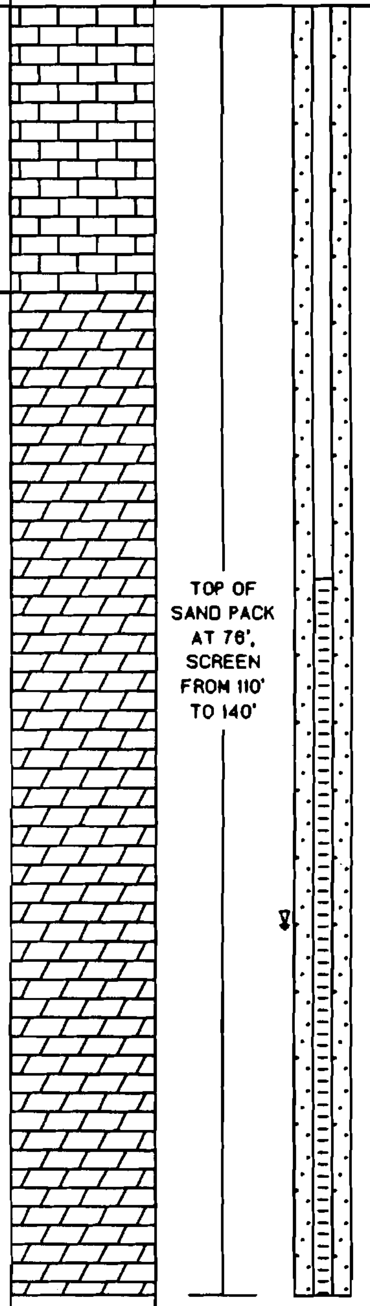
HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH ID PVC, SCH 40
0.01 INCH SLOT SCREEN

CONTRACTOR: CT & E	PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD	BORING NO: 48MW1
GEOLOGIST: BACHOVCHIN/GLENNIE		LOCATION: SWMU 48
DRILLING METHOD: HSA/AIR ROTARY		WEATHER: DAMP, 45° F
DTW FROM TOC: 122 FT (FROM SURFACE)	PROJECT NAME: RAAP	DATE/TIME START: 12/17/94 1545
DATE/TIME: 12/19/94 1200	CLIENT: US AEC	DATE/TIME FINISH: 12/19/94 1255
	PROJECT NO.: 722843	

DEPTH (FT)	SAMPLE ID	RECOVERY *	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	DEPTH (FT)
91								LIMESTONE, DARK BROWN CUTTINGS,	91
92								ARGILLACEOUS	92
93									93
94							LMSN	STOPPED OVERNIGHT AT 94 FEET,	94
95								NO WATER IN HOLE 12-19-94	95
96									96
97									97
98								DRILLING RATE IS APPROXIMATELY 1	98
99								FOOT/1.5 MINUTES	99
100									100
101								DOLOMITE, GRAY, WEATHERED, SOFT	101
102									102
103									103
104									104
105									105
106									106
107									107
108								DRILLING RATE IS APPROXIMATELY 1	108
109								FOOT/2.5 MINUTES	109
110									110
111									111
112									112
113									113
114									114
115									115
116									116
117									117
118									118
119									119
120							DLMT		120
121									121
122									122
123									123
124									124
125									125
126									126
127									127
128									128
129									129
130									130
131									131
132									132
133									133
134									134
135									135

LITHOLOGIC COLUMN / WELL COMPLETION



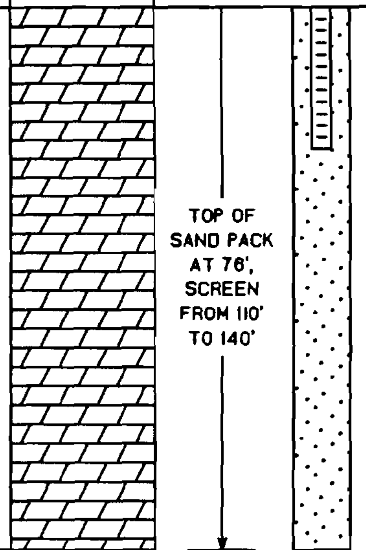
HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH ID PVC, SCH 40
0.01 INCH SLOT SCREEN

CONTRACTOR: CT & E	PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD	BORING NO: 48MW1
GEOLOGIST: BACHOVCHIN/GLENNIE		LOCATION: SWMU 48
DRILLING METHOD: HSA/AIR ROTARY		WEATHER: DAMP, 45° F
DTW FROM TOC: 122 FT (FROM SURFACE)	PROJECT NAME: RAAP	DATE/TIME START: 12/17/94 1545
DATE/TIME: 12/19/94 1200	CLIENT: US AEC	DATE/TIME FINISH: 12/19/94 1255
	PROJECT NO.: 722843	

DEPTH (FT)	SAMPLE ID	RECOVERY *	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS
136								DOLOMITE, GRAY, WEATHERED, SOFT
137								
138								
139								
140								
141								
142								
143								
144								
145							DLMT	
146								
147								
148								BECOMES HARDER AT 148 FEET, NO WATER TO END OF BORING, THEN WATER TO 122 FEET AFTER 1.5 HOURS
149								
150								
151								
152								
153								
154								END OF BORING AT 154 FEET
155								
156								
157								
158								
159								
160								
161								
162								
163								
164								
165								
166								
167								
168								
169								
170								
171								
172								
173								
174								
175								
176								
177								
178								
179								
180								

LITHOLOGIC COLUMN / WELL COMPLETION



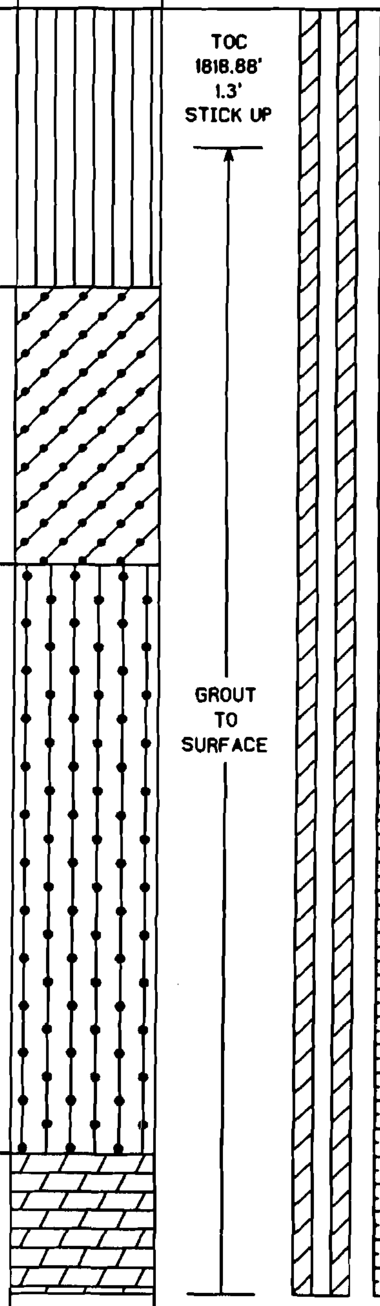
HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH ID PVC, SCH 40
0.01 INCH SLOT SCREEN

CONTRACTOR: CT & E	# PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD	BORING NO: 48MW2
GEOLOGIST: BACHOVCHIN/GLENNIE		LOCATION: SWMU 48 SW OF LOWER DISPOSAL AREA
DRILLING METHOD: HSA/AIR ROTARY		WEATHER: CLEAR, 25° F
DTW FROM TOC: 126 FT (FROM SURFACE)	PROJECT NAME: RAAP	DATE/TIME START: 12/19/94 1630
	CLIENT: US AEC	
DATE/TIME: 1/07/95 0830	PROJECT NO.: 722843	DATE/TIME FINISH: 1/07/95 1200

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS
1								SILT, SOME SAND AND CLAY, RED-BROWN
6	1	60	8,12 15,16	0.0	HS	SS 5'-7'	ML	
11	2	75	7,5 5,4	0.0	HS	SS 10'-12'	SM	SILT AND SAND, BROWN
17								VERY HARD DRILLING AT 17 FEET (GRAVEL)
21	3	5	100/ 2.5	0.0	HS	SS 20'-22'	GM/ML	SILT AND CLAY, SOME SAND, LIGHT BROWN, GRAVEL
31	4	30	10,8 5,4	0.0	HS	SS 30'-32'		
41	5*	90	18,25 25,28			SS 40'-42'	DLMT	DOLOMITE, WEATHERED, LIGHT GRAY, ARGILLACEOUS, INTERBEDDED SILTSTONE
45	6*	5	100/1			SS 44'-46'		SWITCHED TO AIR HAMMER AT 44 FT

LITHOLOGIC COLUMN / WELL COMPLETION



HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
2 INCH ID PVC, SCH 40
0.01 INCH SLOT SCREEN

35

CONTRACTOR: CT & E

GEOLOGIST: BACHOVCHIN/GLENNIE

DRILLING METHOD: HSA/AIR ROTARY

DTW FROM TOC: 126 FT (FROM SURFACE)

DATE/TIME: 1/07/95 0830

PARSONS ENGINEERING-SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO.: 722843

BORING NO: 48MW2

LOCATION: SWMU 48

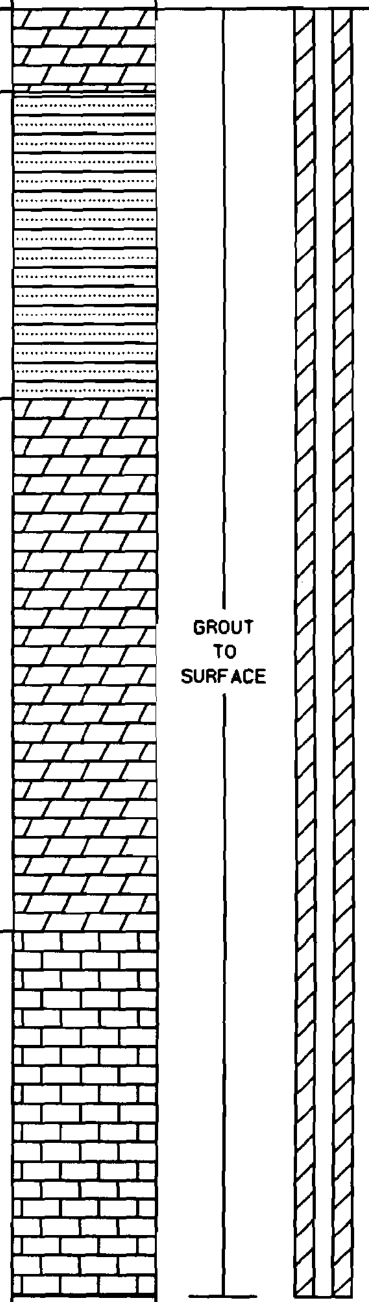
WEATHER: CLEAR, 25° F

DATE/TIME START: 12/19/94 1830

DATE/TIME FINISH: 1/07/95 1200

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS
47–49								DOLOMITE, WEATHERED, LIGHT GRAY
49–60							SLSN	SILTSTONE, LIGHT BROWN, WEATHERED, INTERBEDDED GRAY DOLOMITE DRILLING RATE (1 FOOT/3 MINUTES)
60–79							DLMT	DOLOMITE, WEATHERED, LIGHT GRAY, ARGILLACEOUS DRILLING RATE (1 FOOT/2.3 MINUTES) NOTE: SOFT FORMATION NOT RETURNING CUTTINGS UP HOLE. MUST SET TEMPORARY CASING. HOLE IS STOPPED AT 80 FEET OVER HOLIDAY, RESUME DRILLING ON 1-5-95.
79–92							LMSN	LIMESTONE, WEATHERED, GRAY-BROWN

LITHOLOGIC COLUMN / WELL COMPLETION



HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
2 INCH ID PVC, SCH 40
0.01 INCH SLOT SCREEN

36

CONTRACTOR: CT & E	PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD	BORING NO: 48MW2
GEOLOGIST: BACHOVCHIN/GLENNIE		LOCATION: SWMU 48
DRILLING METHOD: HSA/AIR ROTARY		WEATHER: CLEAR, 25° F
DTW FROM TOC: 126 FT (FROM SURFACE)	PROJECT NAME: RAAP	DATE/TIME START: 12/19/94 1630
	CLIENT: US AEC	
DATE/TIME: 1/07/95 0830	PROJECT NO.: 722843	DATE/TIME FINISH: 1/07/95 1200

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	WELL COMPLETION	DEPTH (FT)
93							LMSN	LIMESTONE, WEATHERED, GRAY-BROWN	GROUT TO SURFACE	93
95								DRILLING RATE (1 FOOT/1.7 MINUTES)		95
99–104									BENTONITE SEAL	99–104
110							DLMT	DOLOMITE, LIGHT GRAY, WEATHERED, ALTERNATING HARD AND SOFT, GRAY AND BROWN, LAYERS	TOP OF SAND PACK AT 104', SCREEN FROM 113.7' TO 133.7'	110
125								DRILLING RATE (1 FOOT/3.3 MINUTES)		125
126									⊽	126
134								END OF BORING AT 133.7 FEET		134
138										138

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
⊽ = WATER LEVEL

COMMENTS:
2 INCH ID PVC, SCH 40
0.01 INCH SLOT SCREEN

CONTRACTOR: CT & E

GEOLOGIST: BACHOVCHIN/GLENNIE

DRILLING METHOD: HSA/AIR ROTARY

DTW FROM TOC: 119 FT (FROM SURFACE)

DATE/TIME: 1/08/95 1430

PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO.: 722843

BORING NO: 48MW3

LOCATION: SWMU 48
SE OF LOWER DISPOSAL AREA

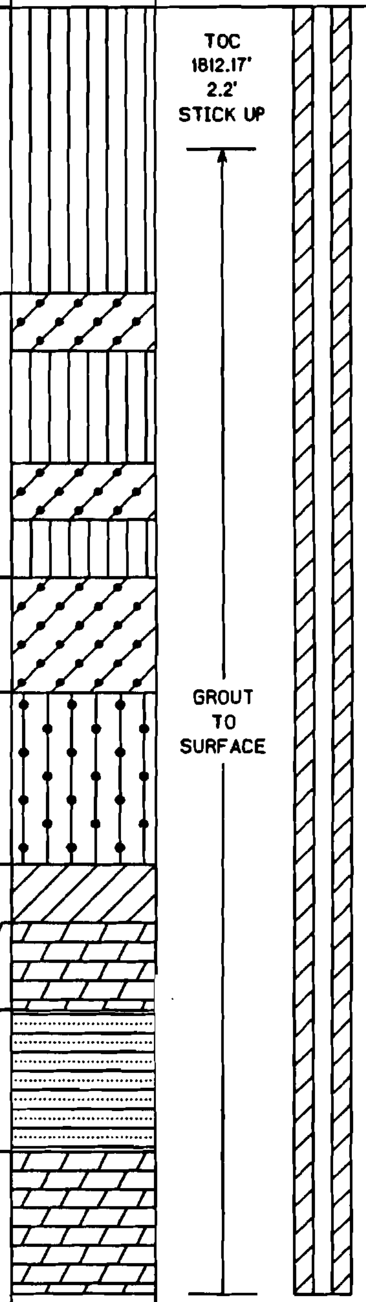
WEATHER: WET, COLD, 40° F

DATE/TIME START: 1/07/95 1237

DATE/TIME FINISH: 1/08/95 1430

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS
1–10							ML	SILT AND CLAY, LITTLE SAND, ORANGE-BROWN
10–20 (11)	1	95	2,5 8,6	2.0	HS	SS	ML/SM	SILT, LITTLE SAND AND CLAY, ORANGE-BROWN
20–24 (21)	2*	95	2,6 6,5	3.5	SS	SS	SM	SILT AND SAND, LITTLE CLAY, ORANGE
24–30							GM	GRAVEL, SILTY
30–32 (31)	3*	90	8,26 50/2"	1.1	HS	SS	CL	CLAY AND SILT, YELLOW-BROWN, SWITCHED TO AIR HAMMER AT 32 FEET
32–35							DLMT	DOLOMITE, WEATHERED, LIGHT GRAY
35–40							SLSN	SILTSTONE, BROWN, INTERBEDDED WITH GRAY DOLOSTONE
40–45							DLMT	DOLOMITE, WEATHERED, GRAY, ARGILLACEOUS

LITHOLOGIC COLUMN / WELL COMPLETION



HSA = HOLLOW STEM AUGER	SS = SPLIT SPOON	BH = BORE HOLE	HS = HEADSPACE
CAL = CALIBRATION	A = AUGER CUTTINGS	GS = GRAB SAMPLE	
USCS = UNIFIED SOIL CLASS. SYS.	* = LAB SAMPLE		⊻ = WATER LEVEL

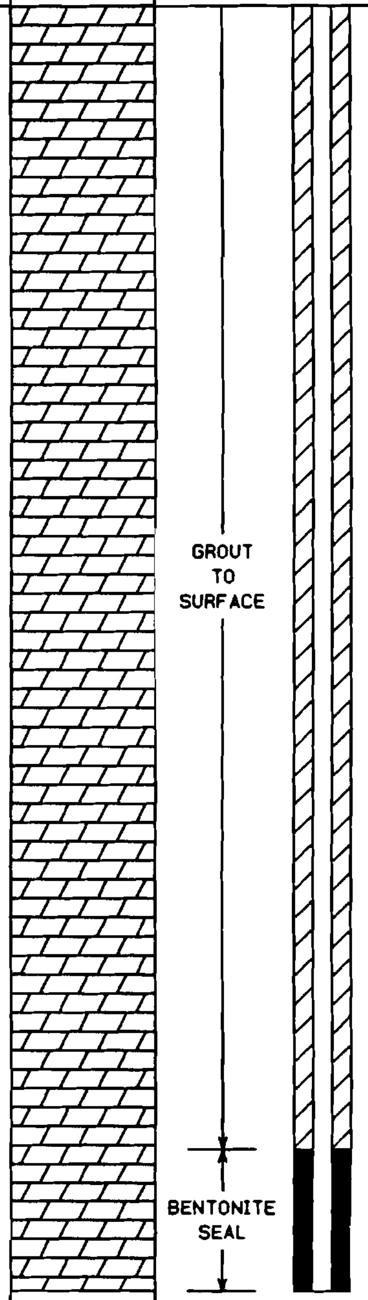
COMMENTS:
4 INCH ID PVC, SCH 40
0.01 INCH SLOT SCREEN

38

CONTRACTOR: CT & E	PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD	BORING NO: 48MW3
GEOLOGIST: BACHOVCHIN/GLENNIE		LOCATION: SWMU 48
DRILLING METHOD: HSA/AIR ROTARY		WEATHER: WET, COLD, 40° F
DTW FROM TOC: 119 FT (FROM SURFACE)	PROJECT NAME: RAAP	DATE/TIME START: 1/07/95 1237
	CLIENT: US AEC	
DATE/TIME: 1/08/95 1430	PROJECT NO.: 722843	DATE/TIME FINISH: 1/08/95 1430

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS
46–47								DOLOMITE, WEATHERED, GRAY, ARGILLACEOUS
48–50								DRILLING RATE FROM 40-60 FEET (1 FOOT/1.8 MINUTES)
54							OLMT	
61								LESS CLAY, LESS WEATHERING
64–65								DRILLING RATE FROM 60-90 FEET (1 FOOT/6.3 MINUTES)
81								DOLOMITE, LIGHT GRAY
90								

LITHOLOGIC COLUMN / WELL COMPLETION



HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH ID PVC, SCH 40
0.01 INCH SLOT SCREEN

CONTRACTOR: CT & E

GEOLOGIST: BACHOVCHIN/GLENNIE

DRILLING METHOD: HSA/AIR ROTARY

DTW FROM TOC: 119 FT (FROM SURFACE)

DATE/TIME: 1/08/95 1430

PARSONS ENGINEERING-SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO.: 722843

BORING NO: 48MW3

LOCATION: SWMU 48

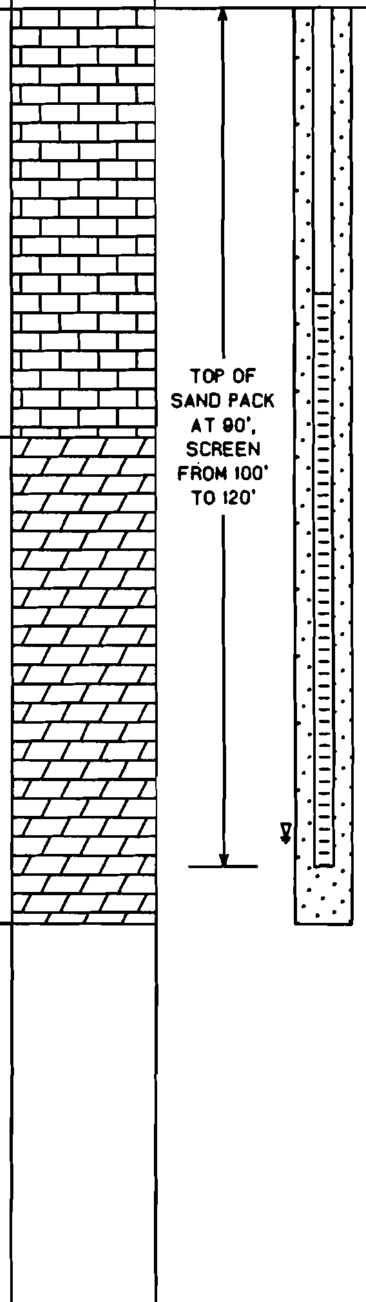
WEATHER: WET, COLD, 40° F

DATE/TIME START: 1/07/95 1237

DATE/TIME FINISH: 1/08/95 1430

DEPTH (FT)	SAMPLE ID	RECOVERY *	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS
91–105							LMSN	LIMESTONE, LIGHT GRAY, DRILLING RATE (1 FOOT/4 MINUTES)
105–122							DLMT	DOLOMITE, LIGHT GRAY, POSSIBLE WET ZONE AT 112 FEET; DRILLING RATE (1 FOOT/3.5 MINUTES)
122–135								END OF BORING AT 122 FEET

LITHOLOGIC COLUMN / WELL COMPLETION



HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH ID PVC, SCH 40
0.01 INCH SLOT SCREEN

CONTRACTOR: CT & E	**PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD**	BORING NO: 48MW4
GEOLOGIST: BACHOVCHIN/GLENNIE		LOCATION: SWMU 48 CENTER OF UPPER DISPOSAL AREA
DRILLING METHOD: HSA/AIR ROTARY		WEATHER: RAIN, 85° F
DTW FROM TOC: 78.19 FT	PROJECT NAME: RAAP	DATE/TIME START: 7/18/95 1100
DATE/TIME: 7/22/95 1200	CLIENT: US AEC	
	PROJECT NO.: 722843	DATE/TIME FINISH: 7/20/95 1830

DEPTH (FT)	SAMPLE ID	RECOVERY *	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION
0–8				0.1 (at 4)	BH		CL	CLAY AND SILT, LITTLE SAND, RED-BROWN		TOC 1832.6 2.06' STICK UP
8–12				0.0 (at 10)	BH		GM	SILT AND GRAVEL, LITTLE SAND, ORANGE-BROWN		
12–30				0.0 (at 18)	BH		CL	CLAY AND SILT, LITTLE SAND, RED-BROWN, MOIST		GROUT TO SURFACE
				0.0 (at 27)	BH					
30–41				0.0 (at 33)	BH		ML	SILT AND CLAY, ORANGE-BROWN, MOIST ZONE AT 40-41 FEET		
41–49				0.0 (at 45)	BH		GM	SAND AND GRAVEL, SOME SILT, BROWN, MOIST, GRAVEL LAYER AT 49 FEET		

HSA = HOLLOW STEM AUGER	SS = SPLIT SPOON	BH = BORE HOLE	HS = HEADSPACE
CAL = CALIBRATION	A = AUGER CUTTINGS	GS = GRAB SAMPLE	
USCS = UNIFIED SOIL CLASS. SYS.	* = LAB SAMPLE		∇ = WATER LEVEL

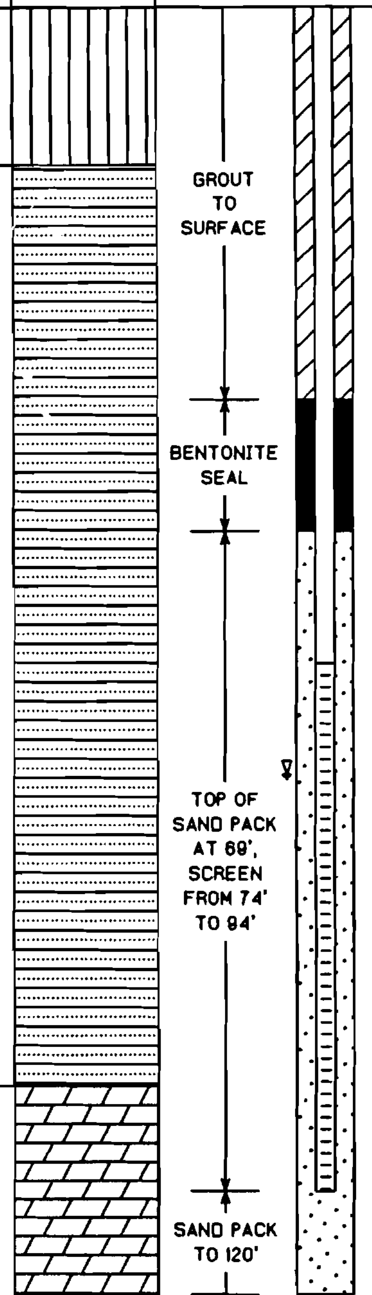
COMMENTS:
4 INCH ID PVC, SCH 40
0.01 INCH SLOT SCREEN

41

CONTRACTOR: CT & E	PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD	BORING NO: 48MW4
GEOLOGIST: BACHOVCHIN/GLENNIE		LOCATION: SWMU 48
DRILLING METHOD: HSA/AIR ROTARY		WEATHER: RAIN, 85° F
DTW FROM TOC: 78.19 FT	PROJECT NAME: RAAP	DATE/TIME START: 7/18/95 1100
DATE/TIME: 7/22/95 1200	CLIENT: US AEC	
	PROJECT NO.: 722843	DATE/TIME FINISH: 7/20/95 1830

DEPTH (FT)	SAMPLE ID	RECOVERY *	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS
50								SILT, BROWN, BECOMING MORE COMPETENT, SWITCHED TO AIR ROTARY DRILLING AT 55 FEET
52				0.0	BH		ML	
55								SILTSTONE, WEATHERED, ALTERNATING RED AND GREEN LAYERS, INTERBEDDED DOLOMITE (SLIGHT HCL FIZZ)
60				0.0	BH		SLSN	
71				0.0	BH			
84				0.0	BH			
90								DOLOMITE, GREEN-GRAY, AND INTERBEDDED DARK GRAY SILTSTONE, SOFT ZONE AT 100-108 FEET (WATER?)
94				0.0	BH		DLMT	
98								

LITHOLOGIC COLUMN / WELL COMPLETION



HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
∇ = WATER LEVEL

COMMENTS:
4 INCH ID PVC, SCH 40
0.01 INCH SLOT SCREEN

CONTRACTOR: CT & E	PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD	BORING NO: 48MW4
GEOLOGIST: BACHOVCHIN/GLENNIE		LOCATION: SWMU 48
DRILLING METHOD: HSA/AIR ROTARY		WEATHER: RAIN, 85° F
DTW FROM TOC: 78.19 FT	PROJECT NAME: RAAP	DATE/TIME START: 7/18/95 1100
DATE/TIME: 7/22/95 1200	CLIENT: US AEC	DATE/TIME FINISH: 7/20/95 1830
	PROJECT NO.: 722843	

DEPTH (FT)	SAMPLE ID	RECOVERY *	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FT)
99–120								DOLOMITE, GREEN-GRAY, AND INTERBEDDED DARK GRAY SILTSTONE, SOFT ZONE AT 100-108 FEET (WATER?)		SAND PACK TO 120'	99–120
108				0.0	BH		DLMT				108
120								END OF BORING AT 120 FEET			120
121–147											121–147

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
∇ = WATER LEVEL

COMMENTS:
4 INCH ID PVC, SCH 40
0.01 INCH SLOT SCREEN

43

CONTRACTOR: CT & E GEOLOGIST: BACHOVCHIN/GLENNIE DRILLING METHOD: HSA DTW FROM TOC: NA DATE/TIME: NA	PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD PROJECT NAME: RAAP CLIENT: US AEC PROJECT NO.: 722843	BORING NO: 54SB1 LOCATION: SWMU 54 SOUTH OF LOWER MOUND WEATHER: COLD, 30° F DATE/TIME START: 12/20/94 1610 DATE/TIME FINISH: 12/20/94 1700

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FT)
1	1*	65	3,5 6,6	5.9	SS	SS 0-2'	ML	SILT, SOME CLAY, LITTLE SAND, DARK BROWN, POSSIBLE ASH OR STAINING AT 2 FEET		SURFACE ELEVATION 1697.3' (MSL)	1
2											2
3	2	60	4,6 9,9	5.8	SS	SS 2-4'					3
4											4
5											5
6	3	85	6,7 7,9	5.3	SS	SS 5-7'					6
7											7
8											8
9											9
10											10
11	4	90	4,5 7,8	5.2	SS	SS 10-12'					11
12											12
13											13
14											14
15											15
16	5	90	10,7 37,32	4.9	HS	SS 15-17'	SM	SAND, SOME SILT, DARK BROWN, MOIST			16
17											17
18							GM	GRAVEL, SOME SILT, DAMP			18
19											19
20							SLSN	SILTSTONE, WEATHERED, GRAY			20
21	6*	90	28,40 100/5	6.0	HS	SS 20-22'	LMSN	LIMESTONE, WEATHERED, GREEN-GRAY			21
22											22
23								END OF BORING AT 22 FEET			23
24											24
25											25
26											26

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

CONTRACTOR: CT & E	# PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD	BORING NO: 54SB2
GEOLOGIST: BACHOVCHIN/GLENNIE		LOCATION: SWMU 54 SOUTH OF LOWER MOUND
DRILLING METHOD: HSA		WEATHER: COLD, 30° F
DTW FROM TOC: NA	PROJECT NAME: RAAP	DATE/TIME START: 12/21/94 0945
	CLIENT: US AEC	
DATE/TIME: NA	PROJECT NO.: 722843	DATE/TIME FINISH: 12/21/94 1030

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FT)
0								SILT, SOME CLAY, LITTLE SAND, DARK BROWN			
1	1*	50	6,4 4,9	7.0	HS	SS 0-2'				SURFACE ELEVATION 1699.1' (MSL)	1
2											2
3	2	70	10,5 6,10	7.9	SS	SS 2-4'					3
4											4
5											5
6	3	90	2,3 4,3	8.7	SS	SS 5-,'					6
7											7
8							ML				8
9											9
10											10
11	4	90	3,6 6,5	8.9	SS	SS 10-12'					11
12											12
13											13
14											14
15											15
16	5*	90	1,2 2,1	8.2	SS	SS 15-17'					16
17											17
18											18
19											19
20							GM	GRAVEL, SOME SILT, WET			20
21	6	60	22,38 35 50/2	4.6	SS	SS 20-22'	SLSN	SILTSTONE, WEATHERED, GRAY			21
22								END OF BORING AT 22 FEET			22
23											23
24											24
25											25
26											26

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
∇ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

45

CONTRACTOR: CT & E GEOLOGIST: BACHOVCHIN/GLENNIE DRILLING METHOD: HSA DTW FROM TOC: NA DATE/TIME: NA	PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD PROJECT NAME: RAAP CLIENT: US AEC PROJECT NO.: 722843	BORING NO: 54SB3 LOCATION: SWMU 54 WEST OF LOWER MOUND WEATHER: COLD, 30° F. DATE/TIME START: 12/21/94 1036 DATE/TIME FINISH: 12/21/94 1110

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FT)
0								SILT, SOME CLAY, DARK BROWN			
1	1*	75	5,6 6,6	1.6	HS	SS 0-2'				SURFACE ELEVATION 1696.6' (MSL)	1
3	2	75	6,6 6,4	1.5	HS	SS 2-4'					3
5							ML				5
6	3	70	2,3 3,5	1.9	HS	SS 5-7'					6
10								SILT AND SAND, LITTLE CLAY, BROWN			10
11	4	95	8,10 11,5	1.9	HS	SS 10-12'					11
13							SM				13
16	5*	40	5,13 24,32	2.0	HS	SS 15-17'					16
17							GM	GRAVEL, SOME SILT, WET			17
19	6	60	45,52 REF.	9.8	SS	SS 18-19'	LMSN	LIMESTONE, WEATHERED, GREEN-GRAY, WET			19
20								END OF BORING AT 19.5 FEET			20

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

4-6

CONTRACTOR: CT & E GEOLOGIST: BACHOVCHIN/GLENNIE DRILLING METHOD: HSA DTW FROM TOC: NA DATE/TIME: NA	PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD PROJECT NAME: RAAP CLIENT: US AEC PROJECT NO.: 722843	BORING NO: 54SB4 LOCATION: SWMU 54 WEST OF LOWER MOUND WEATHER: COLD, 35° F DATE/TIME START: 12/21/94 1120 DATE/TIME FINISH: 12/21/94 1152

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FT)
1	1*	90	3,4 5,4	3.4	HS	SS 0-2'	ML	SILT AND CLAY, LITTLE SAND, DARK BROWN		SURFACE ELEVATION 1897.0' (MSL)	1
3	2	95	4,5 8,6	3.2	HS	SS 2-4'	ML				3
6	3	95	6,7 7,9	4.8	HS	SS 5-7'	CL/ML	CLAY AND SILT, SOME SAND, LIGHT BROWN			6
11	4	90	2,3 2,2	4.9	HS	SS 10-12'	SW	SAND, LITTLE SILT, BROWN, MEDIUM COARSE			11
16	5*	60	2,2 3,8	4.0	HS	SS 15-17'	SM	SAND AND SILT, SOME CLAY, MOIST, BROWN			16
18	6	10	50/2	2.1	SS	SS 18-19'	GM	GRAVEL, OVER WEATHERED, GREEN-GRAY LIMESTONE, WET			18
19								END OF BORING AT 18.5 FEET			19

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

CONTRACTOR: CT & E

GEOLOGIST: BACHOVCHIN/GLENNIE

DRILLING METHOD: HSA

DTW FROM TOC: NA

DATE/TIME: NA

PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO.: 722843

BORING NO: 54SB5

LOCATION: SWMU 54 N. CENTER OF LOWER MOUND

WEATHER: COLD, 35° F

DATE/TIME START: 12/21/94 1204

DATE/TIME FINISH: 12/21/94 1225

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION
0–1								SILT, SOME CLAY, LITTLE SAND, DARK BROWN		SURFACE ELEVATION 1697.0' (MSL)
1	1*	100	3,2 3,4	9.7	HS	SS 0-2'				
6	2	90	4,4 7,8	4.7	HS	SS 5-7'				
8							ML			
11	3	95	9,3 4,6	6.5	HS	SS 10-12'				
15								SILT AND SAND, BROWN		
16	4*	90	4,3 2,3	5.3	HS	SS 15-17'	SM			
17.5–18							GM	GRAVEL, WET		
18								END OF BORING AT 18 FEET		

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

48

CONTRACTOR: CT & E	PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD	BORING NO: 54SB6
GEOLOGIST: BACHOVCHIN/GLENNIE		LOCATION: SWMU 54 CENTER OF LOWER MOUND
DRILLING METHOD: HSA		WEATHER: CLOUDY, 45° F
DTW FROM TOC: NA	PROJECT NAME: RAAP	DATE/TIME START: 12/22/94 1100
DATE/TIME: NA	CLIENT: US AEC	
	PROJECT NO.: 722843	DATE/TIME FINISH: 12/22/94 1200

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	WELL COMPLETION
0–1							ASH	ASH, GLASSY, BLACK	SURFACE ELEVATION 1700.9' (MSL)
1–3	1*	50	NA	32.0	HS	MOSS SPOON 0-5'	SM	SILT AND SAND, LITTLE CLAY, BROWN	
3–5							ASH	ASH, GLASSY, BLACK	
5–6							SM	SILT AND SAND, RED-BROWN	
6–7							ASH	ASH, GLASSY, BLACK-BROWN	
7–19	2	50	NA	6.0	HS	MOSS SPOON 5-10'	SM	SILT AND SAND, SOME CLAY, DARK BROWN, LESS CLAY AT BOTTOM, MOIST	
	3*	90	NA	6.5	HS	MOSS SPOON 10-15'			
	4	75	NA	5.0	HS	MOSS SPOON 15-20'			
19–20							GM	GRAVEL, SOME SILT, WET	
20								END OF BORING AT 20 FEET	

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
∇ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

CONTRACTOR: CT & E	PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD	BORING NO: 54SB7
GEOLOGIST: BACHOVCHIN/GLENNIE		LOCATION: SWMU 54 EAST OF LOWER MOUND
DRILLING METHOD: HSA		WEATHER: WARM, 50° F
DTW FROM TOC: NA	PROJECT NAME: RAAP	DATE/TIME START: 12/22/94 1215
DATE/TIME: NA	CLIENT: US AEC	
	PROJECT NO.: 722843	DATE/TIME FINISH: 12/22/94 1255

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION
0–5							ML	SILT, SOME SAND, LITTLE CLAY, DARK BROWN		SURFACE ELEVATION 1700.1' (MSL)
1	1*	90	2,3 4,7	0.0	HS	SS 0-2'				
5–16							SM	SAND AND SILT, LITLE CLAY, BROWN, MORE CLAY TOWARD 16 FEET		
6	2	95	7,4 4,2	0.0	HS	SS 5-7'				
11	3	90	4,8 9,7	5.0	SS	SS 10-12'				
16–20							ML	SILT AND CLAY, SOME SAND, DARK BROWN		
16	4*	80	1,1 2,3	2.5	SS	SS 15-17'				
20–21							SW	SAND, LITTLE SILT, BROWN, MEDIUM COARSE		
21	5	90	4,10 19,15	0.2	SS	SS 20-22'				
21–23.5							GM	GRAVEL, SAND AND SILT, WET		
23.5–24							LMSN	LIMESTONE, WEATHERED, GRAY		
24								END OF BORING AT 24 FEET		

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.

SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE

BH = BORE HOLE
GS = GRAB SAMPLE

HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

50

CONTRACTOR: CT & E	PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD	BORING NO: 54SB8
GEOLOGIST: BACHOVCHIN/GLENNIE		LOCATION: SWMU 54 EAST OF LOWER MOUND
DRILLING METHOD: HSA		WEATHER: WARM, 50° F
DTW FROM TOC: NA	PROJECT NAME: RAAP	DATE/TIME START: 12/22/94 1320
DATE/TIME: NA	CLIENT: US AEC	
	PROJECT NO.: 722843	DATE/TIME FINISH: 12/22/94 1355

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FT)
0–5								SILT, SOME CLAY, DARK BROWN		SURFACE ELEVATION 1699.4' (MSL)	
1	1*	60	2,2 3,3	9.0	HS	SS 0–2'					1
3							ML				3
5–18								SILT AND SAND, LITLE CLAY, BROWN, MOIST, MORE SAND WITH DEPTH			
6	2	90	5,5 4,2	2.1	HS	SS 5–7'					6
8							SM				8
11	3	90	1,2 2,2	4.8	HS	SS 10–12'					11
16	4*	100	6,5 6,5	5.9	SS	SS 15–17'					16
18–21								SILT AND CLAY, DARK BROWN, MOIST			
19							ML				19
21	5	50	15,11 11, 50/2	2.5	SS	SS 20–22'	GM	GRAVEL, WET, OVER WEATHERED LIMESTONE, GRAY			21
22								END OF BORING AT 22 FEET			22

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

CONTRACTOR: CT & E

GEOLOGIST: BACHOVCHIN/GLENNIE

DRILLING METHOD: HSA

DTW FROM TOC: NA

DATE/TIME: NA

PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO.: 722843

BORING NO: 54SB9

LOCATION: SWMU 54 NORTH OF LOWER MOUND

WEATHER: COLD, 30° F

DATE/TIME START: 12/21/94 1235

DATE/TIME FINISH: 12/21/94 1305

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	WELL COMPLETION
0–17							ML	SILT AND CLAY, SOME SAND, BLACK-BROWN (ASH?)	SURFACE ELEVATION 1697.9' (MSL)
1	1	90	3,4 6,5	4.2	SS	SS 0-2'			
6	2*	85	2,3 4,4	48.0	HS	SS 5-7'			
11	3	50	1,2 2,4	0.0	HS	SS 10-12'			
16	4*	90	2,3 3,3	0.0	HS	SS 15-17'			
17–18							SW	SAND, BROWN, MEDIUM COARSE	
18–20							GM	GRAVEL, SILT, WET	
20–21	5	10	50/2	0.0	HS	SS 20-21'	LMSN	LIMESTONE, WEATHERED, GREEN-GRAY	
21								END OF BORING AT 21 FEET	

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▼ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

J-2

CONTRACTOR: CT & E	PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD	BORING NO: 54SB10
GEOLOGIST: BACHOVCHIN/GLENNIE		LOCATION: SWMU 54 WEST OF UPPER MOUND
DRILLING METHOD: HSA		WEATHER: COLD, 30° F
DTW FROM TOC: NA	PROJECT NAME: RAAP	DATE/TIME START: 12/21/94 1310
DATE/TIME: NA	CLIENT: US AEC	
	PROJECT NO.: 722843	DATE/TIME FINISH: 12/21/94 1340

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION
0-11							ML	SILT, SOME CLAY, DARK-BROWN		SURFACE ELEVATION 1696.6' (MSL)
1	1	50	2,4 6,8	0.0	HS	SS 0-2'				
6	2*	90	6,7 7,6	0.0	HS	SS 5-7'				
11-17							SM	SAND, LITTLE SILT, BROWN		
11	3	75	2,6 7,9	0.2	HS	SS 10-12'				
16	4*	75	2,3 6,13	0.0	HS	SS 15-17'				
17-18							GM	GRAVEL, SILT		
18-19	5	25	100/5	0.0	HS	SS 18-19'	LMSN	LIMESTONE, WEATHERED, GRAY, WET		
19								END OF BORING AT 19 FEET		

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

CONTRACTOR: CT & E

GEOLOGIST: BACHOVCHIN/GLENNIE

DRILLING METHOD: HSA

DTW FROM TOC: NA

DATE/TIME: NA

PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO.: 722843

BORING NO: 54SB11

LOCATION: SWMU 54 WEST OF UPPER MOUND

WEATHER: COLD, 35° F

DATE/TIME START: 12/21/94 1350

DATE/TIME FINISH: 12/21/94 1418

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FT)
1	1*	70	2,2 3,2	2.6	HS	SS 0-2'	ML	SILT, SOME CLAY, LITTLE SAND, DARK-BROWN		SURFACE ELEVATION 1697.3' (MSL)	1
3	2	90	2,4 5,4	0.0	HS	SS 2-4'					3
6	3	90	5,5 6,5	0.0	HS	SS 5-7'	SM	SILT, SOME SAND, LITTLE CLAY, BROWN			6
11	4	95	5,5 5,6	0.6	HS	SS 10-12'					11
16	5*	80	2,2 3,2	0.0	HS	SS 15-17'					16
17							GM	GRAVEL, SILT, WET			17
18								AUGER REFUSAL AT 18 FEET			18

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

CONTRACTOR: CT & E

GEOLOGIST: BACHOVCHIN/GLENNIE

DRILLING METHOD: HSA

DTW FROM TOC: NA

DATE/TIME: NA

PARSONS ENGINEERING-SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO.: 722843

BORING NO: 54SB12

LOCATION: SWMU 54 NORTHWEST OF UPPER MOUND

WEATHER: COLD, 35° F

DATE/TIME START: 12/21/94 1500

DATE/TIME FINISH: 12/21/94 1540

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION
0–5							ML	SILT AND CLAY, DARK-BROWN		SURFACE ELEVATION 1696.8' (MSL)
1	1*	90	2,2 3,2	2.8	HS	SS 0-2'				
3	2	100	3,5 7,6	1.7	HS	SS 2-4'				
5–16							CL/ML	CLAY AND SILT, DARK BROWN, MOIST AT 16 FEET		
6	3	90	3,6 5,5	0.8	HS	SS 5-7'				
11	4	95	2,2 2,2	0.8	HS	SS 10-12'				
16–18							SM	SAND AND SILT, LIGHT BROWN		
16	5*	90	2,3 3,5	0.0	HS	SS 15-17'				
18–19							GM	GRAVEL OVER LIMESTONE, WET		
19								AUGER REFUSAL AT 18 FEET		
19.5	6	10	100/6	0.0	HS	SS 18-19'				

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

55

CONTRACTOR: CT & E

GEOLOGIST: BACHOVCHIN/GLENNIE

DRILLING METHOD: HSA

DTW FROM TOC: NA

DATE/TIME: NA

PARSONS ENGINEERING-SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO.: 722843

BORING NO: 54SB13

LOCATION: SWMU 54
EAST OF UPPER MOUND

WEATHER: COLD, 35° F

DATE/TIME START: 12/21/94 1550

DATE/TIME FINISH: 12/21/94 1645

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	FID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	WELL COMPLETION
0–5							ML	SILT, SOME CLAY, LITTLE SAND, DARK-BROWN	SURFACE ELEVATION 1700.0' (MSL)
1	1*	85	2,2 2,3	0.0	HS	SS 0-2'			
3	2	80	2,4 4,3	0.0	HS	SS 2-4'			
5–10							SM	SILT AND SAND, LITTLE CLAY, BROWN	
6	3	90	4,6 7,6	0.0	HS	SS 5-7'			
10–15							CL/ML	SILT AND CLAY, LITTLE SAND, DARK BROWN	
11	4	90	1,1 1,1	0.0	HS	SS 10-12'			
15–20							ML	SILT, SOME CLAY AND SAND, BROWN	
16	5	85	2,5 5,4	0.0	HS	SS 15-17'			
20–22							SM	SAND AND SILT, BROWN, MOIST	
21	6*	80	2,2 13,8	0.0	HS	SS 20-22'			
22–23							GM	GRAVEL, WET	
23	7	50	19,13 52/2	0.0	HS	SS 22-24'	LMSN	LIMESTONE, WEATHERED, GREEN-GRAY	
24								END OF BORING AT 24 FEET	

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
∇ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

PARSONS ENGINEERING-SCIENCE, INC.
DRILLING RECORD

CONTRACTOR: CT & E
GEOLOGIST: BACHOVCHIN/GLENNIE
DRILLING METHOD: HSA
DTW FROM TOC: NA
DATE/TIME: NA

PROJECT NAME: RAAP
CLIENT: US AEC
PROJECT NO.: 722843

BORING NO: 54SB14
LOCATION: SWMU 54 NORTHEAST OF UPPER MOUND
WEATHER: WARM, 40° F
DATE/TIME START: 12/22/94 0830
DATE/TIME FINISH: 12/22/94 0910

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	WELL COMPLETION
0–5	1*	55	NA	1.7	HS	MOSS SPOON 0-5'	ML	SILT, SOME SAND, LITTLE CLAY, DARK-BROWN	SURFACE ELEVATION 1699.6' (MSL)
5–10	2	95	NA	6.0	HS	MOSS SPOON 5-10'	SM	SAND AND SILT, LITTLE CLAY, BROWN	
10–15	3*	75	NA	5.6	HS	MOSS SPOON 10-15'	SM		
15–20	4	5	NA	1.4	HS	MOSS SPOON 15-20'	SM		
20–21							GM	GRAVEL OVER LIMESTONE, WET	
21								AUGER REFUSAL AT 21 FEET	

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

57

CONTRACTOR: CT & E	PARSONS ENGINEERING-SCIENCE, INC. DRILLING RECORD	BORING NO: 54SB15
GEOLOGIST: BACHOVCHIN/GLENNIE		LOCATION: SWMU 54 CENTER OF UPPER MOUND
DRILLING METHOD: HAND AUGERED		WEATHER: WARM, 40° F
DTW FROM TOC: NA	PROJECT NAME: RAAP	DATE/TIME START: 12/22/94 1100
DATE/TIME: NA	CLIENT: US AEC PROJECT NO.: 722843	DATE/TIME FINISH: 12/22/94 1130

DEPTH (FT)	SAMPLE ID	RECOVERY *	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FT)
0–4							ML	SILT, LITTLE CLAY, BROWN		SURFACE ELEVATION 1704.5' (MSL)	0–4
4–5							ASH	ASH, GLASSY BLACK, AND BROWN SILT			4–5
5–8							ML	SILT, LITTLE CLAY, BROWN			5–8
8								END OF BORING AT 8 FEET * 4-6 FEET INTERVAL SUBMITTED TO LAB NOTE: NO PID READINGS ABOVE BACKGROUND RECORDED			8

Depth scale: 1–26 ft.

HSA = HOLLOW STEM AUGER CAL = CALIBRATION USCS = UNIFIED SOIL CLASS. SYS.	SS = SPLIT SPOON A = AUGER CUTTINGS * = LAB SAMPLE	BH = BORE HOLE GS = GRAB SAMPLE	HS = HEADSPACE ▽ = WATER LEVEL

COMMENTS:
HAND AUGERED
GROUTED TO SURFACE

58

CONTRACTOR: CT & E

GEOLOGIST: BACHOVCHIN/GLENNIE

DRILLING METHOD: HSA

DTW FROM TOC: NA

DATE/TIME: NA

PARSONS ENGINEERING-SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO.: 722843

BORING NO: 54SB16

LOCATION: SWMU 54
N. OF UPPER MOUND (BACKGROUND)

WEATHER: WARM, 45° F

DATE/TIME START: 12/22/94 0940

DATE/TIME FINISH: 12/22/94 1005

DEPTH (FT)	SAMPLE ID	RECOVERY %	BLOW COUNT	PID (ppm)	READING AT	SAMPLE TYPE	USCS	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION
0–10							ML	SILT, SOME CLAY, LITTLE SAND, DARK-BROWN		SURFACE ELEVATION 1697.0' (MSL)
1	1*	90	2,2 2,3	27.1	HS	SS 0-2'				
6	2	80	3,3 4,6	7.4	SS	SS 5-7'				
10–16							SM	SAND AND SILT, LITTLE CLAY, MEDIUM BROWN		
11	3*	80	4,6 7,6	15.9	HS	SS 10-12'				
16	4	90	1,1 2,4	2.8	SS	SS 15-17'				
16–17							ML	SILT AND CLAY, DARK BROWN		
17–18							GM	GRAVEL, SOME SILT, WET		
18								AUGER REFUSAL AT 18 FEET		

HSA = HOLLOW STEM AUGER
CAL = CALIBRATION
USCS = UNIFIED SOIL CLASS. SYS.
SS = SPLIT SPOON
A = AUGER CUTTINGS
* = LAB SAMPLE
BH = BORE HOLE
GS = GRAB SAMPLE
HS = HEADSPACE
▽ = WATER LEVEL

COMMENTS:
4 INCH DIAMETER BORING GROUTED TO SURFACE

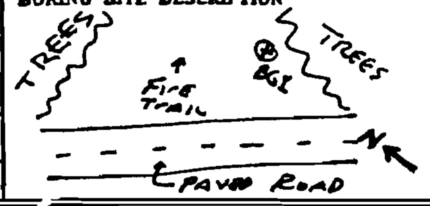
ENGINEERING-SCIENCE DRILLING RECORD

DRILLING CONTRACTOR:	CT & E
DRILLER:	DAVE DOLAN
GEOLOGIST:	S. GLENNIE
RIG TYPE:	B80/92
DRILLING METHOD:	HSA
PROJECT NAME	RAAP
CLIENT	US AEC
PROJECT NO.	722843
WEATHER	Warm - Humid ~78°F
DATE/TIME START	7-19-95 / 1700
DATE/TIME FINISH	7-19-95 / 1710
BORING NO.	BG1 UC
SHEET	1 OF 1
LOCATION:	FIRE TRAIL 4SW4A - NEAR ROAD

WATER LEVEL MEASUREMENTS

MP			
DTW FROM MP	N/A		
TIME			
DATE			

BORING SITE DESCRIPTION



DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FEET)
1–3	18	100	17, 9, 11, 12	0.0	SS	SM	SS	Light GREY DRY SAND (1-2'). LITE BROWN SAND WITH CLAY (2-3')			1–3
3–5	N/A	75	14, 16, 20, 19	0.0	SS	ML	SS	Light BROWN SILT WITH CLAY			3–5
5–6											5–6
6–8	1C	25		0.0	SS	CH	SS	Light BROWN COMPACT CLAY, MINOR black OXIDES			6–8
8–20								E.O.B AT 8 Ft.			8–20

LEGEND: SAND & GRAVEL; CLAY; SILT & CLAY; SAND; SAND & SILT; SILT; BEDROCK; GRAVEL; SAPROLITE; WATER LEVEL

SPT = STANDARD PENETRATION TEST CAL = CALIBRATION BZ = BREATHING ZONE
SS = SPLIT SPOON A = AUGER CUTTINGS C = CORED BH = BOREHOLE GS = GRAB SAMPLE

COMMENTS:

DRILLING CONTRACTOR: CT & E DRILLER: DAVE DOLAN GEOLOGIST: S. GLENNIE RIG TYPE: B80/92 DRILLING METHOD: HSA	ENGINEERING-SCIENCE DRILLING RECORD PROJECT NAME RAAP CLIENT US AEC PROJECT NO. 722843 WEATHER Warm Humid ~ 78°F	BORING NO. BG2UC SHEET 1 OF 1 LOCATION: FIRE TRAIL #SW4A - NEAR ROAD BORING SITE DESCRIPTION ~10' North of BG1 UNISON URBAN LAND COMPLEX

WATER LEVEL MEASUREMENTS

MP			
DTW FROM MP	N/A		
TIME			
DATE			

DATE/TIME START 7-19-95 / 1628
DATE/TIME FINISH 7-19-95 / 1650

DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FEET)
1–3	N/A	<5	9,10 9,9	0.0	SS	SM	SS	Light Brown Silty Sand			1–3
3–5	2B	25	10,11 15,20	0.0	SS	CL	SS	Light Brown Silt with Clay			3–5
5–7	N/A	10	14,17 19,21	0.0	SS	CL	SS	Brown-Red Clay, Minor Silt			5–7
7–9	N/A	100	21,15 19,21	0.0	SS	SM	SS	Light Brown Sand with Silt, Minor Clay			7–9
9–11	2C	50	17,16 14,16	0.0	SS	CL	SS	Brown Dense Clay to Sandy Clay			9–11
11								E.O.B. @ 11 ft			11

LEGEND: SAND & GRAVEL; CLAY; SILT & CLAY; SAND; SAND & SILT; SILT; BEDROCK; GRAVEL; SAPROLITE; WATER LEVEL

SPT = STANDARD PENETRATION TEST CAL = CALIBRATION BZ = BREATHING ZONE
SS = SPLIT SPOON A = AUGER CUTTINGS C = CORED BH = BOREHOLE GS = GRAB SAMPLE

COMMENTS:

DRILLING CONTRACTOR: CT & E

DRILLER: DAVE DOLAN

GEOLOGIST: S. GLENNIE

RIG TYPE: B80/92

DRILLING METHOD: HSA

ENGINEERING-SCIENCE DRILLING RECORD

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO. 722843

WEATHER: 90°F - HUMID

DATE/TIME START: 7-20-95 / 1610

DATE/TIME FINISH: 7-20-95 / 1627

BORING NO. BG3UC

SHEET 1 OF 1

LOCATION: EAST REGION of MAIN MNFC. AREA.

BORING SITE DESCRIPTION

SOIL TYPE: UNISON URBAN LAND COMPLEX

WATER LEVEL MEASUREMENTS

MP			
DTW FROM MP	N/A		
TIME			
DATE			

DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FEET)
1–3	3B	75	6,6, 8,12	0.0	SS	CL	SS	DARK-RED SILT, SOME CLAY, MINOR SAND			1–3
~~19~~ 20 – ~~20~~ 21 – 22	3C	10	14,8, 14,38	0.0	SS	SM	SS	BROWN MED. GRAINED SAND, WITH MICACEOUS SILT.			~~18~~ 19 – ~~19~~ 20 – ~~20~~ 21 – 22
								E.O.B. @ 22 Ft.			

LEGEND: SAND & GRAVEL, CLAY, SILT & CLAY, SAND, SAND & SILT, SILT, BEDROCK, GRAVEL, SAPROLITE, WATER LEVEL

SPT = STANDARD PENETRATION TEST CAL = CALIBRATION BZ = BREATHING ZONE
SS = SPLIT SPOON A = AUGER CUTTINGS C = CORED BH = BOREHOLE GS = GRAB SAMPLE

COMMENTS:

62

ENGINEERING–SCIENCE DRILLING RECORD

DRILLING CONTRACTOR: CT & E
DRILLER: DAVE DOLAN
GEOLOGIST: S. GLENNIE
RIG TYPE: BBO/92
DRILLING METHOD: HSA

PROJECT NAME: RAAP
CLIENT: US AEC
PROJECT NO. 722843
WEATHER: 90°F - HUMID

BORING NO. BG4UC
SHEET 1 OF 1
LOCATION: EAST REGION OF MAIN MNFC. AREA.

BORING SITE DESCRIPTION
SOIL TYPE:
UNISON URBAN LAND COMPLEX

WATER LEVEL MEASUREMENTS

MP			
DTW FROM MP	N/A		
TIME			
DATE			

DATE/TIME START 7-20-95 / 1550
DATE/TIME FINISH 7-20-95 / 1600

DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FEET)
3–5	4B	75	10,9, 10,8	0.0	SS	MH	SS	SANDY SILT, WITH CLAY MINOR GRAVEL (2-3mm). HEAVY MOTTLING. FILL?			
15–17	4C	50	8,6, 7,10	0.0	SS	ML	SS	BROWN MICACEOUS SILT, MINOR CLAY. SOME RED SHALE PIECES.			
17								E.O.B. @ 17 Ft.			

LEGEND: SAND & GRAVEL; CLAY; SILT & CLAY; SAND; SAND & SILT; SILT; BEDROCK; GRAVEL; SAPROLITE; WATER LEVEL

SPT = STANDARD PENETRATION TEST CAL = CALIBRATION BZ = BREATHING ZONE
SS = SPLIT SPOON A = AUGER CUTTINGS C = CORED BH = BOREHOLE GS = GRAB SAMPLE

COMMENTS:

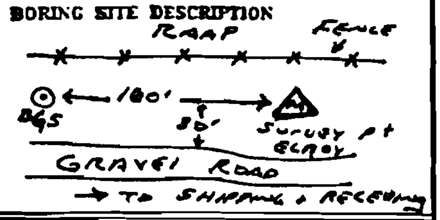
DRILLING CONTRACTOR: CT & E
DRILLER: DAVE DOLAN
GEOLOGIST: S. GLENNIE
RIG TYPE: BB0/92
DRILLING METHOD: HSA

ENGINEERING-SCIENCE DRILLING RECORD

PROJECT NAME: RAAP
CLIENT: US AEC
PROJECT NO. 722843
WEATHER: Warm - Humid ~75°F
DATE/TIME START: 7-19-95 / 1747
DATE/TIME FINISH: 7-19-95 / 1755

BORING NO. BG5UC
SHEET 1 OF 1
LOCATION: NW Region of RAAP

BORING SITE DESCRIPTION



WATER LEVEL MEASUREMENTS

MP			
DTW FROM MP	N/A		
TIME			
DATE			

DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION
1–3	5B	25	7, 8, 12, 6	0.0	SS	SW	SS	Brown SAND - DRY		
3–5	N/A	50	14, 7, 4, 4	0.0	SS	CH	SS	Brown CLAY with SAND, with SILT DAMP		
5–7	N/A	50	4, 4, 4, 4	0.0	SS	CH	SS	RED-Brown CLAY, Minor SILT, RED Mottling - MOIST		
7–8	5C*	50	7, 5	0.0	SS	CH	SS	SAME AS (5-7') WITH BLACK OXIDES		
8								E.O.B AT 8 Ft		
12								SAMPLE BG5CUCB From (6-8') interval		

LEGEND: SAND & GRAVEL, CLAY, SILT & CLAY, SAND, SAND & SILT, SILT, BEDROCK, GRAVEL, SAPROLITE, WATER LEVEL

SPT = STANDARD PENETRATION TEST, CAL = CALIBRATION, BZ = BREATHING ZONE
SS = SPLIT SPOON, A = AUGER CUTTINGS, C = CORED, BH = BOREHOLE, GS = GRAB SAMPLE

COMMENTS:

DRILLING CONTRACTOR: CT & E	ENGINEERING-SCIENCE DRILLING RECORD	BORING NO. 866 OC
DRILLER: DAVE DOLAN		SHEET 1 OF 1
GEOLOGIST: S. GLENNIE	PROJECT NAME RAAP	LOCATION: NW REGION of RAAP,
RIG TYPE: B80/92	CLIENT US AEC	BORING SITE DESCRIPTION
DRILLING METHOD: HSA	PROJECT NO. 722843	20' East of 865
WATER LEVEL MEASUREMENTS	WEATHER Warm Humid ~75°F	UNISON URBAN LAND COMPLEX SOIL
MP		
DTW FROM MP N/A		
TIME	DATE/TIME START 7-19-95 / 1803	
DATE	DATE/TIME FINISH 7-19-95 / 1809	

DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FEET)
1											1
2											2
3											3
4	6B	50	3,5, 6,6	0.0	SS	CL	SS	BROWN CLAY WITH SILT, WITH SAND			4
5											5
6											6
7											7
8											8
9											9
10											10
11	6C	75	3,2, 3,3	0.0	SS	CH	SS	Brown CLAY WITH RED STREAKS, MINOR OXIDE STAINING			11
12								E.O.B @ 12 Ft.			12
13											13
14											14
15											15
16											16
17											17
18											18
19											19
20											20

LEGEND: SAND & GRAVEL, CLAY, SILT & CLAY, SAND, SAND & SILT, SILT, BEDROCK, GRAVEL, SAPROLITE, WATER LEVEL

SPT = STANDARD PENETRATION TEST CAL = CALIBRATION BZ = BREATHING ZONE
SS = SPLIT SPOON A = AUGER CUTTINGS C = CORED BH = BOREHOLE GS = GRAB SAMPLE

COMMENTS:

ENGINEERING-SCIENCE DRILLING RECORD

DRILLING CONTRACTOR: CT & E
DRILLER: DAVE DOLAN
GEOLOGIST: S. GLENNIE
RIG TYPE: B80/92
DRILLING METHOD: HSA

PROJECT NAME: RAAP
CLIENT: US AEC
PROJECT NO. 722843
WEATHER:

BORING NO. BG7UC
SHEET 1 OF 1
LOCATION: NW REGION of RAAP
BORING SITE DESCRIPTION: 40' EAST of BG6
SOIL: UNISON URBAN LAND COMPLEX

WATER LEVEL MEASUREMENTS

MP			
DTW FROM MP	N/A		
TIME			
DATE			

DATE/TIME START: 7-19-95 / 1836
DATE/TIME FINISH: 7-19-95 / 1905

DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION
1–3	N/A	0%						No Recovery From 2 split spoons		
3–5	7B	75	5,5, 6,6	0.0	SS	CH	SS	Light Brown clay, some red streaks, Approx 15% oxides MOIST		
20–21.5	7C	25	8,4, 100/5"	0.0	SS	CH	SS	Brown clay with minor oxide staining. Limestone at 21.5 Feet		
								E.O.B @ 21.5 Ft		

LEGEND: SAND & GRAVEL; CLAY; SILT & CLAY; SAND; SAND & SILT; SILT; BEDROCK; GRAVEL; SAPROLITE; WATER LEVEL

SPT = STANDARD PENETRATION TEST CAL = CALIBRATION BZ = BREATHING ZONE
SS = SPLIT SPOON A = AUGER CUTTINGS C = CORED BH = BOREHOLE GS = GRAB SAMPLE

COMMENTS:

DRILLING CONTRACTOR: CT & E	ENGINEERING-SCIENCE DRILLING RECORD	BORING NO. BG8UC
DRILLER: Dave Dolan		SHEET 1 OF 1
GEOLOGIST: S. Glennie	PROJECT NAME RAAP	LOCATION: NW Corner of RAAP
RIG TYPE: B80/92	CLIENT US AEC	BORING SITE DESCRIPTION
DRILLING METHOD: HSA	PROJECT NO. 722843	45' west of end of wide portion of Gravel Road
WATER LEVEL MEASUREMENTS	WEATHER Warm ~75°F	
MP		
DTW FROM MP N/A		
TIME	DATE/TIME START 7-19-95 / 1915	Soil: Unison Urban Land Complex
DATE	DATE/TIME FINISH 7-19-95 / 1930	

DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION
1–3	N/A	<10	9,7, 10,10	0.0	SS	ML	SS	Red-Brown Silt with Clay; micaceous - damp		
3–5	3B	100	12,12 12,14	0.0	SS	SM/SC	SS	Red Brown Sand and Silt and Clay, some oxide staining		
8–10	8C	75	15,18 7,5	0.0	SS	GM	SS	Brown sand with minor clay and gravel		
10								E.O.B. @ 10 Ft		

LEGEND: SAND & GRAVEL; CLAY; SILT & CLAY; SAND; SAND & SILT; SILT; BEDROCK; GRAVEL; SAPROLITE; WATER LEVEL

SPT = STANDARD PENETRATION TEST CAL = CALIBRATION BZ = BREATHING ZONE
SS = SPLIT SPOON A = AUGER CUTTINGS C = CORED BH = BOREHOLE GS = GRAB SAMPLE

COMMENTS:

ENGINEERING-SCIENCE DRILLING RECORD

DRILLING CONTRACTOR: CT & E
DRILLER: DAVE DOLAN
GEOLOGIST: S. GLENNIE
RIG TYPE: BB0/92
DRILLING METHOD: HSA

PROJECT NAME: RAAP
CLIENT: US AEC
PROJECT NO. 722843
WEATHER: WARM, HUMID ~80F
DATE/TIME START: 7-20-95 / 0930
DATE/TIME FINISH: 7-20-95 / 0940

BORING NO. BG1WL
SHEET 1 OF 1
LOCATION: NE REGION of RAAP
BORING SITE DESCRIPTION
SOIL TYPE:
WHEELING SANDY LOAM.

WATER LEVEL MEASUREMENTS

MP			
DTW FROM MP	N/A		
TIME			
DATE			

DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FEET)
1–3	N/A	25	4,4, 5,4	0.0	SS	SC	SS	BROWN SAND, WITH CLAY, SOME GRAVEL. RED STREAKS AND BLACK OXIDE STAINING.			
3–5	1B	50	3,3, 4,3	0.0	SS	CL	SS	BROWN CLAY WITH SAND.			
5–7	1C	50	1,2, 4,6	0.0	SS	CL	SS	BROWN SAND AND CLAY.			
7–9	N/A	100	4,8 10,11	0.0	SS	CL	SS	(7-8'): BROWN SAND, SOME CLAY (8-9'): BROWN CLAY W/SAND			
9								E.O.B. @ 9 Ft.			

LEGEND: SAND & GRAVEL; CLAY; SILT & CLAY; SAND; SAND & SILT; SILT; BEDROCK; GRAVEL; SAPROLITE; WATER LEVEL

SPT = STANDARD PENETRATION TEST CAL = CALIBRATION BZ = BREATHING ZONE
SS = SPLIT SPOON A = AUGER CUTTINGS C = CORED BH = BOREHOLE GS = GRAB SAMPLE

COMMENTS:

ENGINEERING-SCIENCE DRILLING RECORD

DRILLING CONTRACTOR: CT & E
DRILLER: DAVE DOLAN
GEOLOGIST: S. GLENNIE
RIG TYPE: BBO/92
DRILLING METHOD: HSA

PROJECT NAME: RAAP
CLIENT: US AEC
PROJECT NO. 722843
WEATHER: WARM, HUMID ~80°F
DATE/TIME START: 7-20-95 / 0940
DATE/TIME FINISH: 7-20-95 / 0954

BORING NO. BG2 WL
SHEET 1 OF 1
LOCATION: NE REGION OF RAAP
BORING SITE DESCRIPTION
SOIL TYPE: WHEELING SANDY LOAM

WATER LEVEL MEASUREMENTS

MP			
DTW FROM MP	N/A		
TIME			
DATE			

DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION
1–3	N/A	25	10,2, 2,3	0.0	SS	GC	SS	FILL MATERIAL: GRAVEL AND DARK GREY CLAY		
3–5	2B	50	3,2, 5,5	0.0	SS	SC	SS	BROWN CLAY AND SAND, MINOR BLACK OXIDE STAINING.		
5–7	N/A	100	1,4, 7,7	0.0	SS	CL	SS	BROWN CLAY, MINOR SAND		
7–9	N/A	100	5,10 9,11	0.0	SS	SC-SM	SS	BROWN SAND AND SILT AND CLAY		
9–10	N/A	50	10, 10	0.0	SS	CH	SS	MIXED BROWN + GREY CLAY		
10–12	2C	100	15,14 12,17	0.0	SS	CL	SS	RED-BROWN SAND SOME CLAY (10-11'): ALL SAND (11-12').		
12								E.O.B. @ 12 Ft.		

LEGEND: SAND & GRAVEL; CLAY; SILT & CLAY; SAND; SAND & SILT; SILT; BEDROCK; GRAVEL; SAPROLITE; WATER LEVEL

SPT = STANDARD PENETRATION TEST   CAL = CALIBRATION   BZ = BREATHING ZONE
SS = SPLIT SPOON   A = AUGER CUTTINGS   C = CORED   BH = BOREHOLE   GS = GRAB SAMPLE

COMMENTS:

DRILLING CONTRACTOR: CT & E
DRILLER: DAVE DOLAN
GEOLOGIST: S. GLENNIE
RIG TYPE: BB0/92
DRILLING METHOD: HSA

ENGINEERING-SCIENCE DRILLING RECORD

BORING NO. BG3WL
SHEET 1 OF 2
LOCATION: NE ~~corner~~ AREA of RAAP

PROJECT NAME RAAP
CLIENT US AEC
PROJECT NO. 722843
WEATHER 80F, HUMID

BORING SITE DESCRIPTION
SOIL TYPE: WHEELING SANDY LOAM

WATER LEVEL MEASUREMENTS

MP			
DTW FROM MP	N/A		
TIME			
DATE			

DATE/TIME START 7-20-95 / 1005
DATE/TIME FINISH 7-20-95 / 1037

DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FEET)
1–3	3B	25	2,4 5,2	0.0	SS	SM	SS	BROWN SILT WITH SAND, MINOR CLAY			
3–20								AIR DRILLING TO 20 FEET			
20–	3C	75	9,8, 8,17	0.0	SS		SS	SEE FOLLOWING PAGE			

LEGEND: SAND & GRAVEL, CLAY, SILT & CLAY, SAND, SAND & SILT, SILT, BEDROCK, GRAVEL, SAPROLITE, WATER LEVEL

SPT = STANDARD PENETRATION TEST CAL = CALIBRATION BZ = BREATHING ZONE
SS = SPLIT SPOON A = AUGER CUTTINGS C = CORED BH = BOREHOLE GS = GRAB SAMPLE

COMMENTS:

DRILLING CONTRACTOR: CT & E DRILLER: DAVE DOLAN GEOLOGIST: S. GLENNIE RIG TYPE: BBO/92 DRILLING METHOD: HSA	**ENGINEERING-SCIENCE DRILLING RECORD** PROJECT NAME RAAP CLIENT US AEC PROJECT NO. 722843 WEATHER 80°F, HUMID	BORING NO. BG3WL SHEET 2 OF 2 LOCATION: NE REGION of RAAP BORING SITE DESCRIPTION SOIL TYPE: WHEELING SANDY LOAM

WATER LEVEL MEASUREMENTS

MP				
DTW FROM MP	N/A			
TIME				
DATE				

DATE/TIME START 7-20-95 / 1005
DATE/TIME FINISH 7-20-95 / 1037

DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FEET)
21	3C	75	9, 8, 8, 17	0.0	SS	ML	SS	Light BROWN SAND			21
22		50	9, 9, 16, 6	0.0	SS	SW	SS	Light BROWN SAND			22
23											23
24								E.O.B @ 24 Ft			24
25											25
6											6
7											7
8											8
9											9
10											10
11											11
12											12
13											13
14											14
15											15
16											16
17											17
18											18
19											19
20											20

LEGEND: SAND & GRAVEL, CLAY, SILT & CLAY, SAND, SAND & SILT, SILT, BEDROCK, GRAVEL, SAPROLITE, WATER LEVEL

SPT = STANDARD PENETRATION TEST CAL = CALIBRATION BZ = BREATHING ZONE
SS = SPLIT SPOON A = AUGER CUTTINGS C = CORED BH = BOREHOLE GS = GRAB SAMPLE

COMMENTS:

DRILLING CONTRACTOR: CT & E DRILLER: DAVE DOLAN GEOLOGIST: S. GLENNIE RIG TYPE: BBO/92 DRILLING METHOD: HSA	**ENGINEERING-SCIENCE DRILLING RECORD** PROJECT NAME RAAP CLIENT US AEC PROJECT NO. 722843 WEATHER 85°F - HUMID	BORING NO. BG4 WL SHEET 1 OF 1 LOCATION: NW REGION of RAAP. NEAR SWMU31 BORING SITE DESCRIPTION SOIL TYPE: WHEELING SANDY LOAM.

WATER LEVEL MEASUREMENTS

MP			
DTW FROM MP	N/A		
TIME			
DATE			

DATE/TIME START 7-20-95 / 1317
DATE/TIME FINISH 7-20-95 / 1325

DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FEET)
2–4	4B	50	7,16, 14,20	0.0	SS	CH	SS	BROWN SILT WITH CLAY.			
17–19	4C	25	17,19 21,14	0.0.	SS	ML	SS	BROWN SAND WITH COBBLES.			
19–20								E.O.B. @ 19 ft.			

LEGEND: SAND & GRAVEL, CLAY, SILT & CLAY, SAND, SAND & SILT, SILT, BEDROCK, GRAVEL, SAPROLITE, WATER LEVEL

SPT = STANDARD PENETRATION TEST CAL = CALIBRATION BZ = BREATHING ZONE
SS = SPLIT SPOON A = AUGER CUTTINGS C = CORED BH = BOREHOLE GS = GRAB SAMPLE

COMMENTS:

DRILLING CONTRACTOR: CT & E DRILLER: DAVE DOLAN GEOLOGIST: S. GLENNIE RIG TYPE: BB0/92 DRILLING METHOD: HSA	**ENGINEERING-SCIENCE DRILLING RECORD** PROJECT NAME RAAP CLIENT US AEC PROJECT NO. 722843 WEATHER 85°F - HUMID	BORING NO. BG5WL SHEET 1 OF 1 LOCATION: NW REGION OF RAAP - NEAR SWMU31 BORING SITE DESCRIPTION SOIL TYPE: WHEELING SANDY LOAM.

WATER LEVEL MEASUREMENTS

MP			
DTW FROM MP	N/A		
TIME			
DATE			

DATE/TIME START 7-20-95 / 1301
DATE/TIME FINISH 7-20-95 / 1310

DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FEET)
0-2	N/A	100	5,5,6,7	0.0	SS	ML	SS	Light Brown silt, minor clay - High organics.			
2-4	5B	50	8,11,14,17	0.0	SS	SC	SS	Brown silt with clay, Dry. Dark Red Mottling.			
4-6	N/A	100	17,12,17,14	0.0	SS	SM	SS	Dark Red-Brown silty sand, minor clay.			
6-8	5C	50	12,12,13,12	0.0	SS	CL	SS	Same as (4-6'); with more clay.			
8								E.O.B. @ 8 ft.			

LEGEND: SAND & GRAVEL, CLAY, SILT & CLAY, SAND, SAND & SILT, SILT, BEDROCK, GRAVEL, SAPROLITE, WATER LEVEL

SPT = STANDARD PENETRATION TEST CAL = CALIBRATION BZ = BREATHING ZONE
SS = SPLIT SPOON A = AUGER CUTTINGS C = CORED BH = BOREHOLE GS = GRAB SAMPLE

COMMENTS:

DRILLING CONTRACTOR: CT & E
DRILLER: DAVE DOLAN
GEOLOGIST: S. GLENNIE
RIG TYPE: BB0/92
DRILLING METHOD: HSA

ENGINEERING-SCIENCE DRILLING RECORD

BORING NO. BG6 WL
SHEET 1 OF 1
LOCATION: NW REGION OF RAAP - NEAR SWMU31

PROJECT NAME RAAP
CLIENT US AEC
PROJECT NO. 722843
WEATHER 85°F - HUMID

BORING SITE DESCRIPTION
SOIL TYPE: WHEELING SANDY LOAM

WATER LEVEL MEASUREMENTS

MP			
DTW FROM MP	N/A		
TIME			
DATE			

DATE/TIME START 7-20-95 / 1225
DATE/TIME FINISH 7-20-95 / 1255

DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION
1–2	N/A	< 10%	4,5, 5,7	0.0	SS	OL	SS	DARK BROWN, ORGANIC RICH SOIL		
2–4	6B	100	16,12, 16,24	0.0	SS	SC	SS	BROWN SILT, WITH CLAY BLACK OXIDE STAINING		
4–6	N/A	100	16,10 13,14	0.0	SS	ML	SS	BROWN SILT, WITH CLAY		
6–8	N/A	50	8,12 16,18	0.0	SS	ML	SS	BROWN SILT BLACK OXIDE STAINING		
15–17	6C	25	5,10 17,31	0.0	SS	ML	SS	COARSE BROWN SAND WITH COBBLES. Rock at 17 Ft.		
17								E.O.B. @ 17 Ft.		

LEGEND: SAND & GRAVEL; CLAY; SILT & CLAY; SAND; SAND & SILT; SILT; BEDROCK; GRAVEL; SAPROLITE; WATER LEVEL

SPT = STANDARD PENETRATION TEST CAL = CALIBRATION BZ = BREATHING ZONE
SS = SPLIT SPOON A = AUGER CUTTINGS C = CORED BH = BOREHOLE GS = GRAB SAMPLE

COMMENTS:

DRILLING CONTRACTOR: CT & E
DRILLER: DAVE DOLAN
GEOLOGIST: S. GLENNIE
RIG TYPE: BBO/92
DRILLING METHOD: HSA

ENGINEERING-SCIENCE DRILLING RECORD

BORING NO. BG1BL
SHEET 1 OF 1
LOCATION: N.E. REGION OF RAAP

PROJECT NAME RAAP
CLIENT US AEC
PROJECT NO. 722843
WEATHER 80°F, HUMID

BORING SITE DESCRIPTION
BRADDOCK LOAM SOIL TYPE.

WATER LEVEL MEASUREMENTS

MP			
DTW FROM MP	N/A		
TIME			
DATE			

DATE/TIME START 7-20-95 / 1105
DATE/TIME FINISH 7-20-95 / 1117

DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FEET)
0-2	N/A	<25	5,9, 9,11	0.0	SS	OL	SS	FILL MATERIAL; ORGANIC MATERIAL: GRAVEL + SOIL			
2-4	1B	75	9,7 9,10	0.0	SS	SC	SS	RED-BROWN SILT WITH SAND, MINOR CLAY, MINOR OXIDE STAINING.			
4-6	N/A	50	9,8, 6,6	0.0	SS	SM	SS	RED SILT AND SAND, SOME BLACK OXIDE STAINING.			
6-8	N/A	30	7,7 5,7	0.0	SS	SM	SS	SAME AS (4-6').			
8-10	1C	50	4,4 6,7	0.0	SS	SM	SS	SAME AS (4-6').			
10								E.O.B @ 10 Ft			

LEGEND: SAND & GRAVEL; CLAY; SILT & CLAY; SAND; SAND & SILT; SILT; BEDROCK; GRAVEL; SAPROLITE; WATER LEVEL

SPT = STANDARD PENETRATION TEST CAL = CALIBRATION BZ = BREATHING ZONE
SS = SPLIT SPOON A = AUGER CUTTINGS C = CORED BH = BOREHOLE GS = GRAB SAMPLE

COMMENTS:

ENGINEERING-SCIENCE DRILLING RECORD

DRILLING CONTRACTOR: CT & E
DRILLER: DAVE DOLAN
GEOLOGIST: S. GLENNIE
RIG TYPE: BB0/92
DRILLING METHOD: HSA

WATER LEVEL MEASUREMENTS

MP			
DTW FROM MP	N/A		
TIME			
DATE			

PROJECT NAME RAAP
CLIENT US AEC
PROJECT NO. 722843
WEATHER 80°F, HUMID
DATE/TIME START 7-20-95 / 1130
DATE/TIME FINISH 7-20-95 / 1150

BORING NO. BG2BL
SHEET 1 OF 1
LOCATION: NE REGION OF RAAP.
BORING SITE DESCRIPTION
Soil TYPE:
BRADDOCK LOAM

DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION
3–5	2B	30	7,6, 4,2	0.0	SS	CL	SS	BROWN SILT, SOME SAND, MINOR CLAY. DAMP.		
15–17	2C	50	3,2, 3,6	0.0	SS	SC	SS	BROWN CLAY, WITH SILT - MICACEOUS, AND SAND VERY MOIST.		
17								E.O.B. @ 17 Ft.		

LEGEND: SAND & GRAVEL, CLAY, SILT & CLAY, SAND, SAND & SILT, SILT, BEDROCK, GRAVEL, SAPROLITE, WATER LEVEL

SPT = STANDARD PENETRATION TEST   CAL = CALIBRATION   BZ = BREATHING ZONE
SS = SPLIT SPOON   A = AUGER CUTTINGS   C = CORED   BH = BOREHOLE   GS = GRAB SAMPLE

COMMENTS:

DRILLING CONTRACTOR: CT & E

DRILLER: DAVE DOLAN

GEOLOGIST: S. GLENNIE

RIG TYPE: B80/92

DRILLING METHOD: HSA

ENGINEERING-SCIENCE DRILLING RECORD

PROJECT NAME: RAAP

CLIENT: US AEC

PROJECT NO. 722843

WEATHER: 85°F - HUMID

DATE/TIME START: 7-20-95 / 1450

DATE/TIME FINISH: 7-20-95 / 1511

BORING NO. BG3BL

SHEET 1 OF 1

LOCATION: NW REGION OF HORSESHOE AREA. NEAR

BORING SITE DESCRIPTION: GATE 10.

SOIL TYPE: BRADDOCK LOAM.

WATER LEVEL MEASUREMENTS

MP			
DTW FROM MP	N/A		
TIME			
DATE			

DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FEET)
2	3B	25	4, 6, 6, 6	0.0	SS	CH	SS	LIGHT BROWN MICACEOUS SILT. ORGANIC STAINING.			2
3–19 (20)								AIR DRILLING TO 20 FEET.			3–19 (20)
20 (21)	3C	100	5, 6 6, 10	0.0	SS	MH	SS	RED BROWN SILT.			20 (21)
								E.O.B. @ 22 Ft.			

LEGEND: SAND & GRAVEL; CLAY; SILT & CLAY; SAND; SAND & SILT; SILT; BEDROCK; GRAVEL; SAPROLITE; WATER LEVEL

SPT = STANDARD PENETRATION TEST CAL = CALIBRATION BZ = BREATHING ZONE
SS = SPLIT SPOON A = AUGER CUTTINGS C = CORED BH = BOREHOLE GS = GRAB SAMPLE

COMMENTS:

DRILLING CONTRACTOR: CT & E	**ENGINEERING-SCIENCE DRILLING RECORD**	BORING NO. BG4BL
DRILLER: DAVE DOLAN		SHEET 1 OF 1
GEOLOGIST: S. GLENNIE	PROJECT NAME RAAP	LOCATION: NW REGION OF HORSESHOE AREA
RIG TYPE: BBO/92	CLIENT US AEC	BORING SITE DESCRIPTION
DRILLING METHOD: HSA	PROJECT NO. 722843	NEAR GATE 10.
WATER LEVEL MEASUREMENTS	WEATHER 85°F - HUMID	SOIL TYPE:
MP		BRADDOCK LOAM.
DTW FROM MP N/A		
TIME	DATE/TIME START 7-20-95 / 1415	
DATE	DATE/TIME FINISH 7-20-95 / 1444	

DEPTH (FEET)	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	PID READING	READING AT	USCS	SAMPLE TYPE	LITHOLOGY/REMARKS	LITHOLOGIC COLUMN	WELL COMPLETION	DEPTH (FEET)
1											1
2–4	4B	30	5,8, 6,7	0.0	SS	ML	SS	BROWN SILT WITH CLAY			2–4
4–6	N/A	100	5,6, 6,2	0.0	SS	CL	SS	SAME AS (2-4') MORE CLAY			4–6
6–8	N/A	75	1,3 7,4	0.0	SS	CL	SS	RED-BROWN CLAY, MINOR SILT.			6–8
8–10	4C	75	2,5, 5,10	0.0	SS	CL	SS	RED-BROWN CLAY WITH SILT.			8–10
10								E.O.B. @ 10 FT.			10
11–20											11–20

LEGEND: SAND & GRAVEL; CLAY; SILT & CLAY; SAND; SAND & SILT; SILT; BEDROCK; GRAVEL; SAPROLITE; WATER LEVEL

SPT = STANDARD PENETRATION TEST CAL = CALIBRATION BZ = BREATHING ZONE
SS = SPLIT SPOON A = AUGER CUTTINGS C = CORED BH = BOREHOLE GS = GRAB SAMPLE

COMMENTS:

APPENDIX D

MONITORING WELL DEVELOPMENT - FIELD DATA SHEETS

ES ENGINEERING-SCIENCE

WELL DEVELOPMENT SUMMARY SHEET

Project Name: RADFORD
Location:
Weather:

Well Number: 31MW1

12-18-94

PURGING CALCULATIONS

Well Depth: 52.40 feet
Depth to Water: 34.79 feet
Water Column Length: (L) 17.61 FT
Inner Casing Diameter (d): 4 inches = ______ feet

Volume of Standing Water (V): 11.5 gallons

$$V \text{ (gallons)} = 0.41 \times d^2 \times L$$

Total Volume to Purge: 69 gallons (V x 6)

PURGING EQUIPMENT

Purging Device: SUB. PUMP

OBSERVATIONS

Purge Water Appearance Initial: Clear / Turbid / Opaque
Purge Water Appearance Initial: Clear / Turbid / Opaque

PURGE WATER TESTING

	Initial Test	2nd Test (After 3 vol)	3rd Test (After 6 vol)	4th Test *	5th Test *
Time	0945	0955	1005	1015	1025
Purged Volume (GAL)		35	70	95	115
Turbidity					
Odor	—	—	—	—	—
PID					
pH	7.03	7.43	7.42	7.35	7.30
Conductance	336	336	338	351	334
Temperature (~~C~~ F)	60.4	62.4	61.0	65.1	63.1

µS/cm

COMMENTS

* IF NOT CLEAR AFTER 6 VOLUMES, PUMP 5 MINUTES MORE AND TAKE MEASUREMENTS. IF CLEAR OR WITHIN 20% OF PREVIOUS READINGS, STOP. IF NOT, REPEAT UNTIL WITHIN 20%

WELL DEVELOPMENT SUMMARY SHEET

Project Name: RADFORD

Well Number: 31MW2

Location:

Weather:

12-17-~~9~~94

PURGING CALCULATIONS

Well Depth: 28.50 feet

Depth to Water: 26.06 feet

Water Column Length: (L) 2.44 FT

Inner Casing Diameter (d): 4 inches = ______ feet

Volume of Standing Water (V): 1.6 gallons

$$V \text{ (gallons)} = 0.41 \times d^2 \times L$$

Total Volume to Purge: 9.6 gallons (V x 6)

PURGING EQUIPMENT

Purging Device: SUB. pump

OBSERVATIONS

Purge Water Appearance Initial: Clear / Turbid / Opaque

Purge Water Appearance Initial: Clear / Turbid / Opaque

PURGE WATER TESTING

	Initial Test	After 3 vol 2nd Test	After 6 vol 3rd Test	4th Test *	5th Test *
Time	1055	1109	1129		
Purged Volume (GAL)		5	10		
Turbidity					
Odor	—	—	—		
PID					
pH	7.52	7.61	7.79		
Conductance	991	291	281		
Temperature (~~C~~)	64.3	61.7	61.9		

µS/cm F

COMMENTS

* IF NOT CLEAR AFTER 6 VOLUMES, PUMP 5 MINUTES MORE AND TAKE MEASUREMENTS. IF CLEAR OR WITHIN 20% OF PREVIOUS READINGS, STOP. IF NOT, REPEAT UNTIL WITHIN 20%

ES ENGINEERING-SCIENCE

WELL DEVELOPMENT SUMMARY SHEET

Project Name: RADFORD Well Number: 31MW3
Location:
Weather: 12/17/~~89~~94

PURGING CALCULATIONS
Well Depth: 32.43 feet
Depth to Water: 24.16 feet
Water Column Length: (L) 8.27 FT
Inner Casing Diameter (d): 4 inches = ______ feet

Volume of Standing Water (V): 5.4 gallons

$$V \text{ (gallons)} = 0.41 \times d^2 \times L$$

Total Volume to Purge: 32.4 gallons (V×6)

PURGING EQUIPMENT
Purging Device: SUB. pump

OBSERVATIONS

Purge Water Appearance Initial: Clear / Turbid / Opaque
Purge Water Appearance Initial: Clear / Turbid / Opaque

PURGE WATER TESTING

	Initial Test	After 3 vol 2nd Test	After 6 vol 3rd Test	4th Test *	5th Test *
Time	0940	0950	1003	1010	1025
Purged Volume (GAL)		20	40	46	52
Turbidity					
Odor	—	—	—	—	—
PID					
pH	7.43	7.52	7.71	7.50	7.60
Conductance	180	332	340	341	293
Temperature (~~C~~) F	59.9	60.7	62.5	63.0	65.2

µS/cm

COMMENTS

* IF NOT CLEAR AFTER 6 VOLUMES, PUMP 5 MINUTES MORE AND TAKE MEASUREMENTS. IF CLEAR OR WITHIN 20% OF PREVIOUS READINGS, STOP. IF NOT, REPEAT UNTIL WITHIN 20%

ES ENGINEERING SCIENCE

WELL DEVELOPMENT SUMMARY SHEET

Project Name: RADFORD

Well Number: 31MW4

Location:

Weather:

12-17-~~93~~ 94

PURGING CALCULATIONS

Well Depth: 30.45 feet

Depth to Water: 24.60 feet

Water Column Length: (L) 5.80 FT

Inner Casing Diameter (d): 4 inches = ______ feet

Volume of Standing Water (V): 3.8 gallons

$$V \text{ (gallons)} = 0.41 \times d^2 \times L$$

Total Volume to Purge: 22.7 gallons (V × 6)

PURGING EQUIPMENT

Purging Device: Sub. pump

OBSERVATIONS

Purge Water Appearance Initial: Clear / Turbid / Opaque

Purge Water Appearance Initial: Clear / Turbid / Opaque

PURGE WATER TESTING

	Initial Test	2nd Test (After 3 vol)	3rd Test (After 6 vol)	4th Test *	5th Test *
Time	1300				
Purged Volume (GAL)		12	24		
Turbidity					
Odor					
PID					
pH					
Conductance					
Temperature (C)					

NOTE: DRILLER LOST ORIGINAL SHEET WITH MEASUREMENTS. AMOUNT PURGED OBTAINED FROM DRILLER'S DAILY LOG. WELL HAD BEEN DEVELOPED COMPLETELY IN ACCORDANCE WITH PROCEDURES.

COMMENTS

* IF NOT CLEAR AFTER 6 VOLUMES, PUMP 5 MINUTES MORE AND TAKE MEASUREMENTS. IF CLEAR OR WITHIN 20% OF PREVIOUS READINGS, STOP. IF NOT, REPEAT UNTIL WITHIN 20%

WELL DEVELOPMENT SUMMARY SHEET

Project Name: RADFORD Well Number: 48MW1
Location:
Weather: 12/21/~~93~~ 94

PURGING CALCULATIONS
Well Depth: 142.00 feet
Depth to Water: 106.90 feet
Water Column Length: (L) 35.1 FT
Inner Casing Diameter (d): 4 inches = ______ feet

Volume of Standing Water (V): 22.9 gallons

$$V \text{ (gallons)} = 0.41 \times d^2 \times L$$

Total Volume to Purge: 22.9 / 137.5 gallons (V x 6)

PURGING EQUIPMENT
Purging Device: Sub. pump

OBSERVATIONS

Purge Water Appearance Initial: ~~Clear~~ / Turbid / Opaque
Purge Water Appearance Initial: Clear / Turbid / Opaque

PURGE WATER TESTING

	Initial Test	2nd Test (After 3 vol)	3rd Test (After 6 vol)	4th Test *	5th Test *
Time	1515	1524	1535	1550	
Purged Volume (GAL)		69	138	175	
Turbidity					
Odor	—	—	—	—	
PID					
pH	7.03	7.22	7.19	7.24	
Conductance (uS/cm)	369	352	342	343	
Temperature (~~C~~ F)	55.2	50.7	54.3	52.7	

COMMENTS

* IF NOT CLEAR AFTER 6 VOLUMES, PUMP 5 MINUTES MORE AND TAKE MEASUREMENTS. IF CLEAR OR WITHIN 20% OF PREVIOUS READINGS, STOP. IF NOT, REPEAT UNTIL WITHIN 20%

WELL DEVELOPMENT SUMMARY SHEET

Project Name: RADFORD
Well Number: 48MW2
Location:
Weather:
1/9/95

PURGING CALCULATIONS

Well Depth: 135.7 feet
Depth to Water: 117.5 feet
Water Column Length: (L) 18.2 FT
Inner Casing Diameter (d): 2 inches = feet

Volume of Standing Water (V): 3.0 gallons

$$V \text{ (gallons)} = 0.41 \times d^2 \times L$$

Total Volume to Purge: 18 gallons (V×6)

PURGING EQUIPMENT

Purging Device: SUB. pump

OBSERVATIONS

Purge Water Appearance Initial: Clear / Turbid / Opaque
Purge Water Appearance Initial: Clear / Turbid / Opaque

PURGE WATER TESTING

	Initial Test	2nd Test (After 3 vol)	3rd Test (After 6 vol)	4th Test *	5th Test *
Time	1330	1345	1400	1410	
Purged Volume (GAL		10	20	25	
Turbidity					
Odor	—	—	—	—	
PID					
pH	8.10	7.79	7.81	7.84	
Conductance	329	334	332	342	
Temperature (F)	60.7	59.4	55.6	57.3	

µS/cm

COMMENTS

* IF NOT CLEAR AFTER 6 VOLUMES, PUMP 5 MINUTES MORE AND TAKE MEASUREMENTS. IF CLEAR OR WITHIN 20% OF PREVIOUS READINGS, STOP. IF NOT, REPEAT UNTIL WITHIN 20%

WELL DEVELOPMENT SUMMARY SHEET

Project Name: RADFORD Well Number: 48MW3
Location:
Weather: 1/10/95

PURGING CALCULATIONS

Well Depth: 122.30 feet
Depth to Water: 93.22 feet
Water Column Length: (L) 29.08 FT
Inner Casing Diameter (d): 4 inches = ______ feet

Volume of Standing Water (V): 18.99 gallons

V (gallons) = 0.41 x d² x L

Total Volume to Purge: ~~18.99~~ 114 gallons (V x 6)

PURGING EQUIPMENT

Purging Device: Sub. pump

OBSERVATIONS

Purge Water Appearance Initial: Clear / Turbid / Opaque
Purge Water Appearance Initial: Clear / Turbid / Opaque

PURGE WATER TESTING

	Initial Test	After 3 vol 2nd Test	After 6 vol 3rd Test	4th Test *	5th Test *
Time	1230	1240	1250	1300	
Purged Volume (GAL)		60	120	150	
Turbidity					
Odor	—	—	—	—	
PID					
pH	7.20	7.26	7.31	7.27	
Conductance	346	354	352	357	
Temperature (°F)	54.2	55.7	57.8	58.0	

µS/cm

COMMENTS

* IF NOT CLEAR AFTER 6 VOLUMES, PUMP 5 MINUTES MORE AND TAKE MEASUREMENTS. IF CLEAR OR WITHIN 20% OF PREVIOUS READINGS, STOP. IF NOT, REPEAT UNTIL WITHIN 20%

WELL DEVELOPMENT SUMMARY SHEET

Project Name: RADFORD Well Number: 48 MW4
Location:
Weather: 7/22/95

PURGING CALCULATIONS

Well Depth: 96.06 feet
Depth to Water: 71.40 feet
Water Column Length: (L) 24.66 FT
Inner Casing Diameter (d): 4 inches = ______ feet

Volume of Standing Water (V): 16.10 gallons

$$V \text{ (gallons)} = 0.41 \times d^2 \times L$$

Total Volume to Purge: 96.6 gallons (V x6)

PURGING EQUIPMENT

Purging Device: SUB. pump

OBSERVATIONS

Purge Water Appearance Initial: Clear / Turbid / Opaque
Purge Water Appearance Initial: Clear / Turbid / Opaque

PURGE WATER TESTING

	Initial Test	After 3 vol 2nd Test	After 6 vol 3rd Test	4th Test *	5th Test *
Time	1000	1037	1130	1135	1145
Purged Volume (GAL)		50	100	115	130
Turbidity					
Odor	—	—	—	—	—
PID					
pH	7.88	8.06	7.96	7.46	7.71
Conductance	154	280	431	313	361
Temperature (C) (F)	70.3	73.9	77.6	73.4	77.9

μS/cm

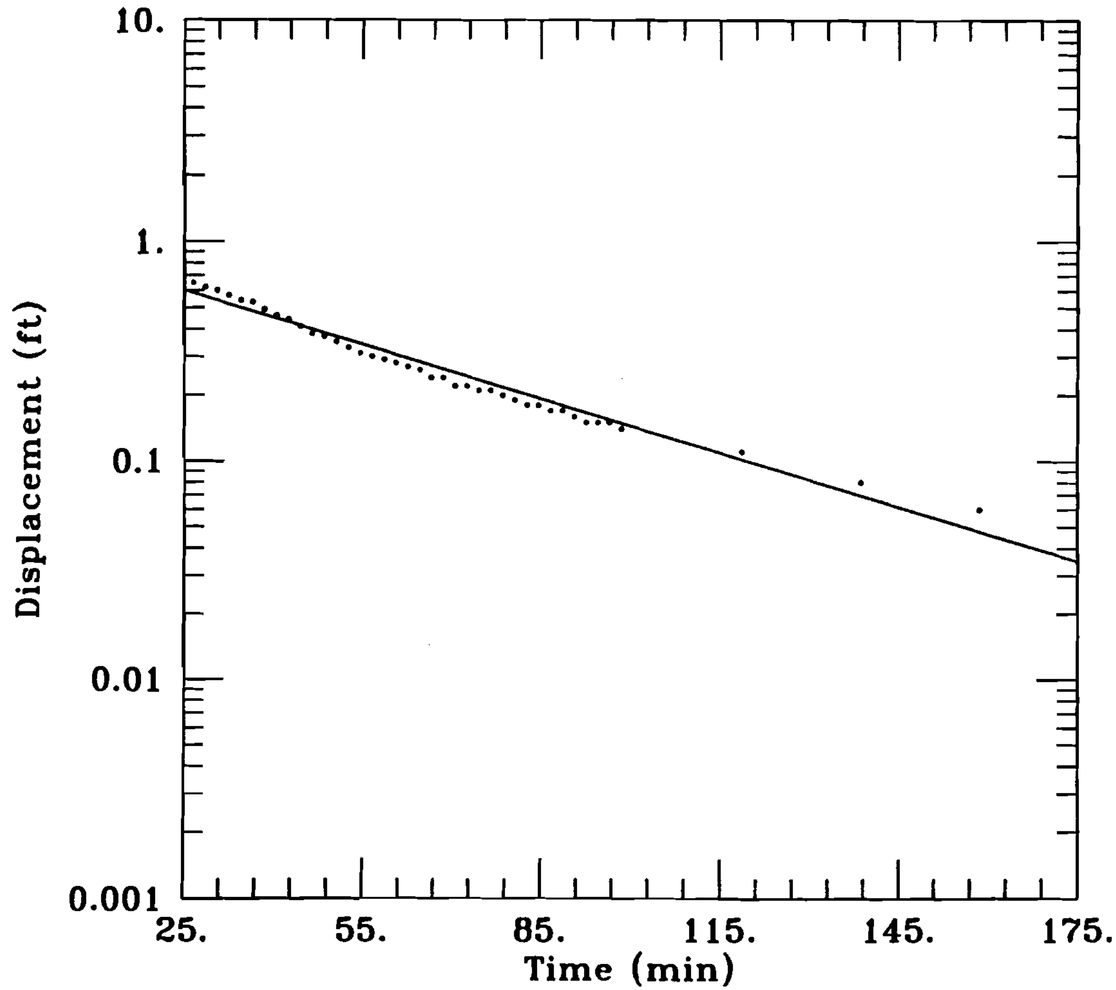
COMMENTS

* IF NOT CLEAR AFTER 6 VOLUMES, PUMP 5 MINUTES MORE AND TAKE MEASUREMENTS. IF CLEAR OR WITHIN 20% OF PREVIOUS READINGS, STOP. IF NOT, REPEAT UNTIL WITHIN 20%

86

APPENDIX E

AQUIFER SLUG TESTING DATA



DATA SET:
SMU31MW1.DAT
09/03/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: January 12, 1995
obs. well: 31MW1

TEST DATA:
H0 = 3.26 ft
rc = 0.167 ft
rw = 0.413 ft
L = 10. ft
b = 20. ft
H = 17.24 ft

PARAMETER ESTIMATES:
K = 0.0001607 ft/min
y0 = 0.9645 ft

RAAP SWMU-31 31MW1 INJECTION

Client: USAEC	Company: Parsons Engineering Science
Location: Radford, Virginia	Project: 722843

AQTESOLV

187

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V R E S U L T S
Version 2.01

Developed by Glenn M. Duffield
(c) 1988-1995 Geraghty & Miller, Inc.

09/01/95 09:16:35

==

TEST DESCRIPTION

Data set........... SMU31MW1.DAT
Output file........ SMU31MW1.OUT
Data set title..... RAAP SWMU-31 31MW1 INJECTION
Company............ Parsons Engineering Science
Project............ 722843
Client............. USCOE
Location........... Radford, Virginia
Test date.......... January 12, 1995
Obs. well.......... 31MW1

Units of Measurement
Length.......... ft
Time............ min

Test Well Data
Initial displacement in well..... 3.26
Radius of well casing............ 0.167
Radius of wellbore............... 0.413
Aquifer saturated thickness...... 20
Well screen length............... 10
Static height of water in well... 17.24
Gravel pack porosity............. 0.3
Effective well casing radius..... 0.2659
Effective wellbore radius........ 0.413
Log(Re/Rw)....................... 2.398
Constants A, B and C............. 2.269 , 0.364, 0.000
No. of observations.............. 108

==

ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

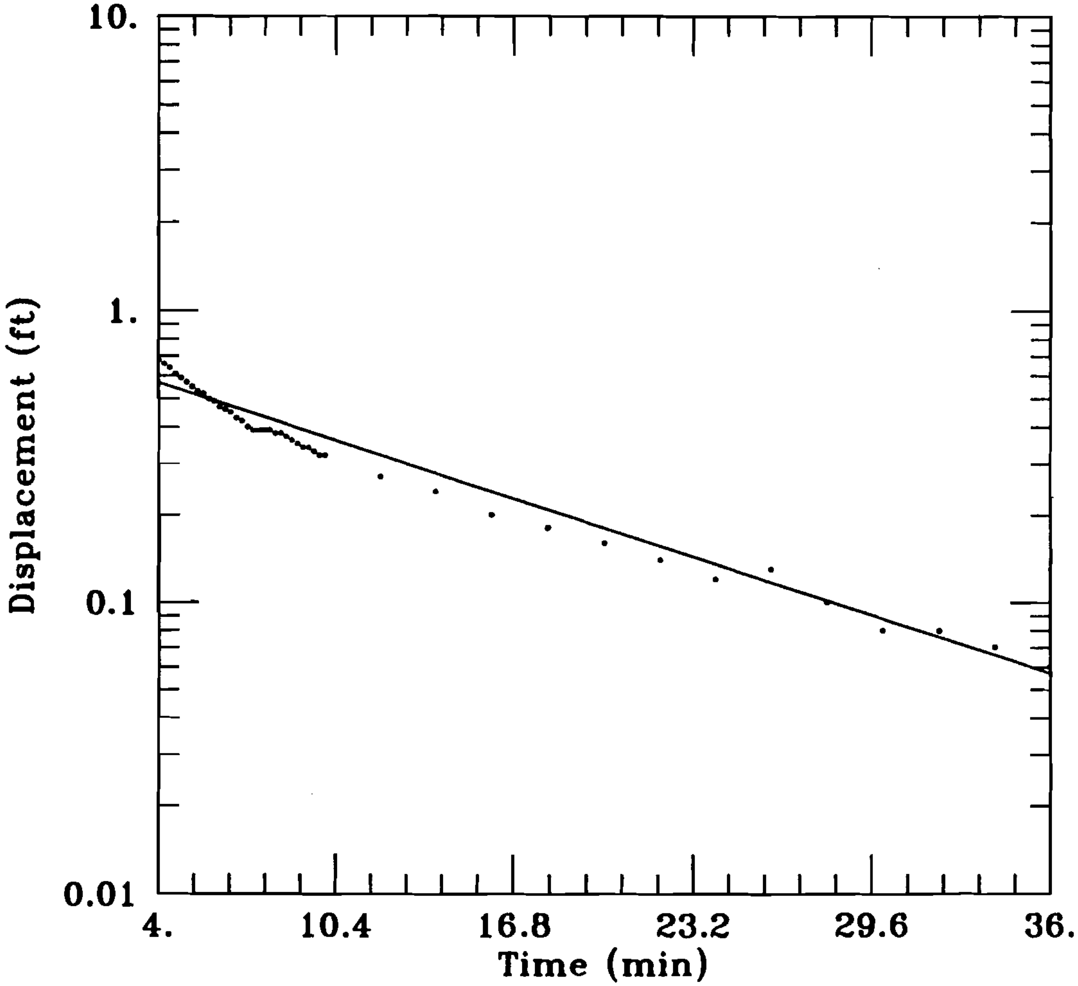
==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
K =	1.6073E-004 ft/min
y0 =	9.6446E-001 ft

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>



DATA SET:
SMU31MW2.DAT
09/03/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: JANUARY 12, 1995
obs. well: SWMU-31 31MW2

TEST DATA:
H0 = 2.18 ft
rc = 0.167 ft
rw = 0.413 ft
L = 10. ft
b = 20. ft
H = 4.46 ft

PARAMETER ESTIMATES:
K = 0.0004158 ft/min
y0 = 0.7575 ft

RAAP SWMU-31 31MW2 INJECTION

Client: USAEC	Company: PARSONS ENGINEERING SCIENCE
Location: RADFORD, VIRGINIA	Project: 722843

AQTESOLV

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V R E S U L T S

Version 2.01

Developed by Glenn M. Duffield
(c) 1988-1995 Geraghty & Miller, Inc.

09/03/95 12:41:05

==

TEST DESCRIPTION

```
Data set........... SMU31MW2.DAT
Output file........ SMU31MW2.OUT
Data set title..... RAAP SWMU-31 31MW2 INJECTION
Company............ PARSONS ENGINEERING SCIENCE
Project............ 722843
Client............. USAEC
Location........... RADFORD, VIRGINIA
Test date.......... JANUARY 12, 1995
Obs. well.......... SWMU-31 31MW2

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 2.18
   Radius of well casing............ 0.167
   Radius of wellbore............... 0.413
   Aquifer saturated thickness...... 20
   Well screen length............... 10
   Static height of water in well... 4.46
   Gravel pack porosity............. 0.3
   Effective well casing radius..... 0.2659
   Effective wellbore radius........ 0.413
   Log(Re/Rw)....................... 1.638
   Constants A, B and C............. 2.269 ,  0.364,   0.000
   No. of observations.............. 204
```

==

ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

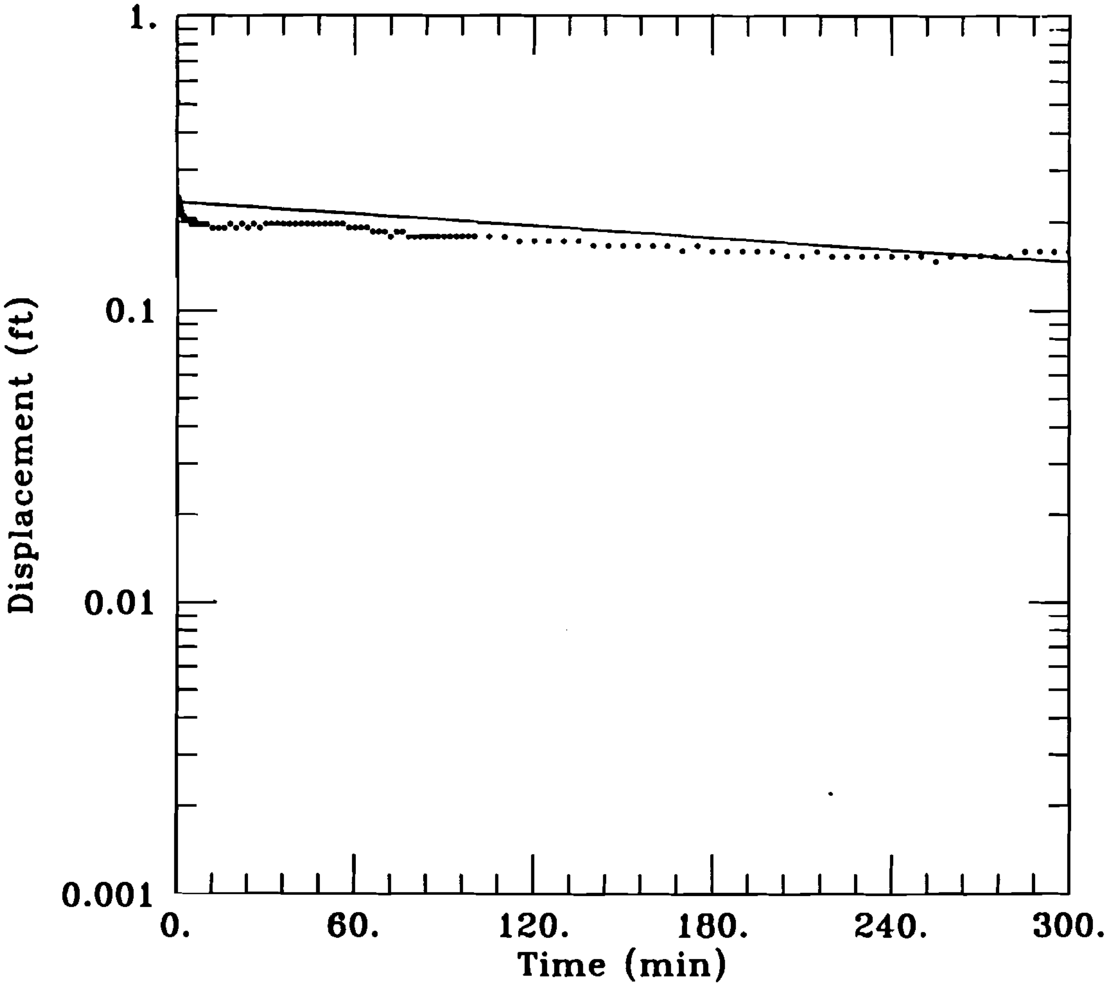
==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

```
           Estimate
   K  =   4.1580E-004 ft/min
   y0 =   7.5754E-001 ft
```

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>



DATA SET:
SMU31MW3.DAT
03/03/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: January 11, 1995
obs. well: 31MW3

TEST DATA:
H0 = 0.51 ft
rc = 0.167 ft
rw = 0.413 ft
L = 10. ft
b = 20. ft
H = 6.87 ft

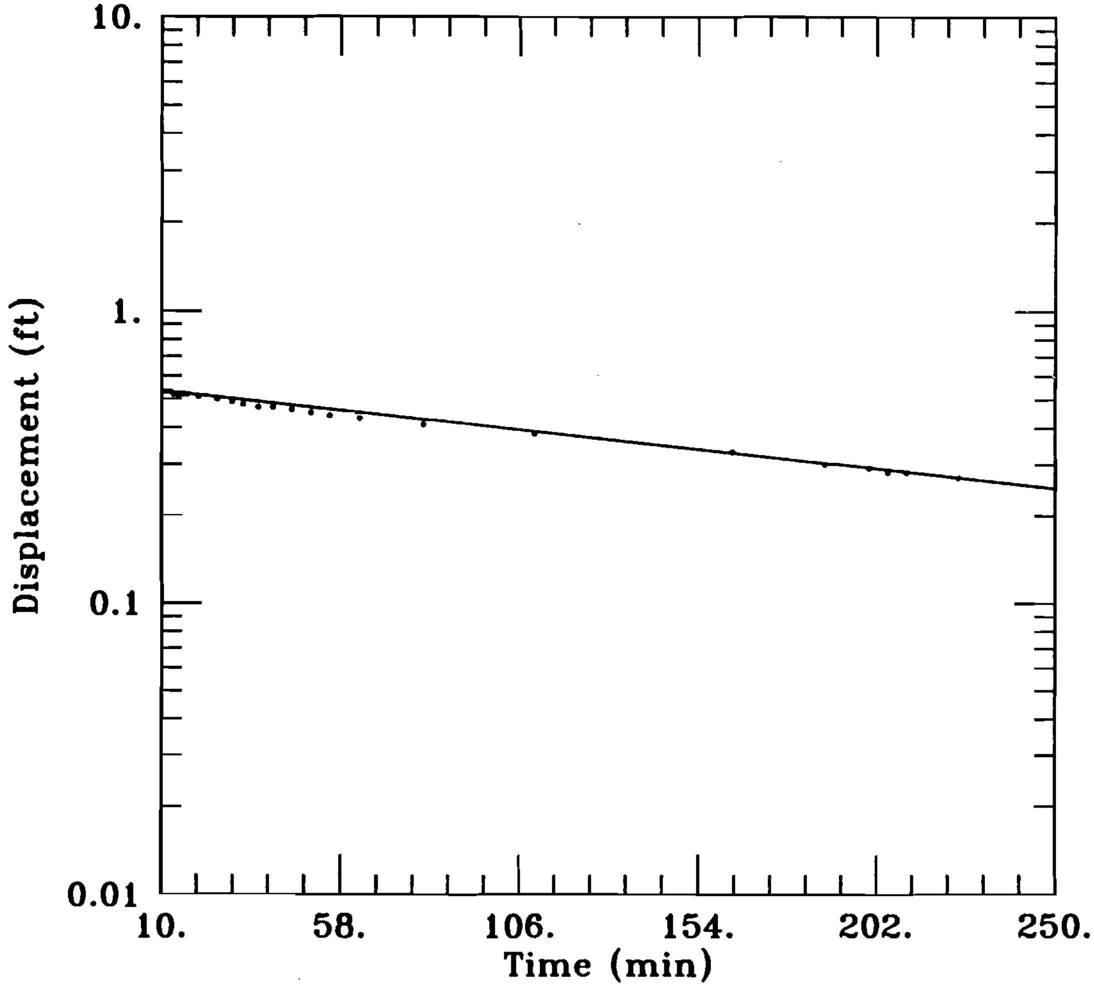
PARAMETER ESTIMATES:
K = 1.024E-05 ft/min
y0 = 0.2338 ft

RAAP SWMU-31 31MW3 INJECTION

Client: USAEC	Company: Parsons Engineering Science
Location: Radford, Virginia	Project: 722843

AQTESOLV

```
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>

                     A Q T E S O L V   R E S U L T S
                              Version 2.01

                      Developed by Glenn M. Duffield
                  (c) 1988-1995  Geraghty & Miller, Inc.

09/03/95                                                                13:37:0

================================================================================
                              TEST DESCRIPTION

Data set........... SMU31MW3.DAT
Output file........ SMU31M3I.OUT
Data set title..... RAAP SWMU-31 31MW3 INJECTION
Company............ Parsons Engineering Science
Project............ 722843
Client............. USCOE
Location........... Radford, Virginia
Test date.......... January 11, 1995
Obs. well.......... 31MW3

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 0.51
   Radius of well casing............ 0.167
   Radius of wellbore............... 0.413
   Aquifer saturated thickness...... 20
   Well screen length............... 10
   Static height of water in well... 6.87
   Gravel pack porosity............. 0.3
   Effective well casing radius..... 0.2659
   Effective wellbore radius........ 0.413
   Log(Re/Rw)....................... 1.862
   Constants A, B and C............. 2.269 ,  0.364,  0.000
   No. of observations.............. 314

================================================================================
                              ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

================================================================================
                      RESULTS FROM VISUAL CURVE MATCHING


VISUAL MATCH PARAMETER ESTIMATES

          Estimate
   K  =   1.0236E-005 ft/min
   y0 =   2.3381E-001 ft


<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
```



DATA SET:
SMU31M3W.DAT
09/03/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: JANUARY 12, 1995
obs. well: 31MW3

TEST DATA:
H0 = 1.47 ft
rc = 0.167 ft
rw = 0.413 ft
L = 10. ft
b = 50. ft
H = 6.87 ft

PARAMETER ESTIMATES:
K = 2.034E-05 ft/min
y0 = 0.5517 ft

RAAP SWMU-31 31MW3 WITHDRAWAL

Client: USAEC	Company: PARSONS ENGINEERING SCIENCE
Location: RADFORD, VIRGINIA	Project: 722843

AQTESOLV

A Q T E S O L V   R E S U L T S
Version 2.01

Developed by Glenn M. Duffield

09/03/95 14:08:55

TEST DESCRIPTION

```
Data set........... SMU31M3W.DAT
Output file........ SMU31M3W.OUT
Data set title..... RAAP SWMU-31 31MW3 WITHDRAWAL
Company............ PARSONS ENGINEERING SCIENCE
Project............ 722843
Client............. USAEC
Location........... RADFORD, VIRGINIA
Test date.......... JANUARY 12, 1995
Obs. well.......... 31MW3

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 1.47
   Radius of well casing............ 0.167
   Radius of wellbore............... 0.413
   Aquifer saturated thickness...... 50
   Well screen length............... 10
   Static height of water in well... 6.87
   Gravel pack porosity............. 0.3
   Effective well casing radius..... 0.2659
   Effective wellbore radius........ 0.413
   Log(Re/Rw)....................... 1.802
   Constants A, B and C............. 2.269 ,  0.364,  0.000
   No. of observations.............. 57
```

ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

```
          Estimate           Std.  Error
   K  =   3.6792E-005 +/-    6.5099E-006 ft/min
   y0 =   6.6427E-001 +/-    2.3484E-002 ft
```

ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated
weighted residual = residual * weight

Weighted Residual Statistics:
   Number of residuals............... 57
   Number of estimated parameters.... 2
   Degrees of freedom................ 55
   Residual mean..................... 0.001927
   Residual standard deviation....... 0.1349
   Residual variance................. 0.0182

Model Residuals:

Time	Observed	Calculated	Residual	Weight
1	1.35	0.66045	0.68955	1
1.17	1.05	0.6598	0.3902	1
1.25	0.94	0.65949	0.28051	1
1.5	0.84	0.65854	0.18146	1
1.58	0.78	0.65824	0.12176	1
1.67	0.74	0.65789	0.082106	1
1.75	0.73	0.65759	0.072409	1
1.91	0.71	0.65698	0.053017	1
2	0.69	0.65664	0.033358	1
2.25	0.68	0.65569	0.024306	1
2.41	0.67	0.65509	0.014911	1
2.5	0.656	0.65475	0.0012519	1
2.67	0.65	0.65411	-0.0041055	1
2.91	0.64	0.6532	-0.013199	1
3.17	0.63	0.65222	-0.022219	1
3.33	0.62	0.65162	-0.031617	1
3.67	0.61	0.65034	-0.040338	1
3.91	0.6	0.64944	-0.049437	1
4	0.59	0.6491	-0.0591	1
4.75	0.58	0.64629	-0.066294	1
5	0.57	0.64536	-0.075362	1
6	0.57	0.64164	-0.071645	1
6.25	0.55	0.64072	-0.090719	1
6.75	0.55	0.63887	-0.088871	1
7.25	0.55	0.63703	-0.087029	1
8.25	0.55	0.63336	-0.08336	1
9.25	0.54	0.62971	-0.089712	1
9.75	0.53	0.6279	-0.097896	1
10.25	0.53	0.62609	-0.096086	1
11.25	0.53	0.62248	-0.09248	1
12.25	0.53	0.61889	-0.088895	1
13.25	0.52	0.61533	-0.09533	1
14.25	0.52	0.61179	-0.091787	1
15.25	0.52	0.60826	-0.088263	1
16	0.52	0.60563	-0.085634	1
17	0.52	0.60215	-0.082146	1
20	0.51	0.5918	-0.081802	1
25	0.5	0.57496	-0.074955	1
29	0.49	0.56182	-0.071824	1
32	0.48	0.55217	-0.072173	1
36	0.47	0.53956	-0.069562	1
40	0.47	0.52724	-0.057239	1
45	0.46	0.51223	-0.05223	1
50	0.45	0.49765	-0.047649	1

55	0.44	0.48348	-0.043482	1
63	0.43	0.46165	-0.03165	1
80	0.41	0.41847	-0.0084749	1
110	0.38	0.3519	0.028103	1
163	0.33	0.2591	0.0709	1
188	0.3	0.22426	0.075737	1
200	0.29	0.20925	0.080755	1
205	0.28	0.20329	0.076711	1
210	0.28	0.1975	0.082498	1
224	0.27	0.18216	0.08784	1
252	0.24	0.15496	0.085041	1
305	0.07	0.1141	-0.044095	1
335	0.02	0.095943	-0.075943	1

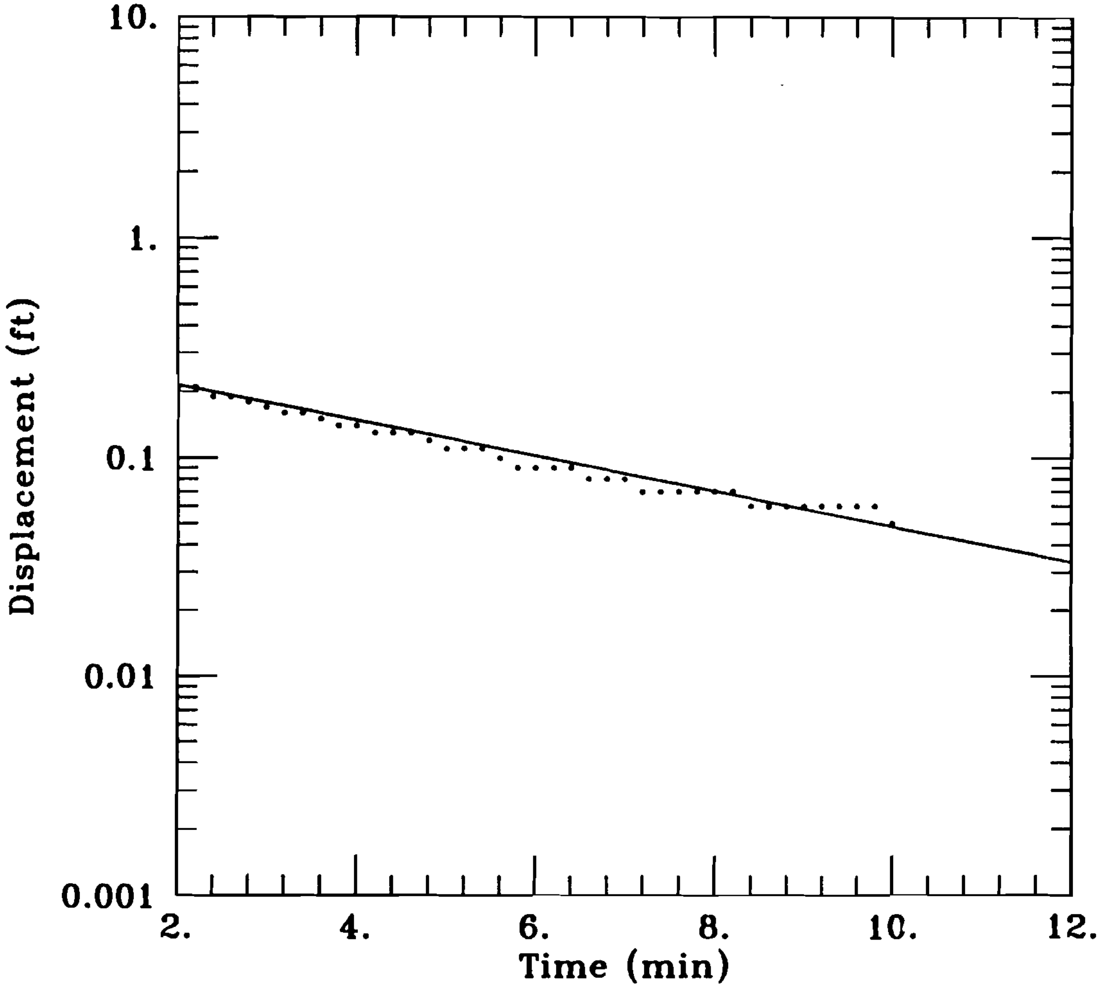
==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

```
           Estimate
   K  =    2.0339E-005 ft/min
   y0 =    5.5172E-001 ft
```

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>



DATA SET:
SMU31MW4.DAT
09/03/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: January 11, 1995
obs. well: 31MW4

TEST DATA:
H0 = 0.33 ft
rc = 0.167 ft
rw = 0.413 ft
L = 10. ft
b = 20. ft
H = 5.61 ft

PARAMETER ESTIMATES:
K = 0.001161 ft/min
y0 = 0.3135 ft

RAAP SWMU-31 31MW4 INJECTION

Client: USAEC	Company: Parsons Engineering Science
Location: Radford, Virginia	Project: 722483

AQTESOLV

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S

Version 2.01

Developed by Glenn M. Duffield

08/09/95 09:14:31

==

TEST DESCRIPTION

```
Data set........... SMU31MW4.DAT
Output file........ SMU31MW4.OUT
Data set title..... RAAP SWMU-31 31MW4 INJECTION
Company............ Parsons Engineering Science
Project............ 722483
Client............. USCOE
Location........... Radford, Virginia
Test date.......... January 11, 1995
Obs. well.......... 31MW4

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 0.33
   Radius of well casing............ 0.167
   Radius of wellbore............... 0.413
   Aquifer saturated thickness...... 20
   Well screen length............... 10
   Static height of water in well... 5.61
   Gravel pack porosity............. 0.3
   Effective well casing radius..... 0.2659
   Effective wellbore radius........ 0.413
   Log(Re/Rw)....................... 1.758
   Constants A, B and C............. 2.269 ,  0.364,  0.000
   No. of observations.............. 84
```

==

ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

```
          Estimate          Std. Error
   K  =   2.4211E-002 +/-   2.8895E-003 ft/min
   y0 =   2.4020E+001 +/-   9.2029E+000 ft
```

ANALYSIS OF MODEL RESIDUALS

```
residual = observed - calculated
weighted residual = residual * weight

Weighted Residual Statistics:
   Number of residuals............... 84
   Number of estimated parameters.... 2
   Degrees of freedom................ 82
   Residual mean..................... 0.05972
   Residual standard deviation....... 0.1186
   Residual variance................. 0.01408
```

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.75	1.55	1.2931	0.25694	1
0.767	1.47	1.2102	0.25981	1
0.783	1.3	1.1371	0.16294	1
0.8	1.18	1.0642	0.11581	1
0.817	1.09	0.996	0.094004	1
0.833	1.01	0.93581	0.074193	1
0.85	0.61	0.87584	-0.26584	1
0.867	0.64	0.81971	-0.17971	1
0.883	0.59	0.77017	-0.18017	1
0.9	0.55	0.72082	-0.17082	1
0.917	0.52	0.67463	-0.15463	1
0.933	0.49	0.63386	-0.14386	1
0.95	0.47	0.59324	-0.12324	1
0.967	0.45	0.55522	-0.10522	1
0.983	0.43	0.52167	-0.091669	1
1	0.42	0.48824	-0.068238	1
1.2	0.4	0.224	0.176	1
1.4	0.3	0.10277	0.19723	1
1.6	0.26	0.047148	0.21285	1
1.8	0.23	0.021631	0.20837	1
2	0.21	0.009924	0.20008	1
2.2	0.21	0.004553	0.20545	1
2.4	0.19	0.0020889	0.18791	1
2.6	0.19	0.00095835	0.18904	1
2.8	0.18	0.00043968	0.17956	1
3	0.17	0.00020172	0.1698	1
3.2	0.16	9.2546E-005	0.15991	1
3.4	0.16	4.2459E-005	0.15996	1
3.6	0.15	1.948E-005	0.14998	1
3.8	0.14	8.937E-006	0.13999	1
4	0.14	4.1002E-006	0.14	1
4.2	0.13	1.8811E-006	0.13	1
4.4	0.13	8.6303E-007	0.13	1
4.6	0.13	3.9595E-007	0.13	1
4.8	0.12	1.8166E-007	0.12	1
5	0.11	8.3341E-008	0.11	1
5.2	0.11	3.8236E-008	0.11	1
5.4	0.11	1.7542E-008	0.11	1
5.6	0.1	8.0481E-009	0.1	1
5.8	0.09	3.6924E-009	0.09	1
6	0.09	1.694E-009	0.09	1
6.2	0.09	7.7719E-010	0.09	1
6.4	0.09	3.5657E-010	0.09	1
6.6	0.08	1.6359E-010	0.08	1

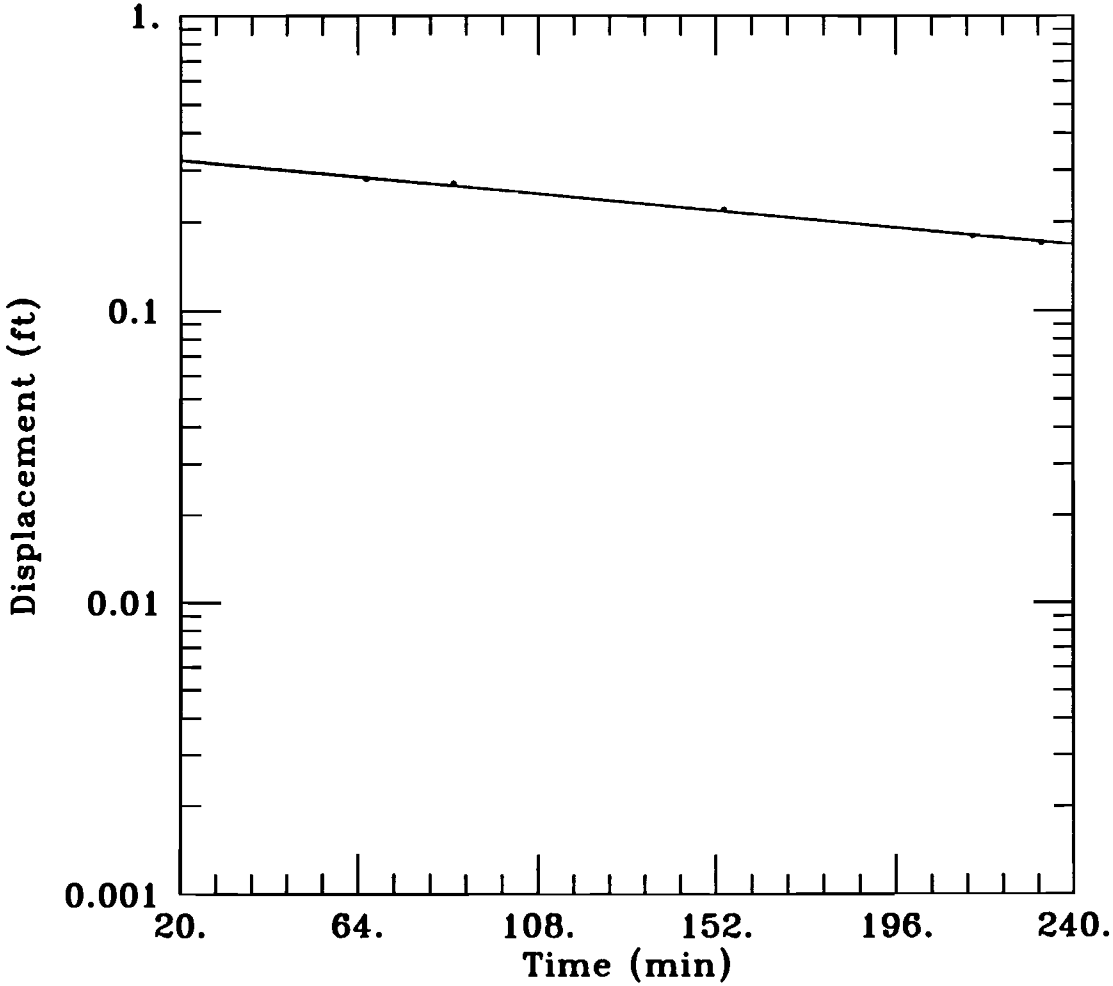
6.8	0.08	7.5052E-011	0.08	1
7	0.08	3.4433E-011	0.08	1
7.2	0.07	1.5797E-011	0.07	1
7.4	0.07	7.2476E-012	0.07	1
7.6	0.07	3.3251E-012	0.07	1
7.8	0.07	1.5255E-012	0.07	1
8	0.07	6.9989E-013	0.07	1
8.2	0.07	3.211E-013	0.07	1
8.4	0.06	1.4732E-013	0.06	1
8.6	0.06	6.7587E-014	0.06	1
8.8	0.06	3.1008E-014	0.06	1
9	0.06	1.4226E-014	0.06	1
9.2	0.06	6.5268E-015	0.06	1
9.4	0.06	2.9944E-015	0.06	1
9.6	0.06	1.3738E-015	0.06	1
9.8	0.06	6.3028E-016	0.06	1
10	0.05	2.8916E-016	0.05	1
12	0.05	1.1947E-019	0.05	1
14	0.04	4.936E-023	0.04	1
16	0.03	2.0393E-026	0.03	1
18	0.02	8.4255E-030	0.02	1
20	0.02	3.4811E-033	0.02	1
22	0.02	1.4382E-036	0.02	1
24	0.02	5.9421E-040	0.02	1
26	0.01	2.455E-043	0.01	1
28	0.02	1.0143E-046	0.02	1
30	0.01	4.1906E-050	0.01	1
32	0.01	1.7314E-053	0.01	1
34	0.01	7.1533E-057	0.01	1
36	0.01	2.9554E-060	0.01	1
38	0.01	1.2211E-063	0.01	1
40	0.01	5.0449E-067	0.01	1
42	0.01	2.0843E-070	0.01	1
44	0.01	8.6114E-074	0.01	1
46	0.01	3.5579E-077	0.01	1
48	0.01	1.47E-080	0.01	1
50	0.01	6.0732E-084	0.01	1
52	0.01	2.5092E-087	0.01	1
54	0.01	1.0367E-090	0.01	1
56	0.01	4.2831E-094	0.01	1

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
K =	8.3952E-003 ft/min
y0 =	9.5775E+000 ft

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>



DATA SET:
SMU31M4W.DAT
09/03/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: JANUARY 12, 1995
obs. well: 31MW4

TEST DATA:
H0 = 0.9 ft
rc = 0.167 ft
rw = 0.413 ft
L = 10. ft
b = 20. ft
H = 5.3 ft

PARAMETER ESTIMATES:
K = 1.821E-05 ft/min
y0 = 0.3432 ft

RAAP SWMU-31 31MW4 WITHDRAWAL

Client: USAEC	Company: PARSONS ENGINEERING SCIENCE
Location: RADFORD, VIRGINIA	Project: 722843

AQTESOLV

101

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S
Version 2.01

Developed by Glenn M. Duffield
(c) 1988-1995 Geraghty & Miller, Inc.

09/03/95 14:57:2

==

TEST DESCRIPTION

```
Data set........... SMU31M4W.DAT
Output file........ SMU31M4W.OUT
Data set title..... RAAP SWMU-31 31MW4 WITHDRAWAL
Company............ PARSONS ENGINEERING SCIENCE
Project............ 722843
Client............. USAEC
Location........... RADFORD, VIRGINIA
Test date.......... JANUARY 12, 1995
Obs. well.......... 31MW4

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 0.9
   Radius of well casing............ 0.167
   Radius of wellbore............... 0.413
   Aquifer saturated thickness...... 20
   Well screen length............... 10
   Static height of water in well... 5.3
   Gravel pack porosity............. 0.3
   Effective well casing radius..... 0.2659
   Effective wellbore radius........ 0.413
   Log(Re/Rw)....................... 1.729
   Constants A, B and C............. 2.269 ,  0.364,  0.000
   No. of observations.............. 27
```

==

ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

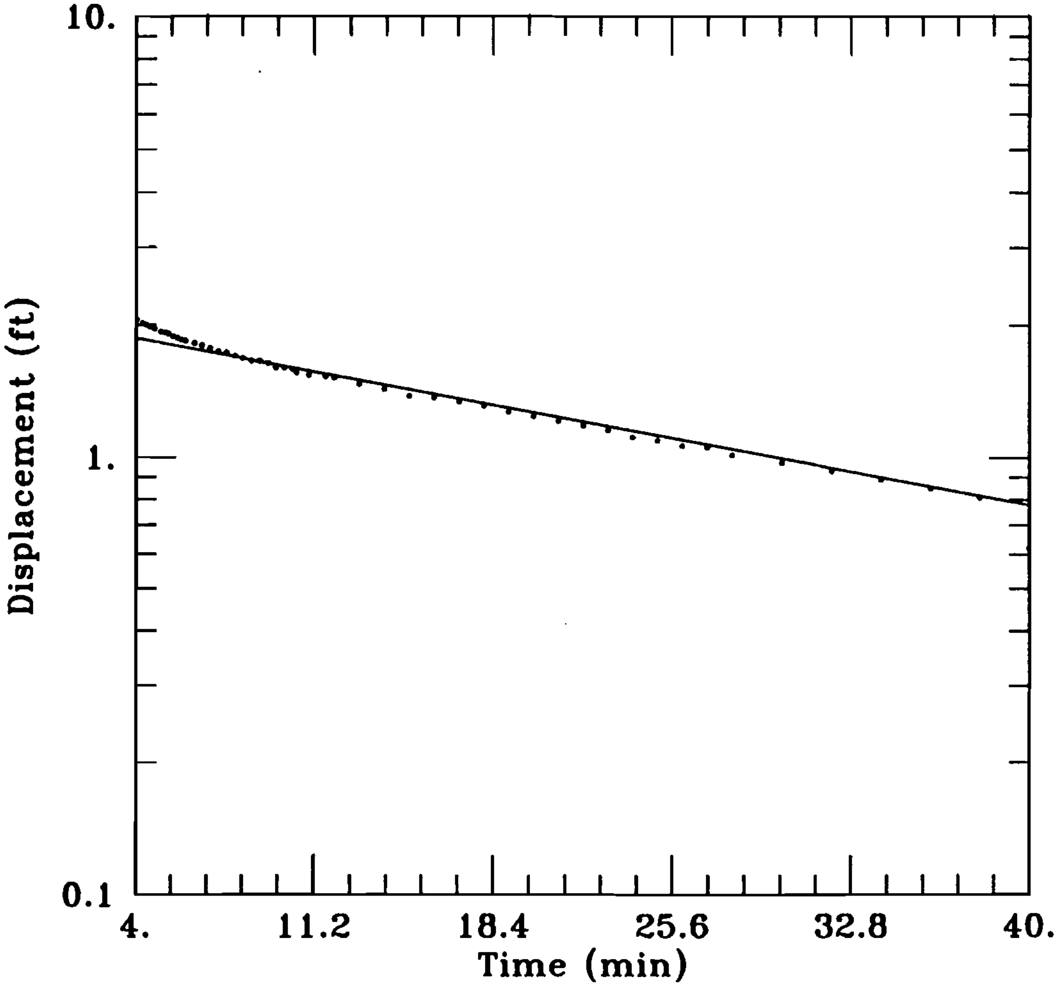
==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

```
           Estimate
   K  =   1.8206E-005 ft/min
   y0 =   3.4319E-001 ft
```

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>



DATA SET:
SMU48MW1.DAT
09/03/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: January 13, 1995
obs. well: 48MW1

TEST DATA:
H0 = 3.24 ft
rc = 0.167 ft
rw = 0.413 ft
L = 30. ft
b = 50. ft
H = 42.96 ft

PARAMETER ESTIMATES:
K = 9.178E-05 ft/min
y0 = 2.056 ft

RAAP SWMU-48 48MW1 INJECTION

Client: USAEC	Company: **Parsons Engineering Science**
Location: **Radford, Virginia**	Project: **722843**

AQTESOLV

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S
Version 2.01

Developed by Glenn M. Duffield

09/03/95 15:02:5

==

TEST DESCRIPTION

Data set........... SMU48MW1.DAT
Output file........ SMU48M1I.OUT
Data set title..... RAAP SWMU-48 48MW1 INJECTION
Company............ Parsons Engineering Science
Project............ 722843
Client............. USCOE
Location........... Radford, Virginia
Test date.......... January 13,1995
Obs. well.......... 48MW1

Units of Measurement
Length.......... ft
Time............ min

Test Well Data
Initial displacement in well..... 3.24
Radius of well casing............ 0.167
Radius of wellbore............... 0.413
Aquifer saturated thickness...... 50
Well screen length............... 30
Static height of water in well... 42.96
Gravel pack porosity............. 0.3
Effective well casing radius..... 0.2659
Effective wellbore radius........ 0.413
Log(Re/Rw)....................... 3.21
Constants A, B and C............. 3.737 , 0.596, 0.000
No. of observations.............. 82

==

ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

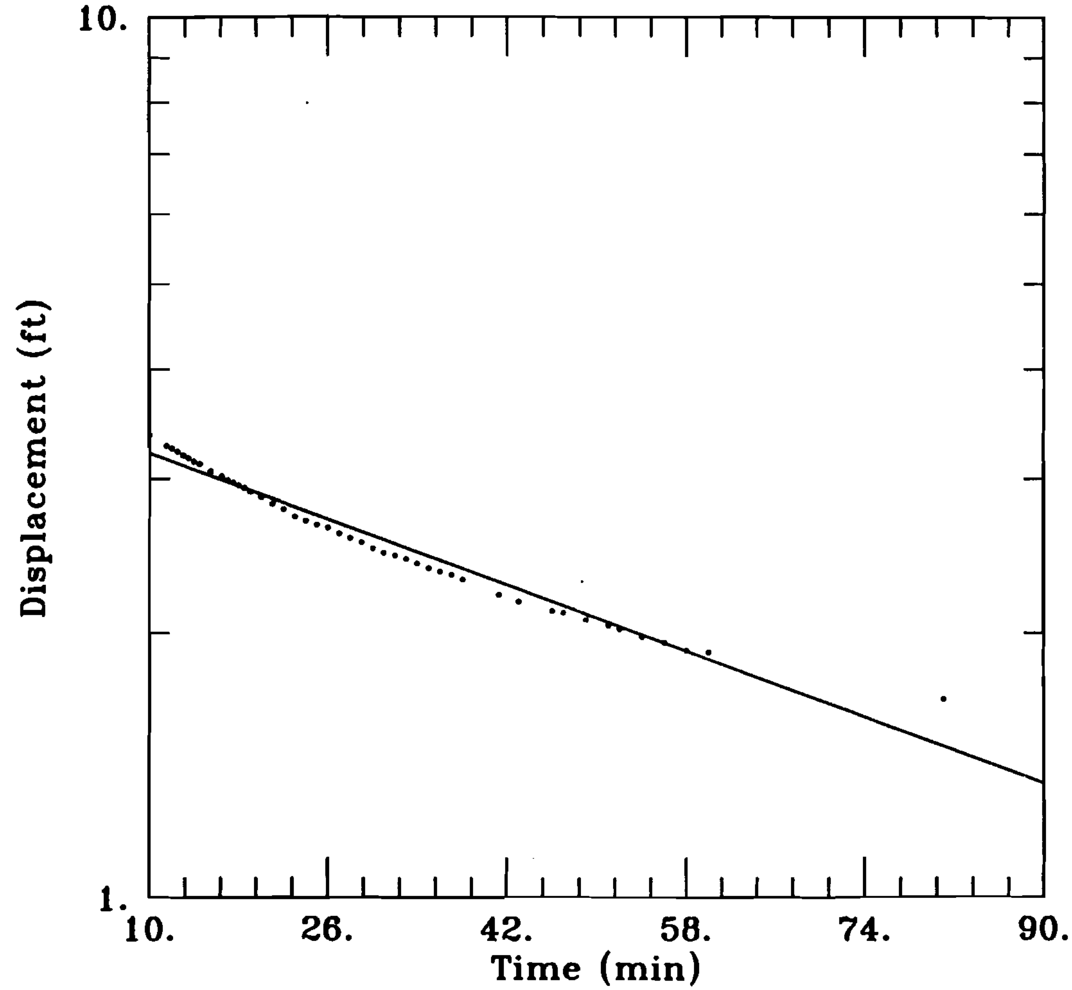
==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
K =	9.1785E-005 ft/min
y0 =	2.0556E+000 ft

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>



DATA SET:
SMU48M1W.DAT
09/03/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: JANUARY 13, 1995
obs. well: 48MW1

TEST DATA:
H0 = 4.22 ft
rc = 0.167 ft
rw = 0.413 ft
L = 30. ft
b = 50. ft
H = 43. ft

PARAMETER ESTIMATES:
K = 4.107E-05 ft/min
y0 = 3.579 ft

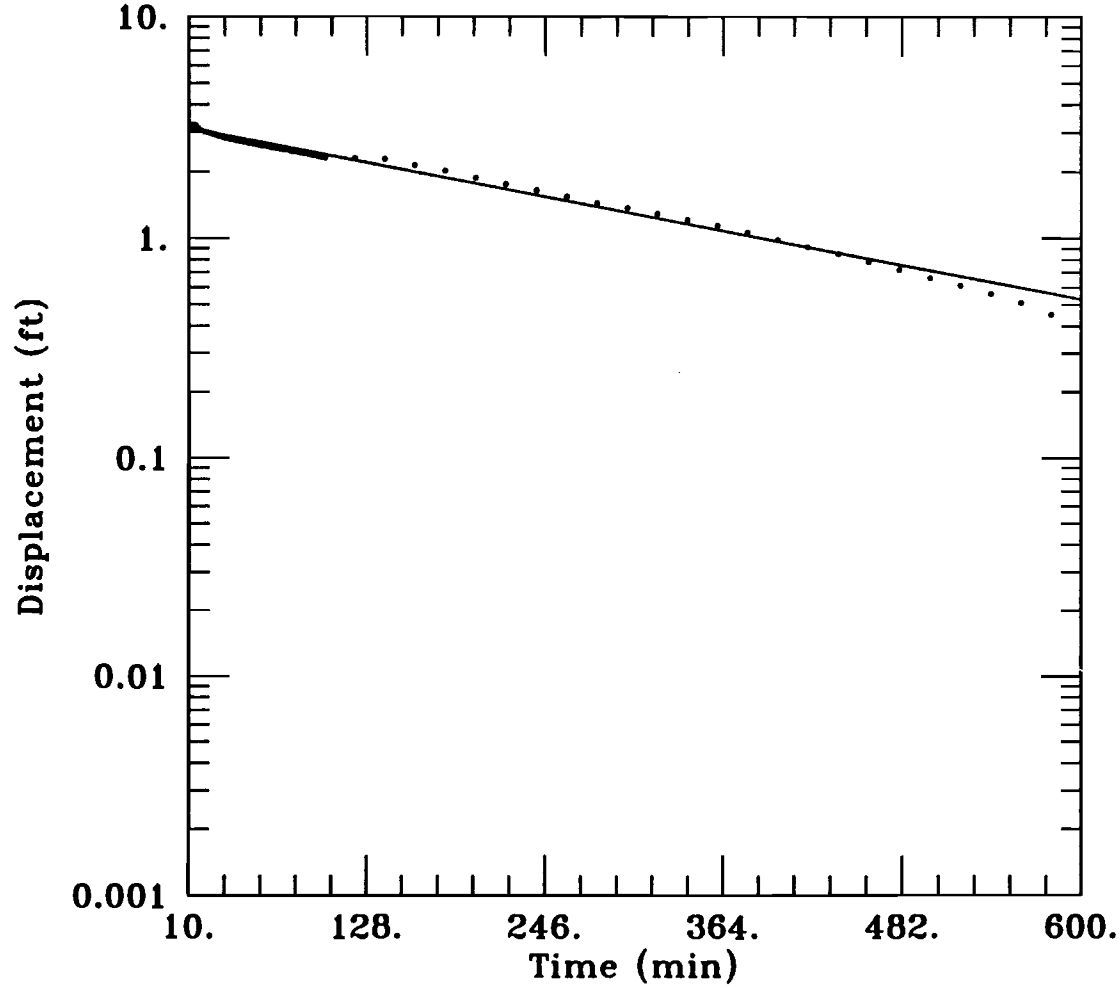
RAAP SWMU-48 48MW1 WITHDRAWAL

Client: USAEC	Company: PARSONS ENGINEERING SCIENCE
Location: RADFORD, VIRGINIA	Project: 722843

AQTESOLV

106

```
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>

                    A Q T E S O L V   R E S U L T S
                             Version 2.01

                      Developed by Glenn M. Duffield
                  (c) 1988-1995  Geraghty & Miller, Inc.

09/03/95                                                                16:06:28

================================================================================
                              TEST DESCRIPTION

Data set........... SMU48M1W.DAT
Output file........ SMU48M1W.OUT
Data set title..... RAAP SWMU-48 48MW1 WITHDRAWAL
Company............ PARSONS ENGINEERING SCIENCE
Project............ 722843
Client............. USAEC
Location........... RADFORD, VIRGINIA
Test date.......... JANUARY 13, 1995
Obs. well.......... 48MW1

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 4.22
   Radius of well casing............ 0.167
   Radius of wellbore............... 0.413
   Aquifer saturated thickness...... 50
   Well screen length............... 30
   Static height of water in well... 43
   Gravel pack porosity............. 0.3
   Effective well casing radius..... 0.2659
   Effective wellbore radius........ 0.413
   Log(Re/Rw)....................... 3.211
   Constants A, B and C............. 3.737 ,  0.596,  0.000
   No. of observations.............. 85

================================================================================
                              ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

================================================================================
                     RESULTS FROM VISUAL CURVE MATCHING


VISUAL MATCH PARAMETER ESTIMATES

           Estimate
   K  =   4.1069E-005 ft/min
   y0 =   3.5793E+000 ft


<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
```



DATA SET:
SMU48MW2.DAT
09/03/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: January 13, 1995
obs. well: 48MW2

TEST DATA:
H0 = 1.36 ft
rc = 0.086 ft
rw = 0.208 ft
L = 30. ft
b = 50. ft
H = 19.11 ft

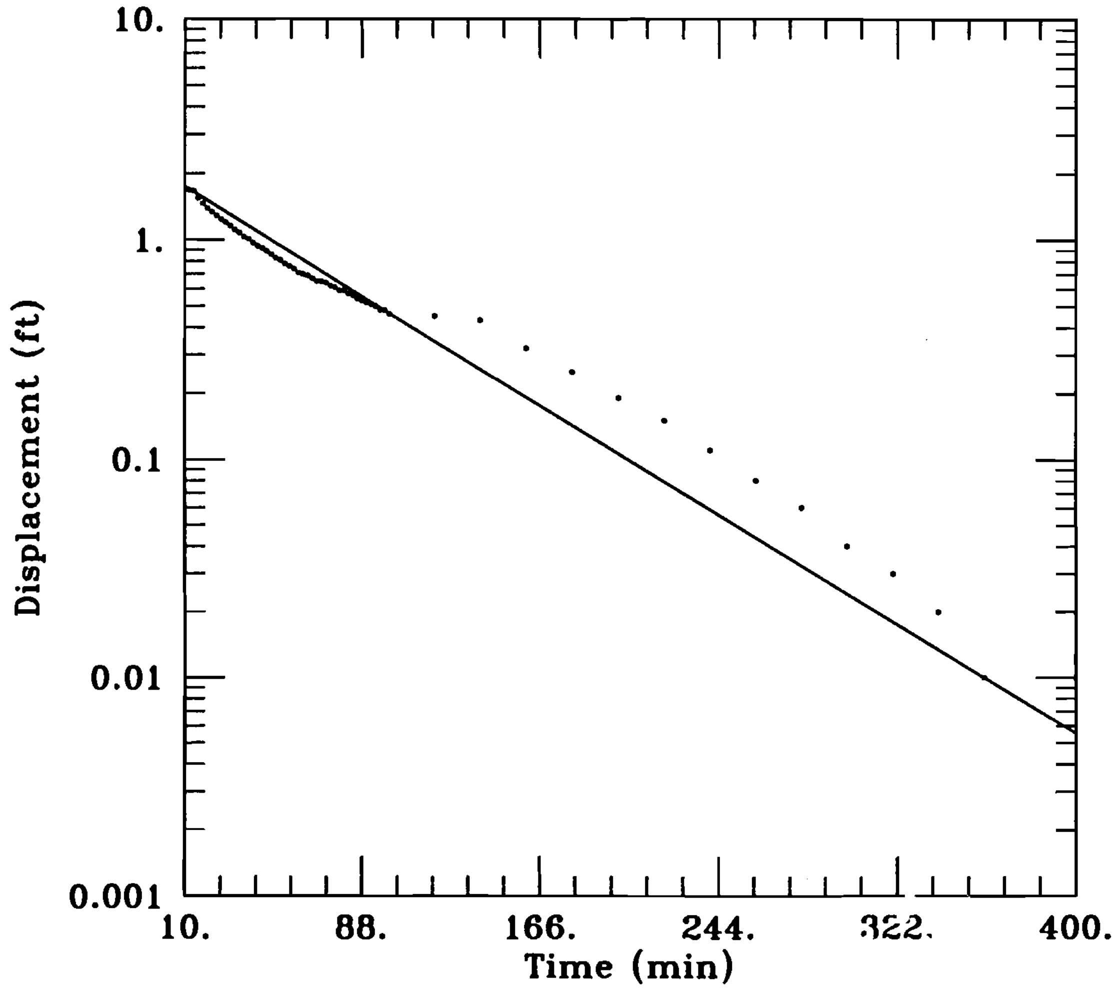
PARAMETER ESTIMATES:
K = 2.923E-06 ft/min
y0 = 3.222 ft

RAAP SWMU-48 48MW2 INJECTION

Client: USAEC	Company: **Parsons Engineering Science**
Location: **Radford, Virginia**	Project: **722483**

AQTESOLV

```
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>

                    A Q T E S O L V    R E S U L T S
                              Version 2.01

                     Developed by Glenn M. Duffield
                  (c) 1988-1995  Geraghty & Miller, Inc.

09/03/95                                                                16:11:1

================================================================================
                            TEST DESCRIPTION

Data set........... SMU48MW2.DAT
Output file........ SMU48M2I.OUT
Data set title..... RAAP SWMU-48 48MW2 INJECTION
Company............ Parsons Engineering Science
Project............ 722483
Client............. USCOE
Location........... Radford, Virginia
Test date.......... January 13, 1995
Obs. well.......... 48MW2

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 1.36
   Radius of well casing............ 0.086
   Radius of wellbore............... 0.208
   Aquifer saturated thickness...... 50
   Well screen length............... 30
   Static height of water in well... 19.11
   Gravel pack porosity............. 0.3
   Effective well casing radius..... 0.1347
   Effective wellbore radius........ 0.208
   Log(Re/Rw)....................... 3.207
   Constants A, B and C............. 5.297 ,  0.917,  0.000
   No. of observations.............. 122

================================================================================
                            ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

================================================================================
                   RESULTS FROM VISUAL CURVE MATCHING


VISUAL MATCH PARAMETER ESTIMATES

             Estimate
   K  =   2.9225E-006 ft/min
   y0 =   3.2217E+000 ft


<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
```



DATA SET:
SMU48MW3.DAT
09/03/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: January 13, 1995
obs. well: 48MW3

TEST DATA:
H0 = 3.08 ft
rc = 0.167 ft
rw = 0.413 ft
L = 20. ft
b = 50. ft
H = 29.78 ft

PARAMETER ESTIMATES:
K = 7.268E-05 ft/min
y0 = 2.024 ft

RAAP SWMU-48 48MW3 INJECTION

Client: USAEC

Company: **Parsons Engineering Science**

Location: **Radford, Virginia**

Project: **722483**

AQTESOLV

103

A Q T E S O L V   R E S U L T S
Version 2.01

Developed by Glenn M. Duffield
(c) 1988-1995 Geraghty & Miller, Inc.

09/03/95 16:13:28

TEST DESCRIPTION

Data set........... SMU48MW3.DAT
Output file........ SMU48M3I.OUT
Data set title..... RAAP SWMU-48 48MW3 INJECTION
Company............ Parsons Engineering Science
Project............ 722483
Client............. USCOE
Location........... Radford, Virginia
Test date.......... January 13, 1995
Obs. well.......... 48MW3

Units of Measurement
  Length.......... ft
  Time............ min

Test Well Data
  Initial displacement in well..... 3.08
  Radius of well casing............ 0.167
  Radius of wellbore............... 0.413
  Aquifer saturated thickness...... 50
  Well screen length............... 20
  Static height of water in well... 29.78
  Gravel pack porosity............. 0.3
  Effective well casing radius..... 0.2659
  Effective wellbore radius........ 0.413
  Log(Re/Rw)....................... 2.788
  Constants A, B and C............. 3.025 , 0.487, 0.000
  No. of observations.............. 142

ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate	
K =	7.2684E-005	ft/min
y0 =	2.0241E+000	ft

ES ENGINEERING-SCIENCE, INC.

111

Client - USAEC	Job No. 722843	Sheet 1 of 1
Subject Slug tests - R.A.A.P. - FALLING HEAD/INJECTION -	By Ben Walker	Date 1/12/95
	Checked J.C. [illegible]	Rev. 11/7/95

Data analyzed using Bouwer - Rice (1979) Solution from Aqtesolv :

31MW1

INJECTION

k = hydraulic conductivity

$$K = 1.607 \times 10^{-4} \text{ ft./min.}$$

$$K = \frac{1.607 \times 10^{-4} \text{ ft.}}{\text{min.}} \times \frac{60 \text{ min.}}{1 \text{ hr.}} \times \frac{24 \text{ hr.}}{1 \text{ day}}$$

$$\boxed{K = 0.231 \text{ ft./day}}$$

$$= \quad \times 3.53 \times 10^{-4} \text{ (cm/sec. conversion)}$$

$$\boxed{K = 8.15 \times 10^{-5} \text{ cm/sec.}}$$

T = transmissivity

$$T = kb$$

$$T = (0.231 \text{ ft./day}) \times 20 \text{ ft.}$$

$$T = \boxed{4.62 \text{ ft}^2\text{/day}}$$

112

Client	USAEC	Job No. 722843	Sheet 1 of 1
Subject	Slug tests - R.A.A.P.	By Ben Walker	Date 1/12/95
	- FALLING HEAD/ INJECTION -	Checked J.C. [illegible]	Rev. 11/7/95

Data analyzed using Bouwer - Rice (1979) Solution from Aqtesolv :

31MW2

INJECTION

k = hydraulic conductivity

$$K = 4.158 \times 10^{-4} \ ft./min.$$

$$k = \frac{4.158 \times 10^{-4} \ ft.}{min.} \times \frac{60 \ min.}{1 \ hr.} \times \frac{24 \ hr.}{1 \ day}$$

$$\boxed{K = 0.599 \ ft./day}$$

$$= \quad \times 3.53 \times 10^{-4} \ (cm/sec. \ conversion)$$

$$\boxed{k = 2.11 \times 10^{-4} \ cm/sec.}$$

T= transmissivity

$$T = kb$$

$$T = (0.599 \ ft./day) \times 20 \ ft.$$

$$T = \boxed{11.98 \ ft^2/day}$$

 113

ent - USAEC
bject Slug tests - R.A.A.P.
- FALLING HEAD/ INJECTION -

Job No. 722843
By Ben Walker
Checked J.C. [illegible]

Sheet 1 of 1
Date 1/11/95
Rev. 11/7/95

Data analyzed using Bouwer - Rice (1979) Solution from Aqtesolv :

$\boxed{31MW3}$ INJECTION

k = hydraulic conductivity

$K = 1.024 \times 10^{-5}$ ft./min.

$$K = \frac{1.024 \times 10^{-5} \text{ ft.}}{\text{min.}} \times \frac{60 \text{ min.}}{1 \text{ hr.}} \times \frac{24 \text{ hr.}}{1 \text{ day}}$$

$$\boxed{K = 0.015 \text{ ft./day}}$$

$= \qquad \times 3.53 \times 10^{-4}$ (cm/sec. conversion)

$$\boxed{K = 5.30 \times 10^{-6} \text{ cm/sec.}}$$

T = transmissivity

$T = kb$

$T = (0.015 \text{ ft./day}) \times 20 \text{ ft.}$

$T = \boxed{0.30 \text{ ft}^2/\text{day}}$

ES ENGINEERING-SCIENCE, INC.

114

Client - USAEC | Job No. 722843 | Sheet 1 of 1

Subject Slug tests - R.A.A.P. - FALLING HEAD/INJECTION- | By Ben Walker | Date 1/12/95

Checked J.C. [illegible] | Rev. 11/7/95

Data analyzed using Bouwer-Rice (1979) Solution from Aqtesolv:

$\boxed{\text{31MW4}}$ INJECTION

k = hydraulic conductivity

$K = 1.161 \times 10^{-3}$ ft./min.

$$k = \frac{1.161 \times 10^{-3} \text{ ft.}}{\text{min.}} \times \frac{60 \text{ min.}}{1 \text{ hr.}} \times \frac{24 \text{ hr.}}{1 \text{ day}}$$

$$\boxed{K = 1.67 \text{ ft./day}}$$

$=$ $\times 3.53 \times 10^{-4}$ (cm/sec. conversion)

$$\boxed{k = 5.30 \times 10^{-4} \text{ cm/sec.}}$$

T = transmissivity

$T = kb$

$T = (1.67 \text{ ft./day}) \times 20 \text{ ft.}$

$T = \boxed{33.4 \text{ ft}^2/\text{day}}$

ES-COR-E 5 86

ES ENGINEERING-SCIENCE, INC.

115

Client	USAEC	Job No. 722843	Sheet 1 of 1
Subject	Slug tests - R.A.A.P. - FALLING HEAD/INJECTION -	By Ben Walker	Date 1/13/95
		Checked 2.C. [illegible]	Rev. 11/7/95

Data analyzed using Bouwer-Rice (1979) Solution from Aqtesolv:

48MW1 INJECTION

k = hydraulic conductivity

$K = 9.178 \times 10^{-5}$ ft/min.

$$K = \frac{9.178 \times 10^{-5} \text{ ft.}}{\text{min.}} \times \frac{60 \text{ min.}}{1 \text{ hr.}} \times \frac{24 \text{ hr.}}{1 \text{ day}}$$

$\boxed{K = 0.132 \text{ ft/day}}$

$= \times 3.53 \times 10^{-4}$ (cm/sec. conversion)

$\boxed{K = 4.66 \times 10^{-5} \text{ cm/sec.}}$

T = transmissivity

$T = kb$

$T = (0.132 \text{ ft/day}) \times 50 \text{ ft.}$

$T = \boxed{6.60 \text{ ft}^2\text{/day}}$

ES ENGINEERING-SCIENCE, INC.

116

Client	USAEC	Job No. 722843	Sheet 1 of 1
Subject	Slug tests - R.A.A.P.	By Ben Walker	Date 1/13/95
	- FALLING HEAD/INJECTION -	Checked D.C. [illegible]	Rev. 11/7/95

Data analyzed using Bouwer-Rice (1979) Solution from Aqtesolv:

$\boxed{48MW2}$ INJECTION

k = hydraulic conductivity

$K = 2.923 \times 10^{-6}$ ft/min.

$$K = \frac{2.923 \times 10^{-6} \text{ ft.}}{\text{min.}} \times \frac{60 \text{ min.}}{1 \text{ hr.}} \times \frac{24 \text{ hr.}}{1 \text{ day}}$$

$$\boxed{K = 0.0042 \text{ ft/day}}$$

$= \times 3.53 \times 10^{-4}$ (cm/sec. conversion)

$$\boxed{K = 1.48 \times 10^{-6} \text{ cm/sec}}$$

T = transmissivity

$T = Kb$

$T = (0.0042 \text{ ft/day}) \times 50 \text{ ft.}$

$T = \boxed{0.21 \text{ ft}^2/\text{day}}$

ES-COP-E 5 82

ES ENGINEERING-SCIENCE, INC.

Client: USAEC
Subject: Slug tests - R.A.A.P. - FALLING HEAD/INJECTION -
Job No.: 722843
By: Ben Walker
Checked: [illegible]
Sheet 1 of 1
Date 1/13/95
Rev. 11/7/95

117

Data analyzed using Bouwer-Rice (1979) Solution from Aqtesolv:

$\boxed{\text{48MW3}}$ INJECTION

k = hydraulic conductivity

$$K = 7.268 \times 10^{-5} \text{ ft./min.}$$

$$K = \frac{7.268 \times 10^{-5} \text{ ft.}}{\text{min.}} \times \frac{60 \text{ min.}}{1 \text{ hr.}} \times \frac{24 \text{ hr.}}{1 \text{ day}}$$

$$\boxed{K = 0.105 \text{ ft./day}}$$

$$= \times 3.53 \times 10^{-4} \text{ (cm/sec. conversion)}$$

$$\boxed{K = 3.71 \times 10^{-5} \text{ cm/sec.}}$$

T = transmissivity

$$T = kb$$

$$T = (0.105 \text{ ft./day}) \times 50 \text{ ft.}$$

$$T = \boxed{5.25 \text{ ft}^2\text{/day}}$$

ES-COR-8 5 86

ES ENGINEERING-SCIENCE, INC.

Client	USAEC	Job No.	722843	Sheet	1 of 1
Subject	Slug tests - R.A.A.P. RISING HEAD/WITHDRAWAL	By	Ben Waller	Date	1/12/95
		Checked	D.C. [illegible]	Rev.	11/7/95

118

Data analyzed using Bouwer-Rice (1979) Solution from Aqtesolv:

$\boxed{31MW3}$ WITHDRAWAL

K = hydraulic Conductivity

$$K = 2.034 \times 10^{-5} \text{ ft./min.}$$

$$K = \frac{2.034 \times 10^{-5} \text{ ft.}}{\text{min.}} \times \frac{60 \text{ min.}}{1 \text{ hr.}} \times \frac{24 \text{ hr.}}{1 \text{ day}}$$

$$\boxed{K = 0.0293 \text{ ft/day}}$$

$$= \quad \times 3.53 \times 10^{-4} \text{ (cm/sec. conversion)}$$

$$\boxed{K = 1.03 \times 10^{-5} \text{ cm/sec}}$$

T = transmissivity

$$T = Kb$$

$$T = (0.0293 \text{ ft./day}) \times 50 \text{ ft.}$$

$$\boxed{T = 1.465 \text{ ft}^2\text{/day}}$$

ES-CDF-2 (5/85)

ENGINEERING-SCIENCE, INC.

Client: USAEC | Job No. 722843 | Sheet 1 of 1

Subject: Slug tests - R.A.A.P. RISING HEAD/WITHDRAWAL | By: Ben Waller | Date: 1/12/95

Checked: R. G. [illegible] | Rev. 1/17/95

Data analyzed using Bouwer-Rice (1979) Solution from Aqtesolv:

31MW4

WITHDRAWAL

K = hydraulic Conductivity

$K = 1.821 \times 10^{-5}$ ft/min.

$$K = \frac{1.821 \times 10^{-5} \text{ ft.}}{\text{min.}} \times \frac{60 \text{ min.}}{1 \text{ hr.}} \times \frac{24 \text{ hr.}}{1 \text{ day}}$$

$\boxed{K = 0.026 \text{ ft/day}}$

$= \times 3.53 \times 10^{-4}$ (cm/sec. conversion)

$\boxed{K = 9.178 \times 10^{-6} \text{ cm/sec}}$

T = transmissivity

$T = Kb$

$T = (0.026 \text{ ft./day}) \times 20 \text{ ft.}$

$\boxed{T = 0.52 \text{ ft}^2\text{/day}}$

ES-COF-8 (5/83)

ENGINEERING-SCIENCE, INC.

Client	USAEC	Job No.	722843	Sheet	1 of 1
Subject	Slug tests - R.A.A.P. RISING HEAD/WITHDRAWAL	By	Ben Waller	Date	1/13/95
		Checked	[illegible]	Rev.	11/7/95

Data analyzed using Bouwer-Rice (1979) Solution from Aqtesolv:

$\boxed{\text{48MW1}}$ WITHDRAWAL

K = hydraulic Conductivity

$K = 4.107 \times 10^{-5}$ ft./min.

$$K = \frac{4.107 \times 10^{-5} \text{ ft.}}{\text{min.}} \times \frac{60 \text{ min.}}{1 \text{ hr.}} \times \frac{24 \text{ hr.}}{1 \text{ day}}$$

$\boxed{K = 0.059 \text{ ft/day}}$

$= \quad \times 3.53 \times 10^{-4}$ (cm/sec. conversion)

$\boxed{K = 2.08 \times 10^{-5} \text{ cm/sec}}$

T = transmissivity

$T = Kb$

$T = (0.059 \text{ ft./day}) \times 50 \text{ ft.}$

$\boxed{T = 2.95 \text{ ft}^2\text{/day}}$

PARSONS ENGINEERING SCIENCE, INC.

Client: USAEC | Job No. 722843 | Sheet 1 of 1

Subject: R.A.A.P. – SLUG TESTS / G.W. VELOCITY | By: Ben Wallen | Date: 11/1/95

Checked: Ben Wallen / for T.C. Richardson | Rev.: 11/7/95

CALCULATION OF GROUNDWATER VELOCITY FOR SWMU 31 USING DARCY'S EQUATION

DARCY'S EQUATION: $V = Ki/n$ where:

V = G.W. Velocity
K = Hydraulic Conductivity
i = Hydraulic Gradient
n = Effective Porosity

$$V = \frac{(7.80 \times 10^{-5}\ \text{cm/sec})(.01)}{(.35)}$$

$$V = \underline{2.23 \times 10^{-6}}\ \text{cm/sec}$$

Conversion to ft/yr:

$$\frac{2.23\times10^{-6}\ \text{cm}}{\text{sec}} \times \frac{60\ \text{sec}}{1\ \text{min}} \times \frac{60\ \text{min}}{1\ \text{hr}} \times \frac{24\ \text{hr}}{1\ \text{day}} \cdot \frac{365\ \text{days}}{1\ \text{yr}} \cdot \frac{1\ \text{in}}{2.54\ \text{cm}} \cdot \frac{1\ \text{ft}}{12\ \text{in}} =$$

$$\underline{2.31}\ \text{ft/yr}$$

PARSONS ENGINEERING SCIENCE, INC.

Client: USAEC	Job No. 722843	Sheet 1 of 1
Subject: R.A.A.P. – SLUG TESTS G.W. VELOCITY	By: Ben Wallen	Date 11/1/95
	Checked: Ben Wallen / FOR T.C. RICHARDSON	Rev. 11/7/95

CALCULATION OF GROUNDWATER VELOCITY FOR SWMU 48 USING DARCY'S EQUATION

DARCY'S EQUATION: $V = Ki/n$ where:

V = G.W. Velocity
K = Hydraulic Conductivity
i = Hydraulic Gradient
n = Effective Porosity

$$V = \frac{(2.65 \times 10^{-5}\ \text{cm/sec})(.125)}{(.10)}$$

$$V = \underline{3.31 \times 10^{-5}}\ \text{cm/sec}$$

Conversion to ft/yr:

$$\frac{3.31 \times 10^{-5}\ \text{cm}}{\text{sec}} \times \frac{60\ \text{sec}}{1\ \text{min}} \times \frac{60\ \text{min}}{1\ \text{hr}} \times \frac{24\ \text{hr}}{1\ \text{day}}\ \frac{365\ \text{days}}{1\ \text{yr}}\ \frac{1\ \text{in}}{2.54\ \text{cm}}\ \frac{1\ \text{ft}}{12\ \text{in}} =$$

$$\underline{34.25}\ \text{ft/yr}$$

123

APPENDIX F

GEOTECHNICAL DATA

APPENDIX F
GEOTECHNICAL DATA
RADFORD ARMY AMMUNITION PLANT

Sample	Depth	Description	USCS (1)	Grain Size Distribution (2) Percent Gravel	Percent Sand	Percent Fines	Atterberg Limits (3) LL	PL	PI	Comments
31MW1	10-12'	Light grey sandy silty clay	CL	0	38	62	28	18.5	9.5	
48MW3	10-12'	Brown clayey sand	SC-SM	2	60	38	27.8	22	5.8	1 of 2 samples
48MW3	10-12'	Brown clayey sand	SC-SM	2	65	33	28.8	22.5	6.3	2 of 2 samples
48SB5	10-11'	Brown silty sand with gravel	SM	15	57	28	NP	NP	NP	
48MW2	40-42'	Light grey sandy silt	ML	0	30	70	NP	NP	NP	
54SB1	15-17'	Brown silty sand	SM	0	68	32	NP	NP	NP	
54SB2	10-12'	Brown sandy silt	ML	0	47	53	NP	NP	NP	
54SB3	10-12'	Brown silty sand	SM	0	68	32	NP	NP	NP	
54SB4	5-7'	Brown sandy silt	CL-ML	0	40	60	26	21	5	
54SB5	15-17'	Brown silty sand	SM	0	52	48	NP	NP	NP	
54SB6	15-20'	Brown silty sand	SM	0	52	48	NP	NP	NP	
54SB7	10-12'	Brown silty sand	SM	0	82	18	NP	NP	NP	
54SB8	15-17'	Brown silty sand	SM	0	59	41	NP	NP	NP	
54SB9	10-12'	Brown sandy silt	ML	0	46	54	24.1	21.2	2.9	

hrl

APPENDIX F
GEOTECHNICAL DATA
RADFORD ARMY AMMUNITION PLANT

Sample	Depth	Description	USCS (1)	Grain Size Distribution (2) Percent Gravel	Percent Sand	Percent Fines	Atterberg Limits (3) LL	PL	PI	Comments
54SB10	10-12'	Brown silty sand	SM	0	63	37	NP	NP	NP	
54SB11	15-17'	Brown silty sand	SM	0	63	37	NP	NP	NP	
54SB12	5-7'	Brown sandy lean clay	CL-ML	0	42	58	23.2	18	5.2	
54SB13	5-7'	Brown silty sand	SM	0	48	52	NP	NP	NP	
54SB14	7-9'	Brown silty sand	SM	0	75	25	NP	NP	NP	
54SB16	10-12'	Brown silty sand	SM	0	71	29	NP	NP	NP	
BG1BUC3	3-5'	Brown silty sand some clay	SM	0	81	19	33	19	4	
BG4CUC17	15-17'	Brown sandy silt	ML	3	41	56	29	24	5	
BG8BUC5	3-5'	Brown silty sand some clay	SM	0	61	39	41	28	13	
BG8CUC10	8-10'	Brown silty gravel with sand	GM	35	33	32	36	26	10	
BG3CWL22	20-22'	Brown sandy silt	ML	0	17	83	NP	NP	NP	
BG5BWL3	1-3'	Brown clayey silt	SC	0	71	29	32	19	13	
BG5CWL8	6-8'	Dark brown silty sand	CL	0	41	59	30	20	10	
BG6BWL4	2-4'	Brown clayey silt	SC	0	64	36	31	20	11	

APPENDIX F
GEOTECHNICAL DATA
RADFORD ARMY AMMUNITION PLANT

Sample	Depth	Description	USCS (1)	Grain Size Distribution (2) Percent Gravel	Percent Sand	Percent Fines	Atterberg Limits (3) LL	PL	PI	Comments
BG1BBL4	2-4'	Brown clayey sandy silt	SC	0	57	43	28	16	12	
BG1CBL10	8-10'	Brown silty sand	SM	0	52	48	30	25	5	
BG2CBL17	15-17'	Brown clayey silt	SC	0	61	39	32	22	10	
BG4BBL5	3-5'	Brown lean clay with sand	CL	2	27	71	26	18	8	

(1) USCS: Unified Soil Classification System
(2) Grain Size Distribution:
Gravel: Particles of rock that are retained on a 4.75 mm (No. 4) sieve.
Sand: Particles that will pass a 4.75 mm sieve, but are retained on a 0.075 mm (No. 200) sieve.
Fines: Include silt and sand. Particles that will pass a 0.075 mm (No. 200) sieve.
(3) Atterberg Limits:
LL: Liquid Limit
PL: Plasticity Limit
PI: Plasticity Index (PI = LL - PL)
NP: Nonplastic

k:\shared\raap\rfi-repo\geotech.xls

VISUAL MANUAL SOIL CLASSIFICATION DATA SUMMARY

Sample ID	BG1CWL8	BG2CWL12	BG4BWL4	BG5CWL8	BG5BWL3	BG6CWL17	BG4CWL17	BG1BBL4
Group Symbol	CL	CL	CH	CL	CL	ML	ML	
Color	Light Brown	Light Brown\ Gray-Brown	Brown	Dark Red-Brown	Light Brown	Brown	Brown	Red-Brown
Odor	None	None	None	None	None	None	None	None
Moisture Content	Moist	Moist	Moist	Moist	Moist	Moist to Wet	Moist	Moist
HCl Reaction	None	None	None	None	None	None	None	None
Consistency	Soft	Firm	Hard	Firm	Firm	Soft	Soft	Firm
Cementation	Moderate	Moderate	Moderate	Moderate	Moderate	Weak	Weak	Moderate
Structure	Stratified	Stratified	Homogeneous	Homogeneous	Stratified	Stratified	Homogeneous	Stratified
Maximum Particle size	Fine Sand	Fine Sand	Fine Sand	Fine Sand	Fine Sand	Medium Sand	Coarse gravel	Fine Sand
Dry Strength	Very High	Very High	Very High	Very High	Very High	N/A	N/A	Very High
Dilatancy	None	None	None	None	None	N/A	N/A	None
Toughness	Medium	Medium	High	Medium	Medium	N/A	N/A	Low
Plasticity	Low	Low	High	Low	Low	N/A	N/A	Non-Plastic
Angularity	N/A	N/A	N/A	N/A	N/A	Subangular	Subrounded	N/A
Size Range	N/A	N/A	N/A	N/A	N/A	fine-med. sand	sand-gravel	N/A
Hardness	N/A	N/A	N/A	N/A	N/A	Hard	Hard	N/A
Other	Minor oxide staining				Dark red Mottling	Soil at bedrock interface		Black oxide staining

k:\shared\raap\rfi-repo\SOILTBL.XLS

VISUAL MANUAL SOIL CLASSIFICATION DATA SUMMARY

Sample ID	BG1CBL10	BG2BBL5	BG3BBL3	BG3CBL22	BG4BBL5	BG3CUC22	BG3CUC3	BG4BUC5
Group Symbol	CL	CL	CH	MH	CH	MH	CL	CL
Color	Red-Brown	Brown to Red-Brown	Dark Brown to Black	Light brown to Red-Brown	Light brown	Brown	Dark brown to Red-Brown	Light brown
Odor	None	None	Organic Decay	None	None	None	Organic Decay	None
Moisture Content	Moist	Moist	Moist	Moist	Moist	Moist	Moist	Moist
HCl Reaction	None	None	None	None	None	None	None	None
Consistency	Soft	Soft	Soft	Firm	Soft	Hard	Soft	Firm
Cementation	Moderate	Weak	Weak	Moderate	Weak	Moderate	Weak	Moderate
Structure	Homogeneous	Homogeneous	Stratified	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Stratified
Maximum Particle size	Fine Sand	Fine Sand	Silt	Fine Sand	Fine Sand	Medium Sand	Fine Sand	Medium Sand
Dry Strength	High	Very High	Very High	Medium	Medium	Medium	Very High	Very High
Dilatancy	None	Slow	None	Slow	Slow	Slow	None	None
Toughness	Medium	Medium	High	Low	Low	Low	Medium	Medium
Plasticity	Low	Low	Medium	Low	Low	Non-plastic	Low	Low
Angularity	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Size Range	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hardness	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Other	Some black oxide staining		Small sized roots in soil	Black oxide staining	Black oxide staining	Very Micaceous	Small sized roots in soil	Heavy mottling fill material?

k:\shared\raap\rfi-repo\SOILTBL.XLS

128

APPENDIX G

DATA SUMMARY TABLES

DATA SUMMARY TABLES FOR JANUARY 1995 SAMPLING EVENT

Field Sample Number ->	SCSW1		SCSW2		SCSW3		17AFBSO		48EQSO		48TBSO		54TBSO		SCEQSE		SCTBAQ	
Lab Analysis Number ->	UC00196		UC00197		UC00198		UB06523		UB06570		UB06571		UB06630		UC00201		UC00202	
Volatile Organics (ug/L)																		
1,1,1-Trichloroethane	1	U	1	U	1	U	1	U	**1.1**		**1.2**		**1.4**		1	U	1	U
1,1,2-Trichloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
*1,2-DICHLOROETHYLENES (Total)	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
1,2-Dichloroethane	1	U	1	U	1	U	1	U	1	U	**3.5**		**6.1**		1	U	1	U
1,2-Dichloropropane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Acetone	8	U	8	U	8	U	8	U	8	U	**32**		**27**		8	U	8	U
Acrylonitrile	8.4	U	8.4	U	8.4	U	8.4	U	8.4	U	8.4	U	8.4	U	8.4	U	8.4	U
Bromodichloromethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Vinyl chloride	12	U	12	U	12	U	12	U	12	U	12	U	12	U	12	U	12	U
Chloroethane	8	U	8	U	8	U	8	U	8	U	8	U	8	U	8	U	8	U
Benzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Trichlorofluoromethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Carbon tetrachloride	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Methylene chloride	1	U	1	U	1	U	**3.3**		1	U	**4.5**		**3.4**		1	U	**3.3**	
Bromomethane	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U
Chloromethane	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
Bromoform	11	U	11	U	11	U	11	U	11	U	11	U	11	U	11	U	11	U
Chloroform	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Chlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Ethylbenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Toluene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
2-BUTANONE	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
4-METHYL-2-PENTANONE	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
1,1,2,2-Tetrachloroethane	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
Tetrachloroethylene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Trichloroethylene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
*XYLENES	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U

Field Sample Number ->	48MW1		48MW2		48MW3		SCSW1		SCSW2		SCSW3		17AFBSO		48EQGW		48EQSO		SCEQSE	
Lab Analysis Number ->	UC00247		UC00245		UC00248		UC00196		UC00197		UC00198		UB06523		UC00246		UB06570		UC00201	
Semivolatile Organics (ug/L)																				
1,2,4-Trichlorobenzene	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U
1,2-Dichlorobenzene	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
1,3-Dichlorobenzene	3.4	U	3.4	U	3.4	U	3.4	U	3.4	U	3.4	U	3.4	U	3.4	U	3.4	U	3.4	U
1,4-Dichlorobenzene	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
2,4,5-Trichlorophenol	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U
2,4,6-Trichlorophenol	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U
2,4-Dichlorophenol	8.4	U	8.4	U	8.4	U	8.4	U	8.4	U	8.4	U	8.4	U	8.4	U	8.4	U	8.4	U
2,4-Dimethylphenol	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U
2,4-Dinitrophenol	180	U	180	U	180	U	180	U	180	U	180	U	180	U	180	U	180	U	180	U
2,4-Dinitrotoluene	5.8	U	5.8	U	5.8	U	5.8	U	5.8	U	5.8	U	5.8	U	5.8	U	5.8	U	5.8	U
2,6-Dinitrotoluene	6.7	U	6.7	U	6.7	U	6.7	U	6.7	U	6.7	U	6.7	U	6.7	U	6.7	U	6.7	U
2-Chlorophenol	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U
2-Chloronaphthalene	2.6	U	2.6	U	2.6	U	2.6	U	2.6	U	2.6	U	2.6	U	2.6	U	2.6	U	2.6	U
2-Methylphenol	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U
3,3'-Dichlorobenzidine	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4,6-Dinitro-2-cresol	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
4-BROMOPHENYLPHENYL ETHER	22	U	22	U	22	U	22	U	22	U	22	U	22	U	22	U	22	U	22	U
3-METHYL-4-CHLOROPHENOL	8.5	U	8.5	U	8.5	U	8.5	U	8.5	U	8.5	U	8.5	U	8.5	U	8.5	U	8.5	U
4-Methylphenol	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U
4-Nitrophenol	96	U	96	U	96	U	96	U	96	U	96	U	96	U	96	U	96	U	96	U
Anthracene	5.2	U	5.2	U	5.2	U	5.2	U	5.2	U	5.2	U	5.2	U	5.2	U	5.2	U	5.2	U
Bis(2-chloroethoxy) methane	6.8	U	6.8	U	6.8	U	6.8	U	6.8	U	6.8	U	6.8	U	6.8	U	6.8	U	6.8	U
Bis(2-chloroisopropyl) ether	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Bis(2-chloroethyl) ether	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U
Bis(2-ethylhexyl) phthalate	7.7	U	12		23		7.7	U	7.7	U	7.7	U	7.7	U	7.7	U	7.7	U	7.7	U
Benzo[a]anthracene	9.8	U	9.8	U	9.8	U	9.8	U	9.8	U	9.8	U	9.8	U	9.8	U	9.8	U	9.8	U
Benzo[a]pyrene	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U
Benzo[b]fluoranthene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Butylbenzyl phthalate	28	U	28	U	28	U	28	U	28	U	28	U	28	U	28	U	28	U	28	U
Benzo[k]fluoranthene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Chrysene	7.4	U	7.4	U	7.4	U	7.4	U	7.4	U	7.4	U	7.4	U	7.4	U	7.4	U	7.4	U
Hexachlorobenzene	12	U	12	U	12	U	12	U	12	U	12	U	12	U	12	U	12	U	12	U
Hexachlorocyclopentadiene	54	U	54	U	54	U	54	U	54	U	54	U	54	U	54	U	54	U	54	U
Hexachloroethane	8.3	U	8.3	U	8.3	U	8.3	U	8.3	U	8.3	U	8.3	U	8.3	U	8.3	U	8.3	U
Dibenz[ah]anthracene	12	U	12	U	12	U	12	U	12	U	12	U	12	U	12	U	12	U	12	U
Diethyl phthalate	5.9	U	5.9	U	5.9	U	5.9	U	5.9	U	5.9	U	5.9	U	5.9	U	5.9	U	5.9	U
Dimethyl phthalate	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U
Di-n-butyl phthalate	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U
Di-n-octyl phthalate	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U

Field Sample Number ->	48MW1		48MW2		48MW3		SCSW1		SCSW2		SCSW3		17AFBSO		48EQGW		48EQSO		SCEQSE	
Lab Analysis Number ->	UC00247		UC00245		UC00248		UC00196		UC00197		UC00198		UB06523		UC00246		UB06570		UC00201	
Semivolatile Organics (ug/L)																				
Fluoranthene	24	U	24	U	24	U	24	U	24	U	24	U	24	U	24	U	24	U	24	U
Hexachlorobutadiene	8.7	U	8.7	U	8.7	U	8.7	U	8.7	U	8.7	U	8.7	U	8.7	U	8.7	U	8.7	U
Indeno[1,2,3-C,D]pyrene	21	U	21	U	21	U	21	U	21	U	21	U	21	U	21	U	21	U	21	U
Naphthalene	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Nitrobenzene	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U
N-Nitrosodi-n-propylamine	6.8	U	6.8	U	6.8	U	6.8	U	6.8	U	6.8	U	6.8	U	6.8	U	6.8	U	6.8	U
N-Nitrosodiphenylamine	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U
Pentachlorophenol	9.1	U	9.1	U	9.1	U	9.1	U	9.1	U	9.1	U	9.1	U	9.1	U	9.1	U	9.1	U
Phenanthrene	9.9	U	9.9	U	9.9	U	9.9	U	9.9	U	9.9	U	9.9	U	9.9	U	9.9	U	9.9	U
Phenol	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U
Pyrene	17	U	17	U	17	U	17	U	17	U	17	U	17	U	17	U	17	U	17	U

Field Sample Number ->	17PZ1		17MW2		17MW3		40MW3		SPG3SW1		SCSW1		SCSW2		SCSW3		17AFBSO	
Lab Analysis Number ->	UC00208		UC00209		UC00244		UC00243		UC00131		UC00196		UC00197		UC00198		UB06523	
Explosives (ug/L)																		
2,4,6-Trinitrotoluene	0.426	UJ4	0.426	UJ4	0.426	UJ4	0.426	UJ4	0.426	UJ4	0.426	UJ4	0.426	UJ4	0.426	UJ4	0.426	UJ4
2,4-Dinitrotoluene	0.397	UJ4	0.397	UJ4	0.397	UJ4	0.397	UJ4	0.397	UJ4	0.397	UJ4	0.397	UJ4	0.397	UJ4	0.397	UJ4
2,6-Dinitrotoluene	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U
Cyclotetramethylenetetranitramine	0.533	U	0.533	U	0.533	U	0.533	U	0.533	U	5.3	J9	5.3	J9	5.3	J9	0.533	U
Cyclonite (RDX)	0.416	UJ4	0.416	UJ4	0.416	UJ4	0.416	UJ4	0.416	UJ4	0.416	UJ4	0.416	UJ4	0.416	UJ4	0.416	UJ4
TETRYL	0.631	U	0.631	U	0.631	U	0.631	U	0.631	U	0.631	U	0.631	U	0.631	U	0.631	U

Field Sample Number ->	17FBAQGW		48EQSO		54EQS02		54EQSO		54FBSO		SCEQSE		SPG3FBAQ		SPG3FBSE	
Lab Analysis Number ->	UC00210		UB06570		UB06649		UB06628		UB06629		UC00201		UC00199		UC00200	
Explosives (ug/L)																
2,4,6-Trinitrotoluene	0.426	UJ4	0.426	UJ4	0.426	UJ4	0.727	J4	0.426	UJ4	0.426	UJ4	0.426	UJ4	0.426	UJ4
2,4-Dinitrotoluene	0.397	UJ4	0.397	UJ4	0.397	UJ4	0.397	UJ4	0.397	UJ4	0.397	UJ4	0.397	UJ4	0.397	UJ4
2,6-Dinitrotoluene	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U
Cyclotetramethylenetetranitramine	0.533	U	0.533	U	0.533	U	0.533	U	0.533	U	0.533	U	0.533	U	0.533	U
Cyclonite (RDX)	0.416	UJ4	0.416	UJ4	0.416	UJ4	0.416	UJ4	0.416	UJ4	0.416	UJ4	0.416	UJ4	0.416	UJ4
TETRYL	0.631	U	0.631	U	0.631	U	0.631	U	0.631	U	0.631	U	0.631	U	0.631	U

Field Sample Number ->	**17PZ1**		**17MW2**		**17MW3***		**40MW3***		**SPG3SW1**		**31MW1**		**31MW2**		**31MW3**	
Lab Analysis Number ->	**UC00208**		**UC00209**		**UC00244**		**UC00243**		**UC00131**		**UC00207**		**UC00203**		**UC00204**	
Metals (ug/L)																
Arsenic	2.35	UJ4	2.35	UJ4	2.35	UJ4	2.35	UJ4	2.35	UJ4	2.35	UJ4	2.35	UJ4	2.35	UJ4
Mercury	0.1	UJ4	0.1	UJ4	0.1	U	0.1	U	0.1	UJ4	0.1	UJ4	0.1	UJ4	0.1	UJ4
Lead	4.47	UJ4	4.47	UJ4	4.47	UJ4	4.47	UJ4	25.2	J4	4.47	UJ4	4.47	UJ4	4.47	UJ4
Selenium	2.53	U	2.53	U	2.53	UJ4	2.53	UJ4	2.53	U	2.53	U	2.53	U	2.53	U
Silver	0.333	UJ4	0.333	UJ4	0.333	UJ4	0.333	UJ4	0.333	UJ4	0.333	UJ4	0.333	UJ4	0.333	UJ4
Barium	117	J4	63.2	J4	167	UJ4	32.5	UJ4	26.6	J4	222	J4	23.7	J4	38.1	J4
Beryllium	4.66		4.1		4.72	U	2.47	U	1.64		3.84		1.56		1.86	
Cadmium	6.78	UJ4	6.78	UJ4	6.78	UJ4	6.78	UJ4	6.78	UJ4	6.78	UJ4	6.78	UJ4	6.78	UJ4
Chromium	16.8	UJ4	16.8	UJ4	16.8	UJ4	16.8	UJ4	16.8	UJ4	16.8	UJ4	16.8	UJ4	16.8	UJ4
Nickel	32.1	UJ4U	32.1	UJ4	32.1	UJ4	32.1	UJ4	32.1	UJ4	32.1	UJ4	32.1	UJ4	32.1	UJ4
Antimony	60	U	60.2		60	U	60	U	60	U	65.2		60	U	60	U
Thallium	125	U	125	U	125	UJ4	125	UJ4	125	U	125	U	125	U	125	U
Field Sample Number ->	**17PZ1**		**17MW2**		**17MW3**		**40MW3**		**SPG3SW1**		**31MW1**		**31MW2**		**31MW3**	
Lab Analysis Number ->	**UC00208**		**UC00209**		**UC00244**		**UC00243**		**UC00131**		**UC00207**		**UC00203**		**UC00204**	
***TOTAL ORGANIC CARBON (ug/L)**	1000	U	1000	U	1240		1000	U	1200		2040		1320		1160	
***TOTAL ORGANIC HALOGENS (ug/L)**	15.7		27.5		107		63.9		10	U	15.4		15		25.3	
***TOTAL HARDNESS (ug/L)**	445000	*	268000	*	368000	*	148000		152000		153000		818	*		
TOTAL PETROLEUM HYDROCARBONS (ug/L)	143		480		247		100	U	100	U						

136

Field Sample Number ->	**31MW4**		**31MW5**		**48MW1***		**48MW2***		**48MW3***		**SCSW1**		**SCSW2**		**SCSW3**	
Lab Analysis Number ->	**UC00205**		**UC00206**		**UC00247**		**UC00245**		**UC00248**		**UC00196**		**UC00197**		**UC00198**	
Metals (ug/L)																
Arsenic	2.35	UJ4	2.35	UJ4	2.35	UJ4	2.35	UJ4	2.35	UJ4	2.35	UJ4	2.35	UJ4	2.35	UJ4
Mercury	0.1	UJ4	0.1	UJ4	0.1	U	0.1	U	0.1	U	0.1	UJ4	0.1	UJ4	0.1	UJ4
Lead	4.47	UJ4	4.47	UJ4	4.47	UJ4	4.47	UJ4	4.47	UJ4	4.47	UJ4	4.47	UJ4	4.47	UJ4
Selenium	2.53	U	2.53	U	2.53	UJ4	2.53	UJ4	2.53	UJ4	2.53	U	2.53	U	2.53	U
Silver	0.333	UJ4	0.333	UJ4	0.333	UJ4	0.333	UJ4	0.333	UJ4	0.333	UJ4	0.333	UJ4	0.333	UJ4
Barium	29.2	J4	42.8	J4	67	UJ4	215	UJ4	91.9	UJ4	44.7	J4	47.3	J4	48	J4
Beryllium	1.1	J5	2.43		4.18	U	2.22	U	3.17	U	1.95		2.22		2.23	
Cadmium	6.78	UJ4	6.78	UJ4	6.78	UJ4	6.78	UJ4	6.78	UJ4	6.78	UJ4	6.78	UJ4	6.78	UJ4
Chromium	16.8	UJ4	16.8	UJ4	16.8	UJ4	16.8	UJ4	16.8	UJ4	16.8	UJ4	30.9	J4	16.8	UJ4
Nickel	32.1	UJ4	32.1	UJ4	32.1	UJ4	32.1	UJ4	32.1	UJ4	32.1	UJ4	32.1	UJ4	32.1	UJ4
Antimony	60	U	60	U	60	U	60	U	60	U	60	U	60	U	60	U
Thallium	125	U	125	U	125	UJ4	125	UJ4	125	UJ4	125	U	125	U	125	U
Field Sample Number ->	**31MW4**		**31MW5**		**48MW1**		**48MW2**		**48MW3**		**SCSW1**		**SCSW2**		**SCSW3**	
Lab Analysis Number ->	**UC00205**		**UC00206**		**UC00247**		**UC00245**		**UC00248**		**UC00196**		**UC00197**		**UC00198**	
***TOTAL ORGANIC CARBON (ug/L)**	1000	U	1350		1000	U	2620		1610		2690		**2490**	**J7**	2370	
***TOTAL ORGANIC HALOGENS (ug/L)**	15.6		33.4		13.7		33.6		178		16.9		**18**	**J7**	16	
***TOTAL HARDNESS (ug/L)**																
TOTAL PETROLEUM HYDROCARBONS (ug/L)																

Field Sample Number ->	**17AFBSO**		**17FBAQGW**		**31MWEQSO**		**31MWFBSO**		**48EQGW***		**48EQSO**		**54EQSO1**		**54EQSO2**	
Lab Analysis Number ->	**UB06523**		**UC00210**		**UB06522**		**UB06521**		**UC00246**		**UB06570**		**UB06628**		**UB06649**	
Metals (ug/L)																
Arsenic	2.35	UJ4	2.35	UJ4	2.35	UJ4	2.35	UJ4	2.35	UJ4	2.35	UJ4	2.35	UJ4	2.35	UJ4
Mercury	0.1	UJ4	0.1	UJ4	0.1	UJ4	0.1	UJ4	0.1	U	0.1	UJ4	0.1	UJ4	0.1	UJ4
Lead	4.47	UJ4	4.47	UJ4	4.47	UJ4	4.47	UJ4	4.47	UJ4	4.47	UJ4	10.3	UJ4	4.47	UJ4
Selenium	2.53	UJ4	2.53	U	2.53	UJ4	2.53	UJ4	2.53	UJ4	2.53	UJ4	2.53	U	2.53	U
Silver	0.333	UJ4	0.333	UJ4	0.333	UJ4	0.333	UJ4	0.333	UJ4	0.333	UJ4	0.333	UJ4	0.333	UJ4
Barium	2.82	UJ4	2.82	UJ4	2.82	UJ4	2.82	UJ4	2.82	UJ4	2.82	UJ4	43.7	UJ4	2.82	UJ4
Beryllium	1.12	U	1.12	U	1.12	U	1.12	U	1.12	U	1.12	U	1.12	U	1.12	U
Cadmium	6.78	UJ4	6.78	UJ4	6.78	UJ4	6.78	UJ4	6.78	UJ4	6.78	UJ4	6.78	UJ4	6.78	UJ4
Chromium	16.8	UJ4	16.8	UJ4	16.8	UJ4	16.8	UJ4	16.8	UJ4	16.8	UJ4	47.6	J4	16.8	UJ4
Nickel	32.1	UJ4	32.1	UJ4	32.1	UJ4	32.1	UJ4	32.1	UJ4	32.1	UJ4	32.1	UJ4	32.1	UJ4
Antimony	60	U	60	U	60	U	60	U	60	U	60	U	60	U	60	U
Thallium	125	U	125	U	125	U	125	U	125	UJ4	125	U	125	U	125	U
Field Sample Number ->	**17FBAQGW**		**48EQGW**		**48EQSO**		**54EQSO**		**54EQSO2**		**54FBSO**		**SCEQSE**		**SPG3FBAQ**	
Lab Analysis Number ->	**UC00210**		**UC00246**		**UB06570**		**UB06628**		**UB06649**		**UB06629**		**UC00201**		**UC00199**	
***TOTAL ORGANIC CARBON (ug/L)**	1000	U	1000	U	110	U	646		110	U	200		1000	U	1000	U
***TOTAL ORGANIC HALOGENS (ug/L)**	10	U	10	U	10	U	10	U	10	U						
***TOTAL HARDNESS (ug/L)**																
TOTAL PETROLEUM HYDROCARBONS (ug/L)																

138

Field Sample Number ->	**54EQSOWA**		**54FBSO**		**SCEQSE**		**SPG3FBAQ**		**SPG3FBSE**	
Lab Analysis Number ->	**UB06627**		**UB06629**		**UC00201**		**UC00199**		**UC00200**	
Metals (ug/L)										
Arsenic	2.35	UJ4	2.35	UJ4	2.35	UJ4	2.35	UJ4	2.35	UJ4
Mercury	0.1	UJ4	0.1	UJ4	0.1	UJ4	0.1	UJ4	0.1	UJ4
Lead	4.47	UJ4	4.47	UJ4	4.47	UJ4	4.47	UJ4	4.47	UJ4
Selenium	2.53	U	2.53	U	2.53	U	2.53	U	2.53	U
Silver	0.333	UJ4	0.333	UJ4	0.333	UJ4	0.333	UJ4	0.333	UJ4
Barium	2.82	UJ4	2.82	UJ4	2.82	UJ4	2.82	UJ4	2.82	UJ4
Beryllium	1.12	U	1.12	U	1.12	U	1.12	U	1.12	U
Cadmium	6.78	UJ4	6.78	UJ4	6.78	UJ4	6.78	UJ4	6.78	UJ4
Chromium	16.8	UJ4	16.8	UJ4	16.8	UJ4	16.8	UJ4	16.8	UJ4
Nickel	32.1	UJ4	32.1	UJ4	32.1	UJ4	32.1	UJ4	32.1	UJ4
Antimony	60	U	60	U	60	U	60	U	60	U
Thallium	125	U	125	U	125	U	125	U	125	U
Field Sample Number ->	**SPG3FBSE**									
Lab Analysis Number ->	**UC00200**									
***TOTAL ORGANIC CARBON (ug/L)**	1000	U								
***TOTAL ORGANIC HALOGENS (ug/L)**										
***TOTAL HARDNESS (ug/L)**										
TOTAL PETROLEUM HYDROCARBONS (ug/L)										

Field Sample Number ->	17ASB105		17ASB122		17ASB205		17ASB225		17ASB305		17ASB325		17ASB340	
Lab Analysis Number ->	UB06429		UB06433		UB06435		UB06439		UB06442		UB06446		UB06447	
Volatile Organics (ug/g)														
1,1,1-Trichloroethane	0.26	U	0.26	U	0.25	U	0.29	U	0.30	U	0.22	U	0.22	U
1,1,2-Trichloroethane	0.42	U	0.43	U	0.41	U	0.47	U	0.50	U	0.36	U	0.36	U
1,1-Dichloroethene	0.35	U	0.35	U	0.34	U	0.39	U	0.41	U	0.30	U	0.30	U
1,1-Dichloroethane	0.63	U	0.64	U	0.61	U	0.70	U	0.74	U	0.54	U	0.54	U
*1,2-DICHLOROETHYLENES (Total)	0.41	U	0.42	U	0.40	U	0.46	U	0.48	U	0.35	U	0.35	U
1,2-Dichloroethane	0.41	U	0.42	U	0.40	U	0.46	U	0.48	U	0.35	U	0.35	U
1,2-Dichloropropane	0.68	U	0.69	U	0.66	U	0.76	U	0.80	U	0.58	U	0.58	U
Acetone	4.23	U	4.31	U	4.11	U	4.73	U	4.99	U	3.62	U	3.62	U
Acrylonitrile	2.56	U	2.61	U	2.49	U	2.87	U	3.03	U	2.19	U	2.20	U
Bromodichloromethane	0.26	U	0.26	U	0.25	U	0.29	U	0.30	U	0.22	U	0.22	U
Vinyl chloride	2.31	U	2.35	U	2.24	U	2.58	U	2.72	U	1.97	U	1.98	U
Chloroethane	0.82	U	0.84	U	0.80	U	0.92	U	0.97	U	0.70	U	0.70	U
Benzene	0.13	U	0.13	U	0.12	U	0.14	U	0.15	U	0.11	U	0.11	U
Trichlorofluoromethane	0.29	U	0.30	U	0.29	U	0.33	U	0.35	U	0.25	U	0.25	U
Carbon tetrachloride	0.40	U	0.41	U	0.39	U	0.44	U	0.47	U	0.34	U	0.34	U
Methylene chloride	5.64	U	5.75	U	5.48	U	6.30	U	6.66	U	4.82	U	4.83	U
Bromomethane	0.33	U	0.34	U	0.32	U	0.37	U	0.39	U	0.29	U	0.29	U
Chloromethane	1.23	U	1.25	U	1.20	U	1.38	U	1.45	U	1.05	U	1.05	U
Bromoform	0.26	U	0.26	U	0.25	U	0.29	U	0.30	U	0.22	U	0.22	U
Chloroform	0.31	U	0.31	U	0.30	U	0.34	U	0.36	U	0.26	U	0.26	U
Chlorobenzene	0.13	U	0.13	U	0.12	U	0.14	U	0.15	U	0.11	U	0.11	U
Ethylbenzene	0.24	U	0.25	U	0.24	U	0.27	U	0.29	U	0.21	U	0.21	U
Toluene	0.13	U	0.13	U	0.12	U	0.14	U	0.15	U	0.11	U	0.11	U
2-BUTANONE	5.51	U	5.62	U	5.35	U	6.16	U	6.51	U	4.71	U	4.72	U
4-METHYL-2-PENTANONE	0.81	U	0.82	U	0.78	U	0.90	U	0.95	U	0.69	U	0.69	U
1,1,2,2-Tetrachloroethane	0.26	U	0.26	U	0.25	U	0.29	U	0.30	U	0.22	U	0.22	U
Tetrachloroethylene	0.21	U	0.21	U	0.20	U	0.23	U	0.24	U	0.18	U	0.18	U
Trichloroethylene	0.29	U	0.30	U	0.29	U	0.33	U	0.35	U	0.25	U	0.25	U
*XYLENES Total	1.00	U	1.02	U	0.97	U	1.12	U	1.18	U	0.86	U	0.86	U

Field Sample Number ->	48SB4A11		48SB4B21		48SS1		48SS2		48SS3		48SS8		SCSE1	
Lab Analysis Number ->	**UB06567**		**UB06568**		**UB06558**		**UB06559**		**UB06560**		**UB06564**		**UC00193**	
Volatile Organics (ug/g)														
1,1,1-Trichloroethane	0.26	U	0.24	U	0.26	U	0.25	U	0.23	U	0.24	U	0.25	U
1,1,2-Trichloroethane	0.42	U	0.40	U	0.44	U	0.40	U	0.38	U	0.40	U	0.41	U
1,1-Dichloroethene	0.34	U	0.33	U	0.36	U	0.33	U	0.31	U	0.33	U	0.33	U
1,1-Dichloroethane	0.63	U	0.59	U	0.65	U	0.60	U	0.57	U	0.59	U	0.60	U
*1,2-DICHLOROETHYLENES (Total)	0.41	U	0.39	U	0.42	U	0.39	U	0.37	U	0.39	U	0.39	U
1,2-Dichloroethane	0.41	U	0.39	U	0.42	U	0.39	U	0.37	U	0.39	U	0.39	U
1,2-Dichloropropane	0.68	U	0.64	U	0.70	U	0.65	U	0.61	U	0.64	U	0.65	U
Acetone	4.21	U	3.99	U	4.37	U	4.05	U	3.83	U	3.98	U	4.06	U
Acrylonitrile	2.55	U	2.42	U	2.65	U	2.45	U	2.32	U	2.41	U	2.46	U
Bromodichloromethane	0.26	U	0.24	U	0.26	U	0.25	U	0.23	U	0.24	U	0.25	U
Vinyl chloride	2.30	U	2.18	U	2.38	U	2.21	U	2.09	U	2.17	U	2.21	U
Chloroethane	0.82	U	0.77	U	0.85	U	0.79	U	0.74	U	0.77	U	0.79	U
Benzene	0.13	U	0.12	U	0.13	U	0.12	U	0.12	U	0.12	U	0.12	U
Trichlorofluoromethane	0.29	U	0.28	U	0.30	U	0.28	U	0.27	U	0.28	U	0.28	U
Carbon tetrachloride	0.40	U	0.37	U	0.41	U	0.38	U	0.36	U	0.37	U	0.38	U
Methylene chloride	5.61	U	5.32	U	5.83	U	5.40	U	5.10	U	5.30	U	5.41	U
Bromomethane	0.33	U	0.31	U	0.34	U	0.32	U	0.30	U	0.31	U	0.32	U
Chloromethane	1.22	U	1.16	U	1.27	U	1.18	U	1.11	U	1.16	U	1.18	U
Bromoform	0.26	U	0.24	U	0.26	U	0.25	U	0.23	U	0.24	U	0.25	U
Chloroform	0.31	U	0.29	U	0.32	U	0.29	U	0.28	U	0.29	U	0.30	U
Chlorobenzene	0.13	U	0.12	U	0.13	U	0.12	U	0.12	U	0.12	U	0.12	U
Ethylbenzene	0.24	U	0.23	U	0.25	U	0.23	U	0.22	U	0.23	U	0.23	U
Toluene	0.13	U	0.12	U	0.13	U	0.12	U	0.12	U	0.12	U	0.12	U
2-BUTANONE	5.48	U	5.20	U	5.70	U	5.28	U	4.99	U	5.18	U	5.29	U
4-METHYL-2-PENTANONE	0.80	U	0.76	U	0.83	U	0.77	U	0.73	U	0.76	U	0.77	U
1,1,2,2-Tetrachloroethane	0.26	U	0.24	U	0.26	U	0.25	U	0.23	U	0.24	U	0.25	U
Tetrachloroethylene	0.20	U	0.19	U	0.21	U	0.20	U	0.19	U	0.19	U	0.20	U
Trichloroethylene	0.29	U	0.28	U	0.30	U	0.28	U	0.27	U	0.28	U	0.28	U
*XYLENES Total	0.99	U	0.94	U	1.03	U	0.96	U	0.90	U	0.94	U	0.96	U

Field Sample Number ->	SCSE2		SCSE3	
Lab Analysis Number ->	UC00194		UC00195	
Volatile Organics (ug/g)				
1,1,1-Trichloroethane	0.29	U	0.28	U
1,1,2-Trichloroethane	0.49	U	0.47	U
1,1-Dichloroethene	0.40	U	0.38	U
1,1-Dichloroethane	0.72	U	0.70	U
*1,2-DICHLOROETHYLENES (Total)	0.47	U	0.45	U
1,2-Dichloroethane	0.47	U	0.45	U
1,2-Dichloropropane	0.78	U	0.75	U
Acetone	4.87	U	4.68	U
Acrylonitrile	2.95	U	2.84	U
Bromodichloromethane	0.29	U	0.28	U
Vinyl chloride	2.65	U	2.55	U
Chloroethane	0.94	U	0.91	U
Benzene	0.15	U	0.14	U
Trichlorofluoromethane	0.34	U	0.33	U
Carbon tetrachloride	0.46	U	0.44	U
Methylene chloride	6.49	U	6.24	U
Bromomethane	0.38	U	0.37	U
Chloromethane	1.42	U	1.36	U
Bromoform	0.29	U	0.28	U
Chloroform	0.35	U	0.34	U
Chlorobenzene	0.15	U	0.14	U
Ethylbenzene	0.28	U	0.27	U
Toluene	0.15	U	0.14	U
2-BUTANONE	6.34	U	6.10	U
4-METHYL-2-PENTANONE	0.93	U	0.89	U
1,1,2,2-Tetrachloroethane	0.29	U	0.28	U
Tetrachloroethylene	0.24	U	0.23	U
Trichloroethylene	0.34	U	0.33	U
*XYLENES Total	1.15	U	1.11	U

142

Field Sample Number ->	17ASB105		17ASB122		17ASB205		17ASB225		17ASB305		17ASB325		17ASB340		48SB4A11	
Lab Analysis Number ->	UB06429		UB06433		UB06435		UB06439		UB06442		UB06446		UB06447		UB06567	
Semivolatile Organics (ug/g)																
1,2,4-Trichlorobenzene	0.28	U	0.29	U	0.27	U	0.32	U	0.33	U	0.24	U	0.24	U	0.28	U
1,2-Dichlorobenzene	0.05	U	0.05	U	0.05	U	0.06	U	0.06	U	0.05	U	0.05	U	0.05	U
1,3-Dichlorobenzene	0.05	U	0.05	U	0.05	U	0.06	U	0.06	U	0.05	U	0.05	U	0.05	U
1,4-Dichlorobenzene	0.04	U	0.04	U	0.04	U	0.05	U	0.05	U	0.04	U	0.04	U	0.04	U
2,4,5-Trichlorophenol	0.63	U	0.64	U	0.61	U	0.70	U	0.74	U	0.54	U	0.54	U	0.63	U
2,4,6-Trichlorophenol	0.08	U	0.08	U	0.08	U	0.09	U	0.09	U	0.07	U	0.07	U	0.08	U
2,4-Dichlorophenol	0.08	U	0.08	U	0.08	U	0.09	U	0.10	U	0.07	U	0.07	U	0.08	U
2,4-Dimethylphenol	3.85	U	3.92	U	3.74	U	4.30	U	4.54	U	3.29	U	3.29	U	3.83	U
2,4-Dinitrophenol	6.03	U	6.14	U	5.85	U	6.73	U	7.11	U	5.15	U	5.16	U	5.99	U
2,4-Dinitrotoluene	1.79	U	1.83	U	1.74	U	2.01	U	2.12	U	1.54	U	1.54	U	1.79	U
2,6-Dinitrotoluene	0.41	U	0.42	U	0.40	U	0.46	U	0.48	U	0.35	U	0.35	U	0.41	U
2-Chlorophenol	0.07	U	0.07	U	0.07	U	0.08	U	0.08	U	0.06	U	0.06	U	0.07	U
2-Chloronaphthalene	0.31	U	0.31	U	0.30	U	0.34	U	0.36	U	0.26	U	0.26	U	0.31	U
2-Methylphenol	0.13	U	0.13	U	0.12	U	0.14	U	0.15	U	0.11	U	0.11	U	0.13	U
3,3'-Dichlorobenzidine	2.05	U	2.09	U	1.99	U	2.29	U	2.42	U	1.75	U	1.76	U	2.04	U
4,6-Dinitro-2-cresol	1.03	U	1.05	U	1.00	U	1.15	U	1.21	U	0.88	U	0.88	U	1.02	U
4-BROMOPHENYLPHENYL ETHER	0.05	U	0.05	U	0.05	U	0.06	U	0.06	U	0.04	U	0.05	U	0.05	U
3-METHYL-4-CHLOROPHENOL	1.19	U	1.22	U	1.16	U	1.33	U	1.41	U	1.02	U	1.02	U	1.19	U
4-Methylphenol	0.31	U	0.31	U	0.30	U	0.34	U	0.36	U	0.26	U	0.26	U	0.31	U
4-Nitrophenol	4.23	U	4.31	U	4.11	U	4.73	U	4.99	U	3.62	U	3.62	U	4.21	U
Anthracene	0.91	U	0.93	U	0.88	U	1.02	U	1.07	U	0.78	U	0.78	U	0.91	U
Bis(2-chloroethoxy) methane	0.24	U	0.25	U	0.24	U	0.27	U	0.29	U	0.21	U	0.21	U	0.24	U
Bis(2-chloroisopropyl) ether	0.56	U	0.58	U	0.55	U	0.63	U	0.67	U	0.48	U	0.48	U	0.56	U
Bis(2-chloroethyl) ether	0.46	U	0.47	U	0.45	U	0.52	U	0.54	U	0.39	U	0.40	U	0.46	U
Bis(2-ethylhexyl) phthalate	10.13		2.48		5.85		0.69	U	3.48		2.30		0.53	U	3.57	
Benzo[a]anthracene	0.99		0.05	U	0.05	U	0.06	U	0.06	U	0.29		0.05	U	0.05	U
Benzo[a]pyrene	1.54	U	1.57	U	1.49	U	1.72	U	1.82	U	1.32	U	1.32	U	1.53	U
Benzo[b]fluoranthene	1.92		0.41	U	0.39	U	0.44	U	0.47	U	0.34	U	0.34	U	0.40	U
Butylbenzyl phthalate	2.31	U	2.35	U	2.24	U	2.58	U	2.72	U	1.97	U	1.98	U	2.30	U
Benzo[k]fluoranthene	0.56		0.17	U	0.16	U	0.19	U	0.20	U	0.14	U	0.14	U	0.17	U
Chrysene	1.04		0.04	U	0.04	U	0.05	U	0.05	U	0.25		0.04	U	0.04	U
Hexachlorobenzene	0.10	U	0.10	U	0.10	U	0.11	U	0.12	U	0.09	U	0.09	U	0.10	U
Hexachlorocyclopentadiene	0.67	U	0.68	U	0.65	U	0.74	U	0.79	U	0.57	U	0.57	U	0.66	U
Hexachloroethane	2.31	U	2.35	U	2.24	U	2.58	U	2.72	U	1.97	U	1.98	U	2.30	U
Dibenz[ah]anthracene	0.40	U	0.41	U	0.39	U	0.44	U	0.47	U	0.34	U	0.34	U	0.40	U
Diethyl phthalate	0.31	U	0.31	U	0.30	U	0.34	U	0.36	U	9.87		0.26	U	0.31	U
Dimethyl phthalate	0.08	U	0.08	U	0.08	U	0.09	U	0.10	U	0.07	U	0.07	U	0.08	U
Di-n-butyl phthalate	1.67	U	1.70	U	1.62	U	1.86	U	1.97	U	1.43	U	1.43	U	1.66	U
Di-n-octyl phthalate	0.29	U	0.30	U	0.29	U	0.33	U	0.35	U	0.25	U	0.25	U	0.29	U
Fluoranthene	0.81		0.04	U	0.04	U	0.05	U	0.05	U	0.38		0.04	U	0.04	U
Hexachlorobutadiene	1.24	U	1.27	U	1.21	U	1.39	U	1.47	U	1.06	U	1.06	U	1.24	U
Indeno[1,2,3-C,D]pyrene	3.08	U	3.14	U	2.99	U	3.44	U	3.63	U	2.63	U	2.63	U	3.06	U

Field Sample Number ->	17ASB105		17ASB122		17ASB205		17ASB225		17ASB305		17ASB325		17ASB340		48SB4A11	
Lab Analysis Number ->	UB06429		UB06433		UB06435		UB06439		UB06442		UB06446		UB06447		UB06567	
Semivolatile Organics (ug/g)																
Naphthalene	0.95	U	0.97	U	0.92	U	1.06	U	1.12	U	0.81	U	0.81	U	0.94	U
Nitrobenzene	2.31	U	2.35	U	2.24	U	2.58	U	2.72	U	1.97	U	1.98	U	2.30	U
N-Nitrosodi-n-propylamine	1.41	U	1.44	U	1.37	U	1.58	U	1.66	U	1.21	U	1.21	U	1.40	U
N-Nitrosodiphenylamine	0.37	U	0.38	U	0.36	U	0.42	U	0.44	U	0.32	U	0.32	U	1.79	
Pentachlorophenol	0.97	U	0.99	U	0.95	U	1.09	U	1.15	U	0.83	U	0.83	U	0.97	U
Phenanthrene	1.67		0.04	U	0.04	U	0.05	U	0.05	U	0.65		0.04	U	0.04	U
Phenol	0.07	U	0.07	U	0.06	U	0.07	U	0.08	U	0.06	U	0.06	U	0.07	U
Pyrene	1.54		0.11	U	0.10	U	0.12	U	0.13	U	0.50		0.09	U	0.11	U

Field Sample Number ->	48SB4B21		48SB5A19		48SB5B37		48SS1		48SS2		48SS3		48SS4		48SS5	
Lab Analysis Number ->	UB06568		UB06572		UB06573		UB06558		UB06559		UB06560		UB06561		UB06562	
Semivolatile Organics (ug/g)																
1,2,4-Trichlorobenzene	0.27	U	1.22	U	0.27	U	0.29	U	0.27	U	0.26	U	0.26	U	0.27	U
1,2-Dichlorobenzene	0.05	U	0.24	U	0.05	U	0.06	U	0.05	U	0.05	U	0.05	U	0.05	U
1,3-Dichlorobenzene	0.05	U	0.24	U	0.05	U	0.06	U	0.05	U	0.05	U	0.05	U	0.05	U
1,4-Dichlorobenzene	0.04	U	0.24	U	0.04	U	0.05	U	0.04	U	0.04	U	0.04	U	0.04	U
2,4,5-Trichlorophenol	0.59	U	2.43	U	0.60	U	0.65	U	0.60	U	0.57	U	0.58	U	0.61	U
2,4,6-Trichlorophenol	0.07	U	0.36	U	0.08	U	0.08	U	0.07	U	0.07	U	0.07	U	0.08	U
2,4-Dichlorophenol	0.08	U	0.36	U	0.08	U	0.09	U	0.08	U	0.08	U	0.08	U	0.08	U
2,4-Dimethylphenol	3.63	U	24.30	U	3.70	U	3.97	U	3.68	U	3.48	U	3.56	U	3.71	U
2,4-Dinitrophenol	5.68	U	24.30	U	5.80	U	6.23	U	5.77	U	5.45	U	5.58	U	5.81	U
2,4-Dinitrotoluene	1.69	U	8.51	U	1.73	U	1.85	U	1.72	U	1.62	U	1.66	U	1.73	U
2,6-Dinitrotoluene	0.39	U	2.43	U	0.39	U	0.42	U	0.39	U	0.37	U	0.38	U	0.40	U
2-Chlorophenol	0.07	U	0.36	U	0.07	U	0.07	U	0.07	U	0.06	U	0.07	U	0.07	U
2-Chloronaphthalene	0.29	U	1.22	U	0.30	U	0.32	U	0.29	U	0.28	U	0.29	U	0.30	U
2-Methylphenol	0.12	U	0.61	U	0.12	U	0.13	U	0.12	U	0.11	U	0.12	U	0.12	U
3,3'-Dichlorobenzidine	1.93	U	9.72	U	1.97	U	2.12	U	1.96	U	1.86	U	1.90	U	1.98	U
4,6-Dinitro-2-cresol	0.97	U	4.86	U	0.99	U	1.06	U	0.98	U	0.93	U	0.95	U	0.99	U
4-BROMOPHENYLPHENYL ETHER	0.05	U	0.24	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
3-METHYL-4-CHLOROPHENOL	1.12	U	6.08	U	1.15	U	1.23	U	1.14	U	1.08	U	1.10	U	1.15	U
4-Methylphenol	0.29	U	1.22	U	0.30	U	0.32	U	0.29	U	0.28	U	0.29	U	0.30	U
4-Nitrophenol	3.99	U	24.30	U	4.07	U	4.37	U	4.05	U	3.83	U	3.92	U	4.08	U
Anthracene	0.86	U	4.86	U	0.88	U	0.94	U	0.87	U	0.82	U	0.84	U	0.88	U
Bis(2-chloroethoxy) methane	0.23	U	1.22	U	0.23	U	0.25	U	0.23	U	0.22	U	0.23	U	0.23	U
Bis(2-chloroisopropyl) ether	0.53	U	2.43	U	0.54	U	0.58	U	0.54	U	0.51	U	0.52	U	0.54	U
Bis(2-chloroethyl) ether	0.44	U	2.43	U	0.44	U	0.48	U	0.44	U	0.42	U	0.43	U	0.44	U
Bis(2-ethylhexyl) phthalate	4.35		48.60		12.33		1.99		1.60		0.56	U	0.57	U	0.59	U
Benzo[a]anthracene	0.05	U	0.24	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Benzo[a]pyrene	1.45	U	7.29	U	1.48	U	1.59	U	1.47	U	1.39	U	1.43	U	1.48	U
Benzo[b]fluoranthene	0.37	U	2.43	U	0.38	U	0.41	U	0.38	U	0.36	U	0.37	U	0.38	U
Butylbenzyl phthalate	2.18	U	10.94	U	2.22	U	2.38	U	2.21	U	2.09	U	2.14	U	2.22	U
Benzo[k]fluoranthene	0.16	U	0.73	U	0.16	U	0.17	U	0.16	U	0.15	U	0.15	U	0.16	U
Chrysene	0.04	U	0.24	U	0.04	U	0.11		0.04	U	0.04	U	0.09		0.04	U
Hexachlorobenzene	0.10	U	0.49	U	0.10	U	0.11	U	0.10	U	0.09	U	0.10	U	0.10	U
Hexachlorocyclopentadiene	0.63	U	3.65	U	0.64	U	0.69	U	0.64	U	0.60	U	0.62	U	0.64	U
Hexachloroethane	2.18	U	10.94	U	2.22	U	2.38	U	2.21	U	2.09	U	2.14	U	2.22	U
Dibenz[ah]anthracene	0.37	U	2.43	U	0.38	U	0.41	U	0.38	U	0.36	U	0.37	U	0.38	U
Diethyl phthalate	0.29	U	1.22	U	0.30	U	0.32	U	0.29	U	0.28	U	0.29	U	0.30	U
Dimethyl phthalate	0.08	U	0.36	U	0.08	U	0.08	U	0.08	U	0.07	U	0.07	U	0.08	U
Di-n-butyl phthalate	7.26		7.29	U	1.60	U	1.72	U	12.27		1.51	U	1.54	U	1.61	U
Di-n-octyl phthalate	0.28	U	1.22	U	0.28	U	0.30	U	0.28	U	0.27	U	0.27	U	0.28	U
Fluoranthene	0.04	U	0.24	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
Hexachlorobutadiene	1.17	U	6.08	U	1.20	U	1.28	U	1.19	U	1.13	U	1.15	U	1.20	U
Indeno[1,2,3-G,D]pyrene	2.90	U	12.15	U	2.96	U	3.18	U	2.94	U	2.78	U	2.85	U	2.97	U

Field Sample Number ->	48SB4B21		48SB5A19		48SB5B37		48SS1		48SS2		48SS3		48SS4		48SS5	
Lab Analysis Number ->	UB06568		UB06572		UB06573		UB06558		UB06559		UB06560		UB06561		UB06562	
Semivolatile Organics (ug/g)																
Naphthalene	0.89	U	24.30		0.91	U	0.98	U	0.91	U	0.86	U	0.88	U	0.91	U
Nitrobenzene	2.18	U	10.94	U	2.22	U	2.38	U	2.21	U	2.09	U	2.14	U	2.22	U
N-Nitrosodi-n-propylamine	1.33	U	7.29	U	1.36	U	1.46	U	1.35	U	1.28	U	1.31	U	1.36	U
N-Nitrosodiphenylamine	2.06		1.22	U	0.36	U	0.38	U	0.36	U	0.34	U	0.34	U	0.36	U
Pentachlorophenol	0.92	U	4.86	U	0.94	U	1.01	U	0.93	U	0.88	U	0.90	U	0.94	U
Phenanthrene	0.04	U	12.15		0.04	U	0.36		0.04	U	0.04	U	0.37		0.04	U
Phenol	0.06	U	0.36	U	0.06	U	0.07	U	0.06	U	0.06	U	0.06	U	0.06	U
Pyrene	0.10	U	0.97		0.10	U	0.11	U	0.10	U	0.10	U	0.10	U	0.10	U

Field Sample Number ->	48SS6		48SS8		48MW1A22		48MW1B54		48MW2A42		48MW2B46		48MW3A22		48MW3B32	
Lab Analysis Number ->	UB06563		UB06564		UB06575		UB06576		UB06585		UB06586		UC00028		UC00029	
Semivolatile Organics (ug/g)																
1,2,4-Trichlorobenzene	0.26	U	0.27	U	0.28	U	0.30	U	0.25	U	0.24	U	0.27	U	0.27	U
1,2-Dichlorobenzene	0.05	U	0.05	U	0.05	U	0.06	U	0.05	U	0.05	U	0.05	U	0.05	U
1,3-Dichlorobenzene	0.05	U	0.05	U	0.05	U	0.06	U	0.05	U	0.05	U	0.05	U	0.05	U
1,4-Dichlorobenzene	0.04	U	0.04	U	0.04	U	0.05	U	0.04	U	0.04	U	0.04	U	0.04	U
2,4,5-Trichlorophenol	0.57	U	0.59	U	0.62	U	0.66	U	0.57	U	0.53	U	0.60	U	0.61	U
2,4,6-Trichlorophenol	0.07	U	0.07	U	0.08	U	0.08	U	0.07	U	0.07	U	0.07	U	0.08	U
2,4-Dichlorophenol	0.08	U	0.08	U	0.08	U	0.09	U	0.08	U	0.07	U	0.08	U	0.08	U
2,4-Dimethylphenol	3.51	U	3.61	U	3.82	U	4.06	U	3.46	U	3.26	U	3.65	U	3.73	U
2,4-Dinitrophenol	5.50	U	5.66	U	5.98	U	6.36	U	5.43	U	5.11	U	5.71	U	5.85	U
2,4-Dinitrotoluene	1.64	U	1.69	U	1.78	U	1.89	U	1.62	U	1.52	U	1.70	U	1.74	U
2,6-Dinitrotoluene	0.37	U	0.39	U	0.41	U	0.43	U	0.37	U	0.35	U	0.39	U	0.40	U
2-Chlorophenol	0.06	U	0.07	U	0.07	U	0.07	U	0.06	U	0.06	U	0.07	U	0.07	U
2-Chloronaphthalene	0.28	U	0.29	U	0.31	U	0.32	U	0.28	U	0.26	U	0.29	U	0.30	U
2-Methylphenol	0.11	U	0.12	U	0.12	U	0.13	U	0.11	U	0.11	U	0.12	U	0.12	U
3,3'-Dichlorobenzidine	1.87	U	1.93	U	2.04	U	2.17	U	1.85	U	1.74	U	1.94	U	1.99	U
4,6-Dinitro-2-cresol	0.94	U	0.96	U	1.02	U	1.08	U	0.92	U	0.87	U	0.97	U	1.00	U
4-BROMOPHENYLPHENYL ETHER	0.05	U	0.05	U	0.05	U	0.06	U	0.05	U	0.04	U	0.05	U	0.05	U
3-METHYL-4-CHLOROPHENOL	1.09	U	1.12	U	1.18	U	1.26	U	1.07	U	1.01	U	1.13	U	1.16	U
4-Methylphenol	0.28	U	0.29	U	0.31	U	0.32	U	0.28	U	0.26	U	0.29	U	0.30	U
4-Nitrophenol	3.86	U	3.98	U	4.20	U	4.47	U	3.81	U	3.59	U	4.01	U	4.10	U
Anthracene	0.83	U	0.86	U	0.90	U	0.96	U	0.82	U	0.77	U	0.86	U	0.88	U
Bis(2-chloroethoxy) methane	0.22	U	0.23	U	0.24	U	0.26	U	0.22	U	0.21	U	0.23	U	0.24	U
Bis(2-chloroisopropyl) ether	0.51	U	0.53	U	0.56	U	0.60	U	0.51	U	0.48	U	0.53	U	0.55	U
Bis(2-chloroethyl) ether	0.42	U	0.43	U	0.46	U	0.49	U	0.42	U	0.39	U	0.44	U	0.45	U
Bis(2-ethylhexyl) phthalate	1.40		1.57		8.14		7.17		1.96		0.52	U	3.77		2.49	
Benzo[a]anthracene	0.05	U	0.05	U	0.05	U	0.06	U	0.05	U	0.04	U	0.05	U	0.05	U
Benzo[a]pyrene	1.40	U	1.45	U	1.53	U	1.62	U	1.39	U	1.31	U	1.46	U	1.49	U
Benzo[b]fluoranthene	0.36	U	0.37	U	0.39	U	0.42	U	0.36	U	0.34	U	0.38	U	0.39	U
Butylbenzyl phthalate	2.11	U	2.17	U	2.29	U	2.44	U	2.08	U	1.96	U	2.19	U	2.24	U
Benzo[k]fluoranthene	0.15	U	0.16	U	0.17	U	0.18	U	0.15	U	0.14	U	0.16	U	0.16	U
Chrysene	0.08		0.09		0.04	U	0.04	U	0.04	U	0.03	U	0.04	U	0.04	U
Hexachlorobenzene	0.09	U	0.10	U	0.10	U	0.11	U	0.09	U	0.09	U	0.10	U	0.10	U
Hexachlorocyclopentadiene	0.61	U	0.63	U	0.66	U	0.70	U	0.60	U	0.57	U	0.63	U	0.65	U
Hexachloroethane	2.11	U	2.17	U	2.29	U	2.44	U	2.08	U	1.96	U	2.19	U	2.24	U
Dibenz[ah]anthracene	0.36	U	0.37	U	0.39	U	0.42	U	0.36	U	0.34	U	0.38	U	0.39	U
Diethyl phthalate	0.28	U	0.29	U	0.31	U	0.32	U	0.28	U	0.26	U	0.29	U	0.30	U
Dimethyl phthalate	0.07	U	0.08	U	0.08	U	0.09	U	0.07	U	0.07	U	0.08	U	0.08	U
Di-n-butyl phthalate	1.52	U	8.55		1.65	U	1.76	U	1.50	U	1.41	U	2.31		1.62	U
Di-n-octyl phthalate	0.27	U	0.28	U	0.29	U	0.31	U	0.27	U	0.25	U	0.28	U	0.29	U
Fluoranthene	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.03	U	0.04	U	0.04	U
Hexachlorobutadiene	1.13	U	1.17	U	1.23	U	1.31	U	1.12	U	1.06	U	1.18	U	1.21	U
Indeno[1,2,3-C,D]pyrene	2.81	U	2.89	U	3.05	U	3.25	U	2.77	U	2.61	U	2.92	U	2.99	U

Field Sample Number ->	48SS6		48SS8		48MW1A22		48MW1B54		48MW2A42		48MW2B46		48MW3A22		48MW3B32	
Lab Analysis Number ->	UB06563		UB06564		UB06575		UB06576		UB06585		UB06586		UC00028		UC00029	
Semivolatile Organics (ug/g)																
Naphthalene	0.87	U	0.89	U	0.94	U	1.00	U	0.85	U	0.81	U	0.90	U	0.92	U
Nitrobenzene	2.11	U	2.17	U	2.29	U	2.44	U	2.08	U	1.96	U	2.19	U	2.24	U
N-Nitrosodi-n-propylamine	1.29	U	1.33	U	1.40	U	1.49	U	1.27	U	1.20	U	1.34	U	1.37	U
N-Nitrosodiphenylamine	0.34	U	0.35	U	0.37	U	0.39	U	0.33	U	0.32	U	0.35	U	0.36	U
Pentachlorophenol	0.89	U	0.92	U	0.97	U	1.03	U	0.88	U	0.83	U	0.92	U	0.95	U
Phenanthrene	0.33		0.04	U	0.04	U	0.04	U	0.04	U	0.03	U	0.04	U	0.04	U
Phenol	0.06	U	0.06	U	0.07	U	0.07	U	0.14		0.06	U	0.06	U	0.06	U
Pyrene	0.10	U	0.10	U	0.11	U	0.11	U	0.10	U	0.09	U	0.10	U	0.10	U

Field Sample Number ->	SCSE1		SCSE2		SCSE3	
Lab Analysis Number ->	UC00193		UC00194		UC00195	
Semivolatile Organics (ug/g)						
1,2,4-Trichlorobenzene	0.27	U	0.32	U	0.31	U
1,2-Dichlorobenzene	0.05	U	0.06	U	0.06	U
1,3-Dichlorobenzene	0.05	U	0.06	U	0.06	U
1,4-Dichlorobenzene	0.04	U	0.05	U	0.05	U
2,4,5-Trichlorophenol	0.60	U	0.72	U	0.70	U
2,4,6-Trichlorophenol	0.08	U	0.09	U	0.09	U
2,4-Dichlorophenol	0.08	U	0.10	U	0.09	U
2,4-Dimethylphenol	3.69	U	4.42	U	4.26	U
2,4-Dinitrophenol	5.78	U	6.93	U	6.67	U
2,4-Dinitrotoluene	1.72	U	2.06	U	1.99	U
2,6-Dinitrotoluene	0.39	U	0.47	U	0.45	U
2-Chlorophenol	0.07	U	0.08	U	0.08	U
2-Chloronaphthalene	0.30	U	0.35	U	0.34	U
2-Methylphenol	0.12	U	0.14	U	0.14	U
3,3'-Dichlorobenzidine	1.97	U	2.36	U	2.27	U
4,6-Dinitro-2-cresol	0.98	U	1.18	U	1.13	U
4-BROMOPHENYLPHENYL ETHER	0.05	U	0.06	U	0.06	U
3-METHYL-4-CHLOROPHENOL	1.14	U	1.37	U	1.32	U
4-Methylphenol	0.30	U	0.35	U	0.34	U
4-Nitrophenol	4.06	U	4.87	U	4.68	U
Anthracene	0.87	U	1.05	U	1.01	U
Bis(2-chloroethoxy) methane	0.23	U	0.28	U	0.27	U
Bis(2-chloroisopropyl) ether	0.54	U	0.65	U	0.62	U
Bis(2-chloroethyl) ether	0.44	U	0.53	U	0.51	U
Bis(2-ethylhexyl) phthalate	0.59	U	0.71	U	0.68	U
Benzo[a]anthracene	0.05	U	0.06	U	0.06	U
Benzo[a]pyrene	1.48	U	1.77	U	1.70	U
Benzo[b]fluoranthene	0.38	U	0.46	U	0.44	U
Butylbenzyl phthalate	2.21	U	2.65	U	2.55	U
Benzo[k]fluoranthene	0.16	U	0.19	U	0.18	U
Chrysene	0.04	U	0.22		0.05	U
Hexachlorobenzene	0.10	U	0.12	U	0.11	U
Hexachlorocyclopentadiene	0.64	U	0.77	U	0.74	U
Hexachloroethane	2.21	U	2.65	U	2.55	U
Dibenz[ah]anthracene	0.38	U	0.46	U	0.44	U
Diethyl phthalate	0.30	U	0.35	U	0.34	U
Dimethyl phthalate	0.08	U	0.09	U	0.09	U
Di-n-butyl phthalate	1.60	U	7.82	J1	5.53	J1
Di-n-octyl phthalate	0.28	U	0.34	U	0.33	U
Fluoranthene	0.04	U	0.27		0.16	
Hexachlorobutadiene	1.19	U	1.43	U	1.38	U
Indeno[1,2,3-C,D]pyrene	2.95	U	3.54	U	3.40	U

157

Field Sample Number ->	SCSE1		SCSE2		SCSE3	
Lab Analysis Number ->	UC00193		UC00194		UC00195	
Semivolatile Organics (ug/g)						
Naphthalene	0.91	U	1.09	U	1.05	U
Nitrobenzene	2.21	U	2.65	U	2.55	U
N-Nitrosodi-n-propylamine	1.35	U	1.62	U	1.56	U
N-Nitrosodiphenylamine	0.36	U	0.43	U	0.41	U
Pentachlorophenol	0.93	U	1.12	U	1.08	U
Phenanthrene	0.04	U	0.29		0.13	
Phenol	0.06	U	0.08	U	0.07	U
Pyrene	0.10	U	0.12	U	0.12	U

Field Sample Number ->	17ASB105		17ASB110		17ASB115		17ASB120		17ASB122		17ASB205		17ASB210		17ASB215		17ASB220	
Lab Analysis Number ->	UB06429		UB06430		UB06431		UB06432		UB06433		UB06435		UB06436		UB06437		UB06438	
Explosives (ug/g)																		
2,4,6-Trinitrotoluene	2.04	UJ4	2.02	UJ4	2.19	UJ4	2.21	UJ4	2.14	UJ4	2.88	UJ4	2.10	UJ4	2.00	UJ4	2.15	UJ4
2,4-Dinitrotoluene	2.55	UJ4	2.53	UJ4	2.73	UJ4	2.77	UJ4	2.67	UJ4	3.60	UJ4	2.63	UJ4	2.51	UJ4	2.69	UJ4
2,6-Dinitrotoluene	2.04	U	2.02	U	2.19	U	2.21	U	2.14	U	2.88	U	2.10	U	2.00	U	2.15	U
Cyclotetramethylenetetranitramine	2.04	U	2.02	U	2.19	U	2.21	U	2.14	U	2.88	U	2.10	U	2.00	U	2.15	U
Cyclonite (RDX)	1.31	UJ4	1.29	UJ4	1.40	UJ4	1.42	UJ4	1.37	UJ4	1.84	UJ4	1.35	UJ4	1.28	UJ4	1.38	UJ4
TETRYL	2.15	U	2.13	U	2.31	U	2.34	U	2.26	U	3.04	U	2.22	U	2.11	U	2.27	U

Field Sample Number ->	**17ASB225**		**17ASS3**		**17ASB305**		**17ASB310**		**17ASB315**		**17ASB320**		**17ASB325**		**17ASB340**		**17BSS1**	
Lab Analysis Number ->	**UB06439**		**UB06441**		**UB06442**		**UB06443**		**UB06444**		**UB06445**		**UB06446**		**UB06447**		**UB06463**	
Explosives (ug/g)																		
2,4,6-Trinitrotoluene	2.16	UJ4	2.08	UJ4	2.04	UJ4	2.14	UJ4	2.20	UJ4	2.19	UJ4	2.20	UJ4	2.01	UJ4	2.90	UJ4
2,4-Dinitrotoluene	2.70	UJ4	2.60	UJ4	2.55	UJ4	2.68	UJ4	2.75	UJ4	2.74	UJ4	2.74	UJ4	2.51	UJ4	3.63	UJ4
2,6-Dinitrotoluene	2.16	U	2.08	U	2.04	U	2.14	U	2.20	U	2.19	U	2.20	U	2.01	U	2.90	U
Cyclotetramethylenetetranitramine	2.16	U	2.08	U	2.04	U	2.14	U	2.20	U	2.19	U	2.20	U	2.01	U	2.90	U
Cyclonite (RDX)	1.38	UJ4	1.33	UJ4	1.30	UJ4	1.37	UJ4	1.41	UJ4	1.40	UJ4	1.41	UJ4	1.28	UJ4	1.86	UJ4
TETRYL	2.28	U	2.20	U	2.15	U	2.26	U	2.32	U	2.31	U	2.32	U	2.12	U	3.06	U

Field Sample Number ->	17BSS2		17CSB105		17CSB110		17CSB114		17CSB205		17CSB210		17CSB215		17CSB240		17DSB105	
Lab Analysis Number ->	UB06464		UB06465		UB06466		UB06467		UB06469		UB06470		UB06471		UB06473		UB06476	
Explosives (ug/g)																		
2,4,6-Trinitrotoluene	2.89	UJ4	2.46	UJ4	2.73	UJ4	2.66	UJ4	2.49	UJ4	2.96	UJ4	2.54	UJ4	3.11	UJ4	2.56	UJ4
2,4-Dinitrotoluene	3.61	UJ4	3.08	UJ4	3.42	UJ4	3.32	UJ4	3.11	UJ4	3.70	UJ4	3.18	UJ4	3.88	UJ4	3.20	UJ4
2,6-Dinitrotoluene	2.89	U	2.46	U	2.73	U	2.66	U	2.49	U	2.96	U	2.54	U	3.11	U	2.56	U
Cyclotetramethylenetetranitramine	2.89	U	2.46	U	2.73	U	2.66	U	2.49	U	2.96	U	2.54	U	3.11	U	2.56	U
Cyclonite (RDX)	1.85	UJ4	1.57	UJ4	1.75	UJ4	1.70	UJ4	1.59	UJ4	1.89	UJ4	1.63	UJ4	1.99	UJ4	1.64	UJ4
TETRYL	3.04	U	2.60	U	2.88	U	2.60	U	2.63	U	3.12	U	2.68	U	3.28	U	2.70	U

Field Sample Number ->	17DSB110		17DSB115		17DSB120		17DSB125		17DSB205		17DSB210		17DSB127		17DSB215		17DSB220	
Lab Analysis Number ->	UB06477		UB06478		UB06479		UB06480		UB06483		UB06484		UB06481		UB06485		UB06486	
Explosives (ug/g)																		
2,4,6-Trinitrotoluene	2.48	UJ4	2.56	UJ4	2.67	UJ4	3.19	UJ4	2.46	UJ4	2.57	UJ4	3.33	UJ4	3.23	UJ4	3.26	UJ4
2,4-Dinitrotoluene	3.09	UJ4	3.21	UJ4	3.34	UJ4	3.99	UJ4	3.08	UJ4	3.21	UJ4	4.16	UJ4	4.04	UJ4	4.08	UJ4
2,6-Dinitrotoluene	2.48	U	2.56	U	2.67	U	3.19	U	2.46	U	2.57	U	3.33	U	3.23	U	3.26	U
Cyclotetramethylenetetranitramine	2.48	U	2.56	U	2.67	U	3.19	U	2.46	U	2.57	U	3.33	U	3.23	U	3.26	U
Cyclonite (RDX)	1.58	UJ4	1.64	UJ4	1.71	UJ4	2.04	UJ4	1.58	UJ4	1.65	UJ4	2.13	UJ4	2.07	UJ4	2.09	UJ4
TETRYL	2.61	U	2.71	U	2.82	U	3.37	U	2.60	U	2.71	U	3.51	U	3.41	U	3.44	U

Field Sample Number ->	17DSB225		17DSB240		SPG3SE1		48SB4A11		48SB4B21		48SS1		48SS2		48SS3		48SS8	
Lab Analysis Number ->	UB06487		UB06488		UC00174		UB06567		UB06568		UB06558		UB06559		UB06560		UB06564	
Explosives (ug/g)																		
2,4,6-Trinitrotoluene	2.83	UJ4	2.52	UJ4	3.13	UJ4	2.55	UJ4	2.42	UJ4	2.65	UJ4	2.45	UJ4	2.32	UJ4	2.41	UJ4
2,4-Dinitrotoluene	3.54	UJ4	3.15	UJ4	3.92	UJ4	3.19	UJ4	3.02	UJ4	3.31	UJ4	3.07	UJ4	2.90	UJ4	3.01	UJ4
2,6-Dinitrotoluene	2.83	U	2.52	U	3.13	U	2.55	U	2.42	U	2.65	U	2.45	U	2.32	U	2.41	U
Cyclotetramethylenetetranitramine	2.83	U	2.52	U	3.13	U	2.55	U	2.42	U	2.65	U	2.45	U	2.32	U	2.41	U
Cyclonite (RDX)	1.81	UJ4	1.61	UJ4	2.01	UJ4	1.63	UJ4	1.55	UJ4	1.70	UJ4	1.57	UJ4	1.48	UJ4	1.54	UJ4
TETRYL	2.99	U	2.66	U	3.31	U	2.69	U	2.55	U	2.79	U	2.59	U	2.45	U	2.54	U

Field Sample Number ->	**54SB1A**		**54SB1B**		**54SB2A**		**54SB2B**		**54SB3A**		**54SB3B**		**54SB4A**		**54SB4B**		**54SB5A**	
Lab Analysis Number ->	**UB06593**		**UB06594**		**UB06595**		**UB06596**		**UB06597**		**UB06598**		**UB06599**		**UB06600**		**UB06601**	
Explosives (ug/g)																		
2,4,6-Trinitrotoluene	2.35	UJ4	2.19	UJ4	4.41	J4	2.45	UJ4	2,988.51	J4	48.42	J4	2.48	UJ4	2.41	UJ4	2.49	UJ4
2,4-Dinitrotoluene	2.94	UJ4	2.74	UJ4	2.80	UJ4	3.07	UJ4	12.76	J4	3.29	UJ4	3.10	UJ4	3.01	UJ4	3.12	UJ4
2,6-Dinitrotoluene	2.35	U	2.19	U	2.24	U	2.45	U	2.30	U	2.63	U	2.48	U	2.41	U	2.49	U
Cyclotetramethylenetetranitramine	2.35	U	2.19	U	2.24	U	2.45	U	4.68		2.63	U	2.48	U	2.41	U	2.49	U
Cyclonite (RDX)	1.50	UJ4	1.40	UJ4	1.43	UJ4	1.57	UJ4	1.98	J4	1.68	UJ4	1.59	UJ4	1.54	UJ4	1.60	UJ4
TETRYL	2.48	U	2.31	U	2.37	U	2.59	U	2.43	U	2.78	U	2.61	U	2.54	U	2.63	U

957

Field Sample Number ->	54SB5B		54SB6A		54SB6B		54SB7A		54SB7B		54SB8A		54SB8B		54SB9A		54SB9B	
Lab Analysis Number ->	UB06602		UB06642		UB06643		UB06644		UB06645		UB06646		UB06647		UB06603		UB06604	
Explosives (ug/g)																		
2,4,6-Trinitrotoluene	2.55	UJ4	4.71	J4	6,527.78	J4	2.85	J6	2.68	UJ4	2.42	UJ4	2.49	UJ4	48.54	J4	2.51	UJ4
2,4-Dinitrotoluene	3.18	UJ4	25.31	J4	56.67	J4	2.86	UJ4	3.35	UJ4	3.02	UJ4	3.12	UJ4	3.05	UJ4	3.14	UJ4
2,6-Dinitrotoluene	2.55	U	2.44	U	112.50		2.29	U	2.68	U	2.42	U	2.49	U	2.44	U	2.51	U
Cyclotetramethylenetetranitramine	2.55	U	2.44	U	7.28	J9	2.29	U	2.68	U	2.42	U	2.49	U	2.44	U	2.51	U
Cyclonite (RDX)	1.63	UJ4	1.56	UJ4	1.78	UJ4	1.46	UJ4	1.72	UJ4	1.55	UJ4	1.60	UJ4	1.56	UJ4	1.61	UJ4
TETRYL	2.69	U	2.58	U	2.93	U	2.41	U	2.83	U	2.55	U	2.63	U	2.57	U	2.65	U

57

Field Sample Number ->	54SB10A		54SB10B		54SB10D		54SB11A		54SB11B		54SB12A		54SB12B		54SB13A		54SB13B	
Lab Analysis Number ->	**UB06605**		**UB06606**		**UB06607**		**UB06631**		**UB06632**		**UB06633**		**UB06634**		**UB06635**		**UB06636**	
Explosives (ug/g)																		
2,4,6-Trinitrotoluene	2.42	UJ4	2.45	UJ4	11.67	J4	2.43	UJ4	2.42	UJ4	2.50	UJ4	2.66	UJ4	2.45	UJ4	2.42	UJ4
2,4-Dinitrotoluene	3.02	UJ4	3.06	UJ4	2.86	UJ4	3.04	UJ4	3.03	UJ4	3.12	UJ4	3.32	UJ4	3.07	UJ4	3.03	UJ4
2,6-Dinitrotoluene	2.42	U	2.45	U	2.29	U	2.43	U	2.42	U	2.50	U	2.66	U	2.45	U	2.42	U
Cyclotetramethylenetetranitramine	2.42	U	2.45	U	2.29	U	2.43	U	2.42	U	2.50	U	2.66	U	2.45	U	2.42	U
Cyclonite (RDX)	1.55	UJ4	1.57	UJ4	1.46	UJ4	1.56	UJ4	1.55	UJ4	1.60	UJ4	1.70	UJ4	1.57	UJ4	1.55	UJ4
TETRYL	2.55	U	2.59	U	2.41	U	2.56	U	2.55	U	2.63	U	2.80	U	2.59	U	2.55	U

Field Sample Number ->	54SB14A		54SB14B		54SB15A		54SB16A		54SB16B		54SB16D		SCSE1		SCSE2		SCSE3	
Lab Analysis Number ->	UB06637		UB06638		UB06648		UB06639		UB06640		UB06641		UC00193		UC00194		UC00195	
Explosives (ug/g)																		
2,4,6-Trinitrotoluene	2.36	UJ4	2.41	UJ4	2.47	UJ4	2.45	UJ4	2.47	UJ4	2.49	UJ4	2.46	UJ4	2.95	UJ4	2.84	UJ4
2,4-Dinitrotoluene	2.95	UJ4	3.01	UJ4	3.09	UJ4	3.06	UJ4	3.09	UJ4	3.11	UJ4	3.08	UJ4	3.69	UJ4	3.55	UJ4
2,6-Dinitrotoluene	2.36	U	2.41	U	2.47	U	2.45	U	2.47	U	2.49	U	2.46	U	2.95	U	2.84	U
Cyclotetramethylenetetranitramine	2.36	U	2.41	U	2.47	U	2.45	U	2.47	U	2.49	U	2.46	U	2.95	U	2.84	U
Cyclonite (RDX)	1.51	UJ4	1.54	UJ4	1.58	UJ4	1.57	UJ4	1.58	UJ4	1.59	UJ4	1.57	UJ4	1.89	UJ4	1.82	UJ4
TETRYL	2.49	U	2.54	U	2.60	U	2.58	U	2.60	U	2.62	U	2.60	U	3.11	U	2.99	U

Field Sample Number ->	17ASB105		17ASB110		17ASB115		17ASB120		17ASB122		17ASB205		17ASB210		17ASB215		17ASB220		17ASB225	
Lab Analysis Number ->	UB06429		UB06430		UB06431		UB06432		UB06433		UB06435		UB06436		UB06437		UB06438		UB06439	
Metals (ug/g)																				
Arsenic	94.87	J4	9.30	J4	13.50	J4	16.69	J4	3.27	UJ4	7.33	J4	2.99	UJ4	8.98	J4	3.84	UJ4	3.58	UJ4
Selenium	0.58	UJ4	0.57	UJ4	0.55	UJ4	0.56	UJ4	0.59	UJ4	0.56	UJ4	0.54	UJ4	0.65	UJ4	0.69	UJ4	0.64	UJ4
Lead	5,256.41	J6	101.39	J6	56.44	J6	273.97	J6	11.79	J6	26.28	J6	14.13	J6	69.06	J6	41.78	J6	77.36	J6
Silver	42.31	J4	0.39	J4	0.02	UJ4	2.12	J4	0.02	UJ4	0.02	UJ4	0.01	UJ4	0.02	UJ4	0.02	UJ4	0.02	UJ4
Barium	5,128.21	J1	63.12	J1	69.20	J1	69.36	J1	71.50	J1	64.38	J1	75.69	J1	86.91	J1	134.26	J1	9.56	J1
Beryllium	1.65	J4	2.22	J4	2.11	J4	1.77	J4	2.13	J4	2.23	J4	2.06	J4	4.52	J4	6.82	J4	0.61	UJ4
Cadmium	13.72		1.52	U	1.47	U	1.49	U	1.57	U	1.49	U	1.44	U	1.73	U	1.84	U	1.72	U
Chromium	2,051.28	J6	55.51	J6	54.72	J6	54.92	J6	68.50	J6	46.82	J6	49.70	J6	86.04	J6	122.27	J6	7.56	J6
Nickel	902.56	J4	24.84	J4	29.20	J4	24.28	J4	28.37	J4	26.15	J4	27.78	J4	56.83	J4	78.96	J4	6.12	J4
Antimony	77.95		24.84	U	24.05	U	24.41	U	25.62	U	24.41	U	23.47	U	28.20	U	30.11	U	28.08	U
Thallium	43.97	UJ4	43.47	UJ4	42.09	UJ4	42.71	UJ4	44.84	UJ4	42.71	UJ4	41.08	UJ4	49.35	UJ4	52.69	UJ4	49.14	UJ4
Mercury	0.29	J4	0.14	J4	0.16	J4	0.11	J4	0.09	J4	0.18	J4	0.06	UJ4	0.12	J4	0.08	UJ4	0.07	UJ4

Field Sample Number ->	17ASS3		17ASB305		17ASB310		17ASB315		17ASB320		17ASB325		17ASB340		17BSS1		17BSS2		17CSB105	
Lab Analysis Number ->	UB06441		UB06442		UB06443		UB06444		UB06445		UB06446		UB06447		UB06463		UB06464		UB06465	
Metals (ug/g)																				
Arsenic	101.70	J4	6.70	J4	7.51	J4	4.64	J4	3.75	J4	1.74	UJ4	3.30	J4	127.72	J4	18.18	J4	11.98	J4
Selenium	0.54	UJ4	0.68	UJ4	0.66	UJ4	0.61	UJ4	0.49	UJ4	0.49	UJ4	0.49	UJ4	0.65	UJ4	0.65	UJ4	0.55	UJ4
Lead	4,721.55	J6	27.08	J6	23.02	J6	21.83	J6	30.77	J6	9.23	J6	15.70	J6	65.[illegible].12	J1	128.43	J1	41.82	J1
Silver	2.18	J4	0.02	UJ4	0.02	UJ4	0.02	UJ4	0.01	UJ4	0.01	UJ4	0.01	UJ4	1.89	J4	0.13	J4	0.02	UJ4
Barium	577.48	J1	71.26	J1	126.39	J1	45.16	J1	52.97	J1	54.71	J1	34.58	J1	261.25	J1	99.42	J1	29.40	J1
Beryllium	0.98	J4	3.40	J4	7.39	J4	2.20	J4	0.57	J4	0.77	J4	1.55	J4	1.41	J4	5.61	J4	3.23	J4
Cadmium	4.29		1.82	U	1.76	U	1.64	U	1.32	U	1.32	U	1.32	U	3.12	J4	1.73	UJ4	1.46	UJ4
Chromium	222.76	J6	53.71	J6	79.33	J6	75.99	J6	17.25	J6	22.59	J6	45.44	J6	144.41		76.05		61.87	
Nickel	69.13	J4	34.64	J4	71.26	J4	36.43	J4	6.30	J4	10.90	J4	23.71	J4	40.49	J4	51.80	J4	25.95	J4
Antimony	23.73	U	29.65	U	28.74	U	26.74	U	21.54	U	21.49	U	21.51	U	28.45	UJ4	28.28	UJ4	24.11	UJ4
Thallium	41.53	UJ4	51.89	UJ4	50.29	UJ4	46.79	UJ4	37.69	UJ4	37.61	UJ4	37.65	UJ4	49.78	UJ4	49.49	UJ4	42.19	UJ4
Mercury	0.33	J4	0.18	J4	0.13	J4	0.07	UJ4	0.05	UJ4	0.05	UJ4	0.05	UJ4	0.25	J4	0.07	UJ4	0.06	UJ4

Field Sample Number ->	17CSB110		17CSB114		17CSB205		17CSB210		17CSB215		17CSB240		17DSB105		17DSB110		17DSB115		17DSB120	
Lab Analysis Number ->	**UB06466**		**UB06467**		**UB06469**		**UB06470**		**UB06471**		**UB06473**		**UB06476**		**UB06477**		**UB06478**		**UB06479**	
Metals (ug/g)																				
Arsenic	3.42	UJ4	3.32	UJ4	3.11	UJ4	3.70	UJ4	4.59	J4	3.88	UJ4	3.20	UJ4	3.09	UJ4	3.21	UJ4	3.34	UJ4
Selenium	0.61	UJ4	0.60	UJ4	0.56	UJ4	0.66	UJ4	0.57	UJ4	0.70	UJ4	0.57	UJ4	0.56	UJ4	0.58	UJ4	0.60	UJ4
Lead	18.44	J1	18.73	J1	12.20	J1	13.68	J1	190.60	J1	17.24	J1	20.08	J1	17.95	J1	26.54	J1	12.36	J1
Silver	0.02	UJ4	0.02	UJ4	0.02	UJ4	0.02	UJ4	0.04	J4	0.02	UJ4	0.03	J4	0.02	UJ4	0.02	UJ4	0.02	UJ4
Barium	78.55	J1	84.33	J1	36.74	J1	70.12	J1	104.70	J1	86.49	J1	68.93	J1	60.40	J1	67.05	J1	69.69	J1
Beryllium	5.19	J4	3.61	J4	1.56	J4	5.77	J4	2.52	J4	6.21	J4	1.83	J4	2.02	J4	3.21	J4	3.04	J4
Cadmium	1.64	UJ4	1.59	UJ4	1.49	UJ4	1.78	UJ4	4.73	J4	1.86	UJ4	1.53	UJ4	1.49	UJ4	1.54	UJ4	1.60	UJ4
Chromium	72.81		59.89		33.62		54.29		71.92		74.38		29.92		43.94		67.82		56.07	
Nickel	46.17	J4	35.33	J4	18.68	J4	46.60	J4	45.62	J4	56.83	J4	14.58	J4	1[illegible].21	J4	28.97	J4	45.53	J4
Antimony	26.78	UJ4	26.03	UJ4	24.41	UJ4	28.99	UJ4	24.90	UJ4	30.43	UJ4	25 06	UJ4	24.26	UJ4	25.13	UJ4	26.17	UJ4
Thallium	46.86	UJ4	45.55	UJ4	42.71	UJ4	50.74	UJ4	43.58	UJ4	53.26	UJ4	43.86	UJ4	42.45	UJ4	43.97	UJ4	45.79	UJ4
Mercury	0.10	J4	0.07	UJ4	0.06	UJ4	0.07	UJ4	0.06	UJ4	0.08	UJ4	0.06	UJ4	0.06	UJ4	0.06	UJ4	0.07	UJ4

Field Sample Number ->	17DSB125		17DSB205		17DSB210		17DSB127		17DSB215		17DSB220		17DSB225		17DSB240		SPG3SE1		31MW1A25	
Lab Analysis Number ->	UB06480		UB06483		UB06484		UB06481		UB06485		UB06486		UB06487		UB06488		UC00174		UB06565	.
Metals (ug/g)																				
Arsenic	3.99	UJ4	3.08	UJ4	6.32	J4	4.16	UJ4	11.32	J4	4.08	UJ4	3.54	UJ4	8.03	J4	17.40	J4	2.61	UJ4
Selenium	0.72	UJ4	0.55	UJ4	0.58	UJ4	0.75	UJ4	0.73	UJ4	0.73	UJ4	0.64	UJ4	0.57	UJ4	0.70	UJ4	0.47	UJ4
Lead	28.23	J1	20.81	J1	17.87	J1	23.46	J1	23.10	J1	11.31	J1	8.43	J1	14.63	J1	548.59	J6	0.63	J6
Silver	0.02	UJ4	0.02	UJ4	0.02	UJ4	0.07	J4	0.02	UJ4	0.02	UJ4	0.02	UJ4	0.02	UJ4	0.22	J4	0.01	UJ4
Barium	72.73	J1	65.89	J1	80.98	J1	111.48	J1	142.65	J1	111.91	J1	55.95	J1	68.85	J1	700.63	J1	28.11	J1
Beryllium	4.77	J4	1.42	J4	2.48	J4	5.89	J4	7.88	J4	5.48	J4	11.84	J4	2.23	J4	4.23	J4	0.94	J4
Cadmium	1.91	UJ4	1.48	UJ4	1.54	UJ4	2.00	UJ4	1.94	UJ4	1.96	UJ4	1.70	UJ4	1.51	UJ4	1.88	UJ4	1.25	UJ4
Chromium	86.92		31.28		56.30		77.87		97.09		63.30		77.76		49.18		62.70	J6	18.50	J6
Nickel	50.40	J4	11.18	J4	28.79	J4	66.39	J4	72.05	J4	57.42	J4	87.82	J4	23.33	J4	52.98	J4	23.62	J4
Antimony	31.26	UJ4	24.14	UJ4	25.19	UJ4	32.61	UJ4	31.66	UJ4	31.97	UJ4	27.76	UJ4	24.72	UJ4	30.72	UJ4	20.48	UJ4
Thallium	54.70	UJ4	42.24	UJ4	44.09	UJ4	57.07	UJ4	55.41	UJ4	55.95	UJ4	48.58	UJ4	43.25	UJ4	53.76	UJ4	35.84	UJ4
Mercury	0.08	UJ4	0.06	UJ4	0.06	UJ4	0.15	J4	0.24	J4	0.08	UJ4	0.07	UJ4	0.06	UJ4	0.13	J4	0.05	UJ4

Field Sample Number ->	31MW1B35		31MW2A		31MW2B		31MW3A10		31MW3B20		31MW4A12		31MW4B22		31MW4C40		48SS1		48SS2	
Lab Analysis Number ->	UB06566		UB06474		UB06475		UB06516		UB06517		UB06518		UB06519		UB06520		UB06558		UB06559	
Metals (ug/g)																				
Arsenic	2.65	UJ4	3.09	UJ4	4.40	J4	2.92	UJ4	2.78	UJ4	2.87	UJ4	2.71	UJ4	2.90	UJ4	4.53	J4	9.78	J4
Selenium	0.48	UJ4	0.56	UJ4	0.54	UJ4	0.52	UJ4	0.50	UJ4	0.52	UJ4	0.49	UJ4	0.52	UJ4	0.59	UJ4	1.31	UJ4
Lead	7.32	J6	21.16	J1	20.86	J1	31.54	J1	40.00	J1	17.70	J1	13.96	J1	19.98	J1	5.83	J6	196.32	J6
Silver	0.02	J4	0.02	UJ4	0.01	UJ4	0.01	UJ4	0.11	J4	0.01	UJ4	0.01	UJ4	0.01	UJ4	0.02	UJ4	0.03	J4
Barium	58.39	J1	134.90	J1	97.33	J1	134.00	J1	75.10	J1	136.78	J1	82.68	J1	140.53	J1	757.62	J1	100.98	J1
Beryllium	1.18	J4	1.00	J4	1.06	J4	0.95	J4	0.75	J4	1.18	J4	0.83	J4	1.22	J4	2.15	J4	0.91	J4
Cadmium	1.27	UJ4	1.49	UJ4	1.33	UJ4	1.20	UJ4	1.20	UJ4	1.38	UJ4	1.30	UJ4	1.39	UJ4	1.59	UJ4	1.47	UJ4
Chromium	24.10	J6	43.94		34.00		26.80		19.50		43.91		32.03		44.13		7.07	J6	58.65	J6
Nickel	30.89	J4	13.37	J4	22.78	J4	12.60	J4	13.30	J4	20.23	J4	18.18	J4	21.49	J4	11.83	J4	31.17	J4
Antimony	20.81	UJ4	24.26	UJ4	21.78	UJ4	19.60	UJ4	19.60	UJ4	22.53	UJ4	21.21	UJ4	22.76	UJ4	25.96	UJ4	24.05	UJ4
Thallium	36.41	UJ4	42.45	UJ4	38.11	UJ4	34.30	UJ4	34.30	UJ4	39.43	UJ4	37.12	UJ4	39.84	UJ4	45.43	UJ4	42.09	UJ4
Mercury	0.05	UJ4	0.06	UJ4	0.07	J4	0.18	J4	0.06	UJ4	0.06	UJ4	0.05	UJ4	0.06	UJ4	1.47	J4	0.54	J4

Field Sample Number ->	48SS3		48SS4		48SS5		48SS6		48SS8		54SB1A		54SB1B		54SB2A		54SB2B		54SB3A	
Lab Analysis Number ->	UB06560		UB06561		UB06562		UB06563		UB06564		UB06593		UB06594		UB06595		UB06596		UB06597	
Metals (ug/g)																				
Arsenic	2.90	UJ4	4.35	J4	3.09	UJ4	4.46	J4	4.76	J4	2.94	UJ4	2.74	UJ4	3.27	J4	3.07	UJ4	2.87	UJ4
Selenium	0.52	UJ4	0.79	J4	0.56	UJ4	0.53	UJ4	0.78	J4	0.53	UJ4	0.49	UJ4	0.50	UJ4	0.55	UJ4	0.52	UJ4
Lead	20.88	J6	25.53	J6	27.19	J6	16.49	J6	38.55	J6	716.80	J6	5.77	J6	2,354.26	J6	14.23	J6	321.84	J6
Silver	0.03	J4	0.03	J4	0.02	UJ4	0.03	J4	0.02	J4	0.07	J4	0.01	UJ4	0.03	J4	0.03	J4	0.03	J4
Barium	125.29	J1	135.39	J1	66.63	J1	139.18	J1	110.72	J1	164.51	J1	307.44	J1	224.22	J1	175.46	J1	178.16	J1
Beryllium	1.01	J4	0.51	UJ4	0.77	J4	0.87	J4	1.31	J4	0.93	J4	0.47	UJ4	1.76	J4	1.33	J4	1.11	J4
Cadmium	1.39	UJ4	1.43	UJ4	1.48	UJ4	1.40	UJ4	1.45	UJ4	2.40	J4	1.31	UJ4	1.35	UJ4	1.47	UJ4	1.38	UJ4
Chromium	28.19	J6	17.10	J6	37.45	J6	18.60	J6	37.59	J6	25.38	J6	9.80	J6	27.91	J6	29.45	J6	28.16	J6
Nickel	7.11	J4	7.17	J4	12.73	J4	6.75	J4	14.22	J4	11.66	J4	6.23	J4	10.25	J4	16.69	J4	13.45	J4
Antimony	22.74	UJ4	23.28	UJ4	24.23	UJ4	22.92	UJ4	23.61	UJ4	23.03	UJ4	21.44	UJ4	21.97	UJ4	24.05	UJ4	22.53	UJ4
Thallium	39.79	UJ4	40.74	UJ4	42.40	UJ4	40.12	UJ4	41.33	UJ4	40.31	UJ4	37.53	UJ4	38.45	UJ4	42.09	UJ4	39.43	UJ4
Mercury	0.06	UJ4	0.59	J4	0.13	J4	0.06	UJ4	0.39	J4	0.09	J4	0.05	UJ4	0.13	J4	0.06	UJ4	5.06	J4

165

Field Sample Number ->	54SB3B		54SB4A		54SB4B		54SB5A		54SB5B		54SB6A		54SB6B		54SB7A		54SB7B		54SB8A	
Lab Analysis Number ->	UB06598		UB06599		UB06600		UB06601		UB06602		UB06642		UB06643		UB06644		UB06645		UB06646	
Metals (ug/g)																				
Arsenic	3.29	UJ4	3.10	UJ4	3.01	UJ4	3.12	UJ4	3.18	UJ4	4.08	J4	3.47	UJ4	2.86	UJ4	3.35	UJ4	3.02	UJ4
Selenium	0.59	UJ4	0.56	UJ4	0.54	UJ4	0.56	UJ4	0.57	UJ4	0.55	UJ4	0.62	UJ4	0.51	UJ4	0.60	UJ4	0.54	UJ4
Lead	14.74	J6	84.26	J6	8.36	J6	39.90	J6	16.82	J6	3,789.73	J6	430.56	J6	50.29	J6	22.79	J6	229.75	J6
Silver	0.04	J4	0.04	J4	0.03	J4	0.04	J4	0.05	J4	0.30	J4	0.02	UJ4	0.01	UJ4	0.02	UJ4	0.04	UJ4
Barium	87.63	J1	313.51	J1	108.30	J1	281.80	J1	244.59	J1	1,077.02	J1	362.50	J1	138.29	J1	420.91	J1	188.63	J1
Beryllium	0.56	UJ4	1.78	J4	0.51	UJ4	1.55	J4	1.61	J4	1.11	J4	2.43	J4	0.82	J4	2.47	J4	1.15	J4
Cadmium	1.58	UJ4	1.49	UJ4	1.44	UJ4	1.50	UJ4	1.53	UJ4	11.75	J4	1.67	UJ4	1.37	UJ4	1.61	UJ4	1.45	UJ4
Chromium	37.76	J6	35.56	J6	21.30	J6	34.54	J6	40.64	J6	136.92	J6	70.14	J6	24.00	J6	57.10	J6	27.69	J6
Nickel	10.26	J4	21.44	J4	9.19	J4	21.20	J4	24.46	J4	16.99	J4	30.14	J4	12.34	J4	34.72	J4	15.60	J4
Antimony	25.79	UJ4	24.29	UJ4	23.59	UJ4	24.44	UJ4	24.97	UJ4	23.96	UJ4	27.22	UJ4	22.40	UJ4	26.27	UJ4	23.70	UJ4
Thallium	45.13	UJ4	42.50	UJ4	41.28	UJ4	42.77	UJ4	43.69	UJ4	41.93	UJ4	47.64	UJ4	39.20	UJ4	45.98	UJ4	41.48	UJ4
Mercury	0.21	J4	0.06	UJ4	0.06	UJ4	0.06	UJ4	0.06	UJ4	72.13	J4	0.07	UJ4	0.06	UJ4	0.07	UJ4	0.06	UJ4

Field Sample Number ->	54SB8B		54SB9A		54SB9B		54SB10A		54SB10B		54SB10D		54SB11A		54SB11B		54SB12A	
Lab Analysis Number ->	UB06647		UB06603		UB06604		UB06605		UB06606		UB06607		UB06631		UB06632		UB06633	
Metals (ug/g)																		
Arsenic	3.12	UJ4	3.05	UJ4	3.14	UJ4	4.28	J4	3.06	UJ4	2.86	UJ4	3.04	UJ4	3.03	UJ4	3.12	UJ4
Selenium	0.56	UJ4	0.55	UJ4	0.56	UJ4	0.54	UJ4	0.55	UJ4	0.51	UJ4	0.55	UJ4	0.54	UJ4	0.56	UJ4
Lead	21.20	J6	20.85	J6	15.83	J6	205.56	J6	11.69	J6	13.16	J6	91.13	J6	12.11	J6	21.22	J6
Silver	0.02	UJ4	0.03	UJ4	0.04	J4	0.07	J4	0.03	J4	0.03	J4	0.02	UJ4	0.02	UJ4	0.02	UJ4
Barium	243.14	J1	193.90	J1	201.01	J1	319.23	J1	158.09	J1	141.88	J1	223.57	J1	175.55	J1	235.96	J1
Beryllium	1.72	J4	1.39	J4	1.53	J4	1.81	J4	1.20	J4	1.03	J4	1.49	J4	1.34	J4	1.54	J4
Cadmium	1.50	UJ4	1.46	UJ4	1.51	UJ4	1.45	UJ4	1.47	UJ4	1.37	UJ4	1.46	UJ4	1.45	UJ4	1.50	UJ4
Chromium	40.15	J6	27.93	J6	37.56	J6	33.86	J6	29.78	J6	27.23	J6	33.17	J6	32.93	J6	36.08	J6
Nickel	25.56	J4	17.68	J4	22.61	J4	19.71	J4	18.01	J4	15.45	J4	20.05	J4	18.89	J4	20.10	J4
Antimony	24.44	UJ4	23.90	UJ4	24.62	UJ4	23.70	UJ4	24.02	UJ4	22.43	UJ4	23.82	UJ4	23.73	UJ4	24.47	UJ4
Thallium	42.77	UJ4	41.83	UJ4	43.09	UJ4	41.48	UJ4	42.03	UJ4	39.24	UJ4	41.68	UJ4	41.53	UJ4	42.82	UJ4
Mercury	0.06	UJ4	0.06	UJ4	0.06	UJ4	0.06	UJ4	0.12	J4	0.06	UJ4	0.06	UJ4	0.06	UJ4	0.06	UJ4

169

Field Sample Number ->	54SB12B		54SB13A		54SB13B		54SB14A		54SB14B		54SB15A		54SB16A		54SB16B		54SB16D	
Lab Analysis Number ->	UB06634		UB06635		UB06636		UB06637		UB06638		UB06648		UB06639		UB06640		UB06641	
Metals (ug/g)																		
Arsenic	3.32	UJ4	3.07	UJ4	3.03	UJ4	2.95	UJ4	3.01	UJ4	3.09	UJ4	3.06	UJ4	3.09	UJ4	3.11	UJ4
Selenium	0.60	UJ4	0.55	UJ4	0.54	UJ4	0.53	UJ4	0.54	UJ4	0.55	UJ4	0.55	UJ4	0.55	UJ4	0.56	UJ4
Lead	13.28	J6	134.97	J6	8.23	J6	36.56	J6	13.25	J6	28.40	J6	31.82	J6	14.81	J6	13.68	J6
Silver	0.02	UJ4	0.07	J4	0.02	UJ4	0.01	UJ4	0.01	UJ4	0.02	UJ4	0.02	UJ4	0.02	UJ4	0.02	UJ4
Barium	248.34	J1	226.99	J1	118.64	J1	153.30	J1	166.27	J1	338.27	J1	231.33	J1	203.70	J1	237.56	J1
Beryllium	1.82	J4	1.42	J4	0.52	UJ4	0.89	J4	1.08	J4	1.93	J4	1.47	J4	1.48	J4	1.77	J4
Cadmium	1.59	UJ4	1.47	UJ4	1.45	UJ4	1.42	UJ4	1.45	UJ4	1.48	UJ4	1.47	UJ4	1.48	UJ4	1.49	UJ4
Chromium	46.48	J6	31.29	J6	32.32	J6	20.52	J6	34.10	J6	45.93	J6	34.27	J6	34.20	J6	43.53	J6
Nickel	26.43	J4	18.90	J4	13.20	J4	12.38	J4	20.12	J4	26.05	J4	20.56	J4	20.12	J4	24.25	J4
Antimony	26.03	UJ4	24.05	UJ4	23.73	UJ4	23.11	UU4	23.61	UJ4	24.20	UJ4	23.99	UJ4	24.20	UJ4	24.38	UJ4
Thallium	45.55	UJ4	42.09	UJ4	41.53	UJ4	40.45	UU4	41.33	UJ4	42.35	UJ4	41.98	UJ4	42.35	UJ4	42.66	UJ4
Mercury	0.07	UJ4	0.06	UJ4	0.06	UJ4	0.06	UJ4	0.06	UJ4	0.06	UJ4	0.06	UJ4	0.06	UJ4	0.06	UJ4

Field Sample Number ->	SCSE1		SCSE2		SCSE3	
Lab Analysis Number ->	UC00193		UC00194		UC00195	
Metals (ug/g)						
Arsenic	10.59	J4	9.03	J4	6.70	J4
Selenium	0.55	UJ4	0.66	UJ4	0.64	UJ4
Lead	13.41	J6	95.87	J6	31.21	J6
Silver	0.03	J4	0.18	J4	0.21	J4
Barium	141.45	J1	240.41	J1	262.41	J1
Beryllium	1.38	J4	1.45	J4	1.39	J4
Cadmium	1.48	UJ4	1.77	UJ4	1.70	UJ4
Chromium	27.80	J6	39.53	J6	36.17	J6
Nickel	32.60	J4	26.99	J4	26.10	J4
Antimony	24.11	UJ4	28.91	UJ4	27.80	UJ4
Thallium	42.19	UJ4	50.59	UJ4	48.65	UJ4
Mercury	0.06	UJ4	0.07	UJ4	0.07	UJ4

Field Sample Number ->	**48SB4A11**		**48SB4B21**		**48SB5A19**		**48SB5B37**		**48SS1**		**48SS2**		**48SS3**		**48SS4**		**48SS5**	
Lab Analysis Number ->	**UB06567**		**UB06568**		**UB06572**		**UB06573**		**UB06558**		**UB06559**		**UB06560**		**UB06561**		**UB06562**	
TOTAL PETROLEUM HYDROCARBONS (ug/g)	12.76	U	12.09	U	4,337.79		12.33	U	13.25	U	12.27	U	11.60	U	14.25		414.09	

Field Sample Number ->		48SS6		48SS8		48MW1A22		48MW1B54		48MW2A42		48MW2B46		48MW3A22		48MW3B32	
Lab Analysis Number ->		UB06563		UB06564		UB06575		UB06576		UB06585		UB06586		UC00028		UC00029	
TOTAL PETROLEUM HYDROCARBONS (ug/g)		11.70	U	12.05	U	12.72	U	13.53	U	11.55	U	10.88	U	12.15	U	12.44	U

Field Sample Number ->	17ASB1		17ASB2		17ASB3		17CSB1		17CSB1		17CSB2		17DSB2		48SB4		48SB5		54SS1		54SS2	
Lab Analysis Number ->	UB06434		UB06440		UB06448		UB06468		UB06482		UB06472		UB06489		UB06569		UB06574		UB06608		UB06609	
*PH	7.46		7.06		7.63		8.08		7.45		7.19		7.62		4.79		5.31		7.00		6.92	

Field Sample Number ->	17ASB1		17ASB2		17ASB3		17CSB1		17CSB1		17CSB2		17DSB2		48SB4		48SB5		54SS1		54SS2	
Lab Analysis Number ->	UB06434		UB06440		UB06448		UB06468		UB06482		UB06472		UB06489		UB06569		UB06574		UB06608		UB06609	
*PH	7.46		7.06		7.63		8.08		7.45		7.19		7.62		4.79		5.31		7.00		6.92	

DATA SUMMARY TABLES FOR JULY 1995 SAMPLING EVENT

Field Sample Number ->	NRSW1		NRSW2		NRSW3		NRSW4		NRSW5		NRSW6		NRSW8	
Lab Analysis Number ->	UC02381		UC02382		UC02383		UC02481		UC02272		UC02482		UC02273	
Volatile Organics (ug/L)														
1,1,1-Trichloroethane	**1**	**U**	1	U	1	U	**1**	**U**	1	U	1	U	1	U
1,1,2-Trichloroethane	**1**	**U**	1	U	1	U	**1**	**U**	1	U	1	U	1	U
1,1-Dichloroethene	**1**	**U**	1	U	1	U	**1**	**U**	1	U	1	U	1	U
1,1-Dichloroethane	**1**	**U**	1	U	1	U	**1**	**U**	1	U	1	U	1	U
*1,2-DICHLOROETHYLENES (Total)	**5**	**U**	5	U	5	U	**5**	**U**	5	U	5	U	5	U
1,2-Dichloroethane	**1**	**U**	1	U	1	U	**1**	**U**	1	U	1	U	1	U
1,2-Dichloropropane	**1**	**U**	1	U	1	U	**1**	**U**	1	U	1	U	1	U
Acetone	**8**	**U**	8	U	8	U	**8**	**U**	8	U	8	U	8	U
Acrylonitrile	**8.4**	**U**	8.4	U	8.4	U	**8.4**	**U**	8.4	U	8.4	U	8.4	U
Bromodichloromethane	**1**	**U**	1	U	1	U	**1**	**U**	1	U	1	U	1	U
Vinyl chloride	**12**	**U**	12	U	12	U	**12**	**U**	12	U	12	U	12	U
Chloroethane	**8**	**U**	8	U	8	U	**8**	**U**	8	U	8	U	8	U
Benzene	**1**	**U**	1	U	1	U	**1**	**U**	1	U	1	U	1	U
Trichlorofluoromethane	**1**	**U**	1	U	1	U	**1**	**U**	1	U	1	U	1	U
Carbon tetrachloride	**1**	**U**	1	U	1	U	**1**	**U**	1	U	1	U	1	U
Methylene chloride	**1**	**U**	1	U	1	U	**1**	**U**	1	U	1	U	1	U
Bromomethane	**14**	**U**	14	U	14	U	**14**	**U**	14	U	14	U	14	U
Chloromethane	**1.2**	**U**	1.2	U	1.2	U	**1.2**	**U**	1.2	U	1.2	U	1.2	U
Bromoform	**11**	**U**	11	U	11	U	**11**	**U**	11	U	11	U	11	U
Chloroform	**1**	**U**	1	U	1	U	**1**	**U**	1	U	1	U	1	U
Chlorobenzene	**1**	**U**	1	U	1	U	**1**	**U**	1	U	1	U	1	U
Ethylbenzene	**1**	**U**	1	U	1	U	**1**	**U**	1	U	1	U	1	U
Toluene	**1**	**U**	1	U	1	U	**1**	**U**	1	U	1	U	1	U
2-BUTANONE	**10**	**U**	10	U	10	U	**10**	**U**	10	U	10	U	10	U
4-METHYL-2-PENTANONE	**1.4**	**U**	1.4	U	1.4	U	**1.4**	**U**	1.4	U	1.4	U	1.4	U
1,1,2,2-Tetrachloroethane	**1.5**	**U**	1.5	U	1.5	U	**1.5**	**U**	1.5	U	1.5	U	1.5	U
Tetrachloroethene	**1**	**U**	1	U	1	U	**1**	**U**	1	U	1	U	1	U
Trichloroethene	**1**	**U**	1	U	1	U	**1**	**U**	1	U	1	U	1	U
XYLENES, TOTAL	**2**	**UJ8**	2	UJ8	2	UJ8	**2**	**UJ8**	2	UJ8	2	U	2	UJ8

Field Sample Number ->	48MW1		48MW2		48MW3		48MW4		NRSEEQ		NRSWTB		NRSWFB	
Lab Analysis Number ->	UC02306		UC02305		UC02385		UC02480		UC02264		UC02260		UC02265	
Volatile Organics (ug/L)														
1,1,1-Trichloroethane	4.1		0.98		1	U	1	U	1	U	1	U	1	U
1,1,2-Trichloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethene	1.1		1	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethane	2.3		1	U	1	U	1	U	1	U	1	U	1	U
*1,2-DICHLOROETHYLENES (Total)	5	U	5	U	5	U	5	U	5	U	5	U	5	U
1,2-Dichloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloropropane	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Acetone	8	U	8	U	8	U	8	U	8	U	8	U	8	U
Acrylonitrile	8.4	U	8.4	U	8.4	U	8.4	U	8.4	U	8.4	U	8.4	U
Bromodichloromethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Vinyl chloride	12	U	12	U	12	U	12	U	12	U	12	U	12	U
Chloroethane	8	U	8	U	8	U	8	U	8	U	8	U	8	U
Benzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Trichlorofluoromethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Carbon tetrachloride	1	U	92		100		1	U	1	U	1	U	1	U
Methylene chloride	1	U	**1.1**	**J1**	1	U	1	U	1	U	4.2		1	U
Bromomethane	14	U	14	U	14	U	14	U	14	U	14	U	14	U
Chloromethane	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
Bromoform	11	U	11	U	11	U	11	U	11	U	11	U	11	U
Chloroform	1	U	6.7		30		1	U	1	U	1	U	1	U
Chlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Ethylbenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Toluene	1	U	1	U	1	U	1	U	1	U	1	U	1	U
2-BUTANONE	10	U	10	U	10	U	10	U	10	U	10	U	10	U
4-METHYL-2-PENTANONE	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
1,1,2,2-Tetrachloroethane	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
Tetrachloroethene	1.2		1	U	1	U	1	U	1	U	1	U	1	U
Trichloroethene	17		11		37		1	U	1	U	1	U	1	U
XYLENES, TOTAL	2	UJ8	2	UJ8	2	UJ8	2	U	2	UJ8	2	UJ8	2	UJ8

Field Sample Number ->	48MWTB		48MWTB2		NRSWTB2		NRSWTB3	
Lab Analysis Number ->	UC02307		UC02483		UC02267		UC02386	
Volatile Organics (ug/L)								
1,1,1-Trichloroethane	1	U	1	U	1	U	1	U
1,1,2-Trichloroethane	1	U	1	U	1	U	1	U
1,1-Dichloroethene	1	U	1	U	1	U	1	U
1,1-Dichloroethane	1	U	1	U	1	U	1	U
*1,2-DICHLOROETHYLENES (Total)	5	U	5	U	5	U	5	U
1,2-Dichloroethane	1	U	1	U	1	U	1	U
1,2-Dichloropropane	1	U	1	U	1	U	1	U
Acetone	16		54		8	U	8	U
Acrylonitrile	8.4	U	8.4	U	8.4	U	8.4	U
Bromodichloromethane	1	U	1	U	1	U	1	U
Vinyl chloride	12	U	12	U	12	U	12	U
Chloroethane	8	U	8	U	8	U	8	U
Benzene	1	U	1	U	1	U	1	U
Trichlorofluoromethane	1	U	1	U	1	U	1	U
Carbon tetrachloride	1	U	1	U	1	U	1	U
Methylene chloride	2.9		2.6		4.5		1	U
Bromomethane	14	U	14	U	14	U	14	U
Chloromethane	1.2	U	1.2	U	1.2	U	1.2	U
Bromoform	11	U	11	U	11	U	11	U
Chloroform	1	U	1	U	1	U	1	U
Chlorobenzene	1	U	1	U	1	U	1	U
Ethylbenzene	1	U	1	U	1	U	1	U
Toluene	1	U	1	U	1	U	1	U
2-BUTANONE	10	U	10	U	10	U	10	U
4-METHYL-2-PENTANONE	1.4	U	1.4	U	1.4	U	1.4	U
1,1,2,2-Tetrachloroethane	1.5	U	1.5	U	1.5	U	1.5	U
Tetrachloroethene	1	U	1	U	1	U	1	U
Trichloroethene	1	U	1	U	1	U	1	U
XYLENES, TOTAL	2	UJ8	2	U	2	UJ8	2	UJ8

177

Field Sample Number ->	NRSW1		NRSW2		NRSW3		NRSW4		NRSW5		NRSW6		NRSW8	
Lab Analysis Number ->	UC02381		UC02382		UC02383		UC02481		UC02272		UC02482		UC02273	
Semivolatile Organics (ug/L)														
1,2,4-Trichlorobenzene	**2.4**	**U**	2.4	U	2.4	U	**2.4**	**U**	2.4	UJ7	2.4	U	2.4	UJ7
1,2-Dichlorobenzene	**1.2**	**U**	1.2	U	1.2	U	**1.2**	**U**	1.2	UJ7	1.2	U	1.2	UJ7
1,3-Dichlorobenzene	**3.4**	**U**	3.4	U	3.4	U	**3.4**	**U**	3.4	UJ7	3.4	U	3.4	UJ7
1,4-Dichlorobenzene	**1.5**	**U**	1.5	U	1.5	U	**1.5**	**U**	1.5	UJ7	1.5	U	1.5	UJ7
2,4,5-Trichlorophenol	**2.8**	**U**	2.8	U	2.8	U	**2.8**	**U**	2.8	UJ7	2.8	U	2.8	UJ7
2,4,6-Trichlorophenol	**3.6**	**U**	3.6	U	3.6	U	**3.6**	**U**	3.6	UJ7	3.6	U	3.6	UJ7
2,4-Dichlorophenol	**8.4**	**U**	8.4	U	8.4	U	**8.4**	**U**	8.4	UJ7	8.4	U	8.4	UJ7
2,4-Dimethylphenol	**4.4**	**U**	4.4	U	4.4	U	**4.4**	**U**	4.4	UJ7	4.4	U	4.4	UJ7
2,4-Dinitrophenol	**180**	**U**	180	U	180	U	**180**	**U**	180	UJ7	180	U	180	UJ7
2,4-Dinitrotoluene	**5.8**	**U**	5.8	U	5.8	U	**5.8**	**U**	5.8	UJ7	5.8	U	5.8	UJ7
2,6-Dinitrotoluene	**6.7**	**U**	6.7	U	6.7	U	**6.7**	**U**	6.7	UJ7	6.7	U	6.7	UJ7
2-Chlorophenol	**2.8**	**U**	2.8	U	2.8	U	**2.8**	**U**	2.8	UJ7	2.8	U	2.8	UJ7
2-Chloronaphthalene	**2.6**	**U**	2.6	U	2.6	U	**2.6**	**U**	2.6	UJ7	2.6	U	2.6	UJ7
2-Methylphenol	**3.6**	**U**	3.6	U	3.6	U	**3.6**	**U**	3.6	UJ7	3.6	U	3.6	UJ7
3,3'-Dichlorobenzidine	**5**	**U**	5	U	5	U	**5**	**U**	5	UJ7	5	U	5	UJ7
4,6-Dinitro-2-cresol	**50**	**U**	50	UJ8	50	UJ8	**50**	**U**	50	UJ6	50	UJ8	50	UJ6
4-BROMOPHENYLPHENYL ETHER	**22**	**U**	22	U	22	U	**22**	**U**	22	UJ7	22	U	22	UJ7
3-METHYL-4-CHLOROPHENOL	**8.5**	**U**	8.5	U	8.5	U	**8.5**	**U**	8.5	UJ7	8.5	U	8.5	UJ7
4-Methylphenol	**2.8**	**U**	2.8	U	2.8	U	**2.8**	**U**	2.8	UJ7	2.8	U	2.8	UJ7
4-Nitrophenol	**96**	**U**	96	U	96	U	**96**	**U**	96	UJ7	96	U	96	UJ7
Anthracene	**5.2**	**U**	5.2	U	5.2	U	**5.2**	**U**	5.2	UJ7	5.2	U	5.2	UJ7
Bis(2-chloroethoxy) methane	**6.8**	**U**	6.8	U	6.8	U	**6.8**	**U**	6.8	UJ7	6.8	U	6.8	UJ7
Bis(2-chloroisopropyl) ether	**5**	**U**	5	U	5	U	**5**	**U**	5	UJ7	5	U	5	UJ7
Bis(2-chloroethyl) ether	**0.68**	**U**	0.68	U	0.68	U	**0.68**	**U**	0.68	UJ7	0.68	U	0.68	UJ7
Bis(2-ethylhexyl) phthalate	**7.7**	**U**	7.7	U	7.7	U	**7.7**	**U**	7.7	UJ7	7.7	U	7.7	UJ7
Benzo[a]anthracene	**9.8**	**U**	9.8	U	9.8	U	**9.8**	**U**	9.8	UJ7	9.8	U	9.8	UJ7
Benzo[a]pyrene	**14**	**U**	14	U	14	U	**14**	**U**	14	UJ7	14	U	14	UJ7
Benzo[b]fluoranthene	**10**	**U**	10	U	10	U	**10**	**U**	10	UJ7	10	U	10	UJ7
Butylbenzyl phthalate	**28**	**U**	28	U	28	U	**28**	**U**	28	UJ7	28	U	28	UJ7
Benzo[k]fluoranthene	**10**	**U**	10	U	10	U	**10**	**U**	10	UJ7	10	U	10	UJ7
Chrysene	**7.4**	**U**	7.4	U	7.4	U	**7.4**	**U**	7.4	UJ7	7.4	U	7.4	UJ7
Hexachlorobenzene	**12**	**U**	12	U	12	U	**12**	**U**	12	UJ7	12	U	12	UJ7
Hexachlorocyclopentadiene	**54**	**U**	54	U	54	U	**54**	**U**	54	UJ7	54	U	54	UJ7
Hexachloroethane	**8.3**	**U**	8.3	U	8.3	U	**8.3**	**U**	8.3	UJ7	8.3	U	8.3	UJ7
Dibenz[ah]anthracene	**12**	**U**	12	U	12	U	**12**	**U**	12	UJ7	12	U	12	UJ7
Diethyl phthalate	**5.9**	**U**	5.9	U	5.9	U	**5.9**	**U**	5.9	UJ7	5.9	U	5.9	UJ7
Dimethyl phthalate	**2.2**	**U**	2.2	U	2.2	U	**2.2**	**U**	2.2	UJ7	2.2	U	2.2	UJ7
Di-n-butyl phthalate	**33**	**U**	33	U	33	U	**33**	**U**	33	UJ7	33	U	33	UJ7
Di-n-octyl phthalate	**1.5**	**U**	1.5	U	1.5	U	**1.5**	**U**	1.5	UJ7	1.5	U	1.5	UJ7
Fluoranthene	**24**	**U**	24	U	24	U	**24**	**U**	24	UJ7	24	U	24	UJ7

178

Field Sample Number ->	NRSW1		NRSW2		NRSW3		NRSW4		NRSW5		NRSW6		NRSW8	
Lab Analysis Number ->	UC02381		UC02382		UC02383		UC02481		UC02272		UC02482		UC02273	
Semivolatile Organics (ug/L)														
Hexachlorobutadiene	**8.7**	**U**	8.7	U	8.7	U	**8.7**	**U**	8.7	UJ7	8.7	U	8.7	UJ7
Indeno[1,2,3-C,D]pyrene	**21**	**U**	21	U	21	U	**21**	**U**	21	UJ7	21	U	21	UJ7
Naphthalene	**0.5**	**U**	0.5	U	0.5	U	**0.5**	**U**	0.5	UJ7	0.5	U	0.5	UJ7
Nitrobenzene	**3.7**	**U**	3.7	U	3.7	U	**3.7**	**U**	3.7	UJ7	3.7	U	3.7	UJ7
N-Nitrosodi-n-propylamine	**6.8**	**U**	6.8	U	6.8	U	**6.8**	**U**	6.8	UJ7	6.8	U	6.8	UJ7
N-Nitrosodiphenylamine	**3.7**	**U**	3.7	U	3.7	U	**3.7**	**U**	3.7	UJ7	3.7	U	3.7	UJ7
Pentachlorophenol	**9.1**	**U**	9.1	U	9.1	U	**9.1**	**U**	9.1	UJ7	9.1	U	9.1	UJ7
Phenanthrene	**9.9**	**U**	9.9	U	9.9	U	**9.9**	**U**	9.9	UJ7	9.9	U	9.9	UJ7
Phenol	**2.2**	**U**	2.2	U	2.2	U	**2.2**	**U**	2.2	UJ7	2.2	U	2.2	UJ7
Pyrene	**17**	**U**	17	U	17	U	**17**	**U**	17	UJ7	17	U	17	UJ7

179

Field Sample Number ->	NRSEEQ		NRSWFB	
Lab Analysis Number ->	UC02264		UC02265	
Semivolatile Organics (ug/L)				
1,2,4-Trichlorobenzene	2.4	UJ7	2.4	UJ7
1,2-Dichlorobenzene	1.2	UJ7	1.2	UJ7
1,3-Dichlorobenzene	3.4	UJ7	3.4	UJ7
1,4-Dichlorobenzene	1.5	UJ7	1.5	UJ7
2,4,5-Trichlorophenol	2.8	UJ7	2.8	UJ7
2,4,6-Trichlorophenol	3.6	UJ7	3.6	UJ7
2,4-Dichlorophenol	8.4	UJ7	8.4	UJ7
2,4-Dimethylphenol	4.4	UJ7	4.4	UJ7
2,4-Dinitrophenol	180	UJ7	180	UJ7
2,4-Dinitrotoluene	5.8	UJ7	5.8	UJ7
2,6-Dinitrotoluene	6.7	UJ7	6.7	UJ7
2-Chlorophenol	2.8	UJ7	2.8	UJ7
2-Chloronaphthalene	2.6	UJ7	2.6	UJ7
2-Methylphenol	3.6	UJ7	3.6	UJ7
3,3'-Dichlorobenzidine	5	UJ7	5	UJ7
4,6-Dinitro-2-cresol	50	UJ6	50	UJ6
4-BROMOPHENYLPHENYL ETHER	22	UJ7	22	UJ7
3-METHYL-4-CHLOROPHENOL	8.5	UJ7	8.5	UJ7
4-Methylphenol	2.8	UJ7	2.8	UJ7
4-Nitrophenol	96	UJ7	96	UJ7
Anthracene	5.2	UJ7	5.2	UJ7
Bis(2-chloroethoxy) methane	6.8	UJ7	6.8	UJ7
Bis(2-chloroisopropyl) ether	5	UJ7	5	UJ7
Bis(2-chloroethyl) ether	0.68	UJ7	0.68	UJ7
Bis(2-ethylhexyl) phthalate	7.7	UJ7	7.7	UJ7
Benzo[a]anthracene	9.8	UJ7	9.8	UJ7
Benzo[a]pyrene	14	UJ7	14	UJ7
Benzo[b]fluoranthene	10	UJ7	10	UJ7
Butylbenzyl phthalate	28	UJ7	28	UJ7
Benzo[k]fluoranthene	10	UJ7	10	UJ7
Chrysene	7.4	UJ7	7.4	UJ7
Hexachlorobenzene	12	UJ7	12	UJ7
Hexachlorocyclopentadiene	54	UJ7	54	UJ7
Hexachloroethane	8.3	UJ7	8.3	UJ7
Dibenz[ah]anthracene	12	UJ7	12	UJ7
Diethyl phthalate	5.9	UJ7	5.9	UJ7
Dimethyl phthalate	2.2	UJ7	2.2	UJ7
Di-n-butyl phthalate	33	UJ7	33	UJ7
Di-n-octyl phthalate	1.5	UJ7	1.5	UJ7
Fluoranthene	24	UJ7	24	UJ7

Field Sample Number ->	NRSEEQ		NRSWFB	
Lab Analysis Number ->	UC02264		UC02265	
Semivolatile Organics (ug/L)				
Hexachlorobutadiene	8.7	UJ7	8.7	UJ7
Indeno(1,2,3-C,D)pyrene	21	UJ7	21	UJ7
Naphthalene	0.5	UJ7	0.5	UJ7
Nitrobenzene	3.7	UJ7	3.7	UJ7
N-Nitrosodi-n-propylamine	6.8	UJ7	6.8	UJ7
N-Nitrosodiphenylamine	3.7	UJ7	3.7	UJ7
Pentachlorophenol	9.1	UJ7	9.1	UJ7
Phenanthrene	9.9	UJ7	9.9	UJ7
Phenol	2.2	UJ7	2.2	UJ7
Pyrene	17	UJ7	17	UJ7

Field Sample Number ->	NRSW1		NRSW2		NRSW3		NRSW4		NRSW5		NRSW6		54MW1	
Lab Analysis Number ->	UC02381		UC02382		UC02383		UC02481		UC02272		UC02482		UC02223	
Explosives (ug/L)														
2,4,6-Trinitrotoluene	0.426	U	0.426	U	0.426	U	0.426	U	0.426	U	0.426	U	0.426	U
2,4-Dinitrotoluene	0.397	U	0.397	U	0.397	U	0.397	U	0.397	U	0.397	U	0.397	U
2,6-Dinitrotoluene	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U
Cyclotetramethylenetetranitramine	0.533	U	0.533	U	0.533	U	0.533	U	0.533	U	0.533	U	0.533	U
Cyclonite (RDX)	0.416	U	0.416	U	0.416	U	0.416	U	0.416	U	0.416	U	0.416	U
TETRYL	0.631	U	0.631	U	0.631	U	0.631	U	0.631	U	0.631	U	0.631	U

182

Field Sample Number ->	54MW2		54MW3		NRSW8		NRSEEQ		NRSWFB		54MWEQ	
Lab Analysis Number ->	UC02271		UC02270		UC02273		UC02264		UC02265		UC02266	
Explosives (ug/L)												
2,4,6-Trinitrotoluene	17.5	U	0.426	U	0.426	U	0.426	U	0.426	U	0.426	U
2,4-Dinitrotoluene	0.397	U	0.397	U	0.397	U	0.397	U	0.397	U	0.397	U
2,6-Dinitrotoluene	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U
Cyclotetramethylenetetranitramine	4.63		3.18	J10	0.533	U	0.533	U	0.533	U	0.533	U
Cyclonite (RDX)	0.416	UJ8	0.416	U	0.416	U	0.416	U	0.416	U	0.416	U
TETRYL	0.631	U	0.631	U	0.631	U	0.631	U	0.631	U	0.631	U

883

Field Sample Number ->	NRSW1		NRSW2		NRSW3		NRSW4		NRSW5		NRSW6		54MW1		54MW2	
Lab Analysis Number ->	UC02381		UC02382		UC02383		UC02481		UC02272		UC02482		UC02223		UC02271	
Total Metals (ug/L)																
Arsenic	2.35	U	2.35	U	2.35	U	2.35	U	2.35	U	2.35	U	20.7		2.35	U
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Lead	4.47	U	4.47	U	4.47	U	8.79		4.47	U	4.47	U	16.6		9.31	
Selenium	2.53	U	2.53	U	2.53	U	2.53	U	2.53	U	2.53	U	2.53	U	2.53	U
Silver	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U
Barium	24.9		25.1		24.9		26.3		21.1		24.8		1060		144	
Beryllium	1.12	U	1.12	U	1.12	U	1.12	U	1.12	U	1.12	U	20		3.19	
Cadmium	6.78	U	6.78	U	6.78	U	6.78	U	6.78	U	6.78	U	6.78	U	6.78	U
Chromium	16.8	U	16.8	U	16.8	U	16.8	U	16.8	U	16.8	U	66.7		16.8	U
Nickel	32.1	U	32.1	U	32.1	U	32.1	U	32.1	U	32.1	U	37.4		32.1	U
Antimony	60	U	60	U	60	U	60	U	60	U	60	U	110		60	U
Thallium	125	U	125	U	125	U	125	U	125	U	125	U	125	U	125	U

Field Sample Number ->	54MW3		NRSW8		17PZ1		17MW2		17MW3		40MW3		31MW1		31MW2	
Lab Analysis Number ->	UC02270		UC02273		UC02304		UC02303		UC02387		UC02384		UC02221		UC02215	
Total Metals (ug/L)																
Arsenic	2.35	U	2.35	U	2.35	U	2.35	U	2.35	U	2.35	U	2.35	U	7.44	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Lead	4.47	U	4.47	U	4.47	U	4.47	U	6.3		4.47	U	7.58		41.8	
Selenium	2.53	U	2.53	U	2.53	U	3.63		2.53	U	2.53	U	2.53	U	2.53	U
Silver	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U
Barium	175		21.1		106		63.6		174		54.5		300		183	
Beryllium	4.09		1.12	U	4.55		4.03		1.12	U	1.12	U	5.16		6	
Cadmium	6.78	U	6.78	U	6.78	U	6.78	U	6.78	U	6.78	U	6.78	U	6.78	U
Chromium	16.8	U	16.8	U	16.8	U	16.8	U	16.8	U	16.8	U	16.8	U	97.3	
Nickel	32.1	U	32.1	U	32.1	U	32.1	U	32.1	U	32.1	U	32.1	U	49.9	
Antimony	60	U	60	U	60	U	60	U	60	U	60	U	60	U	60	U
Thallium	125	U	125	U	125	U	125	U	125	U	125	U	125	U	125	U

Field Sample Number ->	31MW3		31MW4		48MW1		48MW2		48MW3		48MW4		NRSEEQ		NRSWFB	
Lab Analysis Number ->	UC02217		UC02219		UC02306		UC02305		UC02385		UC02480		UC02264		UC02265	
Total Metals (ug/L)																
Arsenic	2.35	U	2.35	U	2.35	U	2.35	U	2.35	U	2.35	U	2.35	U	2.35	U
Mercury	0.138		0.142		0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Lead	36.2		11.3		4.47	U	9.29		4.47	U	12.4		4.47	U	4.47	U
Selenium	2.53	U	2.53	U	2.72		2.53	U	2.53	U	2.53	U	2.53	U	2.53	U
Silver	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U
Barium	257		137		81		1070		70.7		299		2.82	U	2.82	U
Beryllium	5.24		5.26		4.16		10.7		1.12	U	1.12	U	1.12	U	1.12	U
Cadmium	6.78	U	6.78	U	6.78	U	6.78	U	6.78	U	6.78	U	6.78	U	6.78	U
Chromium	89.1		31.6		16.8	U	42.8		16.8	U	16.8	U	16.8	U	16.8	U
Nickel	58.4		32.1	U	32.1	U	32.1	U	32.1	U	32.1	U	32.1	U	32.1	U
Antimony	60	U	60	U	60	U	60	U	60	U	60	U	60	U	60	U
Thallium	125	U	125	U	125	U	125	U	125	U	125	U	125	U	125	U

Field Sample Number ->	54MWEQ		FBLK1		EQBLK	
Lab Analysis Number ->	UC02266		UC02353		UC02354	
Total Metals (ug/L)						
Arsenic	2.35	U	2.35	U	2.35	U
Mercury	0.1	U	0.1	U	0.1	U
Lead	4.47	U	4.47	U	4.47	U
Selenium	2.53	U	2.53	U	2.53	U
Silver	0.333	U	0.333	U	0.333	U
Barium	2.82	U	2.82	U	2.82	U
Beryllium	1.12	U	1.12	U	1.12	U
Cadmium	6.78	U	6.78	U	6.78	U
Chromium	16.8	U	16.8	U	16.8	U
Nickel	32.1	U	32.1	U	32.1	U
Antimony	60	U	60	U	60	U
Thallium	125	U	125	U	125	U

Field Sample Number ->	54MW1F		54MW2F		54MW3F		17PZ1F		17MW2F		17MW3F		40MW3F	
Lab Analysis Number ->	UC02224		UC02275		UC02274		UC02320		UC02319		UC02390		UC02388	
Dissolved Metals (ug/L)														
Arsenic	15.1		2.35	U	2.35	U	2.35	U	2.35	U	2.35	U	2.35	U
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Lead	6.33		4.47	U	4.47	U	4.47	U	4.47	U	4.47	U	4.47	U
Selenium	2.53	U	2.53	U	2.53	U	2.53	U	2.53	U	2.53	U	2.53	U
Silver	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U
Barium	519		89.5		106		110		63.2		164		31	
Beryllium	13.2		2.96		2.82		4.28		4.26		1.12	U	1.12	U
Cadmium	6.78	U	6.78	U	6.78	U	6.78	U	6.78	U	6.78	U	6.78	U
Chromium	26.6		16.8	U	16.8	U	16.8	U	16.8	U	16.8	U	16.8	U
Nickel	32.1	U	32.1	U	32.1	U	32.1	U	32.1	U	32.1	U	32.1	U
Antimony	97.5		60	U	60	U	60	U	60	U	60	U	60	U
Thallium	125	U	125	U	125	U	125	U	125	U	125	U	125	U

189

Field Sample Number ->	31MW1F		31MW2F		31MW3F		31MW4F		48MW1F		48MW2F		48MW3F	
Lab Analysis Number ->	UC02222		UC02216		UC02218		UC02220		UC02322		UC02321		UC02389	
Dissolved Metals (ug/L)														
Arsenic	2.35	U	2.35	U	2.35	U	2.35	U	2.35	U	2.35	U	2.35	U
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Lead	4.47	U	4.47	U	4.47	U	4.47	U	4.47	U	4.47	U	4.47	U
Selenium	2.53	U	5.4		2.53	U	2.53	U	2.53	U	2.53	U	2.53	U
Silver	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U
Barium	264		27		24.7		19.7		69.7		816		69.8	
Beryllium	3.98		1.63		1.86		1.12	U	4.05		2.69		1.12	U
Cadmium	6.78	U	6.78	U	6.78	U	6.78	U	6.78	U	6.78	U	6.78	U
Chromium	16.8	U	16.8	U	16.8	U	16.8	U	16.8	U	16.8	U	16.8	U
Nickel	32.1	U	32.1	U	32.1	U	32.1	U	32.1	U	32.1	U	32.1	U
Antimony	60	U	60	U	60	U	60	U	60	U	60	U	60	U
Thallium	125	U	125	U	125	U	125	U	125	U	125	U	125	U

Field Sample Number ->	48MW4F		54MWEQF	
Lab Analysis Number ->	UC02484		UC02268	
Dissolved Metals (ug/L)				
Arsenic	2.35	U	2.35	U
Mercury	0.1	U	0.1	U
Lead	4.47	U	4.47	U
Selenium	2.53	U	2.53	U
Silver	0.333	U	0.333	U
Barium	295		2.82	U
Beryllium	1.12	U	1.12	U
Cadmium	6.78	U	6.78	U
Chromium	16.8	U	16.8	U
Nickel	32.1	U	32.1	U
Antimony	60	U	60	U
Thallium	125	U	125	U

Field Sample Number ->	NRSW1		NRSW2		NRSW3		NRSW4		NRSW5		NRSW6		54MW1	
Lab Analysis Number ->	UC02381		UC02382		UC02383		UC02481		UC02272		UC02482		UC02223	
*TOTAL ORGANIC CARBON (ug/L)	2180		2320		2080		1960		1810		2310		1170	
Chloride (ug/L)	3740		3600		3660		3800		3870		3960			

Field Sample Number ->	54MW2		54MW3		NRSW8		NRSEEQ		NRSWFB		54MWEQ	
Lab Analysis Number ->	UC02271		UC02270		UC02273		UC02264		UC02265		UC02266	
*TOTAL ORGANIC CARBON (ug/L)	1000	UJ7	1000	UJ7	1870	J7	1000	U	1000	U	1000	U
Chloride (ug/L)					3840	J7			278	U		

192

Field Sample Number ->	**NRSW1**		**NRSW2**		**NRSW3**		**NRWS4**		**NRSW5**		**NRSW6**		**54MW1**	
Lab Analysis Number ->	**UC02381**		**UC02382**		**UC02383**		**UC02[illegible]62**		**UC02272**		**UC02482**		**UC02223**	
*TOTAL ORGANIC HALOGENS (ug/L)	**10**	**U**	10	U	10	U	10	U	10	U	10	U	10.8	

Field Sample Number ->	54MW2		54MW3		NRSW8		NRSEEQ		NRSWFB		54MWEQ	
Lab Analysis Number ->	UC02271		UC02270		UC02273		UC02264		UC02265		UC02266	
*TOTAL ORGANIC HALOGENS (ug/L)	13	J7	10	UJ7	10	UJ7	10	U	10	U	10	U

Field Sample Number ->	**NRSW1**		**NRSW2**		**NRSW3**		**NRSW4**		**NRSW5**		**NRSW6**		**NRSW8**		**NRSWFB**	
Lab Analysis Number ->	**UC02381**		**UC02382**		**UC02383**		**UC02481**		**UC02272**		**UC02482**		**UC02273**		**UC02265**	
*TOTAL HARDNESS (ug/L)	42700		42800		43200		44600		47800		51300		47700		818	U

Field Sample Number ->	NRSE1		NRSE1		NRSE2		NRSE3		NRSE4		NRSE4		NRSE5		NRSE6		NRSE8	
Lab Analysis Number ->	UC02261		UC02391		UC02392		UC02393		UC02269		UC02485		UC02276		UC02486		UC02277	
Volatile Organics (ug/g)																		
1,1,1-Trichloroethane	0.42	U	0.37	U	0.32	U	0.33	U	0.22	U	0.26	U	0.28	U	0.31	U	0.27	U
1,1,2-Trichloroethane	0.69	U	0.61	U	0.52	U	0.55	U	0.37	U	0.43	U	0.45	U	0.50	U	0.45	U
1,1-Dichloroethene	0.56	U	0.50	U	0.43	U	0.45	U	0.30	U	0.35	U	0.37	U	0.41	U	0.37	U
1,1-Dichloroethane	1.03	U	0.91	U	0.78	U	0.82	U	0.55	U	0.64	U	0.67	U	0.75	U	0.67	U
*1,2-DICHLOROETHYLENES (Total)	0.67	U	0.59	U	0.51	U	0.53	U	0.36	U	0.42	U	0.44	U	0.49	U	0.44	U
1,2-Dichloroethane	0.67	U	0.59	U	0.51	U	0.53	U	0.36	U	0.42	U	0.44	U	0.49	U	0.44	U
1,2-Dichloropropane	1.11	U	0.98	U	0.84	U	0.88	U	0.59	U	0.69	U	0.73	U	0.81	U	0.72	U
Acetone	6.90	U	6.12	U	5.23	U	5.50	U	3.69	U	4.29	U	4.54	U	5.04	U	4.51	U
Acrylonitrile	4.18	U	3.71	U	3.17	U	3.33	U	2.23	U	2.60	U	2.75	U	3.05	U	2.73	U
Bromodichloromethane	0.42	U	0.37	U	0.32	U	0.33	U	0.22	U	0.26	U	0.28	U	0.31	U	0.27	U
Vinyl chloride	3.77	U	3.34	U	2.85	U	3.00	U	2.01	U	2.34	U	2.48	U	2.75	U	2.46	U
Chloroethane	1.34	U	1.19	U	1.01	U	1.07	U	0.72	U	0.83	U	0.88	U	0.98	U	0.87	U
Benzene	0.21	U	0.19	U	0.16	U	0.17	U	0.11	U	0.13	U	0.14	U	0.15	U	0.14	U
Trichlorofluoromethane	0.48	U	0.43	U	0.36	U	0.38	U	0.26	U	0.30	U	0.32	U	0.35	U	0.31	U
Carbon tetrachloride	0.65	U	0.58	U	0.49	U	0.52	U	0.35	U	0.40	U	0.43	U	0.47	U	0.42	U
Methylene chloride	9.21	U	8.16	U	6.97	U	7.33	U	4.92	U	5.71	U	6.05	U	6.72	U	6.01	U
Bromomethane	0.54	U	0.48	U	0.41	U	0.43	U	0.29	U	0.34	U	0.36	U	0.40	U	0.36	U
Chloromethane	2.01	U	1.78	U	1.52	U	1.60	U	1.07	U	1.25	U	1.32	U	1.47	U	1.31	U
Bromoform	0.42	U	0.37	U	0.32	U	0.33	U	0.22	U	0.26	U	0.28	U	0.31	U	0.27	U
Chloroform	0.50	U	0.45	U	0.38	U	0.40	U	0.27	U	0.31	U	0.33	U	0.37	U	0.33	U
Chlorobenzene	0.21	U	0.19	U	0.16	U	0.17	U	0.11	U	0.13	U	0.14	U	0.15	U	0.14	U
Ethylbenzene	0.40	U	0.35	U	0.30	U	0.32	U	0.21	U	0.25	U	0.26	U	0.29	U	0.26	U
Toluene	0.21	U	0.19	U	0.16	U	0.17	U	0.11	U	0.13	U	0.14	U	0.15	U	0.14	U
2-BUTANONE	9.00	U	7.98	U	6.81	U	7.17	U	4.80	U	5.58	U	5.91	U	6.56	U	5.87	U
4-METHYL-2-PENTANONE	1.32	U	1.17	U	1.00	U	1.05	U	0.70	U	0.82	U	0.87	U	0.96	U	0.86	U
1,1,2,2-Tetrachloroethane	0.42	U	0.37	U	0.32	U	0.33	U	0.22	U	0.26	U	0.28	U	0.31	U	0.27	U
Tetrachloroethylene	0.33	U	0.30	U	0.25	U	0.27	U	0.18	U	0.21	U	0.22	U	0.24	U	0.22	U
Trichloroethylene	0.48	U	0.43	U	0.36	U	0.38	U	0.26	U	0.30	U	0.32	U	0.35	U	0.31	U
XYLENES, TOTAL	1.63	UJ8	1.45	UJ8	1.24	UJ8	1.30	UJ8	0.87	UJ8	1.01	UJ8	1.07	UJ8	1.19	U	1.07	UJ8

Field Sample Number ->	NRSE1		NRSE2		NRSE3		NRSE4		NRSE5		NRSE6		NRSE8	
Lab Analysis Number ->	UC02391		UC02392		UC02393		UC02485		UC02276		UC02486		UC02277	
Semivolatile Organics (ug/g)														
1,2,4-Trichlorobenzene	0.41	U	0.35	U	0.37	U	0.29	U	0.30	UJ7	0.34	U	0.30	UJ7
1,2-Dichlorobenzene	0.08	U	0.07	U	0.07	U	0.05	U	0.06	UJ7	0.06	U	0.06	UJ7
1,3-Dichlorobenzene	0.08	U	0.07	U	0.07	U	0.05	U	0.06	UJ7	0.06	U	0.06	UJ7
1,4-Dichlorobenzene	0.06	U	0.05	U	0.06	U	0.04	U	0.05	UJ7	0.05	U	0.05	UJ7
2,4,5-Trichlorophenol	0.91	U	0.78	U	0.82	U	0.64	U	0.67	UJ7	0.75	U	0.67	UJ7
2,4,6-Trichlorophenol	0.11	U	0.10	U	0.10	U	0.08	U	0.08	UJ7	0.09	U	0.08	UJ7
2,4-Dichlorophenol	0.12	U	0.10	U	0.11	U	0.08	U	0.09	UJ7	0.10	U	0.09	UJ7
2,4-Dimethylphenol	5.57	U	4.75	U	5.00	U	3.90	U	4.13	UJ7	4.58	U	4.10	UJ7
2,4-Dinitrophenol	8.72	U	7.45	U	7.83	U	6.10	U	6.46	UJ7	7.18	U	6.42	UJ7
2,4-Dinitrotoluene	2.60	U	2.22	U	2.33	U	1.82	U	1.93	UJ7	2.14	U	1.91	UJ7
2,6-Dinitrotoluene	0.59	U	0.51	U	0.53	U	0.42	U	0.44	UJ7	0.49	U	0.44	UJ7
2-Chlorophenol	0.10	U	0.09	U	0.09	U	0.07	U	0.08	UJ7	0.08	U	0.08	UJ7
2-Chloronaphthalene	0.45	U	0.38	U	0.40	U	0.31	U	0.33	UJ7	0.37	U	0.33	UJ7
2-Methylphenol	0.18	U	0.16	U	0.16	U	0.13	U	0.13	UJ7	0.15	U	0.13	UJ7
3,3'-Dichlorobenzidine	2.97	U	2.54	U	2.67	U	2.08	U	2.20	UJ7	2.44	U	2.19	UJ7
4,6-Dinitro-2-cresol	1.48	U	1.27	U	1.33	U	1.04	U	1.10	UJ7	1.22	U	1.09	UJ7
4-BROMOPHENYLPHENYL ETHER	0.08	U	0.06	U	0.07	U	0.05	U	0.06	UJ7	0.06	U	0.06	UJ7
3-METHYL-4-CHLOROPHENOL	1.73	U	1.47	U	1.55	U	1.21	U	1.28	UJ7	1.42	U	1.27	UJ7
4-Methylphenol	0.45	U	0.38	U	0.40	U	0.31	U	0.33	UJ7	0.37	U	0.33	UJ7
4-Nitrophenol	6.12	U	5.23	U	5.50	U	4.29	U	4.54	UJ7	5.04	U	4.51	UJ7
Anthracene	1.32	U	1.13	U	1.18	U	0.92	U	0.98	UJ7	1.08	U	0.97	UJ7
Bis(2-chloroethoxy) methane	0.35	U	0.30	U	0.32	U	0.25	U	0.26	UJ7	0.29	U	0.26	UJ7
Bis(2-chloroisopropyl) ether	0.82	U	0.70	U	0.73	U	0.57	U	0.61	UJ7	0.67	U	0.60	UJ7
Bis(2-chloroethyl) ether	0.67	U	0.57	U	0.60	U	0.47	U	0.50	UJ7	0.55	U	0.49	UJ7
Bis(2-ethylhexyl) phthalate	0.89	U	0.76	U	0.80	U	6.62		0.66	UJ7	0.73	U	0.66	UJ7
Benzo[a]anthracene	0.58		0.32		0.72		0.05	U	0.17	UJ7	0.40		0.06	UJ7
Benzo[a]pyrene	2.23	U	1.90	U	2.00	U	1.56	U	1.65	UJ7	1.83	U	1.64	UJ7
Benzo[b]fluoranthene	0.58	U	0.49	U	0.52	U	0.40	U	0.43	UJ7	0.47	U	0.42	UJ7
Butylbenzyl phthalate	3.34	U	2.85	U	3.00	U	2.34	U	2.48	UJ7	2.75	U	2.46	UJ7
Benzo[k]fluoranthene	0.24	U	0.21	U	0.22	U	0.17	U	0.18	UJ7	0.20	U	0.18	UJ7
Chrysene	1.67		0.35		0.68		0.04	U	0.19	UJ7	0.53		0.14	UJ7
Hexachlorobenzene	0.15	U	0.13	U	0.13	U	0.10	U	0.11	UJ7	0.12	U	0.11	UJ7
Hexachlorocyclopentadiene	0.96	U	0.82	U	0.87	U	0.68	U	0.72	UJ7	0.79	U	0.71	UJ7
Hexachloroethane	3.34	U	2.85	U	3.00	U	2.34	U	2.48	UJ7	2.75	U	2.46	UJ7
Dibenz[ah]anthracene	0.58	U	0.49	U	0.52	U	0.40	U	0.43	UJ7	0.47	U	0.42	UJ7
Diethyl phthalate	0.45	U	0.38	U	0.40	U	6.23		0.33	UJ7	0.37	U	0.33	UJ7
Dimethyl phthalate	0.12	U	0.10	U	0.11	U	8.31		0.09	UJ7	0.10	U	0.09	UJ7
Di-n-butyl phthalate	2.41	U	2.06	U	2.17	U	12.99		1.79	UJ7	1.98	U	1.78	UJ7
Di-n-octyl phthalate	0.43	U	0.36	U	0.38	U	0.30	U	0.32	UJ7	0.35	U	0.31	UJ7
Fluoranthene	0.54	U	0.30		0.80		0.08		0.22	UJ7	0.50		0.13	UJ7
Hexachlorobutadiene	1.80	U	1.54	U	1.62	U	1.26	U	1.33	UJ7	1.48	U	1.33	UJ7
Indeno[1,2,3-C,D]pyrene	4.45	U	3.80	U	4.00	U	3.12	U	3.30	UJ7	3.66	U	3.28	UJ7

Field Sample Number ->	NRSE1		NRSE2		NRSE3		NRSE4		NRSE5		NRSE6		NRSE8	
Lab Analysis Number ->	UC02391		UC02392		UC02393		UC02485		UC02276		UC02486		UC02277	
Semivolatile Organics (ug/g)														
Naphthalene	1.37	U	1.17	U	1.23	U	0.96	U	1.02	UJ7	1.13	U	1.01	UJ7
Nitrobenzene	3.34	U	2.85	U	3.00	U	2.34	U	2.48	UJ7	2.75	U	2.46	UJ7
N-Nitrosodi-n-propylamine	2.04	U	1.74	U	1.83	U	1.43	U	1.51	UJ7	1.68	U	1.50	UJ7
N-Nitrosodiphenylamine	0.54	U	0.46	U	0.48	U	2.60		0.40	UJ7	0.44	U	0.40	UJ7
Pentachlorophenol	1.41	U	1.20	U	1.27	U	0.99	U	1.05	UJ7	1.16	U	1.04	UJ7
Phenanthrene	0.76		0.51		0.82		0.04	U	0.22	UJ7	0.35		0.19	UJ7
Phenol	0.10	U	0.08	U	0.09	U	0.07	U	0.07	UJ7	0.08	U	0.07	UJ7
Pyrene	0.80		0.40		1.00		0.11	U	0.29	UJ7	0.76		0.11	UJ7

Field Sample Number ->	NRSE1		NRSE2		NRSE3		NRSE4		NRSE5		NRSE6		NRSE8	
Lab Analysis Number ->	UC02391		UC02392		UC02393		UC02485		UC02276		UC02486		UC02277	
Explosives (ug/g)														
2,4,6-Trinitrotoluene	3.71	U	3.17	U	3.33	U	2.60	U	28.89	J10	3.05	U	2.73	U
2,4-Dinitrotoluene	4.64	U	3.96	U	4.17	U	3.25	U	3.44	U	3.82	U	3.42	U
2,6-Dinitrotoluene	3.71	U	3.17	U	3.33	U	2.60	U	2.75	U	3.05	U	2.73	U
Cyclotetramethylenetetranitramine	3.71	U	3.17	U	3.33	U	2.60	U	2.75	U	3.05	U	2.73	U
Cyclonite (RDX)	2.37	U	2.03	U	2.13	U	1.66	U	1.76	U	1.95	U	1.75	U
TETRYL	3.91	U	3.34	U	3.52	U	2.74	U	2.90	U	3.22	U	2.88	U

Field Sample Number ->	NRSE1		NRSE2		NRSE3		NRSE4		NRSE5		NRSE6		NRSE8		BG1BUC3	
Lab Analysis Number ->	UC02391		UC02392		UC02393		UC02485		UC02276		UC02486		UC02277		UC02308	
Metals (ug/g)																
Arsenic	4.64	U	3.96	U	4.17	U	3.25	U	6.92		3.82	U	7.83		11.47	
Selenium	0.83	U	0.71	U	1.85		0.58	U	0.62	U	0.69	U	0.61	U	0.56	U
Lead	148.42	J1	136.29	J1	200.00	J1	4,415.58	J1	220.08	J1	141.99	J1	245.90	J1	21.32	J1
Silver	0.14		0.09		0.15		0.10		0.10		0.11		0.07		0.08	J9
Barium	226.35	J1	151.82	J1	415.00	J1	97.14	J1	178.82	J1	109.77	J1	187.16	J1	46.88	J1
Beryllium	0.79	U	0.68	U	3.03		0.99		1.31		0.65	U	1.31		1.42	
Cadmium	2.23	U	1.90	U	2.00	U	1.56	U	1.65	U	1.83	U	1.64	U	1.50	U
Chromium	46.20	J1	32.01	J1	77.33	J1	37.53	J1	31.50	J1	24.89	J1	33.88	J1	50.75	J1
Nickel	25.05		15.72		41.83		13.25		15.82		12.49		14.89		30.17	
Antimony	36.36	U	31.06	U	32.67	U	25.45	U	26.96	U	29.92	U	26.78	U	24.44	U
Thallium	63.64	U	54.36	U	57.17	U	44.55	U	47.18	U	52.37	U	46.86	U	42.77	U
Mercury	0.09	U	0.08	U	0.08	U	0.16	U	0.07	U	0.08	U	0.07	U	0.21	

Field Sample Number ->	BG1CUC8		BG2BUC5		BG2CUC11		BG3BUC3		BG3CUC22		BG4BUC5		BG4CUC17		BG5BUC3	
Lab Analysis Number ->	UC02309		UC02310		UC02311		UC02355		UC02356		UC02357		UC02358		UC02312	
Metals (ug/g)																
Arsenic	6.96		11.61		9.69		14.41		2.74	U	4.34		3.11	U	2.64	U
Selenium	0.54	U	0.53	U	0.57	U	0.54	U	0.49	U	0.55	U	0.56	U	0.47	U
Lead	15.25	J1	27.90	J1	20.03	J1	228.09	J1	11.82	J1	20.44	J1	18.03	J1	5.20	J1
Silver	0.08	J9	0.01	U	0.02	U	0.05		0.01	U	0.02	U	0.02	U	0.01	U
Barium	73.00	J1	31.44	J1	85.20	J1	286.92	J1	107.99	J1	244.53	J1	205.22	J1	36.18	J1
Beryllium	2.92		0.99		3.33		1.81		0.82		1.46		1.58		0.45	U
Cadmium	1.45	U	1.42	U	1.53	U	1.44	U	1.31	U	1.46	U	1.49	U	1.27	U
Chromium	57.26	J1	51.54	J1	47.96	J1	58.10		31.29		55.96		50.12		30.70	J1
Nickel	36.32		13.36		38.01		22.81		16.19		25.30		28.36		5.15	
Antimony	23.73	U	23.17	U	25.00	U	23.53	U	21.44	U	23.84	U	24.38	U	20.68	U
Thallium	41.53	U	40.54	U	43.75	U	41.18	U	37.53	U	41.73	U	42.66	U	36.18	U
Mercury	0.23		0.17		0.19		0.06	U	0.05	U	0.06	U	0.06	U	0.05	U

Field Sample Number ->	**BG5CUC8**		**BG6BUC5**		**BG6CUC12**		**BG7BUC5**		**BG7CUC22**		**BG8BUC5**		**BG8CUC10**		**BG1BBL4**	
Lab Analysis Number ->	**UC02313**		**UC02314**		**UC02315**		**UC02316**		**UC02317**		**UC02318**		**UC02323**		**UC02324**	
Metals (ug/g)																
Arsenic	8.10		8.42		8.92		3.85	U	5.50		3.26	U	3.19	U	3.11	U
Selenium	0.61	U	0.70	U	0.67	U	0.69	U	0.62	U	0.59	U	0.57	U	0.56	U
Lead	24.90	J1	33.18	J1	12.46	J1	17.72	J1	13.37	J1	21.93	J1	9.63	J1	13.45	J1
Silver	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.08	J9	0.02	U
Barium	82.08	J1	62.95	J1	70.51	J1	99.08	J1	95.46	J1	74.54	J1	62.63	J1	97.88	J1
Beryllium	1.96		1.31		2.75		2.33		4.10		1.11		0.94		0.53	U
Cadmium	1.64	U	1.86	U	1.80	U	1.85	U	1.65	U	1.57	U	1.53	U	1.49	U
Chromium	54.45	J1	40.47	J1	41.47	J1	46.07	J1	52.82	J1	37.86	J1	39.41	J1	38.98	J1
Nickel	42.68		30.23		37.87		29.89		47.04		18.93		16.45		9.98	
Antimony	26.81	U	30.39	U	29.34	U	30.20	U	26.96	U	25.59	U	25.00	U	24.41	U
Thallium	46.92	U	53.18	U	51.35	U	52.85	U	47.18	U	44.78	U	43.75	U	42.71	U
Mercury	0.07	U	0.21		0.07	U	0.08	U	0.07	U	0.07	U	0.06	U	0.06	U

Field Sample Number ->	BG1CBL10		BG2BBL5		BG2CBL17		BG3BBL3		BG3CBL22		BG4BBL5		BG4CBL10		BG1BWL5	
Lab Analysis Number ->	UC02325		UC02326		UC02327		UC02359		UC02360		UC02361		UC02362		UC02328	
Metals (ug/g)																
Arsenic	3.06	U	3.06	U	12.44		2.99	U	3.14	U	5.62		3.02	U	3.03	U
Selenium	0.55	U	0.55	U	0.57	U	0.54	U	0.56	U	0.54	U	0.54	U	0.54	U
Lead	14.32	J1	10.85	J1	43.37	J1	20.93	J1	16.48	J1	23.10	J1	22.13	J1	11.31	J1
Silver	0.02	U	0.02	U	0.02	U	0.01	U	0.02	U	0.01	U	0.01	U	0.02	U
Barium	122.28	J1	88.60	J1	131.38	J1	209.33	J1	197.48	J1	74.61	J1	90.21	J1	144.07	J1
Beryllium	1.49		0.52	U	2.42		1.47		2.13		0.51	U	0.52	U	1.53	
Cadmium	1.47	U	1.47	U	2.47		1.44	U	1.51	U	1.44	U	1.45	U	1.45	U
Chromium	41.49	J1	44.61	J1	45.41	J1	38.28		52.58		47.77		33.13		43.10	J1
Nickel	18.12		11.34		36.22		14.83		36.23		14.20		15.11		21.07	
Antimony	23.99	U	24.02	U	25.00	U	23.45	U	24.65	U	23.59	U	23.70	U	23.73	U
Thallium	41.98	U	42.03	U	43.75	U	41.03	U	43.14	U	41.28	U	41.48	U	41.53	U
Mercury	0.06	U	0.09		0.11		0.06	U	0.06	U	0.06	U	0.11		0.06	U

Field Sample Number ->	BG1CWL8		BG2BWL4		BG2CWL12		BG3BWL3		BG3CWL22		BG4BWL4		BG4CWL17		BG5BWL3	
Lab Analysis Number ->	UC02329		UC02330		UC02331		UC02332		UC02333		UC02363		UC02364		UC02365	
Metals (ug/g)																
Arsenic	4.82		3.00	U	3.06	U	2.91	U	3.01	U	3.73		2.72	U	2.99	U
Selenium	0.54	U	0.54	U	0.55	U	0.52	U	0.54	U	0.54	U	0.49	U	0.54	U
Lead	16.81	J1	12.14	J1	15.18	J1	23.19	J1	10.83	J1	24.94	J1	13.82	J1	19.76	J1
Silver	0.01	U	0.01	U	0.02	U	0.55		0.01	U	0.01	U	0.01	U	0.01	U
Barium	102.06	J1	110.70	J1	80.76	J1	79.72	J1	100.24	J1	195.44	J1	79.22	J1	186.83	J1
Beryllium	0.91		1.00		0.84		0.69		0.89		1.49		0.80		1.56	
Cadmium	1.45	U	1.44	U	1.47	U	1.40	U	1.44	U	1.44	U	1.31	U	1.44	U
Chromium	37.97	J1	34.01	J1	39.17	J1	32.63	J1	33.94	J1	49.16		28.29		54.85	
Nickel	13.78		13.46		9.57		10.56		15.28		26.74		14.25		26.59	
Antimony	23.70	U	23.56	U	23.99	U	22.84	U	23.59	U	23.50	U	21.33	U	23.47	U
Thallium	41.48	U	41.23	U	41.98	U	39.98	U	41.28	U	41.13	U	37.32	U	41.08	U
Mercury	0.10		0.06	U	0.09		0.07		0.06	U	0.06	U	0.05	U	0.06	U

Field Sample Number ->	BG5CWL8		BG6BWL4		BG6CWL17		BG4CUCD		3G4BBLD		BG5CWLD	
Lab Analysis Number ->	UC02366		UC02367		UC02368		UC02369		UC02370		UC02371	
Metals (ug/g)												
Arsenic	3.04	U	4.14		3.52		3.05	U	5.47		3.02	U
Selenium	0.55	U	0.55	U	0.51	U	0.55	U	0.54	U	0.54	U
Lead	22.96	J1	23.67	J1	18.58	J1	19.24	J1	17.60	J1	22.37	J1
Silver	0.02	U	0.02	U	0.01	U	0.02	U	0.01	U	0.01	U
Barium	174.97	J1	166.46	J1	55.63	J1	144.95	J1	76.65	J1	175.33	J1
Beryllium	1.51		1.58		0.67		1.50		0.51	U	1.46	
Cadmium	1.46	U	1.48	U	1.35	U	1.46	U	1.44	U	1.45	U
Chromium	47.63		48.83		26.58		53.11		42.04		48.85	
Nickel	27.34		26.76		13.18		26.43		14.61		27.93	
Antimony	23.82	U	24.17	U	22.07	U	23.87	U	23.47	U	23.70	U
Thallium	41.68	U	42.29	U	38.63	U	41.78	U	41.08	U	41.48	U
Mercury	0.06	U	0.06	U	0.06	U	0.06	U	0.19		0.06	U

206

Field Sample Number ->	BG1BBL4		BG1BUC3		BG1CBL10		BG2CBL17		BG3CWL22		BG4BBL5		BG4BBLD		BG4CUC17	
Lab Analysis Number ->	UC02324		UC02308		UC02325		UC02327		UC02333		UC02361		UC02370		UC02358	
Other Parameters (ug/g)																
Extractable Organic Halides (total)																
*TOTAL ORGANIC CARBON	4,246.58		1,246.88	U	1,223.99	U	1,275.51	U	1,203.37	U	2,250.30		14,610.80		1,666.67	

Field Sample Number ->	**BG4CUCD**		**BG5BWL3**		**BG5CWL8**		**BG6BWL4**		**BG8BUC5**		**BG8CUC10**		**NRSE1**		**NRSE2**	
Lab Analysis Number ->	**UC02369**		**UC02365**		**UC02366**		**UC02367**		**UC02318**		**UC02323**		**UC02391**		**UC02392**	
Other Parameters (ug/g)																
Extractable Organic Halides (total)													185.53	U	158.48	U
*TOTAL ORGANIC CARBON	1,778.32		3,365.27		1,980.56		2,157.83		1,305.48	U	1,275.51	U	91,651.20		58,478.60	

Lor

Field Sample Number ->	**NRSE3**		**NRSE4**		**NRSE5**		**NRSE6**		**NRSE8**	
Lab Analysis Number ->	**UC02393**		**UC02485**		**UC02276**		**UC02486**		**UC02277**	
Other Parameters (ug/g)										
Extractable Organic Halides (total)	166.67	U	129.87	U	62.53	U	152.67	U	61.97	U
*TOTAL ORGANIC CARBON	36,333.30		9,831.17		11,251.70		22,595.40		20,218.60	

Field Sample Number ->	**BG1BUC3**		**BG4CUC17**		**BG8BUC5**		**BG8CUC10**		**BG1BBL4**		**BG1CBL10**		**BG2CBL17**		**BG4BBL5**		**BG3CWL22**	
Lab Analysis Number ->	**UC02308**		**UC02358**		**UC02318**		**UC02323**		**UC02324**		**UC02325**		**UC02327**		**UC02361**		**UC02333**	
Corrossivity	4.67		7.49		5.08		5.09		5.49		5.47		5.97		7.33		6.93	

Field Sample Number ->	**BG5BWL3**		**BG5CWL8**		**BG6BWL4**		**BG4CUCD**		**BG4BBLD**	
Lab Analysis Number ->	**UC02365**		**UC02366**		**UC02367**		**UC02369**		**UC02370**	
Corrossivity	6.99		6.21		7.03		7.51		7.13	

ALLIANT TECHSYSTEMS

Alliant Techsystems Inc.
Radford Army Ammunition Plant
Route 114
P.O. Box 1
Radford, VA 24141-0100

February 19, 1997

97-815-063

U. S. Environmental Protection Agency
Region III
841 Chestnut Building
Philadelphia, PA 19109-4431

Attention: Ms. Mary Beck, 3HW90

Re: Radford Army Ammunition Plant, Submittal of revised Appendix H of the Draft RCRA Facility Investigation Report

Enclosed are three copies, with signed certification, of the revised Appendix H, Summary Statistics for Background Distributions, of the Draft RCRA Facility investigation (RGFI) report for Solid Waste management Units 17, 31, 48, and 54, Radford Army Ammunition Plant. A preliminary copy was delivered to you Thursday February 20, 1997.

The certification statement is Attachment 1. The revisions to Appendix H are based on the review comments from the USEPA and discussed in a telephone conversation between Parsons ES, USAEC and USEPA on June 18, 1996. A copy of these comments and the responses are included as Attachment 2. Attachment 3 includes a brief explanation of the changes that were made and all of the pages of Appendix H that were affected by this revision. Attachment 4 includes the revised version of Appendix H. Please entirely replace Appendix H in Volume II of RFI Report for Solid Waste management Units 17, 31, 48, and 54 with Attachment 4.

The certified copies of this submittal will be delivered to you Friday, February 21, 1997. AEC is currently reviewing the Draft RFI Report for Solid Waste Management Units 17, 31, 48, and 54 to determine which sections will be affected by the revision to Appendix H.

Sincerely:

C. A. Jake

C. A. Jake
Environmental Affairs Supervisor

JJRedder:V:\815-063
Enclosures

c: Robert Thomson, P.E., EPA Region III (2)
841 Chestnut Building
Philadelphia, PA 19109-4431

Leslie Romanchik
Virginia Department of Environmental Quality
Waste Division
P. O. Box 10009
Richmond, VA 23240-0009

Devlin Harris
Virginia Department of Environmental Quality
P. O. Box 10009
Richmond, VA 23240-0009

Rob Davie, w/o enclosures
Army Environmental Center
Installation Restoration Division
Bldg. E4480
Aberdeen P.G., MD 21010-5401

John Segna w/o enclosures
Parsons Engineering Science
10521 Rosehaven Street
Fairfax, VA 22030

Coordination: R.L. Richardson
R. L. Richardson

M. L. Griffith
M. L. Griffith

c: Administrative File
R. L. Richardson- ACO Staff
S. J. Barker-ACO Staff
C. A. Jake
J. J. Redder
Env. File

213

ATTACHMENT 1

CERTIFICATION

Concerning the following documents, submitted, February 20, 1997:

1. EPA comments dated April 22, 1996 and Parsons Engineering Science, Inc. responses.
2. Revisions made to Appendix H
3. Revised Appendix H of the Draft RCRA Facility Investigation Report for Solid Waste Management Units 17, 31, 48, and 54.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

SIGNATURE: [signature]
PRINTED NAME: Paul Wojciechowski
TITLE: LTC, CM, Commanding
Radford AAP

SIGNATURE: K D Dolph
PRINTED NAME: Ken Dolph
TITLE: Resident Manager
Alliant Techsystems Inc.

·215

ATTACHMENT 2

USEPA COMMENTS DATED APRIL 22, 1996

AND

PARSONS ENGINEERING SCIENCE, INC. RESPONSES

21 6

RESPONSE TO USEPA REGION III

USEPA comments on the *Draft RCRA Facility Investigation Report for Solid Waste Management Units 17, 31, 48 and 54 Radford Army Ammunition Plant, Radford, Virginia*, Parsons Engineering Science, Inc., January 1996.

Part I. Response to Draft Comments on RAAP Plan for Establishing Background Soil Concentrations and for Evaluating SWMU Data Against Background, by James R. Brown, U.S. EPA, Office of Solid Waste (5303W). These comments were responded to on June 18, 1996 in a conference call involving Jim Brown (U.S. EPA), Mary Beck (U.S. EPA), Rob Davie (U.S. AEC), John Segna (Parsons ES), and Tim Schmitt (Parsons ES).

Comment 2a: **Arsenic Soil C Shapiro-Wilk test--The wrong coefficients are used. The sample size is 8, so the following coefficients ($a_{(n-i+1)}$) should be used: 0.6052, 0.3164, 0.1743, 0.0561.**

Response: Concur. The wrong coefficients were used for the SWMU 17a and SWMU 17bcd arsenic soil horizon C Shapiro-Wilk tests. The analysis was performed again using the corrects coefficients. However, the results of the test did not change.

Comment 2b: **For all Shapiro-Wilk test results, passing the test at the 1% significance level would suffice (Parsons Engineering used 5%). This allows more of the data sets to pass the test on the original scale, and therefore obviates the need for data transformations in many cases.**

Response: Parsons ES used the more conservative 5% significance level and it does not appear useful to change the significance level of the Shapiro Wilk test now. Parsons ES believes that the transformed data more accurately represents the natural distribution of metals in soil, which are typically assumed to be lognormally distributed.

Comment 2c: **Chromium Soil B--An incorrect interpretation is made for the Shapiro Wilk normality test. The calculated W exceeds the critical W, so the correct conclusion should be that the lognormally transformed data meet the assumption of normality (Parsons Engineering declares incorrectly that the lognormally transformed data do not meet the assumption of normality). The same incorrect conclusions were given for Lead horizon B.**

Response: Concur. Parsons ES incorrectly interpreted the Shapiro-Wilk test results for SWMU 17a and 17bcd for chromium and for lead in soil horizon B. These corrections have been made, but the corrections did not effect the results of the tolerance limit comparisons.

<u>Comment 2d:</u>

The Normal Tolerance limits are incorrect. Parsons Engineering did not seem to multiply the tolerance factor (K) by the standard deviation. I observed this in the data set that I checked (Barium horizon b: which calculated the upper tolerance limit by adding to the mean the kappa factor without first multiplying the kappa factor by the standard deviation). It appears as though all other normal tolerance limits were calculated the same way. The poisson based tolerance limit calculations appear to be correct.

Response:

Concur. The normal tolerance limits were recalculated using the correct formula. The results remain the same for all analyses with the exception that there are no longer exceedances for barium or lead in SWMU 17a, soil horizon B.

<u>Comment 3:</u>

The tail area probability "tests" provided for the sediments data are not very revealing. What criteria are used to evaluate samples? Was the Shapiro-Wilk test used to determine whether the normal or lognormal tail area probabilities would be calculated?

Response:

Concur. Parsons ES chose the tail area probability comparison as a crude estimate of differences between sediment metals SWMU samples vs. background based on the limited number of background and SWMU sediment metals samples to be collected.

ATTACHMENT 3

REVISIONS MADE TO APPENDIX H

ATTACHMENT 3

Appendix H was reevaluated based on the comments from the USEPA included as Attachment 2. The changes that were required based on these comments are included in this Attachment, and summarized below.

- The Shapiro-Wilk Goodness of Fit Test was recalculated for one distribution.
- The Shapiro-Wilk Goodness of Fit Test was re-interpreted for two distributions regarding their fit to normal and lognormal distributions.
- A Table "Summary of Tolerance Limits" has been added to Appendix H.
- Thirty two (32) upper tolerance limits were recalculated for various constituents at each of the SWMUs. The upper tolerance limit was recalculated for all of the constituents listed on the Summary of Tolerance Limits Table which have a "normal" tolerance limit type.
- The revised calculations of the upper tolerance limits are shown on individual sheets. These sheets also show the reevaluation of the site data based on the revised tolerance limits.

220

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	0.31	2.27	1.95628369	0.6052	1.1839429
2	0.44	2.19	1.74361013	0.3164	0.5516782
3	0.47	2.09	1.62	0.1743	0.2826903
4	1.70	1.94	0.24	0.0561	0.0132077
5	1.94	1.70			2.0315191
6	2.09	0.47			
7	2.19	0.44			
8	2.27	0.31			

std dev =	0.6510165
N =	8
K =	4
b =	2.0315191
W =	1.3911045
Critical W =	0.748
Result =	Lognormally transformed data meets assumption of normality

221

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	3.42	4.06	0.63808253	0.6052	0.3861675
2	3.63	4.02	0.39078734	0.3164	0.1236451
3	3.70	3.94	0.2418529	0.1743	0.042155
4	3.83	3.93	0.09669377	0.0561	0.0054245
5	3.93	3.83	-0.09669377		0
6	3.94	3.70	-0.2418529		0
7	4.02	3.63			0.5573921
8	4.06	3.42			

std dev =	0.217995
N =	8
K =	4
b =	0.5573921
W =	0.9339647
Critical W =	0.818
Result =	Lognormally transformed data meets assumption of normality

Lead horizon B

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	1.65	5.43	3.78100599	0.6052	2.2882648
2	2.87	3.50	0.62722638	0.3164	0.1984544
3	3.02	3.33	0.31108885	0.1743	0.0542228
4	3.06	3.09	0.0282268	0.0561	0.0015835
5	3.09	3.06	-0.0282268		0
6	3.33	3.02	-0.31108885		0
7	3.50	2.87	-0.62722638		2.5425256
8	5.43	1.65	-3.78100599		

std dev =	1.0448547
N =	8
K =	4
b =	2.5425256
W =	0.8459035
Critical W =	0.818
Result =	Lognormally transformed data meets assumption of normality

223

SUMMARY OF TOLERANCE LIMITS
RADFORD ARMY AMMUNITION PLANT

Soil Horizon	Soil Series	Constituent	Upper Tolerance Limit	Tolerance Limit Type	Exceedance?
SWMU 17A	B	Antimony	21.0	Poisson	Yes
SWMU 17A	B	Arsenic	5.5	Poisson	Yes
SWMU 17A	B	Barium	9.7	Normal	No
SWMU 17A	B	Beryllium	4.5	Poisson	No
SWMU 17A	B	Cadmium	3.5	Poisson	Yes
SWMU 17A	B	Chromium	5.1	Normal	Yes
SWMU 17A	B	Lead	8.7	Normal	No
SWMU 17A	B	Mercury	1.5	Poisson	No
SWMU 17A	B	Nickel	6.0	Normal	Yes
SWMU 17A	B	Selenium	2.5	Poisson	No
SWMU 17A	B	Silver	1.5	Poisson	Yes
SWMU 17A	B	Thallium	33.5	Poisson	No
SWMU 17A	C	Antimony	21.5	Poisson	No
SWMU 17A	C	Arsenic	11.5	Poisson	Yes
SWMU 17A	C	Barium	6.9	Normal	No
SWMU 17A	C	Beryllium	2.7	Normal	No
SWMU 17A	C	Cadmium	3.5	Poisson	No
SWMU 17A	C	Chromium	5.0	Normal	No
SWMU 17A	C	Lead	4.2	Normal	Yes
SWMU 17A	C	Mercury	1.5	Poisson	No
SWMU 17A	C	Nickel	5.4	Normal	No
SWMU 17A	C	Selenium	2.5	Poisson	No
SWMU 17A	C	Silver	1.5	Poisson	Yes
SWMU 17A	C	Thallium	33.5	Poisson	No
SWMU 17BCD	B	Antimony	21.0	Poisson	No
SWMU 17BCD	B	Arsenic	5.5	Poisson	Yes
SWMU 17BCD	B	Barium	9.7	Normal	No
SWMU 17BCD	B	Beryllium	4.5	Poisson	No
SWMU 17BCD	B	Cadmium	3.5	Poisson	No
SWMU 17BCD	B	Chromium	5.1	Normal	No
SWMU 17BCD	B	Lead	8.7	Normal	No
SWMU 17BCD	B	Mercury	1.5	Poisson	No
SWMU 17BCD	B	Nickel	6.0	Normal	No
SWMU 17BCD	B	Selenium	2.5	Poisson	No
SWMU 17BCD	B	Silver	1.5	Poisson	No
SWMU 17BCD	B	Thallium	33.5	Poisson	No
SWMU 17BCD	C	Antimony	21.5	Poisson	No
SWMU 17BCD	C	Arsenic	11.5	Poisson	No
SWMU 17BCD	C	Barium	6.9	Normal	No
SWMU 17BCD	C	Beryllium	2.3	Normal	Yes
SWMU 17BCD	C	Cadmium	3.5	Poisson	Yes
SWMU 17BCD	C	Chromium	5.0	Normal	No
SWMU 17BCD	C	Lead	4.2	Normal	Yes
SWMU 17BCD	C	Mercury	1.5	Poisson	No
SWMU 17BCD	C	Nickel	5.4	Normal	No
SWMU 17BCD	C	Selenium	2.5	Poisson	No
SWMU 17BCD	C	Silver	1.5	Poisson	No
SWMU 17BCD	C	Thallium	33.5	Poisson	No

SUMMARY OF TOLERANCE LIMITS
RADFORD ARMY AMMUNITION PLANT

Soil Horizon	Soil Series	Constituent	Upper Tolerance Limit	Tolerance Limit Type	Exceedance?
SWMU 31	C	Antimony	20.5	Poisson	No
SWMU 31	C	Arsenic	7.0	Poisson	No
SWMU 31	C	Barium	7.1	Normal	No
SWMU 31	C	Beryllium	.5	Normal	No
SWMU 31	C	Cadmium	3.5	Poisson	No
SWMU 31	C	Chromium	4.8	Normal	No
SWMU 31	C	Lead	4.1	Normal	No
SWMU 31	C	Mercury	2.0	Poisson	No
SWMU 31	C	Nickel	4.3	Normal	No
SWMU 31	C	Selenium	2.5	Poisson	No
SWMU 31	C	Silver	1.5	Poisson	No
SWMU 31	C	Thallium	31.5	Poisson	No
SWMU 54	B	Antimony	20.5	Poisson	No
SWMU 54	B	Arsenic	6.5	Poisson	No
SWMU 54	B	Barium	7.4	Normal	No
SWMU 54	B	Beryllium	5.0	Poisson	No
SWMU 54	B	Cadmium	3.5	Poisson	Yes
SWMU 54	B	Chromium	5.0	Normal	No
SWMU 54	B	Lead	4.7	Normal	Yes
SWMU 54	B	Mercury	1.5	Poisson	Yes
SWMU 54	B	Nickel	5.0	Normal	No
SWMU 54	B	Selenium	2.5	Poisson	No
SWMU 54	B	Silver	2.0	Poisson	No
SWMU 54	B	Thallium	32.0	Poisson	No
SWMU 54	C	Antimony	20.5	Poisson	No
SWMU 54	C	Arsenic	7.0	Poisson	No
SWMU 54	C	Barium	7.1	Normal	No
SWMU 54	C	Beryllium	.5	Normal	Yes
SWMU 54	C	Cadmium	3.5	Poisson	No
SWMU 54	C	Chromium	4.8	Normal	No
SWMU 54	C	Lead	4.1	Normal	Yes
SWMU 54	C	Mercury	2.0	Poisson	No
SWMU 54	C	Nickel	4.3	Normal	No
SWMU 54	C	Selenium	2.5	Poisson	No
SWMU 54	C	Silver	1.5	Poisson	No
SWMU 54	C	Thallium	31.5	Poisson	No

Barium horizon B

Normal Tolerance Limit (K) Calculation for Barium soil horizon B, SWMU 17A

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	4.39
Where		std. dev.	0.83
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	6.399951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17ASB105	8.54	9.7019594	5128.21	16349.61	No
17ASB205	4.16	9.7019594	64.38	16349.61	No
17ASB305	4.27	9.7019594	71.26	16349.61	No

Barium horizon C

Normal Tolerance Limit (K) Calculation for Barium soil horizon C

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	4.51
Where		std. dev.	0.37
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	6.519951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17ASB110	4.15	6.9223819	63.12	1014.7341	No
17ASB210	4.33	6.9223819	75.69	1014.7341	No
17ASB310	4.84	6.9223819	126.39	1014.7341	No
17ASB115	4.24	6.9223819	69.20	1014.7341	No
17ASB215	4.46	6.9223819	86.91	1014.7341	No
17ASB315	3.81	6.9223819	45.16	1014.7341	No
17ASB120	4.24	6.9223819	69.36	1014.7341	No
17ASB220	4.90	6.9223819	134.25	1014.7341	No
17ASB320	3.97	6.9223819	52.97	1014.7341	No
17ASB122	4.27	6.9223819	71.50	1014.7341	No
17ASB225	2.26	6.9223819	9.56	1014.7341	No
17ASB325	4.00	6.9223819	54.71	1014.7341	No
17ASB340	3.54	6.9223819	34.58	1014.7341	No

Beryllium horizon C

Normal Tolerance Limit (K) Calculation for Beryllium soil horizon C, SWMU 17A

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	0.7
Where		std. dev.	0.59
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	2.709951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17ASB110	0.80	2.2988711	2.22	9.962929	No
17ASB210	0.72	2.2988711	2.06	9.962929	No
17ASB310	2.00	2.2988711	7.39	9.962929	No
17ASB115	0.75	2.2988711	2.11	9.962929	No
17ASB215	1.51	2.2988711	4.52	9.962929	No
17ASB315	0.79	2.2988711	2.20	9.962929	No
17ASB120	0.57	2.2988711	1.77	9.962929	No
17ASB220	1.92	2.2988711	6.82	9.962929	No
17ASB320	-0.56	2.2988711	0.57	9.962929	No
17ASB122	0.76	2.2988711	2.13	9.962929	No
17ASB225	-1.17	2.2988711	0.31	9.962929	No
17ASB325	-0.26	2.2988711	0.77	9.962929	No
17ASB340	0.44	2.2988711	1.55	9.962929	No

Chromium soil B

Normal Tolerance Limit (K) Calculation for Chromium soil horizon B, SWMU 17A

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.82
Where		std. dev.	0.22
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	5.829951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17ASB105	7.63	5.1025892	2051.28	164.44715	Yes
17ASB205	3.85	5.1025892	46.82	164.44715	No
17ASB305	3.98	5.1025892	53.71	164.44715	No

Chromium soil C

Normal Tolerance Limit (K) Calculation for Chromium soil horizon C, SWMU 17A

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.83
Where		std. dev.	0.2
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	5.839951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17ASB110	4.02	4.9979902	55.51	148.11518	No
17ASB210	3.91	4.9979902	49.70	148.11518	No
17ASB310	4.37	4.9979902	79.33	148.11518	No
17ASB115	4.00	4.9979902	54.72	148.11518	No
17ASB215	4.45	4.9979902	86.04	148.11518	No
17ASB315	4.33	4.9979902	75.99	148.11518	No
17ASB120	4.01	4.9979902	54.92	148.11518	No
17ASB220	4.81	4.9979902	122.27	148.11518	No
17ASB320	2.85	4.9979902	17.25	148.11518	No
17ASB122	4.23	4.9979902	68.50	148.11518	No
17ASB225	2.02	4.9979902	7.56	148.11518	No
17ASB325	3.12	4.9979902	22.59	148.11518	No
17ASB340	3.82	4.9979902	45.44	148.11518	No

Lead horizon B

Normal Tolerance Limit (K) Calculation for Lead soil horizon B, SWMU 17A

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.24
Where		std. dev.	1.04
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	5.249951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17ASB105	8.57	8.6999491	5256.41	6002.6065	No
17ASB205	3.27	8.6999491	26.28	6002.6065	No
17ASB305	3.30	8.6999491	27.08	6002.6065	No

Lead horizon C

Normal Tolerance Limit (K) Calculation for Lead soil horizon C, SWMU 17A

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.71
Where		std. dev.	0.31
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	4.719951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17ASB110	4.62	4.1731848	101.39	64.921888	Yes
17ASB210	2.65	4.1731848	14.13	64.921888	No
17ASB310	3.14	4.1731848	23.02	64.921888	No
17ASB115	4.03	4.1731848	56.44	64.921888	No
17ASB215	4.24	4.1731848	69.06	64.921888	Yes
17ASB315	3.08	4.1731848	21.83	64.921888	No
17ASB120	5.61	4.1731848	273.97	64.921888	Yes
17ASB220	3.73	4.1731848	41.78	64.921888	No
17ASB320	3.43	4.1731848	30.77	64.921888	No
17ASB122	2.47	4.1731848	11.79	64.921888	No
17ASB225	4.35	4.1731848	77.36	64.921888	Yes
17ASB325	2.22	4.1731848	9.23	64.921888	No
17ASB340	2.75	4.1731848	15.70	64.921888	No

Nickel horizon B

Normal Tolerance Limit (K) Calculation for Nickel soil horizon B, SWMU 17A

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.97
Where		std. dev.	0.61
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	4.979951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17ASB105	6.81	6.0077701	902.56	406.5757	Yes
17ASB205	3.26	6.0077701	26.15	406.5757	No
17ASB305	3.55	6.0077701	34.64	406.5757	No

233

Nickel horizon C

Normal Tolerance Limit (K) Calculation for Nickel soil horizon C, SWMU 17A

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.24
Where		std. dev.	0.42
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	5.249951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17ASB110	3.21	5.4449794	24.84	231.59252	No
17ASB210	3.32	5.4449794	27.78	231.59252	No
17ASB310	4.27	5.4449794	71.26	231.59252	No
17ASB115	3.37	5.4449794	29.20	231.59252	No
17ASB215	4.04	5.4449794	56.83	231.59252	No
17ASB315	3.60	5.4449794	36.43	231.59252	No
17ASB120	3.19	5.4449794	24.28	231.59252	No
17ASB220	4.37	5.4449794	78.96	231.59252	No
17ASB320	1.84	5.4449794	6.30	231.59252	No
17ASB122	3.35	5.4449794	28.37	231.59252	No
17ASB225	1.81	5.4449794	6.12	231.59252	No
17ASB325	2.39	5.4449794	10.90	231.59252	No
17ASB340	3.17	5.4449794	23.71	231.59252	No

Barium horizon B

Normal Tolerance Limit (K) Calculation for Barium soil horizon B, SWMU 17BCD

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	4.39
Where		std. dev.	0.83
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	6.399951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17CSB105	3.38	9.7019594	29.40	16349.61	No
17CSB205	3.60	9.7019594	36.74	16349.61	No
17DSB105	4.23	9.7019594	68.93	16349.61	No
17DSB205	4.19	9.7019594	65.89	16349.61	No

235

Barium horizon C

Normal Tolerance Limit (K) Calculation for Barium soil horizon C, SWMU 17BCD

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	4.51
Where		std. dev.	0.37
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	6.519951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17CSB110	4.36	6.9223819	78.55	1014.7341	No
17CSB210	4.25	6.9223819	70.12	1014.7341	No
17DSB110	4.10	6.9223819	60.40	1014.7341	No
17DSB210	4.39	6.9223819	80.98	1014.7341	No
17CSB114	4.43	6.9223819	84.33	1014.7341	No
17CSB215	4.65	6.9223819	104.70	1014.7341	No
17DSB115	4.21	6.9223819	67.05	1014.7341	No
17DSB215	4.96	6.9223819	142.65	1014.7341	No
17DSB120	4.24	6.9223819	69.69	1014.7341	No
17DSB220	4.72	6.9223819	111.91	1014.7341	No
17DSB125	4.29	6.9223819	72.73	1014.7341	No
17DSB225	4.02	6.9223819	55.95	1014.7341	No
17DSB127	4.71	6.9223819	111.48	1014.7341	No
17CSB240	4.46	6.9223819	86.49	1014.7341	No
17DSB240	4.23	6.9223819	68.85	1014.7341	No

Beryllium horizon C

Normal Tolerance Limit (K) Calculation for Beryllium soil horizon C, SWMU 17BCD

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	0.70
Where		std. dev.	0.59
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	2.709951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17CSB110	1.65	2.2988711	5.19	9.962929	No
17CSB210	1.75	2.2988711	5.77	9.962929	No
17DSB110	0.70	2.2988711	2.02	9.962929	No
17DSB210	0.91	2.2988711	2.48	9.962929	No
17CSB114	1.28	2.2988711	3.61	9.962929	No
17CSB215	0.92	2.2988711	2.52	9.962929	No
17DSB115	1.16	2.2988711	3.21	9.962929	No
17DSB215	2.06	2.2988711	7.88	9.962929	No
17DSB120	1.11	2.2988711	3.04	9.962929	No
17DSB220	1.70	2.2988711	5.48	9.962929	No
17DSB125	1.56	2.2988711	4.77	9.962929	No
17DSB225	2.47	2.2988711	11.84	9.962929	Yes
17DSB127	1.77	2.2988711	5.89	9.962929	No
17CSB240	1.83	2.2988711	6.21	9.962929	No
17DSB240	0.80	2.2988711	2.23	9.962929	No

Chromium horizon B

Normal Tolerance Limit (K) Calculation for Chromium soil horizon B, SWMU 17BCD

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.82
Where		std. dev.	0.22
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	5.829951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17CSB105	4.13	5.1025892	61.87	164.44715	No
17CSB205	3.52	5.1025892	33.62	164.44715	No
17DSB105	3.40	5.1025892	29.92	164.44715	No
17DSB205	3.44	5.1025892	31.28	164.44715	No

238

Chromium horizon C

Normal Tolerance Limit (K) Calculation for Chromium soil horizon C, SWMU 17A

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.83
Where		std. dev.	0.2
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	5.839951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17CSB110	4.29	4.9979902	72.81	148.11518	No
17CSB210	3.99	4.9979902	54.29	148.11518	No
17DSB110	3.78	4.9979902	43.94	148.11518	No
17DSB210	4.03	4.9979902	56.30	148.11518	No
17CSB114	4.09	4.9979902	59.89	148.11518	No
17CSB215	4.28	4.9979902	71.92	148.11518	No
17DSB115	4.22	4.9979902	67.82	148.11518	No
17DSB215	4.58	4.9979902	97.09	148.11518	No
17DSB120	4.03	4.9979902	56.07	148.11518	No
17DSB220	4.15	4.9979902	63.30	148.11518	No
17DSB125	4.47	4.9979902	86.92	148.11518	No
17DSB225	4.35	4.9979902	77.76	148.11518	No
17DSB127	4.36	4.9979902	77.87	148.11518	No
17CSB240	4.31	4.9979902	74.38	148.11518	No
17DSB240	3.90	4.9979902	49.18	148.11518	No

Lead horizon B

Normal Tolerance Limit (K) Calculation for Lead soil horizon B, SWMU 17BCD

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.24
Where		std. dev.	1.04
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	5.249951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17CSB105	3.73	8.6999491	41.82	6002.6065	No
17CSB205	2.50	8.6999491	12.20	6002.6065	No
17DSB105	3.00	8.6999491	20.08	6002.6065	No
17DSB205	3.04	8.6999491	20.81	6002.6065	No

Lead horizon C

Normal Tolerance Limit (K) Calculation for Lead soil horizon C, SWMU 17BCD

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.71
Where		std. dev.	0.31
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	4.719951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17CSB110	2.91	4.1731848	18.44	64.921888	No
17CSB210	2.62	4.1731848	13.68	64.921888	No
17DSB110	2.89	4.1731848	17.95	64.921888	No
17DSB210	2.88	4.1731848	17.87	64.921888	No
17CSB114	2.93	4.1731848	18.73	64.921888	No
17CSB215	5.25	4.1731848	190.60	64.921888	Yes
17DSB115	3.28	4.1731848	26.54	64.921888	No
17DSB215	3.14	4.1731848	23.10	64.921888	No
17DSB120	2.51	4.1731848	12.36	64.921888	No
17DSB220	2.43	4.1731848	11.31	64.921888	No
17DSB125	3.34	4.1731848	28.23	64.921888	No
17DSB225	2.13	4.1731848	8.43	64.921888	No
17DSB127	3.16	4.1731848	23.46	64.921888	No
17CSB240	2.85	4.1731848	17.24	64.921888	No
17DSB240	2.68	4.1731848	14.63	64.921888	No

241

Nickel horizon B

Normal Tolerance Limit (K) Calculation for Nickel soil horizon B, SWMU 17BCD

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.97
Where		std. dev.	0.61
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	4.979951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17CSB105	3.26	6.0077701	25.95	406.5757	No
17CSB205	2.93	6.0077701	18.68	406.5757	No
17DSB105	2.68	6.0077701	14.58	406.5757	No
17DSB205	2.41	6.0077701	11.18	406.5757	No

Nickel horizon C

Normal Tolerance Limit (K) Calculation for Nickel soil horizon C, SWMU 17BCD

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.24
Where		std. dev.	0.42
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	5.249951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17CSB110	3.83	5.4449794	46.17	231.59252	No
17CSB210	3.84	5.4449794	46.60	231.59252	No
17DSB110	2.79	5.4449794	16.21	231.59252	No
17DSB210	3.36	5.4449794	28.79	231.59252	No
17CSB114	3.56	5.4449794	35.33	231.59252	No
17CSB215	3.82	5.4449794	45.62	231.59252	No
17DSB115	3.37	5.4449794	28.97	231.59252	No
17DSB215	4.28	5.4449794	72.05	231.59252	No
17DSB120	3.82	5.4449794	45.53	231.59252	No
17DSB220	4.05	5.4449794	57.42	231.59252	No
17DSB125	3.92	5.4449794	50.40	231.59252	No
17DSB225	4.48	5.4449794	87.82	231.59252	No
17DSB127	4.20	5.4449794	66.39	231.59252	No
17CSB240	4.04	5.4449794	56.83	231.59252	No
17DSB240	3.15	5.4449794	23.33	231.59252	No

243

Barium horizon C

Normal Tolerance Limit (K) Calculation for Barium soil horizon C, SWMU 31

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	4.53
Where		std. dev.	0.38
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	6.7064488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
31MW3A1	4.90	7.0784505	134.00	1186.1292	No
31MW2A	4.90	7.0784505	134.90	1186.1292	No
31MW4A1	4.92	7.0784505	136.78	1186.1292	No
31MW3B2	4.32	7.0784505	75.10	1186.1292	No
31MW2B	4.58	7.0784505	97.33	1186.1292	No
31MW4B2	4.42	7.0784505	82.68	1186.1292	No
31MW1A2	3.34	7.0784505	28.11	1186.1292	No
31MW1B3	4.07	7.0784505	58.39	1186.1292	No
31MW4C4	4.95	7.0784505	140.53	1186.1292	No

244

Beryllium C

Normal Tolerance Limit (K) Calculation for Beryllium soil horizon C, SWMU 31

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	-0.09993
Where		std. dev.	0.27
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	2.0765188

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
31MW3A1	-0.05	0.4607301	0.95	1	No
31MW2A	0.00	0.4607301	1.00	1	Yes
31MW4A1	0.17	0.4607301	1.18	1	Yes
31MW3B2	-0.29	0.4607301	0.75	1	No
31MW2B	0.06	0.4607301	1.06	1	Yes
31MW4B2	-0.19	0.4607301	0.83	1	No
31MW1A2	-0.06	0.4607301	0.94	1	No
31MW1B3	0.16	0.4607301	1.18	1	Yes
31MW4C4	0.20	0.4607301	1.22	1	Yes

745

Chromium horizon C

Normal Tolerance Limit (K) Calculation for Chromium soil horizon C, SWMU 31

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.55
Where		std. dev.	0.22
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	5.7264488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
31MW3A1	3.29	4.8098187	26.80	122.70937	No
31MW2A	3.78	4.8098187	43.94	122.70937	No
31MW4A1	3.78	4.8098187	43.91	122.70937	No
31MW3B2	2.97	4.8098187	19.50	122.70937	No
31MW2B	3.53	4.8098187	34.00	122.70937	No
31MW4B2	3.47	4.8098187	32.03	122.70937	No
31MW1A2	2.92	4.8098187	18.50	122.70937	No
31MW1B3	3.18	4.8098187	24.10	122.70937	No
31MW4C4	3.79	4.8098187	44.13	122.70937	No

Lead horizon C

Normal Tolerance Limit (K) Calculation for Lead soil horizon C, SWMU 31

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.77
Where		std. dev.	0.26
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	4.9464488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
31MW3A1	3.45	4.0560767	31.54	57.747305	No
31MW2A	3.05	4.0560767	21.16	57.747305	No
31MW4A1	2.87	4.0560767	17.70	57.747305	No
31MW3B2	3.69	4.0560767	40.00	57.747305	No
31MW2B	3.04	4.0560767	20.86	57.747305	No
31MW4B2	2.64	4.0560767	13.96	57.747305	No
31MW1A2	-0.46	4.0560767	0.63	57.747305	No
31MW1B3	1.99	4.0560767	7.32	57.747305	No
31MW4C4	2.99	4.0560767	19.98	57.747305	No

Nickel horizon C

Normal Tolerance Limit (K) Calculation for Nickel soil horizon C, SWMU 31

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.69
Where		std. dev.	0.34
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	4.8664488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
31MW3A10	2.53	4.3445926	12.60	77.060635	No
31MW2A	2.59	4.3445926	13.37	77.060635	No
31MW4A12	3.01	4.3445926	20.23	77.060635	No
31MW3B20	2.59	4.3445926	13.30	77.060635	No
31MW2B	3.13	4.3445926	22.78	77.060635	No
31MW4B22	2.90	4.3445926	18.18	77.060635	No
31MW1A25	3.16	4.3445926	23.62	77.060635	No
31MW1B35	3.43	4.3445926	30.89	77.060635	No
31MW4C40	3.07	4.3445926	21.49	77.060635	No

Barium horizon B

Normal Tolerance Limit (K) Calculation for Barium soil horizon B, SWMU 54

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	4.95
Where		std. dev.	0.35
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	7.1264488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
54SB10A	5.77	7.4442571	319.23	1710.0144	No
54SB11A	5.41	7.4442571	223.57	1710.0144	No
54SB12A	5.46	7.4442571	235.96	1710.0144	No
54SB13A	5.42	7.4442571	226.99	1710.0144	No
54SB14A	5.03	7.4442571	153.30	1710.0144	No
54SB16A	5.44	7.4442571	231.33	1710.0144	No
54SB1A	5.10	7.4442571	164.51	1710.0144	No
54SB2A	5.41	7.4442571	224.22	1710.0144	No
54SB3A	5.18	7.4442571	178.16	1710.0144	No
54SB4A	5.75	7.4442571	313.51	1710.0144	No
54SB5A	5.64	7.4442571	281.80	1710.0144	No
54SB6A	6.98	7.4442571	1077.02	1710.0144	No
54SB7A	4.93	7.4442571	138.29	1710.0144	No
54SB8A	5.24	7.4442571	188.63	1710.0144	No

Barium horizon C

Normal Tolerance Limit (K) Calculation for Barium soil horizon C, SWMU 54

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	4.53
Where		std. dev.	0.38
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	6.7064488
Limit =	Avg. + K(std. dev.)		

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
54SB15A	5.82	7.0784505	338.27	1186.1292	No
54SB9A	5.27	7.0784505	193.90	1186.1292	No
54SB16B	5.32	7.0784505	203.70	1186.1292	No
54SB14B	5.11	7.0784505	166.27	1186.1292	No
54SB6B	5.89	7.0784505	362.50	1186.1292	No
54SB10B	5.06	7.0784505	158.09	1186.1292	No
54SB11B	5.17	7.0784505	175.54	1186.1292	No
54SB12B	5.51	7.0784505	248.34	1186.1292	No
54SB2B	5.17	7.0784505	175.46	1186.1292	No
54SB3B	4.47	7.0784505	87.63	1186.1292	No
54SB4B	4.68	7.0784505	108.30	1186.1292	No
54SB5B	5.50	7.0784505	244.59	1186.1292	No
54SB7B	6.04	7.0784505	420.91	1186.1292	No
54SB8B	5.49	7.0784505	243.14	1186.1292	No
54SB9B	5.30	7.0784505	201.01	1186.1292	No
54SB10D	4.95	7.0784505	141.88	1186.1292	No
54SB13B	4.78	7.0784505	118.64	1186.1292	No
54SB1B	5.73	7.0784505	307.44	1186.1292	No
54SB16D	5.47	7.0784505	237.56	1186.1292	No

Beryllium horizon B

Poisson-based Tolerance Limit (K) Calculation for Beryllium soil horizon B, SWMU 54

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	7.83
2Tn+2	17.66
Chi Square (2Tn+2)	28.4343
n	6
Lambda Tn	2.369525
2(Lambda Tn)	4.73905
Chi Square0.05[2K+2]>=	4.73905
[2K+2] = 12	
K = 5	

FSampNo	Value	Limit	Limit Exceeded?
54SB10A	1.81	5	No
54SB11A	1.49	5	No
54SB12A	1.54	5	No
54SB13A	1.42	5	No
54SB14A	0.89	5	No
54SB16A	1.47	5	No
54SB1A	0.93	5	No
54SB2A	1.76	5	No
54SB3A	1.11	5	No
54SB4A	1.78	5	No
54SB5A	1.55	5	No
54SB6A	1.11	5	No
54SB7A	0.82	5	No
54SB8A	1.15	5	No

25 1

Chromium horizon B

Normal Tolerance Limit (K) Calculation for Chromium soil horizon B, SWMU 54

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.76
Where		std. dev.	0.21
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	5.9364488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
54SB10A	3.52	5.0066542	33.86	149.40403	No
54SB11A	3.50	5.0066542	33.17	149.40403	No
54SB12A	3.59	5.0066542	36.08	149.40403	No
54SB13A	3.44	5.0066542	31.29	149.40403	No
54SB14A	3.02	5.0066542	20.52	149.40403	No
54SB16A	3.53	5.0066542	34.27	149.40403	No
54SB1A	3.23	5.0066542	25.38	149.40403	No
54SB2A	3.33	5.0066542	27.91	149.40403	No
54SB3A	3.34	5.0066542	28.16	149.40403	No
54SB4A	3.57	5.0066542	35.56	149.40403	No
54SB5A	3.54	5.0066542	34.54	149.40403	No
54SB6A	4.92	5.0066542	136.92	149.40403	No
54SB7A	3.18	5.0066542	24.00	149.40403	No
54SB8A	3.32	5.0066542	27.69	149.40403	No

253

Chromium horizon C

Normal Tolerance Limit (K) Calculation for Chromium soil horizon C, SWMU 54

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.55
Where		std. dev.	0.22
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	5.7264488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
54SB15A	3.83	4.8098187	45.93	122.70937	No
54SB9A	3.33	4.8098187	27.93	122.70937	No
54SB16B	3.53	4.8098187	34.20	122.70937	No
54SB14B	3.53	4.8098187	34.10	122.70937	No
54SB6B	4.25	4.8098187	70.14	122.70937	No
54SB10B	3.39	4.8098187	29.78	122.70937	No
54SB11B	3.49	4.8098187	32.93	122.70937	No
54SB12B	3.84	4.8098187	46.48	122.70937	No
54SB2B	3.38	4.8098187	29.45	122.70937	No
54SB3B	3.63	4.8098187	37.76	122.70937	No
54SB4B	3.06	4.8098187	21.30	122.70937	No
54SB5B	3.70	4.8098187	40.64	122.70937	No
54SB7B	4.04	4.8098187	57.10	122.70937	No
54SB8B	3.69	4.8098187	40.15	122.70937	No
54SB9B	3.63	4.8098187	37.56	122.70937	No
54SB10D	3.30	4.8098187	27.23	122.70937	No
54SB13B	3.48	4.8098187	32.32	122.70937	No
54SB1B	2.28	4.8098187	9.80	122.70937	No
54SB16D	3.77	4.8098187	43.53	122.70937	No

Lead horizon B

Normal Tolerance Limit (K) Calculation for Lead soil horizon B, SWMU 54

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.91
Where		std. dev.	0.35
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	5.0864488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
54SB10A	5.33	4.6902571	205.56	108.88117	Yes
54SB11A	4.51	4.6902571	91.13	108.88117	No
54SB12A	3.06	4.6902571	21.22	108.88117	No
54SB13A	4.91	4.6902571	134.97	108.88117	Yes
54SB14A	3.60	4.6902571	36.56	108.88117	No
54SB16A	3.46	4.6902571	31.82	108.88117	No
54SB1A	6.57	4.6902571	716.80	108.88117	Yes
54SB2A	7.76	4.6902571	2354.26	108.88117	Yes
54SB3A	5.77	4.6902571	321.84	108.88117	Yes
54SB4A	4.43	4.6902571	84.26	108.88117	No
54SB5A	3.69	4.6902571	39.90	108.88117	No
54SB6A	8.24	4.6902571	3789.73	108.88117	Yes
54SB7A	3.92	4.6902571	50.29	108.88117	No
54SB8A	5.44	4.6902571	229.75	108.88117	Yes

Lead horizon C

Normal Tolerance Limit (K) Calculation for Lead soil horizon C

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.77
Where		std. dev.	0.26
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	4.9464488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
54SB15A	3.35	4.0560767	28.40	57.747305	No
54SB9A	3.04	4.0560767	20.85	57.747305	No
54SB16B	2.70	4.0560767	14.81	57.747305	No
54SB14B	2.58	4.0560767	13.25	57.747305	No
54SB6B	6.07	4.0560767	430.56	57.747305	Yes
54SB10B	2.46	4.0560767	11.69	57.747305	No
54SB11B	2.49	4.0560767	12.11	57.747305	No
54SB12B	2.59	4.0560767	13.28	57.747305	No
54SB2B	2.66	4.0560767	14.23	57.747305	No
54SB3B	2.69	4.0560767	14.74	57.747305	No
54SB4B	2.12	4.0560767	8.36	57.747305	No
54SB5B	2.82	4.0560767	16.82	57.747305	No
54SB7B	3.13	4.0560767	22.79	57.747305	No
54SB8B	3.05	4.0560767	21.20	57.747305	No
54SB9B	2.76	4.0560767	15.83	57.747305	No
54SB10D	2.58	4.0560767	13.16	57.747305	No
54SB13B	2.11	4.0560767	8.23	57.747305	No
54SB1B	1.75	4.0560767	5.77	57.747305	No
54SB16D	2.62	4.0560767	13.68	57.747305	No

Nickel horizon B

Normal Tolerance Limit (K) Calculation for Nickel soil horizon B, SWMU 54

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.98
Where		std. dev.	0.4
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	5.1564488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
54SB10A	2.98	5.0425795	19.71	154.86898	No
54SB11A	3.00	5.0425795	20.05	154.86898	No
54SB12A	3.00	5.0425795	20.10	154.86898	No
54SB13A	2.94	5.0425795	18.90	154.86898	No
54SB14A	2.52	5.0425795	12.38	154.86898	No
54SB16A	3.02	5.0425795	20.56	154.86898	No
54SB1A	2.46	5.0425795	11.66	154.86898	No
54SB2A	2.33	5.0425795	10.25	154.86898	No
54SB3A	2.60	5.0425795	13.45	154.86898	No
54SB4A	3.07	5.0425795	21.44	154.86898	No
54SB5A	3.05	5.0425795	21.20	154.86898	No
54SB6A	2.83	5.0425795	16.99	154.86898	No
54SB7A	2.51	5.0425795	12.34	154.86898	No
54SB8A	2.75	5.0425795	15.60	154.86898	No

257

Nickel horizon C

Normal Tolerance Limit (K) Calculation for Nickel soil horizon C, SWMU 54

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.69
Where		std. dev.	0.34
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	4.8664488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
54SB15A	3.26	4.3445926	26.05	77.060635	No
54SB9A	2.87	4.3445926	17.68	77.060635	No
54SB16B	3.00	4.3445926	20.12	77.060635	No
54SB14B	3.00	4.3445926	20.12	77.060635	No
54SB6B	3.41	4.3445926	30.14	77.060635	No
54SB10B	2.89	4.3445926	18.01	77.060635	No
54SB11B	2.94	4.3445926	18.89	77.060635	No
54SB12B	3.27	4.3445926	26.43	77.060635	No
54SB2B	2.81	4.3445926	16.69	77.060635	No
54SB3B	2.33	4.3445926	10.26	77.060635	No
54SB4B	2.22	4.3445926	9.19	77.060635	No
54SB5B	3.20	4.3445926	24.46	77.060635	No
54SB7B	3.55	4.3445926	34.72	77.060635	No
54SB8B	3.24	4.3445926	25.56	77.060635	No
54SB9B	3.12	4.3445926	22.61	77.060635	No
54SB10D	2.74	4.3445926	15.45	77.060635	No
54SB13B	2.58	4.3445926	13.20	77.060635	No
54SB1B	1.83	4.3445926	6.23	77.060635	No
54SB16D	3.19	4.3445926	24.25	77.060635	No

257

ATTACHMENT 4

REVISED APPENDIX H OF THE

DRAFT RCRA FACILITY INVESTIGATION (RFI) REPORT FOR

SOLID WASTE MANAGEMENT UNITS 17, 31, 48, AND 54

RADFORD ARMY AMMUNITION PLANT

258

APPENDIX H

SUMMARY STATISTICS FOR BACKGROUND DISTRIBUTIONS

259

SUMMARY STATISTICS

FOR

BACKGROUND DISTRIBUTIONS

Background, Urban Complex Soil Type

Soil Type	Urban Complex		Urban Complex		Urban Complex		Urban Complex		Urban Complex	
Soil Horizon	B	C	B	C	B	C	B	C	B	C
Metal	Antimony		Arsenic		Barium		Beryllium		Cadmium	
Mean	12.62	12.67	6.89	5.46	110.31	97.76	1.33	2.30	0.78	0.78
Standard Error	0.60	0.42	1.85	1.24	35.00	16.18	0.22	0.41	0.04	0.03
Median	12.07	12.50	6.38	6.23	68.74	83.64	1.37	2.36	0.74	0.77
Standard Deviation	1.71	1.19	5.24	3.50	98.99	45.75	0.61	1.17	0.10	0.07
Sample Variance	2.92	1.42	27.42	12.27	9798.59	2093.11	0.37	1.37	0.01	0.01
Kurtosis	-0.44	0.49	-1.93	-2.05	0.06	5.74	1.26	-1.17	-0.53	0.54
Skewness	0.71	0.11	0.23	-0.21	1.30	2.30	-0.25	0.13	0.74	0.09
Range	4.86	3.95	13.09	8.32	255.47	142.60	2.10	3.28	0.29	0.24
Minimum	10.34	10.72	1.32	1.37	31.44	62.63	0.23	0.82	0.64	0.66
Maximum	15.20	14.67	14.41	9.69	286.91	205.22	2.33	4.10	0.93	0.90
Sum	100.94	101.34	55.13	43.70	882.51	782.09	10.67	18.39	6.20	6.23
Count	8	8	8	8	8	8	8	8	8	8
Confidence Level(95.000%)	1.19	0.83	3.63	2.43	68.59	31.70	0.42	0.81	0.07	0.05

Background, Urban Complex Soil Type

Soil Type	Urban Complex		Urban Complex		Urban Complex		Urban Complex		Urban Complex	
Soil Horizon	B	C	B	C	B	C	B	C	B	C
Metal	Chromium		Lead		Mercury		Nickel		Selenium	
Mean	46.43	46.85	46.97	15.69	0.10	0.08	21.98	32.87	0.29	0.29
Standard Error	3.35	3.11	26.03	1.78	0.03	0.03	3.21	4.07	0.01	0.01
Median	48.41	49.04	21.63	14.31	0.04	0.04	24.06	37.10	0.28	0.29
Standard Deviation	9.48	8.78	73.63	5.03	0.09	0.08	9.08	11.52	0.04	0.03
Sample Variance	89.79	77.16	5421.13	25.26	0.01	0.01	82.37	132.64	0.00	0.00
Kurtosis	-0.83	-0.35	7.72	0.09	-1.95	0.45	0.11	-0.97	-0.54	0.28
Skewness	-0.46	-0.71	2.76	0.83	0.71	1.50	-0.97	-0.63	0.66	0.25
Range	27.41	25.97	222.89	15.27	0.18	0.20	25.08	30.85	0.11	0.09
Minimum	30.70	31.29	5.20	9.63	0.03	0.03	5.15	16.19	0.24	0.25
Maximum	58.10	57.26	228.09	24.90	0.21	0.23	30.23	47.04	0.35	0.34
Sum	371.44	374.78	375.78	125.48	0.76	0.63	175.85	262.93	2.34	2.34
Count	8	8	8	8	8	8	8	8	8	8
Confidence Level(95.000%)	6.57	6.09	51.02	3.48	0.06	0.06	6.29	7.98	0.03	0.02

Background, Urban Complex Soil Type

Soil Type	Urban Complex		Urban Complex	
Soil Horizon	B	C	B	C
Metal	Silver		Thallium	
Mean	0.02	0.03	22.08	22.17
Standard Error	0.01	0.01	1.06	0.74
Median	0.01	0.01	21.13	21.88
Standard Deviation	0.03	0.03	2.99	2.08
Sample Variance	0.00	0.00	8.96	4.34
Kurtosis	2.15	-0.01	-0.44	0.49
Skewness	1.76	1.43	0.71	0.12
Range	0.08	0.08	8.50	6.91
Minimum	0.01	0.01	18.09	18.77
Maximum	0.08	0.08	26.59	25.68
Sum	0.18	0.22	176.62	177.36
Count	8	8	8	8
Confidence Level(95.000%)	0.02	0.02	2.07	1.44

262

Background, Wheeling Loam Soil Type

Soil Type	Wheeling Loam		Wheeling Loam		Wheeling Loam		Wheeling Loam		Wheeling Loam	
Soil Horizon	B	C	B	C	B	C	B	C	B	C
Metal	Antimony		Arsenic		Barium		Beryllium		Cadmium	
Mean	11.78	11.55	2.31	2.38	147.20	98.82	1.30	0.94	0.72	0.70
Standard Error	0.09	0.23	0.52	0.59	18.41	16.72	0.15	0.12	0.01	0.02
Median	11.77	11.83	1.51	1.53	155.26	90.51	1.51	0.87	0.72	0.73
Standard Deviation	0.22	0.55	1.27	1.45	45.09	40.95	0.37	0.29	0.01	0.05
Sample Variance	0.05	0.30	1.60	2.10	2032.89	1677.24	0.14	0.09	0.00	0.00
Kurtosis	1.85	-0.75	-1.60	0.09	-1.08	3.05	-0.18	4.43	1.33	-0.80
Skewness	-0.37	-1.09	1.01	1.29	-0.57	1.52	-1.23	1.96	-0.44	-1.07
Range	0.67	1.33	2.68	3.46	115.72	119.34	0.89	0.84	0.04	0.11
Minimum	11.42	10.67	1.46	1.36	79.72	55.63	0.69	0.67	0.70	0.63
Maximum	12.09	12.00	4.14	4.82	195.44	174.97	1.58	1.51	0.74	0.74
Sum	70.65	69.27	13.85	14.26	883.22	592.90	7.83	5.62	4.33	4.21
Count	6	6	6	6	6	6	6	6	6	6
Confidence Level(95.000%)	0.17	0.44	1.01	1.16	36.08	32.77	0.30	0.23	0.01	0.04

Background, Wheeling Loam Soil Type

Soil Type	Wheeling Loam		Wheeling Loam		Wheeling Loam		Wheeling Loam		Wheeling Loam	
Soil Horizon	B	C	B	C	B	C	B	C	B	C
Metal	Chromium		Lead		Mercury		Nickel		Selenium	
Mean	43.76	35.60	19.17	16.36	0.04	0.05	20.86	15.57	0.27	0.27
Standard Error	3.64	3.17	2.46	1.70	0.01	0.01	2.96	2.48	0.00	0.00
Median	45.96	35.95	21.48	15.99	0.03	0.03	23.83	14.02	0.27	0.27
Standard Deviation	8.91	7.75	6.02	4.18	0.02	0.03	7.25	6.09	0.01	0.01
Sample Variance	79.41	60.14	36.27	17.44	0.00	0.00	52.60	37.04	0.00	0.00
Kurtosis	-1.70	-0.32	-1.97	0.44	6.00	-1.65	-1.76	4.23	2.50	-0.45
Skewness	-0.28	0.43	-0.67	0.46	2.45	1.01	-0.71	1.85	0.00	-0.67
Range	22.22	21.05	13.63	12.13	0.04	0.07	16.20	17.77	0.02	0.03
Minimum	32.63	26.58	11.31	10.83	0.03	0.03	10.56	9.57	0.26	0.25
Maximum	54.85	47.63	24.94	22.96	0.07	0.10	26.76	27.34	0.28	0.28
Sum	262.59	213.57	115.02	98.18	0.22	0.31	125.17	93.41	1.62	1.61
Count	6	6	6	6	6	6	6	6	6	6
Confidence Level(95.000%)	7.13	6.20	4.82	3.34	0.01	0.03	5.80	4.87	0.01	0.01

Background, Wheeling Loam Soil Type

Soil Type	Wheeling Loam		Wheeling Loam	
Soil Horizon	B	C	B	C
Metal	Silver		Thallium	
Mean	0.10	0.01	20.61	20.20
Standard Error	0.09	0.00	0.15	0.39
Median	0.01	0.01	20.60	20.69
Standard Deviation	0.22	0.00	0.38	0.97
Sample Variance	0.05	0.00	0.14	0.93
Kurtosis	6.00	-1.88	1.86	-0.72
Skewness	2.45	0.97	-0.39	-1.10
Range	0.55	0.01	1.16	2.33
Minimum	0.01	0.01	19.99	18.66
Maximum	0.55	0.01	21.15	20.99
Sum	0.59	0.04	123.64	121.19
Count	6	6	6	6
Confidence Level(95.000%)	0.18	0.00	0.30	0.77

765

Background, Braddock Loam Soil Type

Soil Type	Braddock Loam		Braddock Loam		Braddock Loam		Braddock Loam		Braddock Loam	
Soil Horizon	B	C	B	C	B	C	B	C	B	C
Metal	Antimony		Arsenic		Barium		Beryllium		Cadmium	
Mean	11.94	12.17	2.55	4.26	117.61	135.34	0.57	1.58	0.73	1.18
Standard Error	0.11	0.15	1.02	2.73	30.95	22.52	0.30	0.48	0.01	0.43
Median	11.91	12.17	1.55	1.55	93.24	126.83	0.27	1.81	0.73	0.75
Standard Deviation	0.22	0.30	2.05	5.45	61.89	45.04	0.60	0.96	0.02	0.86
Sample Variance	0.05	0.09	4.18	29.72	3830.75	2028.46	0.36	0.92	0.00	0.75
Kurtosis	-1.88	-3.38	4.00	4.00	3.55	1.97	4.00	0.67	-3.90	4.00
Skewness	0.55	0.06	2.00	2.00	1.86	1.06	2.00	-1.13	0.37	2.00
Range	0.49	0.65	4.12	10.93	134.72	107.28	1.21	2.16	0.03	1.74
Minimum	11.72	11.85	1.50	1.51	74.61	90.21	0.26	0.26	0.72	0.73
Maximum	12.21	12.50	5.62	12.44	209.33	197.48	1.47	2.42	0.75	2.47
Sum	47.74	48.68	10.21	17.05	470.42	541.34	2.26	6.30	2.93	4.70
Count	4	4	4	4	4	4	4	4	4	4
Confidence Level(95.000%)	0.22	0.29	2.00	5.34	60.65	44.14	0.59	0.94	0.01	0.85

Background, Braddock Loam Soil Type

Soil Type	Braddock Loam		Braddock Loam		Braddock Loam		Braddock Loam		Braddock Loam	
Soil Horizon	B	C	B	C	B	C	B	C	B	C
Metal	Chromium		Lead		Mercury		Nickel		Selenium	
Mean	42.41	43.15	17.08	24.07	0.05	0.07	12.59	26.42	0.28	0.28
Standard Error	2.28	4.05	2.93	6.64	0.02	0.02	1.16	5.69	0.00	0.00
Median	41.79	43.45	17.19	19.30	0.03	0.07	12.77	27.17	0.28	0.28
Standard Deviation	4.56	8.11	5.86	13.28	0.03	0.05	2.31	11.39	0.01	0.01
Sample Variance	20.82	65.70	34.40	176.28	0.00	0.00	5.34	129.69	0.00	0.00
Kurtosis	-3.64	0.41	-4.42	2.69	4.00	-6.00	-4.03	-5.66	-6.00	1.50
Skewness	0.38	-0.20	-0.05	1.65	2.00	0.00	-0.23	-0.06	0.00	0.00
Range	9.50	19.45	12.26	29.05	0.06	0.08	4.86	21.11	0.01	0.02
Minimum	38.28	33.13	10.85	14.32	0.03	0.03	9.98	15.11	0.27	0.27
Maximum	47.77	52.58	23.10	43.37	0.09	0.11	14.83	36.23	0.28	0.29
Sum	169.64	172.61	68.33	96.29	0.18	0.28	50.34	105.68	1.10	1.12
Count	4	4	4	4	4	4	4	4	4	4
Confidence Level(95.000%)	4.47	7.94	5.75	13.01	0.03	0.05	2.27	11.16	0.01	0.01

Background, Braddock Loam Soil Type

Soil Type	Braddock Loam		Braddock Loam	
Soil Horizon	B	C	B	C
Metal	Silver		Thallium	
Mean	0.01	0.01	20.89	21.30
Standard Error	0.00	0.00	0.19	0.26
Median	0.01	0.01	20.83	21.28
Standard Deviation	0.00	0.00	0.38	0.52
Sample Variance	0.00	0.00	0.15	0.27
Kurtosis	-6.00	NA	-2.10	-3.37
Skewness	0.00	NA	0.55	0.10
Range	0.01	0.00	0.84	1.14
Minimum	0.01	0.01	20.52	20.74
Maximum	0.01	0.01	21.36	21.88
Sum	0.03	0.04	83.54	85.18
Count	4	4	4	4
Confidence Level(95.000%)	0.00	NA	0.37	0.51

POSITIVE RESULTS

FOR

BACKGROUND SAMPLES

POSITIVE RESULTS TABLE OF BACKGROUND SOIL SAMPLES
RADFORD ARMY AMMUNITION PLANT

Field Sample Number	BG1BBL4	BG1BUC3	BG1BWL5	BG1CBL10	BG1CUC8	BG1CWL8	BG2BBL5	BG2BBL5
METALS (ug/g)								
Arsenic		11.47			6.96	4.82		11.61
Lead	13.45 J1	21.32 J1	11.31 J1	14.32 J1	15.25 J1	16.81 J1	10.85 J1	27.90 J1
Silver		0.08 J9			0.08 J9			
Barium	97.88 J1	46.88 J1	144.07 J1	122.28 J1	73.00 J1	102.06 J1	88.60 J1	31.44 J1
Beryllium		1.42	1.53	1.49	2.92	0.91		0.99
Cadmium								
Chromium	38.98 J1	50.75 J1	43.10 J1	41.49 J1	57.26 J1	37.97 J1	44.61 J1	51.54 J1
Nickel	9.98	30.17	21.07	18.12	36.32	13.78	11.34	13.36
Mercury		0.21			0.23	0.10	0.09	0.17
OTHER								
Total Organic Carbon (ug/g)	4246.58	1246.88		1223.99				
pH	5.49	4.67		5.47				

2-70

POSITIVE RESULTS TABLE OF BACKGROUND SOIL SAMPLES
RADFORD ARMY AMMUNITION PLANT

Field Sample Number	BG2BWL4	BG2CBL17	BG2CUC11	BG2CWL12	BG3BBL3	BG3BUC3	BG3BWL3	BG3CBL22
METALS (ug/g)								
Arsenic		12.44	9.69			14.41		
Lead	12.14 J1	43.37 J1	20.03 J1	15.18 J1	20.93 J1	228.09 J1	23.19 J1	16.48 J1
Silver						0.05	0.55	
Barium	110.70 J1	131.38 J1	85.20 J1	80.78 J1	209.33 J1	286.92 J1	79.72 J1	197.48 J1
Beryllium	1.00	2.42	3.33	0.84	1.47	1.81	0.69	2.13
Cadmium		2.47						
Chromium	34.01 J1	45.41 J1	47.96 J1	39.17 J1	38.28	58.10	32.63 J1	52.58
Nickel	13.46	36.22	38.01	9.57	14.83	22.81	10.56	36.23
Mercury		0.11	0.19	0.09			0.07	
OTHER								
Total Organic Carbon (ug/g)		1275.51						
pH		5.97						

POSITIVE RESULTS TABLE OF BACKGROUND SOIL SAMPLES
RADFORD ARMY AMMUNITION PLANT

Field Sample Number	BG3CUC22	BG3CWL22	BG4BBL5	BG4BBLD*	BG4BUC5	BG4BWL4	BG4CBL10	BG4CUC17
METALS (ug/g)								
Arsenic			5.62	5.47	4.34	3.73		
Lead	11.82 J1	10.83 J1	23.10 J1	17.60 J1	20.44 J1	24.94 J1	22.13 J1	18.03 J1
Silver								
Barium	107.99 J1	100.24 J1	74.61 J1	76.65 J1	244.53 J1	195.44 J1	90.21 J1	205.22 J1
Beryllium	0.82	0.89			1.46	1.49		1.58
Cadmium								
Chromium	31.29	33.94 J1	47.77	42.04	55.96	49.16	33.13	50.12
Nickel	16.19	15.28	14.20	14.61	25.30	26.74	15.11	28.36
Mercury				0.19			0.11	
OTHER								
Total Organic Carbon (ug/g)		1203.37	2250.30	14610.80				1666.67
pH		6.93	7.33	7.13				7.49

* BG4BBLD is a duplicate sample of BG4BBL5

POSITIVE RESULTS TABLE OF BACKGROUND SOIL SAMPLES
RADFORD ARMY AMMUNITION PLANT

Field Sample Number	BG4CUCD*	BG4CWL17	BG5BUC3	BG5BWL3	BG5CUC8	BG5CWL8	BG5CWLD*	BG6BUC5
METALS (ug/g)								
Arsenic					8.10			8.42
Lead	19.24 J1	13.82 J1	5.20 J1	19.76 J1	24.90 J1	22.96 J1	22.37 J1	33.18 J1
Silver								
Barium	144.95 J1	79.22 J1	36.18 J1	186.83 J1	82.08 J1	174.97 J1	175.33 J1	62.95 J1
Beryllium	1.50	0.80		1.56	1.96	1.51	1.46	1.31
Cadmium								
Chromium	53.11	28.29	30.70 J1	54.85	54.45 J1	47.63	48.85	40.47 J1
Nickel	26.43	14.25	5.15	26.59	42.68	27.34	27.93	30.23
Mercury								0.21
OTHER								
Total Organic Carbon (ug/g)	1778.32			3365.27		1980.56		
pH	7.51			6.99		6.21		

* BG4CUCD is a duplicate sample of BG4CUC17
* BG5CWLD is a duplicate sample of BG5CWL8

POSITIVE RESULTS TABLE OF BACKGROUND SOIL SAMPLES
RADFORD ARMY AMMUNITION PLANT

Field Sample Number	BG6BWL4	BG6CUC12	BG6CWL17	BG7BUC5	BG7CUC22	BG8BUC5	BG8CUC10
METALS (ug/g)							
Arsenic	4.14	8.92	3.52		5.50		
Lead	23.67 J1	12.46 J1	18.58 J1	17.72 J1	13.37 J1	21.93 J1	9.63 J1
Silver							0.08 J9
Barium	166.46 J1	70.51 J1	55.63 J1	99.08 J1	95.46 J1	74.54 J1	62.63 J1
Beryllium	1.58	2.75	0.67	2.33	4.10	1.11	0.94
Cadmium							
Chromium	48.83	41.47 J1	26.58	46.07 J1	52.82 J1	37.86 J1	39.41 J1
Nickel	26.76	37.87	13.18	29.89	47.04	18.93	16.45
Mercury							
OTHER							
Total Organic Carbon (ug/g)	2157.83					1305.48	1275.51
pH	7.03					5.08	5.09

274

~~75~~

SUMMARY OF TOLERANCE LIMITS
RADFORD ARMY AMMUNITION PLANT

Soil Horizon	Soil Series	Constituent	Upper Tolerance Limit	Tolerance Limit Type	Exceedance?
SWMU 17A	B	Antimony	21.0	Poisson	Yes
SWMU 17A	B	Arsenic	5.5	Poisson	Yes
SWMU 17A	B	Barium	9.7	Normal	No
SWMU 17A	B	Beryllium	4.5	Poisson	No
SWMU 17A	B	Cadmium	3.5	Poisson	Yes
SWMU 17A	B	Chromium	5.1	Normal	Yes
SWMU 17A	B	Lead	8.7	Normal	No
SWMU 17A	B	Mercury	1.5	Poisson	No
SWMU 17A	B	Nickel	6.0	Normal	Yes
SWMU 17A	B	Selenium	2.5	Poisson	No
SWMU 17A	B	Silver	1.5	Poisson	Yes
SWMU 17A	B	Thallium	33.5	Poisson	No
SWMU 17A	C	Antimony	21.5	Poisson	No
SWMU 17A	C	Arsenic	11.5	Poisson	Yes
SWMU 17A	C	Barium	6.9	Normal	No
SWMU 17A	C	Beryllium	2.7	Normal	No
SWMU 17A	C	Cadmium	3.5	Poisson	No
SWMU 17A	C	Chromium	5.0	Normal	No
SWMU 17A	C	Lead	4.2	Normal	Yes
SWMU 17A	C	Mercury	1.5	Poisson	No
SWMU 17A	C	Nickel	5.4	Normal	No
SWMU 17A	C	Selenium	2.5	Poisson	No
SWMU 17A	C	Silver	1.5	Poisson	Yes
SWMU 17A	C	Thallium	33.5	Poisson	No
SWMU 17BCD	B	Antimony	21.0	Poisson	No
SWMU 17BCD	B	Arsenic	5.5	Poisson	Yes
SWMU 17BCD	B	Barium	9.7	Normal	No
SWMU 17BCD	B	Beryllium	4.5	Poisson	No
SWMU 17BCD	B	Cadmium	3.5	Poisson	No
SWMU 17BCD	B	Chromium	5.1	Normal	No
SWMU 17BCD	B	Lead	8.7	Normal	No
SWMU 17BCD	B	Mercury	1.5	Poisson	No
SWMU 17BCD	B	Nickel	6.0	Normal	No
SWMU 17BCD	B	Selenium	2.5	Poisson	No
SWMU 17BCD	B	Silver	1.5	Poisson	No
SWMU 17BCD	B	Thallium	33.5	Poisson	No
SWMU 17BCD	C	Antimony	21.5	Poisson	No
SWMU 17BCD	C	Arsenic	11.5	Poisson	No
SWMU 17BCD	C	Barium	6.9	Normal	No
SWMU 17BCD	C	Beryllium	2.3	Normal	Yes
SWMU 17BCD	C	Cadmium	3.5	Poisson	Yes
SWMU 17BCD	C	Chromium	5.0	Normal	No
SWMU 17BCD	C	Lead	4.2	Normal	Yes
SWMU 17BCD	C	Mercury	1.5	Poisson	No
SWMU 17BCD	C	Nickel	5.4	Normal	No
SWMU 17BCD	C	Selenium	2.5	Poisson	No
SWMU 17BCD	C	Silver	1.5	Poisson	No
SWMU 17BCD	C	Thallium	33.5	Poisson	No

SUMMARY OF TOLERANCE LIMITS
RADFORD ARMY AMMUNITION PLANT

Soil Horizon	Soil Series	Constituent	Upper Tolerance Limit	Tolerance Limit Type	Exceedance?
SWMU 31	C	Antimony	20.5	Poisson	No
SWMU 31	C	Arsenic	7.0	Poisson	No
SWMU 31	C	Barium	7.1	Normal	No
SWMU 31	C	Beryllium	.5	Normal	No
SWMU 31	C	Cadmium	3.5	Poisson	No
SWMU 31	C	Chromium	4.8	Normal	No
SWMU 31	C	Lead	4.1	Normal	No
SWMU 31	C	Mercury	2.0	Poisson	No
SWMU 31	C	Nickel	4.3	Normal	No
SWMU 31	C	Selenium	2.5	Poisson	No
SWMU 31	C	Silver	1.5	Poisson	No
SWMU 31	C	Thallium	31.5	Poisson	No
SWMU 54	B	Antimony	20.5	Poisson	No
SWMU 54	B	Arsenic	6.5	Poisson	No
SWMU 54	B	Barium	7.4	Normal	No
SWMU 54	B	Beryllium	5.0	Poisson	No
SWMU 54	B	Cadmium	3.5	Poisson	Yes
SWMU 54	B	Chromium	5.0	Normal	No
SWMU 54	B	Lead	4.7	Normal	Yes
SWMU 54	B	Mercury	1.5	Poisson	Yes
SWMU 54	B	Nickel	5.0	Normal	No
SWMU 54	B	Selenium	2.5	Poisson	No
SWMU 54	B	Silver	2.0	Poisson	No
SWMU 54	B	Thallium	32.0	Poisson	No
SWMU 54	C	Antimony	20.5	Poisson	No
SWMU 54	C	Arsenic	7.0	Poisson	No
SWMU 54	C	Barium	7.1	Normal	No
SWMU 54	C	Beryllium	.5	Normal	Yes
SWMU 54	C	Cadmium	3.5	Poisson	No
SWMU 54	C	Chromium	4.8	Normal	No
SWMU 54	C	Lead	4.1	Normal	Yes
SWMU 54	C	Mercury	2.0	Poisson	No
SWMU 54	C	Nickel	4.3	Normal	No
SWMU 54	C	Selenium	2.5	Poisson	No
SWMU 54	C	Silver	1.5	Poisson	No
SWMU 54	C	Thallium	31.5	Poisson	No

SHAPIRO-WILK GOODNESS OF FIT TEST

UNISON-URBAN LAND COMPLEX SOIL TYPE

FOR SMWU 17A, 17BCD

Arsenic soil B

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	1.47	2.67	1.20004806	0.6646	0.7975519
2	2.13	2.45	0.32125697	0.2413	0.0775193
3	2.44	2.44	0	0	0
4	2.45	2.13	-0.32125697	0	0
5	2.67	1.47	-1.20004806		0
					0.8750712

std dev =	0.4678917
N =	5
K =	2
b =	0.8750712
W =	0.8744522
Critical W =	0.762
Result =	Lognormally transformed data meets assumption of normality

Arsenic Soil C

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring. Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	0.31	2.27	1.95628369	0.6052	1.1839429
2	0.44	2.19	1.74361013	0.3164	0.5516782
3	0.47	2.09	1.62	0.1743	0.2826903
4	1.70	1.94	0.24	0.0561	0.0132077
5	1.94	1.70			2.0315191
6	2.09	0.47			
7	2.19	0.44			
8	2.27	0.31			

std dev =	0.6510165
N =	8
K =	4
b =	2.0315191
W =	1.3911045
Critical W =	0.748
Result =	Lognormally transformed data meets assumption of normality

Barium soil B

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	3.45	5.66	2.21103812	0.6052	1.3381203
2	3.59	5.50	1.91077368	0.3164	0.6045688
3	3.85	4.60	0.74823143	0.1743	0.1304167
4	4.14	4.31	0.1691042	0.0561	0.0094867
5	4.31	4.14	-0.1691042		0
6	4.60	3.85	-0.74823143		0
7	5.50	3.59			2.0825925
8	5.66	3.45			

std dev =	0.825904
N =	8
K =	4
b =	2.0825925
W =	0.9083463
Critical W =	0.818
Result =	Lognormally transformed data meets assumption of normality

Barium soil B

281

SHAPIRO-WILK GOODNESS OF FIT TEST ON UNTRANSFORMED DATA

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to smallest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring. Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	31.44	286.91	255.472706	0.6052	154.61208
2	36.18	244.53	208.344111	0.3164	65.920077
3	46.88	99.08	52.1927007	0.1743	9.0971877
4	62.95	74.54	11.5973445	0.0561	0.650611
5	74.54	62.95	-11.5973445		0
6	99.08	46.88	-52.1927007		0
7	244.53	36.18			230.27996
8	286.91	31.44			

std dev =	98.987826
N =	8
K =	4
b =	230.27996
W =	0.7731267
Critical W =	0.818
Result =	Untransformed data does not meet assumption of normality

283

Barium soil C

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	4.14	5.32	1.18689622	0.6052	0.7183096
2	4.26	4.68	0.43	0.3164	0.1348717
3	4.29	4.56	0.39151697	0.1743	0.0682414
4	4.41	4.45	0.1510293	0.0561	0.0084727
5	4.45	4.41	0		0
6	4.56	4.29	-0.1510293		0
7	4.68	4.26	-0.39151697		0.9298954
8	5.32	4.14	-1.18689622		

std dev =	0.3705519
N =	8
K =	4
b =	0.9298954
W =	0.8996471
Critical W =	0.818
Result =	Lognormally transformed data meets assumption of normality

283

SHAPIRO-WILK GOODNESS OF FIT TEST ON UNTRANSFORMED DATA

1. Order samples from smallest tc largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring. Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	62.63	205.22	142.596332	0.6052	86.2993
2	70.51	107.99	37.48	0.3164	11.858004
3	73.00	95.46	34.9844433	0.1743	6.0977885
4	82.08	85.20	13.381456	0.0561	0.7506997
5	85.20	82.08	0		0
6	95.46	73.00	-13.381456		0
7	107.99	70.51	-34.9844433		105.00579
8	205.22	62.63	-142.596332		

std dev =	45.750472
N =	8
K =	4
b =	105.00579
W =	0.7525534
Critical W =	0.818
Result =	Untransformed data does not meet assumption of normality

284

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	-1.47	0.84	2.31410815	0.6052	1.4004983
2	-0.01	0.59	0.60433255	0.3164	0.1912108
3	0.11	0.38	0.27193205	0.1743	0.0473978
4	0.27	0.35	0.08040585	0.0561	0.0045108
5	0.35	0.27	-0.08040585		0
6	0.38	0.11	-0.27193205		0
7	0.59	-0.01			1.6436176
8	0.84	-1.47			

std dev =	0.7006256
N =	8
K =	4
b =	1.6436176
W =	0.7861973
Critical W =	0.818
Result =	Lognormally transformed data does not meet assumption of normality

~~785~~

SHAPIRO-WILK GOODNESS OF FIT TEST ON UNTRANSFORMED DATA

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring. Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	0.23	2.33	2.09665633	0.6052	1.2688964
2	0.99	1.81	0.82218136	0.3164	0.2601382
3	1.11	1.46	0.34758245	0.1743	0.0605836
4	1.31	1.42	0.10981842	0.0561	0.0061608
5	1.42	1.31	-0.10981842		0
6	1.46	1.11	-0.34758245		0
7	1.81	0.99			1.595779
8	2.33	0.23			

std dev =	0.6123102
N =	8
K =	4
b =	1.595779
W =	0.9702964
Critical W =	0.818
Result =	Untransformed data meets assumption of normality

286

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	-0.20	1.41	1.61117965	0.6052	0.9750859
2	-0.06	1.20	1.26587534	0.3164	0.400523
3	0.46	1.07	0.61	0.1743	0.106953
4	0.67	1.01	0.55605981	0.0561	0.031195
5	1.01	0.67	0		0
6	1.07	0.46	-0.55605981		0
7	1.20	-0.06	-1.13396618		1.5137568
8	1.41	-0.20	-1.403124		

std dev =	0.5911619
N =	8
K =	4
b =	1.5137568
W =	0.9367016
Critical W =	0.818
Result =	Lognormally transformed data meets assumption of normality

287

SHAPIRO-WILK GOODNESS OF FIT TEST ON UNTRANSFORMED DATA

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	0.82	4.10	3.28065635	0.6052	1.9854532
2	0.94	3.33	2.390306	0.3164	0.7562928
3	1.58	2.92	1.34	0.1743	0.2332262
4	1.96	2.75	1.17488913	0.0561	0.0659113
5	2.75	1.96	0		0
6	2.92	1.58	-1.17488913		0
7	3.33	0.94	-1.97890012		3.0408836
8	4.10	0.82	-2.51070074		

std dev =	1.169182
N =	8
K =	4
b =	3.0408836
W =	0.9663564
Critical W =	0.818
Result =	Untransformed data meets assumption of normality

2-88

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	3.42	4.06	0.63808253	0.6052	0.3861675
2	3.63	4.02	0.39078734	0.3164	0.1236451
3	3.70	3.94	0.2418529	0.1743	0.042155
4	3.83	3.93	0.09669377	0.0561	0.0054245
5	3.93	3.83	-0.09669377		0
6	3.94	3.70	-0.2418529		0
7	4.02	3.63			0.5573921
8	4.06	3.42			

std dev =	0.217995
N =	8
K =	4
b =	0.5573921
W =	0.9339647
Critical W =	0.818
Result =	Lognormally transformed data meets assumption of normality

289

SHAPIRO-WILK GOODNESS OF FIT TEST ON UNTRANSFORMED DATA

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	30.70	58.10	27.4070408	0.6052	16.586741
2	37.86	55.96	18.1020624	0.3164	5.7274925
3	40.47	51.54	11.0715316	0.1743	1.929768
4	46.07	50.75	4.67725354	0.0561	0.2623939
5	50.75	46.07	-4.67725354		0
6	51.54	40.47	-11.0715316		0
7	55.96	37.86	-18.1020624		24.506396
8	58.10	30.70	-27.4070408		

std dev =	9.4759327
N =	8
K =	4
b =	24.506396
W =	0.9554697
Critical W =	0.818
Result =	Untransformed data meets assumption of normality

290

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	3.44	4.05	0.6043394	0.6052	0.3657462
2	3.67	4.00	0.32310627	0.3164	0.1022308
3	3.72	3.97	0.24738981	0.1743	0.04312
4	3.87	3.91	0.04	0.0561	0.0024772
5	3.91	3.87	-0.04		0
6	3.97	3.72	-0.25		0
7	4.00	3.67	-0.32		0.5135743
8	4.05	3.44	-0.60		

std dev =	0.2032647
N =	8
K =	4
b =	0.5135743
W =	0.9119788
Critical W =	0.818
Result =	Lognormally transformed data meets assumption of normality

291

SHAPIRO-WILK GOODNESS OF FIT TEST ON UNTRANSFORMED DATA

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring. Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	31.29	57.26	25.9728944	0.6052	15.718796
2	39.41	54.45	15.0326981	0.3164	4.7563457
3	41.47	52.82	11.3527362	0.1743	1.9787819
4	47.96	50.12	2.17	0.0561	0.1214677
5	50.12	47.96	-2.17		0
6	52.82	41.47	-11.35		0
7	54.45	39.41	-15.03		22.575391
8	57.26	31.29	-25.97		

std dev =	8.7839255
N =	8
K =	4
b =	22.575391
W =	0.9436159
Critical W =	0.818
Result =	Untransformed data meets assumption of normality

292

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	1.65	5.43	3.78100599	0.6052	2.2882648
2	2.87	3.50	0.62722638	0.3164	0.1984544
3	3.02	3.33	0.31108885	0.1743	0.0542228
4	3.06	3.09	0.0282268	0.0561	0.0015835
5	3.09	3.06	-0.0282268		0
6	3.33	3.02	-0.31108885		0
7	3.50	2.87	-0.62722638		2.5425256
8	5.43	1.65	-3.78100599		

std dev =	1.0448547
N =	8
K =	4
b =	2.5425256
W =	0.8459035
Critical W =	0.818
Result =	Lognormally transformed data meets assumption of normality

293

SHAPIRO-WILK GOODNESS OF FIT TEST ON UNTRANSFORMED DATA

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	30.70	58.10	27.4070408	0.6052	16.586741
2	37.86	55.96	18.1020624	0.3164	5.7274925
3	40.47	51.54	11.0715316	0.1743	1.929768
4	46.07	50.75	4.67725354	0.0561	0.2623939
5	50.75	46.07	-4.67725354		0
6	51.54	40.47	-11.0715316		0
7	55.96	37.86	-18.1020624		24.506396
8	58.10	30.70	-27.4070408		

std dev =	9.4759327
N =	8
K =	4
b =	24.506396
W =	0.9554697
Critical W =	0.818
Result =	Untransformed data meets assumption of normality

294

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	2.26	3.21	0.9498696	0.6052	0.5748611
2	2.47	3.00	0.52753616	0.3164	0.1669124
3	2.52	2.89	0.37	0.1743	0.0645216
4	2.59	2.72	0.13	0.0561	0.0073964
5	2.72	2.59	-0.13		0
6	2.89	2.52	-0.37		0
7	3.00	2.47	-0.53		0.8136915
8	3.21	2.26	-0.95		

std dev =	0.3106604
N =	8
K =	4
b =	0.8136915
W =	0.980053
Critical W =	0.818
Result =	Lognormally transformed data meets assumption of normality

295

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	31.29	57.26	25.9728944	0.6052	15.718796
2	39.41	54.45	15.0326981	0.3164	4.7563457
3	41.47	52.82	11.35	0.1743	1.9787819
4	47.96	50.12	2.17	0.0561	0.1214677
5	50.12	47.96	-2.17		0
6	52.82	41.47	-11.35		0
7	54.45	39.41	-15.03		22.575391
8	57.26	31.29	-25.97		

std dev =	8.7839255
N =	8
K =	4
b =	22.575391
W =	0.9436159
Critical W =	0.818
Result =	Untransformed data meets assumption of normality

~296

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	1.64	3.41	1.77037341	0.6052	1.07143
2	2.59	3.41	0.81496067	0.3164	0.2578536
3	2.94	3.40	0.45687393	0.1743	0.0796331
4	3.13	3.23	0.1038072	0.0561	0.0058236
5	3.23	3.13	-0.1038072		0
6	3.40	2.94	-0.45687393		0
7	3.41	2.59	-0.81496067		1.4147403
8	3.41	1.64	-1.77037341		

std dev =	0.6065954
N =	8
K =	4
b =	1.4147403
W =	0.7770647
Critical W =	0.818
Result =	Lognormally transformed data does not meet assumption of normality

297

SHAPIRO-WILK GOODNESS OF FIT TEST ON UNTRANSFORMED DATA

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	5.15	30.23	25.0848787	0.6052	15.181369
2	13.36	30.17	16.8175901	0.3164	5.3210855
3	18.93	29.89	10.9626396	0.1743	1.9107881
4	22.81	25.30	2.49501123	0.0561	0.1399701
5	25.30	22.81	-2.49501123		0
6	29.89	18.93	-10.9626396		0
7	30.17	13.36	-16.8175901		22.553212
8	30.23	5.15	-25.0848787		

std dev =	9.0757451
N =	8
K =	4
b =	22.553212
W =	0.8821739
Critical W =	0.818
Result =	Untransformed data meets assumption of normality

298

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring. Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	2.78	3.85	1.06650255	0.6052	0.6454473
2	2.80	3.75	0.95318633	0.3164	0.3015882
3	3.34	3.64	0.29	0.1743	0.0510591
4	3.59	3.63	0.04	0.0561	0.0023514
5	3.63	3.59	-0.04		0
6	3.64	3.34	-0.29		0
7	3.75	2.80	-0.95		1.000446
8	3.85	2.78	-1.07		

std dev =	0.4163123
N =	8
K =	4
b =	1.000446
W =	0.8249941
Critical W =	0.818
Result =	Lognormally transformed data meets assumption of normality

-49

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	16.19	47.04	30.8500811	0.6052	18.670469
2	16.45	42.68	26.2271755	0.3164	8.2982783
3	28.36	38.01	9.65	0.1743	1.6823428
4	36.32	37.87	1.55	0.0561	0.0872152
5	37.87	36.32	-1.55		0
6	38.01	28.36	-9.65		0
7	42.68	16.45	-26.23		28.738305
8	47.04	16.19	-30.85		

std dev =	11.516846
N =	8
K =	4
b =	28.738305
W =	0.889523
Critical W =	0.818
Result =	Untransformed data meets assumption of normality

300

SHAPIRO-WILK GOODNESS OF FIT TEST

WHEELING SANDY LOAM SOIL TYPE

FOR SMWU 31, 54

401

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	4.38	5.28	0.89674806	0.6431	0.5766987
2	4.71	5.23	0.52338181	0.2806	0.1468609
3	4.97	5.11	0.14447794	0.0875	0.0126418
4	5.11	4.97	-0.14447794		0
5	5.23	4.71	-0.52338181		0
6	5.28	4.38	-0.89674806		0
					0.7362014

std dev =	0.3456863
N =	6
K =	3
b =	0.7362014
W =	0.9071079
Critical W =	0.788
Result =	Lognormally transformed data meets assumption of normality

302

SHAPIRO-WILK GOODNESS OF FIT TEST ON UNTRANSFORMED DATA

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

	i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
	1	79.72	195.44	115.723365	0.6431	74.421696
	2	110.70	186.83	76.1292348	0.2806	21.361863
	3	144.07	166.46	22.3933531	0.0875	1.9594184
	4	166.46	144.07	-22.3933531		0
	5	186.83	110.70	-76.1292348		0
	6	195.44	79.72	-115.723365		0
						97.742977
std dev =		45.087632				
N =		6				
K =		3				
b =		97.742977				
W =		0.93991				
Critical W =		0.788				
Result =	Untransformed data meets assumption of normality					

3 of 3

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	4.02	5.16	1.15	0.6431	0.7369144
2	4.37	4.63	0.25	0.2806	0.0710852
3	4.39	4.61	0.22	0.0875	0.0188828
4	4.61	4.39	-0.22		0
5	4.63	4.37	-0.25		0
6	5.16	4.02	-1.15		0

std dev =	0.3803367
N =	6
K =	3
b =	0.8268823
W =	0.9453246
Critical W =	0.788
Result =	Lognormally transformed data meets assumption of normality

304

SHAPIRO-WILK GOODNESS OF FIT TEST ON UNTRANSFORMED DATA

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	55.63	174.97	119.34	0.6431	76.746906
2	79.22	102.06	22.84	0.2806	6.4086433
3	80.78	100.24	19.46	0.0875	1.7025159
4	100.24	80.78	-19.46		0
5	102.06	79.22	-22.84		0
6	174.97	55.63	-119.34		0

std dev =	40.954097
N =	6
K =	3
b =	84.858065
W =	0.8586606
Critical W =	0.788
Result =	Untransformed data meets assumption of normality

305

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	-0.377877	0.4563473	0.83422443	0.6431	0.5364897
2	-0.003612	0.4426878	0.44630008	0.2806	0.1252318
3	0.3966333	0.4222722	0.02563895	0.0875	0.0022434
4	0.4222722	0.3966333	-0.02563895		0
5	0.4426878	-0.003612	-0.44630008		0
6	0.4563473	-0.377877	-0.83422443		0
					0.6639649

std dev =	0.3420461
N =	6
K =	3
b =	0.6639649
W =	0.7536175
Critical W =	0.788
Result =	Lognormally transformed data does not meet assumption of normality

306

SHAPIRO-WILK GOODNESS OF FIT TEST ON UNTRANSFORMED DATA

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring. Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	0.69	1.58	0.89298367	0.6431	0.5742778
2	1.00	1.56	0.56049195	0.2806	0.157274
3	1.49	1.53	0.03861314	0.0875	0.0033786
4	1.53	1.49	-0.03861314		0
5	1.56	1.00	-0.56049195		0
6	1.58	0.69	-0.89298367		0
					0.6639649

std dev =	0.3739058
N =	6
K =	3
b =	0.6639649
W =	0.630661
Critical W =	0.788
Result =	Untransformed data does not meet assumption of normality

307

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	-0.40041	0.4099105	0.81032087	0.6431	0.5211173
2	-0.227506	-0.092412	0.13509329	0.2806	0.0379072
3	-0.17185	-0.117332	0.0545183	0.0875	0.0047704
4	-0.117332	-0.17185	-0.0545183		0
5	-0.092412	-0.227506	-0.13509329		0
6	0.4099105	-0.40041	-0.81032087		0

std dev =	0.2727758
N =	6
K =	3
b =	0.5637949
W =	0.8543987
Critical W =	0.788
Result =	Lognormally transformed data meets assumption of normality

beryllium soil C

SHAPIRO-WILK GOODNESS OF FIT TEST ON UNTRANSFORMED DATA

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	0.67	1.51	0.83663788	0.6431	0.5380418
2	0.80	0.91	0.11521119	0.2806	0.0323283
3	0.84	0.89	0.04718468	0.0875	0.0041287
4	0.89	0.84	-0.04718468		0
5	0.91	0.80	-0.11521119		0
6	1.51	0.67	-0.83663788		0

std dev =	0.2923879
N =	6
K =	3
b =	0.5744987
W =	0.7721282
Critical W =	0.788
Result =	Untransformed data does not meet assumption of normality

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring. Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	3.49	4.00	0.51925194	0.6431	0.3339309
2	3.53	3.90	0.36830934	0.2806	0.1033476
3	3.76	3.89	0.1248102	0.0875	0.0109209
4	3.89	3.76	-0.1248102		0
5	3.90	3.53	-0.36830934		0
6	4.00	3.49	-0.51925194		0
					0.4481994

std dev =	0.2118383
N =	6
K =	3
b =	0.4481994
W =	0.8952898
Critical W =	0.788
Result =	Lognormally transformed data meets assumption of normality

Chromium horizon B

SHAPIRO-WILK GOODNESS OF FIT TEST ON UNTRANSFORMED DATA

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	32.63	54.85	22.2162659	0.6431	14.287281
2	34.01	49.16	15.1462498	0.2806	4.2500377
3	43.10	48.83	5.72933299	0.0875	0.5013166
4	48.83	43.10	-5.72933299		0
5	49.16	34.01	-15.1462498		0
6	54.85	32.63	-22.2162659		0
					19.038635

std dev =	8.9112582
N =	6
K =	3
b =	19.038635
W =	0.9129007
Critical W =	0.788
Result =	Untransformed data meets assumption of normality

Chromium horizon C

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring. Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	3.28	3.86	0.58344567	0.6431	0.3752139
2	3.34	3.67	0.32528638	0.2806	0.0912754
3	3.52	3.64	0.1123111	0.0875	0.0098272
4	3.64	3.52	-0.1123111		0
5	3.67	3.34	-0.32528638		0
6	3.86	3.28	-0.58344567		0
					0.4763165

std dev =	0.2173526
N =	6
K =	3
b =	0.4763165
W =	0.9604872
Critical W =	0.788
Result =	Lognormally transformed data meets assumption of normality

Chromium horizon C

SHAPIRO-WILK GOODNESS OF FIT TEST ON UNTRANSFORMED DATA

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	26.58	47.63	21.0540463	0.6431	13.539857
2	28.29	39.17	10.8760648	0.2806	3.0518238
3	33.94	37.97	4.03354604	0.0875	0.3529353
4	37.97	33.94	-4.03354604		0
5	39.17	28.29	-10.8760648		0
6	47.63	26.58	-21.0540463		0
					16.944616

std dev =	7.7547526
N =	6
K =	3
b =	16.944616
W =	0.9548993
Critical W =	0.788
Result =	Untransformed data meets assumption of normality

Lead horizon B

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	2.43	3.22	0.79100806	0.6431	0.5086973
2	2.50	3.16	0.66793915	0.2806	0.1874237
3	2.98	3.14	0.16018695	0.0875	0.0140164
4	3.14	2.98	-0.16018695		0
5	3.16	2.50	-0.66793915		0
6	3.22	2.43	-0.79100806		0

std dev =	0.3533872
N =	6
K =	3
b =	0.7101374
W =	0.8076313
Critical W =	0.788
Result =	Lognormally transformed data meets assumption of normality

Lead horizon B

SHAPIRO-WILK GOODNESS OF FIT TEST ON UNTRANSFORMED DATA

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	11.31	24.94	13.632541	0.6431	8.7670871
2	12.14	23.67	11.535051	0.2806	3.2367353
3	19.76	23.19	3.43299366	0.0875	0.3003869
4	23.19	19.76	-3.43299366		0
5	23.67	12.14	-11.535051		0
6	24.94	11.31	-13.632541		0

std dev =	6.0227659
N =	6
K =	3
b =	12.304209
W =	0.8347289
Critical W =	0.788
Result =	Untransformed data meets assumption of normality

Lead horizon C

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Critical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	2.38	3.13	0.7516109	0.6431	0.483361
2	2.63	2.92	0.30	0.2806	0.083078
3	2.72	2.82	0.10	0.0875	0.008927
4	2.82	2.72	-0.10		0
5	2.92	2.63	-0.30		0
6	3.13	2.38	-0.75		0
					0.575366

std dev =	0.257596
N =	6
K =	3
b =	0.575366
W =	0.997796
Critical W =	0.788
Result =	Lognormally transformed data meets assumption of normality

316

Lead horizon C

SHAPIRO-WILK GOODNESS OF FIT TEST ON UNTRANSFORMED DATA

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Critical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	10.83	22.96	12.134438	0.6431	7.803657
2	13.82	18.58	4.76	0.2806	1.336136
3	15.18	16.81	1.63	0.0875	0.142648
4	16.81	15.18	-1.63		0
5	18.58	13.82	-4.76		0
6	22.96	10.83	-12.13		0
					9.282441

std dev =	4.17581
N =	6
K =	3
b =	9.282441
W =	0.988264
Critical W =	0.788
Result =	Untransformed data meets assumption of normality

Nickel horizon B

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	2.36	3.29	0.92977917	0.6431	0.597941
2	2.60	3.29	0.68627194	0.2806	0.1925679
3	3.05	3.28	0.23278519	0.0875	0.0203687
4	3.28	3.05	-0.23278519		0
5	3.29	2.60	-0.68627194		0
6	3.29	2.36	-0.92977917		0
					0.8108776

std dev =	0.4037816
N =	6
K =	3
b =	0.8108776
W =	0.8065803
Critical W =	0.788
Result =	Lognormally transformed data meets assumption of normality

Nickel horizon B

SHAPIRO-WILK GOODNESS OF FIT TEST ON UNTRANSFORMED DATA

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring. Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	10.56	26.76	16.1976498	0.6431	10.416709
2	13.46	26.74	13.2770702	0.2806	3.7255459
3	21.07	26.59	5.52145252	0.0875	0.4831271
4	26.59	21.07	-5.52145252		0
5	26.74	13.46	-13.2770702		0
6	26.76	10.56	-16.1976498		0
					14.625382

std dev =	7.25274
N =	6
K =	3
b =	14.625382
W =	0.8132802
Critical W =	0.788
Result =	Untransformed data meets assumption of normality

SHAPIRO-WILK GOODNESS OF FIT TEST

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Crtitical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	2.26	3.31	1.04951365	0.6431	0.6749422
2	2.58	2.73	0.1483551	0.2806	0.0416284
3	2.62	2.66	0.03351745	0.0875	0.0029328
4	2.66	2.62	-0.03351745		0
5	2.73	2.58	-0.1483551		0
6	3.31	2.26	-1.04951365		0
					0.7195034

std dev =	0.34279
N =	6
K =	3
b =	0.7195034
W =	0.8811289
Critical W =	0.788
Result =	Lognormally transformed data meets assumption of normality

Nickel horizon C

SHAPIRO-WILK GOODNESS OF FIT TEST ON UNTRANSFORMED DATA

1. Order samples from smallest to largest in column x(i)
2. Order samples from largest to samllest in column x(n-i+1)
3. Compute K as the greatest integer less than or equal to N/2. Enter in cell
4. Look up coeffieicents from table A-1 in EPA Statistical Course for GW Monitoring.
Put into column a(n-i+1).
5. Sum the values in column b(i) and enter in cell
6. Enter N in cell
7. Compare W statistic to Cntical W in Table A-2 in same guidance. If W is less than critical W, the distribution is non-normal. Transform and re-test.

i	x(i)	x(n-i+1)	x(n-i+1)-x(i)	a(n-i+1)	b(i)
1	9.57	27.34	17.7674004	0.6431	11.426215
2	13.18	15.28	2.10711608	0.2806	0.5912568
3	13.78	14.25	0.46986041	0.0875	0.0411128
4	14.25	13.78	-0.46986041		0
5	15.28	13.18	-2.10711608		0
6	27.34	9.57	-17.7674004		0
					12.058585

std dev =	6.0864235
N =	6
K =	3
b =	12.058585
W =	0.7850519
Critical W =	0.788
Result =	Untransformed data does not meet assumption of normality

321

TOLERANCE LIMIT CALCULATIONS

SUMMARY OF TOLERANCE LIMITS
RADFORD ARMY AMMUNITION PLANT

Soil Horizon	Soil Series	Constituent	Upper Tolerance Limit	Tolerance Limit Type	Exceedance?
SWMU 17A	B	Antimony	21.0	Poisson	Yes
SWMU 17A	B	Arsenic	5.5	Poisson	Yes
SWMU 17A	B	Barium	9.7	Normal	No
SWMU 17A	B	Beryllium	4.5	Poisson	No
SWMU 17A	B	Cadmium	3.5	Poisson	Yes
SWMU 17A	B	Chromium	5.1	Normal	Yes
SWMU 17A	B	Lead	8.7	Normal	No
SWMU 17A	B	Mercury	1.5	Poisson	No
SWMU 17A	B	Nickel	6.0	Normal	Yes
SWMU 17A	B	Selenium	2.5	Poisson	No
SWMU 17A	B	Silver	1.5	Poisson	Yes
SWMU 17A	B	Thallium	33.5	Poisson	No
SWMU 17A	C	Antimony	21.5	Poisson	No
SWMU 17A	C	Arsenic	11.5	Poisson	Yes
SWMU 17A	C	Barium	6.9	Normal	No
SWMU 17A	C	Beryllium	2.7	Normal	No
SWMU 17A	C	Cadmium	3.5	Poisson	No
SWMU 17A	C	Chromium	5.0	Normal	No
SWMU 17A	C	Lead	4.2	Normal	Yes
SWMU 17A	C	Mercury	1.5	Poisson	No
SWMU 17A	C	Nickel	5.4	Normal	No
SWMU 17A	C	Selenium	2.5	Poisson	No
SWMU 17A	C	Silver	1.5	Poisson	Yes
SWMU 17A	C	Thallium	33.5	Poisson	No
SWMU 17BCD	B	Antimony	21.0	Poisson	No
SWMU 17BCD	B	Arsenic	5.5	Poisson	Yes
SWMU 17BCD	B	Barium	9.7	Normal	No
SWMU 17BCD	B	Beryllium	4.5	Poisson	No
SWMU 17BCD	B	Cadmium	3.5	Poisson	No
SWMU 17BCD	B	Chromium	5.1	Normal	No
SWMU 17BCD	B	Lead	8.7	Normal	No
SWMU 17BCD	B	Mercury	1.5	Poisson	No
SWMU 17BCD	B	Nickel	6.0	Normal	No
SWMU 17BCD	B	Selenium	2.5	Poisson	No
SWMU 17BCD	B	Silver	1.5	Poisson	No
SWMU 17BCD	B	Thallium	33.5	Poisson	No
SWMU 17BCD	C	Antimony	21.5	Poisson	No
SWMU 17BCD	C	Arsenic	11.5	Poisson	No
SWMU 17BCD	C	Barium	6.9	Normal	No
SWMU 17BCD	C	Beryllium	2.3	Normal	Yes
SWMU 17BCD	C	Cadmium	3.5	Poisson	Yes
SWMU 17BCD	C	Chromium	5.0	Normal	No
SWMU 17BCD	C	Lead	4.2	Normal	Yes
SWMU 17BCD	C	Mercury	1.5	Poisson	No
SWMU 17BCD	C	Nickel	5.4	Normal	No
SWMU 17BCD	C	Selenium	2.5	Poisson	No
SWMU 17BCD	C	Silver	1.5	Poisson	No
SWMU 17BCD	C	Thallium	33.5	Poisson	No

SUMMARY OF TOLERANCE LIMITS
RADFORD ARMY AMMUNITION PLANT

Soil Horizon	Soil Series	Constituent	Upper Tolerance Limit	Tolerance Limit Type	Exceedance?
SWMU 31	C	Antimony	20.5	Poisson	No
SWMU 31	C	Arsenic	7.0	Poisson	No
SWMU 31	C	Barium	7.1	Normal	No
SWMU 31	C	Beryllium	.5	Normal	No
SWMU 31	C	Cadmium	3.5	Poisson	No
SWMU 31	C	Chromium	4.8	Normal	No
SWMU 31	C	Lead	4.1	Normal	No
SWMU 31	C	Mercury	2.0	Poisson	No
SWMU 31	C	Nickel	4.3	Normal	No
SWMU 31	C	Selenium	2.5	Poisson	No
SWMU 31	C	Silver	1.5	Poisson	No
SWMU 31	C	Thallium	31.5	Poisson	No
SWMU 54	B	Antimony	20.5	Poisson	No
SWMU 54	B	Arsenic	6.5	Poisson	No
SWMU 54	B	Barium	7.4	Normal	No
SWMU 54	B	Beryllium	5.0	Poisson	No
SWMU 54	B	Cadmium	3.5	Poisson	Yes
SWMU 54	B	Chromium	5.0	Normal	No
SWMU 54	B	Lead	4.7	Normal	Yes
SWMU 54	B	Mercury	1.5	Poisson	Yes
SWMU 54	B	Nickel	5.0	Normal	No
SWMU 54	B	Selenium	2.5	Poisson	No
SWMU 54	B	Silver	2.0	Poisson	No
SWMU 54	B	Thallium	32.0	Poisson	No
SWMU 54	C	Antimony	20.5	Poisson	No
SWMU 54	C	Arsenic	7.0	Poisson	No
SWMU 54	C	Barium	7.1	Normal	No
SWMU 54	C	Beryllium	.5	Normal	Yes
SWMU 54	C	Cadmium	3.5	Poisson	No
SWMU 54	C	Chromium	4.8	Normal	No
SWMU 54	C	Lead	4.1	Normal	Yes
SWMU 54	C	Mercury	2.0	Poisson	No
SWMU 54	C	Nickel	4.3	Normal	No
SWMU 54	C	Selenium	2.5	Poisson	No
SWMU 54	C	Silver	1.5	Poisson	No
SWMU 54	C	Thallium	31.5	Poisson	No

Antimony soil B

Poisson-based Tolerance Limit (K) Calculation for Antimony soil horizon B, SWMU 17A

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	100.94
2Tn+2	203.88
Chi Square (2Tn+2)	238.191
n	8
Lambda Tn	14.886938
2(Lambda Tn)	29.773875
Chi Square0.05[2K+2]>=	29.773875
[2K+2] = 44	
K = 21	

FSampNo	Value	Limit	Limit Exceeded?
17ASB105	77.95	21	Yes
17ASB205	12.21	21	No
17ASB305	14.83	21	No

Antimony soil C

Poisson-based Tolerance Limit (K) Calculation for Antimony soil horizon C, SWMU 17A

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	101.34
2Tn+2	204.68
Chi Square (2Tn+2)	239.056
n	8
Lambda Tn	14.941
2(Lambda Tn)	29.882
Chi Square0.05[2K+2]>=	29.882
[2K+2] = 45	
K = 21.5	

FSampNo	Value	Limit	Limit Exceeded?
17ASB110	12.42	21.5	No
17ASB210	11.74	21.5	No
17ASB310	14.37	21.5	No
17ASB115	12.03	21.5	No
17ASB215	14.10	21.5	No
17ASB315	13.37	21.5	No
17ASB120	12.21	21.5	No
17ASB220	15.06	21.5	No
17ASB320	10.77	21.5	No
17ASB122	12.81	21.5	No
17ASB225	14.04	21.5	No
17ASB325	10.75	21.5	No
17ASB340	10.76	21.5	No

Arsenic horizon B

Poisson-based Tolerance Limit (K) Calculation for Arsenic soil horizon B, SWMU 17A

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	55.13
2Tn+2	112.26
Chi Square (2Tn+2)	137.988
n	8
Lambda Tn	8.62425
2(Lambda Tn)	17.2485
Chi Square0.05[2K+2]>=	17.2485
[2K+2] = 13	
K = 5.5	

FSampNo	Value	Limit	Limit Exceeded?
17ASB105	94.87	5.5	Yes
17ASB205	7.33	5.5	Yes
17ASB305	6.70	5.5	Yes

Arsenic horizon C

Poisson-based Tolerance Limit (K) Calculation for Arsenic soil horizon C, SWMU 17A

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where

Tn =	Poisson count of background
n =	Background sample size
alpha =	Probability level test is conducted at (here, 0.05)

Tn	43.70
2Tn+2	89.40
Chi Square (2Tn+2)	112.471
n	8
Lambda Tn	7.0294375
2(Lambda Tn)	14.058875
Chi Square0.05[2K+2]>=	14.058875
[2K+2] = 25	
K = 11.5	

FSampNo	Value	Limit	Limit Exceeded?
17ASB110	9.30	11.5	No
17ASB210	1.50	11.5	No
17ASB310	7.51	11.5	No
17ASB115	13.50	11.5	Yes
17ASB215	8.98	11.5	No
17ASB315	4.64	11.5	No
17ASB120	16.69	11.5	Yes
17ASB220	1.92	11.5	No
17ASB320	3.75	11.5	No
17ASB122	1.64	11.5	No
17ASB225	1.79	11.5	No
17ASB325	1.37	11.5	No
17ASB340	3.30	11.5	No

Barium horizon B

Normal Tolerance Limit (K) Calculation for Barium soil horizon B, SWMU 17A

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	4.39
Where		std. dev.	0.83
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	6.399951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17ASB105	8.54	9.7019594	5128.21	16349.61	No
17ASB205	4.16	9.7019594	64.38	16349.61	No
17ASB305	4.27	9.7019594	71.26	16349.61	No

Barium horizon C

Normal Tolerance Limit (K) Calculation for Barium soil horizon C

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	4.51
Where		std. dev.	0.37
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	6.519951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17ASB110	4.15	6.9223819	63.12	1014.7341	No
17ASB210	4.33	6.9223819	75.69	1014.7341	No
17ASB310	4.84	6.9223819	126.39	1014.7341	No
17ASB115	4.24	6.9223819	69.20	1014.7341	No
17ASB215	4.46	6.9223819	86.91	1014.7341	No
17ASB315	3.81	6.9223819	45.16	1014.7341	No
17ASB120	4.24	6.9223819	69.36	1014.7341	No
17ASB220	4.90	6.9223819	134.25	1014.7341	No
17ASB320	3.97	6.9223819	52.97	1014.7341	No
17ASB122	4.27	6.9223819	71.50	1014.7341	No
17ASB225	2.26	6.9223819	9.56	1014.7341	No
17ASB325	4.00	6.9223819	54.71	1014.7341	No
17ASB340	3.54	6.9223819	34.58	1014.7341	No

Beryllium horizon B

Poisson-based Tolerance Limit (K) Calculation for Beryllium soil horizon B, SWMU 17A

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where

Tn =	Poisson count of background
n =	Background sample size
alpha =	Probability level test is conducted at (here, 0.05)

Tn	10.67
2Tn+2	23.34
Chi Square (2Tn+2)	35.5955
n	8
Lambda Tn	2.2247188
2(Lambda Tn)	4.4494375
Chi Square0.05[2K+2]>=	4.4494375

[2K+2] = 11
K = 4.5

FSampNo	Value	Limit	Limit Exceeded?
17ASB105	1.65	4.5	No
17ASB205	2.23	4.5	No
17ASB305	3.40	4.5	No

Beryllium horizon C

Normal Tolerance Limit (K) Calculation for Beryllium soil horizon C, SWMU 17A

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	0.7
Where		std. dev.	0.59
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	2.709951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17ASB110	0.80	2.2988711	2.22	9.962929	No
17ASB210	0.72	2.2988711	2.06	9.962929	No
17ASB310	2.00	2.2988711	7.39	9.962929	No
17ASB115	0.75	2.2988711	2.11	9.962929	No
17ASB215	1.51	2.2988711	4.52	9.962929	No
17ASB315	0.79	2.2988711	2.20	9.962929	No
17ASB120	0.57	2.2988711	1.77	9.962929	No
17ASB220	1.92	2.2988711	6.82	9.962929	No
17ASB320	-0.56	2.2988711	0.57	9.962929	No
17ASB122	0.76	2.2988711	2.13	9.962929	No
17ASB225	-1.17	2.2988711	0.31	9.962929	No
17ASB325	-0.26	2.2988711	0.77	9.962929	No
17ASB340	0.44	2.2988711	1.55	9.962929	No

Cadmium soil B

Poisson-based Tolerance Limit (K) Calculation for Cadmium soil horizon B, SWMU 17A

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where

Lambda of Tn =	(1/2n)*((Chi Square at alpha) of (2Tn+2)
Where	
Tn =	Poisson count of background
n =	Background sample size
alpha =	Probability level test is conducted at (here, 0.05)

Tn	6.2
2Tn+2	14.40
Chi Square (2Tn+2)	24.2105
n	8
Lambda Tn	1.5131563
2(Lambda Tn)	3.0263125
Chi Square0.05[2K+2]>=	3.0263125

[2K+2] = 9
K = 3.5

FSampNo	Value	Limit	Limit Exceeded?
17ASB105	13.72	3.5	Yes
17ASB205	0.75	3.5	No
17ASB305	0.91	3.5	No

Cadmium soil C

Poisson-based Tolerance Limit (K) Calculation for Cadmium soil horizon C, SWMU 17A

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	6.23
2Tn+2	14.46
Chi Square (2Tn+2)	24.2892
n	8
Lambda Tn	1.518075
2(Lambda Tn)	3.03615
Chi Square0.05[2K+2]>=	3.03615

[2K+2] = 9
K = 3.5

FSampNo	Value	Limit	Limit Exceeded?
17ASB110	0.76	3.5	No
17ASB210	0.72	3.5	No
17ASB310	0.88	3.5	No
17ASB115	0.74	3.5	No
17ASB215	0.87	3.5	No
17ASB315	0.82	3.5	No
17ASB120	0.75	3.5	No
17ASB220	0.92	3.5	No
17ASB320	0.66	3.5	No
17ASB122	0.79	3.5	No
17ASB225	0.86	3.5	No
17ASB325	0.66	3.5	No
17ASB340	0.66	3.5	No

Chromium soil B

Normal Tolerance Limit (K) Calculation for Chromium soil horizon B, SWMU 17A

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.82
Where		std. dev.	0.22
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	5.829951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17ASB105	7.63	5.1025892	2051.28	164.44715	Yes
17ASB205	3.85	5.1025892	46.82	164.44715	No
17ASB305	3.98	5.1025892	53.71	164.44715	No

Chromium soil C

Normal Tolerance Limit (K) Calculation for Chromium soil horizon C, SWMU 17A

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.83
Where		std. dev.	0.2
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	5.839951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17ASB110	4.02	4.9979902	55.51	148.11518	No
17ASB210	3.91	4.9979902	49.70	148.11518	No
17ASB310	4.37	4.9979902	79.33	148.11518	No
17ASB115	4.00	4.9979902	54.72	148.11518	No
17ASB215	4.45	4.9979902	86.04	148.11518	No
17ASB315	4.33	4.9979902	75.99	148.11518	No
17ASB120	4.01	4.9979902	54.92	148.11518	No
17ASB220	4.81	4.9979902	122.27	148.11518	No
17ASB320	2.85	4.9979902	17.25	148.11518	No
17ASB122	4.23	4.9979902	68.50	148.11518	No
17ASB225	2.02	4.9979902	7.56	148.11518	No
17ASB325	3.12	4.9979902	22.59	148.11518	No
17ASB340	3.82	4.9979902	45.44	148.11518	No

Lead horizon B

Normal Tolerance Limit (K) Calculation for Lead soil horizon B, SWMU 17A

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.24
Where		std. dev.	1.04
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	5.249951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17ASB105	8.57	8.6999491	5256.41	6002.6065	No
17ASB205	3.27	8.6999491	26.28	6002.6065	No
17ASB305	3.30	8.6999491	27.08	6002.6065	No

Lead horizon C

Normal Tolerance Limit (K) Calculation for Lead soil horizon C, SWMU 17A

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.71
Where		std. dev.	0.31
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	4.719951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17ASB110	4.62	4.1731848	101.39	64.921888	Yes
17ASB210	2.65	4.1731848	14.13	64.921888	No
17ASB310	3.14	4.1731848	23.02	64.921888	No
17ASB115	4.03	4.1731848	56.44	64.921888	No
17ASB215	4.24	4.1731848	69.06	64.921888	Yes
17ASB315	3.08	4.1731848	21.83	64.921888	No
17ASB120	5.61	4.1731848	273.97	64.921888	Yes
17ASB220	3.73	4.1731848	41.78	64.921888	No
17ASB320	3.43	4.1731848	30.77	64.921888	No
17ASB122	2.47	4.1731848	11.79	64.921888	No
17ASB225	4.35	4.1731848	77.36	64.921888	Yes
17ASB325	2.22	4.1731848	9.23	64.921888	No
17ASB340	2.75	4.1731848	15.70	64.921888	No

Mercury, horizon B

Poisson-based Tolerance Limit (K) Calculation for Mercury soil horizon B, SWMU 17A

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	0.76
2Tn+2	3.52
Chi Square (2Tn+2)	8.69852
n	8
Lambda Tn	0.5436575
2(Lambda Tn)	1.087315
Chi Square0.05[2K+2]>=	1.087315
[2K+2] = 5	
K = 1.5	

FSampNo	Value	Limit	Limit Exceeded?
17ASB105	0.29	1.5	No
17ASB205	0.18	1.5	No
17ASB305	0.18	1.5	No

Mercury, horizon C

Poisson-based Tolerance Limit (K) Calculation for Mercury soil horizon C, SWMU 17A

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	0.63
2Tn+2	3.26
Chi Square (2Tn+2)	8.26084
n	8
Lambda Tn	0.5163025
2(Lambda Tn)	1.032605
Chi Square0.05[2K+2]>=	1.032605
[2K+2] = 5	
K = 1.5	

FSampNo	Value	Limit	Limit Exceeded?
17ASB110	0.14	1.5	No
17ASB210	0.03	1.5	No
17ASB310	0.13	1.5	No
17ASB115	0.16	1.5	No
17ASB215	0.12	1.5	No
17ASB315	0.04	1.5	No
17ASB120	0.11	1.5	No
17ASB220	0.04	1.5	No
17ASB320	0.03	1.5	No
17ASB122	0.09	1.5	No
17ASB225	0.04	1.5	No
17ASB325	0.03	1.5	No
17ASB340	0.03	1.5	No

Nickel horizon B

Normal Tolerance Limit (K) Calculation for Nickel soil horizon B, SWMU 17A

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.97
Where		std. dev.	0.61
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	4.979951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17ASB105	6.81	6.0077701	902.56	406.5757	Yes
17ASB205	3.26	6.0077701	26.15	406.5757	No
17ASB305	3.55	6.0077701	34.64	406.5757	No

Nickel horizon C

Normal Tolerance Limit (K) Calculation for Nickel soil horizon C, SWMU 17A

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.24
Where		std. dev.	0.42
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	5.249951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17ASB110	3.21	5.4449794	24.84	231.59252	No
17ASB210	3.32	5.4449794	27.78	231.59252	No
17ASB310	4.27	5.4449794	71.26	231.59252	No
17ASB115	3.37	5.4449794	29.20	231.59252	No
17ASB215	4.04	5.4449794	56.83	231.59252	No
17ASB315	3.60	5.4449794	36.43	231.59252	No
17ASB120	3.19	5.4449794	24.28	231.59252	No
17ASB220	4.37	5.4449794	78.96	231.59252	No
17ASB320	1.84	5.4449794	6.30	231.59252	No
17ASB122	3.35	5.4449794	28.37	231.59252	No
17ASB225	1.81	5.4449794	6.12	231.59252	No
17ASB325	2.39	5.4449794	10.90	231.59252	No
17ASB340	3.17	5.4449794	23.71	231.59252	No

Selenium horizon B

Poisson-based Tolerance Limit (K) Calculation for Selenium soil horizon B, SWMU 17A

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	2.34
2Tn+2	6.68
Chi Square (2Tn+2)	13.5992
n	8
Lambda Tn	0.84995
2(Lambda Tn)	1.6999
Chi Square0.05[2K+2]>=	1.6999
[2K+2] = 7	
K = 2.5	

FSampNo	Value	Limit	Limit Exceeded?
17ASB105	0.29	2.5	No
17ASB205	0.28	2.5	No
17ASB305	0.34	2.5	No

Selenium horizon C

Poisson-based Tolerance Limit (K) Calculation for Silver soil horizon C, SWMU 17A

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	2.34
2Tn+2	6.68
Chi Square (2Tn+2)	13.5992
n	8
Lambda Tn	0.84995
2(Lambda Tn)	1.6999
Chi Square0.05[2K+2]>=	1.6999
[2K+2] = 7	
K = 2.5	

FSampNo	Value	Limit	Limit Exceeded?
17ASB110	0.29	2.5	No
17ASB210	0.27	2.5	No
17ASB310	0.33	2.5	No
17ASB115	0.28	2.5	No
17ASB215	0.33	2.5	No
17ASB315	0.31	2.5	No
17ASB120	0.28	2.5	No
17ASB220	0.35	2.5	No
17ASB320	0.25	2.5	No
17ASB122	0.3	2.5	No
17ASB225	0.32	2.5	No
17ASB325	0.25	2.5	No
17ASB340	0.25	2.5	No

Silver horizon B

Poisson-based Tolerance Limit (K) Calculation for Silver soil horizon B, SWMU 17A

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	0.18
2Tn+2	2.36
Chi Square (2Tn+2)	6.67165
n	8
Lambda Tn	0.4169781
2(Lambda Tn)	0.8339563
Chi Square0.05[2K+2]>=	0.8339563
[2K+2] = 5	
K = 1.5	

FSampNo	Value	Limit	Limit Exceeded?
17ASB105	42.31	1.5	Yes
17ASB205	0.01	1.5	No
17ASB305	0.01	1.5	No

Silver horizon C

Poisson-based Tolerance Limit (K) Calculation for Silver soil horizon C, SWMU 17A

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	0.215
2Tn+2	2.43
Chi Square (2Tn+2)	6.80037
n	8
Lambda Tn	0.4250231
2(Lambda Tn)	0.8500463
Chi Square0.05[2K+2]>=	0.8500463
[2K+2] = 5	
K = 1.5	

FSampNo	Value	Limit	Limit Exceeded?
17ASB110	0.39	1.5	No
17ASB210	0.005	1.5	No
17ASB310	0.01	1.5	No
17ASB115	0.01	1.5	No
17ASB215	0.01	1.5	No
17ASB315	0.01	1.5	No
17ASB120	2.12	1.5	Yes
17ASB220	0.01	1.5	No
17ASB320	0.005	1.5	No
17ASB122	0.01	1.5	No
17ASB225	0.01	1.5	No
17ASB325	0.005	1.5	No
17ASB340	0.005	1.5	No

Thallium Horizon B

Poisson-based Tolerance Limit (K) Calculation for Thallium soil horizon B, SWMU 17A

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	176.62
2Tn+2	355.24
Chi Square (2Tn+2)	400.19
n	8
Lambda Tn	25.011875
2(Lambda Tn)	50.02375
Chi Square0.05[2K+2]>=	50.02375
[2K+2] = 69	
K = 33.5	

FSampNo	Value	Limit	Limit Exceeded?
17ASB105	21.99	33.5	No
17ASB205	21.36	33.5	No
17ASB305	25.95	33.5	No

Thallium horizon C

Poisson-based Tolerance Limit (K) Calculation for Thallium soil horizon C

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	177.36
2Tn+2	356.72
Chi Square (2Tn+2)	401.762
n	8
Lambda Tn	25.110125
2(Lambda Tn)	50.22025
Chi Square0.05[2K+2]>=	50.22025

[2K+2] = 69
K = 33.5

FSampNo	Value	Limit	Limit Exceeded?
17ASB110	21.74	33.5	No
17ASB210	20.59	33.5	No
17ASB310	25.15	33.5	No
17ASB115	21.05	33.5	No
17ASB215	24.68	33.5	No
17ASB315	23.40	33.5	No
17ASB120	21.36	33.5	No
17ASB220	26.35	33.5	No
17ASB320	18.85	33.5	No
17ASB122	22.42	33.5	No
17ASB225	24.57	33.5	No
17ASB325	18.81	33.5	No
17ASB340	18.83	33.5	No

Antimony soil B

Poisson-based Tolerance Limit (K) Calculation for Antimony soil horizon B, SWMU 17BCD

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	100.94
2Tn+2	203.88
Chi Square (2Tn+2)	238.191
n	8
Lambda Tn	14.886938
2(Lambda Tn)	29.773875
Chi Square0.05[2K+2]>=	29.773875
[2K+2] = 44	
K = 21	

FSampNo	Value	Limit	Limit Exceeded?
17CSB105	12.06	21	No
17CSB205	12.22	21	No
17DSB105	12.53	21	No
17DSB205	12.07	21	No

Antimony soil C

Poisson-based Tolerance Limit (K) Calculation for Antimony soil horizon C, SWMU 17BCD

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	101.34
2Tn+2	204.68
Chi Square (2Tn+2)	239.056
n	8
Lambda Tn	14.941
2(Lambda Tn)	29.882
Chi Square0.05[2K+2]>=	29.882

[2K+2] = 45
K = 21.5

FSampNo	Value	Limit	Limit Exceeded?
17CSB110	13.39	21.5	No
17CSB210	14.50	21.5	No
17DSB110	12.13	21.5	No
17DSB210	12.60	21.5	No
17CSB114	13.02	21.5	No
17CSB215	12.45	21.5	No
17DSB115	12.57	21.5	No
17DSB215	15.83	21.5	No
17DSB120	13.09	21.5	No
17DSB220	15.99	21.5	No
17DSB125	15.63	21.5	No
17DSB225	13.88	21.5	No
17DSB127	16.31	21.5	No
17CSB240	15.22	21.5	No
17DSB240	12.36	21.5	No

Arsenic horizon B

Poisson-based Tolerance Limit (K) Calculation for Arsenic soil horizon B, SWMU 17BCD

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where

Tn =	Poisson count of background
n =	Background sample size
alpha =	Probability level test is conducted at (here, 0.05)

Tn	55.13
2Tn+2	112.26
Chi Square (2Tn+2)	137.988
n	8
Lambda Tn	8.62425
2(Lambda Tn)	17.2485
Chi Square0.05[2K+2]>=	17.2485
[2K+2] = 13	
K = 5.5	

FSampNo	Value	Limit	Limit Exceeded?
17CSB105	11.98	5.5	Yes
17CSB205	1.56	5.5	No
17DSB105	1.60	5.5	No
17DSB205	1.54	5.5	No

Arsenic horizon C

Poisson-based Tolerance Limit (K) Calculation for Arsenic soil horizon C, SWMU 17BCD

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	43.70
2Tn+2	89.40
Chi Square (2Tn+2)	112.471
n	8
Lambda Tn	7.0294375
2(Lambda Tn)	14.058875
Chi Square0.05[2K+2]>=	14.058875
[2K+2] = 25	
K = 11.5	

FSampNo	Value	Limit	Limit Exceeded?
17CSB110	1.71	11.5	No
17CSB210	1.85	11.5	No
17DSB110	1.55	11.5	No
17DSB210	6.32	11.5	No
17CSB114	1.66	11.5	No
17CSB215	4.59	11.5	No
17DSB115	1.61	11.5	No
17DSB215	11.32	11.5	No
17DSB120	1.67	11.5	No
17DSB220	2.04	11.5	No
17DSB125	1.50	11.5	No
17DSB225	1.77	11.5	No
17DSB127	2.08	11.5	No
17CSB240	1.94	11.5	No
17DSB240	8.03	11.5	No

Barium horizon B

Normal Tolerance Limit (K) Calculation for Barium soil horizon B, SWMU 17BCD

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	4.39
Where		std. dev.	0.83
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	6.399951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17CSB105	3.38	9.7019594	29.40	16349.61	No
17CSB205	3.60	9.7019594	36.74	16349.61	No
17DSB105	4.23	9.7019594	68.93	16349.61	No
17DSB205	4.19	9.7019594	65.89	16349.61	No

Barium horizon C

Normal Tolerance Limit (K) Calculation for Barium soil horizon C, SWMU 17BCD

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	4.51
Where		std. dev.	0.37
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	6.519951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17CSB110	4.36	6.9223819	78.55	1014.7341	No
17CSB210	4.25	6.9223819	70.12	1014.7341	No
17DSB110	4.10	6.9223819	60.40	1014.7341	No
17DSB210	4.39	6.9223819	80.98	1014.7341	No
17CSB114	4.43	6.9223819	84.33	1014.7341	No
17CSB215	4.65	6.9223819	104.70	1014.7341	No
17DSB115	4.21	6.9223819	67.05	1014.7341	No
17DSB215	4.96	6.9223819	142.65	1014.7341	No
17DSB120	4.24	6.9223819	69.69	1014.7341	No
17DSB220	4.72	6.9223819	111.91	1014.7341	No
17DSB125	4.29	6.9223819	72.73	1014.7341	No
17DSB225	4.02	6.9223819	55.95	1014.7341	No
17DSB127	4.71	6.9223819	111.48	1014.7341	No
17CSB240	4.46	6.9223819	86.49	1014.7341	No
17DSB240	4.23	6.9223819	68.85	1014.7341	No

Beryllium horizon B

Poisson-based Tolerance Limit (K) Calculation for Beryllium soil horizon B, SWMU 17BCD

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	10.67
2Tn+2	23.34
Chi Square (2Tn+2)	35.5955
n	8
Lambda Tn	2.2247188
2(Lambda Tn)	4.4494375
Chi Square0.05[2K+2]>=	4.4494375
[2K+2] = 11	
K = 4.5	

FSampNo	Value	Limit	Limit Exceeded?
17CSB105	3.23	4.5	No
17CSB205	1.56	4.5	No
17DSB105	1.83	4.5	No
17DSB205	1.42	4.5	No

Beryllium horizon C

355

Normal Tolerance Limit (K) Calculation for Beryllium soil horizon C, SWMU 17BCD

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	0.70
Where		std. dev.	0.59
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	2.709951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17CSB110	1.65	2.2988711	5.19	9.962929	No
17CSB210	1.75	2.2988711	5.77	9.962929	No
17DSB110	0.70	2.2988711	2.02	9.962929	No
17DSB210	0.91	2.2988711	2.48	9.962929	No
17CSB114	1.28	2.2988711	3.61	9.962929	No
17CSB215	0.92	2.2988711	2.52	9.962929	No
17DSB115	1.16	2.2988711	3.21	9.962929	No
17DSB215	2.06	2.2988711	7.88	9.962929	No
17DSB120	1.11	2.2988711	3.04	9.962929	No
17DSB220	1.70	2.2988711	5.48	9.962929	No
17DSB125	1.56	2.2988711	4.77	9.962929	No
17DSB225	2.47	2.2988711	11.84	9.962929	Yes
17DSB127	1.77	2.2988711	5.89	9.962929	No
17CSB240	1.83	2.2988711	6.21	9.962929	No
17DSB240	0.80	2.2988711	2.23	9.962929	No

Cadmium horizon B

Poisson-based Tolerance Limit (K) Calculation for Cadmium soil horizon B, SWMU 17BCD

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	6.2
2Tn+2	14.40
Chi Square (2Tn+2)	24.2105
n	8
Lambda Tn	1.5131563
2(Lambda Tn)	3.0263125
Chi Square0.05[2K+2]>=	3.0263125
[2K+2] = 9	
K = 3.5	

FSampNo	Value	Limit	Limit Exceeded?
17CSB105	0.74	3.5	No
17CSB205	0.75	3.5	No
17DSB105	0.77	3.5	No
17DSB205	0.74	3.5	No

Poisson-based Tolerance Limit (K) Calculation for Cadmium soil horizon C, SWMU 17BCD

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	6.23
2Tn+2	14.46
Chi Square (2Tn+2)	24.2892
n	8
Lambda Tn	1.518075
2(Lambda Tn)	3.03615
Chi Square0.05[2K+2]>=	3.03615
[2K+2] = 9	
K = 3.5	

FSampNo	Value	Limit	Limit Exceeded?
17CSB110	0.82	3.5	No
17CSB210	0.89	3.5	No
17DSB110	0.75	3.5	No
17DSB210	0.77	3.5	No
17CSB114	0.80	3.5	No
17CSB215	4.73	3.5	Yes
17DSB115	0.77	3.5	No
17DSB215	0.97	3.5	No
17DSB120	0.80	3.5	No
17DSB220	0.98	3.5	No
17DSB125	0.96	3.5	No
17DSB225	0.85	3.5	No
17DSB127	1.00	3.5	No
17CSB240	0.93	3.5	No
17DSB240	0.76	3.5	No

Chromium horizon B

Normal Tolerance Limit (K) Calculation for Chromium soil horizon B, SWMU 17BCD

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.82
Where		std. dev.	0.22
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	5.829951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17CSB105	4.13	5.1025892	61.87	164.44715	No
17CSB205	3.52	5.1025892	33.62	164.44715	No
17DSB105	3.40	5.1025892	29.92	164.44715	No
17DSB205	3.44	5.1025892	31.28	164.44715	No

Chromium horizon C

Normal Tolerance Limit (K) Calculation for Chromium soil horizon C, SWMU 17A

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.83
Where		std. dev.	0.2
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	5.839951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17CSB110	4.29	4.9979902	72.81	148.11518	No
17CSB210	3.99	4.9979902	54.29	148.11518	No
17DSB110	3.78	4.9979902	43.94	148.11518	No
17DSB210	4.03	4.9979902	56.30	148.11518	No
17CSB114	4.09	4.9979902	59.89	148.11518	No
17CSB215	4.28	4.9979902	71.92	148.11518	No
17DSB115	4.22	4.9979902	67.82	148.11518	No
17DSB215	4.58	4.9979902	97.09	148.11518	No
17DSB120	4.03	4.9979902	56.07	148.11518	No
17DSB220	4.15	4.9979902	63.30	148.11518	No
17DSB125	4.47	4.9979902	86.92	148.11518	No
17DSB225	4.35	4.9979902	77.76	148.11518	No
17DSB127	4.36	4.9979902	77.87	148.11518	No
17CSB240	4.31	4.9979902	74.38	148.11518	No
17DSB240	3.90	4.9979902	49.18	148.11518	No

Lead horizon B

Normal Tolerance Limit (K) Calculation for Lead soil horizon B, SWMU 17BCD

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.24
Where		std. dev.	1.04
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	5.249951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17CSB105	3.73	8.6999491	41.82	6002.6065	No
17CSB205	2.50	8.6999491	12.20	6002.6065	No
17DSB105	3.00	8.6999491	20.08	6002.6065	No
17DSB205	3.04	8.6999491	20.81	6002.6065	No

Normal Tolerance Limit (K) Calculation for Lead soil horizon C, SWMU 17BCD

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.71
Where		std. dev.	0.31
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	4.719951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17CSB110	2.91	4.1731848	18.44	64.921888	No
17CSB210	2.62	4.1731848	13.68	64.921888	No
17DSB110	2.89	4.1731848	17.95	64.921888	No
17DSB210	2.88	4.1731848	17.87	64.921888	No
17CSB114	2.93	4.1731848	18.73	64.921888	No
17CSB215	5.25	4.1731848	190.60	64.921888	Yes
17DSB115	3.28	4.1731848	26.54	64.921888	No
17DSB215	3.14	4.1731848	23.10	64.921888	No
17DSB120	2.51	4.1731848	12.36	64.921888	No
17DSB220	2.43	4.1731848	11.31	64.921888	No
17DSB125	3.34	4.1731848	28.23	64.921888	No
17DSB225	2.13	4.1731848	8.43	64.921888	No
17DSB127	3.16	4.1731848	23.46	64.921888	No
17CSB240	2.85	4.1731848	17.24	64.921888	No
17DSB240	2.68	4.1731848	14.63	64.921888	No

Mercury horizon B

Poisson-based Tolerance Limit (K) Calculation for Mercury soil horizon B, SWMU 17BCD

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	0.76
2Tn+2	3.52
Chi Square (2Tn+2)	8.69852
n	8
Lambda Tn	0.5436575
2(Lambda Tn)	1.087315
Chi Square0.05[2K+2]>=	1.087315
[2K+2] = 5	
K = 1.5	

FSampNo	Value	Limit	Limit Exceeded?
17CSB105	0.03	1.5	No
17CSB205	0.03	1.5	No
17DSB105	0.03	1.5	No
17DSB205	0.03	1.5	No

Mercury horizon C

Poisson-based Tolerance Limit (K) Calculation for Mercury soil horizon C, SWMU 17BCD

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	0.63
2Tn+2	3.26
Chi Square (2Tn+2)	8.26084
n	8
Lambda Tn	0.5163025
2(Lambda Tn)	1.032605
Chi Square0.05[2K+2]>=	1.032605
[2K+2] = 5	
K = 1.5	

FSampNo	Value	Limit	Limit Exceeded?
17CSB110	0.10	1.5	No
17CSB210	0.04	1.5	No
17DSB110	0.03	1.5	No
17DSB210	0.03	1.5	No
17CSB114	0.04	1.5	No
17CSB215	0.03	1.5	No
17DSB115	0.03	1.5	No
17DSB215	0.24	1.5	No
17DSB120	0.04	1.5	No
17DSB220	0.04	1.5	No
17DSB125	0.04	1.5	No
17DSB225	0.04	1.5	No
17DSB127	0.15	1.5	No
17CSB240	0.04	1.5	No
17DSB240	0.03	1.5	No

364

Nickel horizon B

Normal Tolerance Limit (K) Calculation for Nickel soil horizon B, SWMU 17BCD

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.97
Where		std. dev.	0.61
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	4.979951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17CSB105	3.26	6.0077701	25.95	406.5757	No
17CSB205	2.93	6.0077701	18.68	406.5757	No
17DSB105	2.68	6.0077701	14.58	406.5757	No
17DSB205	2.41	6.0077701	11.18	406.5757	No

Nickel horizon C

Normal Tolerance Limit (K) Calculation for Nickel soil horizon C, SWMU 17BCD

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.24
Where		std. dev.	0.42
t =	Critical value of Student's t distribution	t	1.895
N =	Sample size	N	8
alpha =	Probability level test is conducted at (here, 0.05)	K	5.249951

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
17CSB110	3.83	5.4449794	46.17	231.59252	No
17CSB210	3.84	5.4449794	46.60	231.59252	No
17DSB110	2.79	5.4449794	16.21	231.59252	No
17DSB210	3.36	5.4449794	28.79	231.59252	No
17CSB114	3.56	5.4449794	35.33	231.59252	No
17CSB215	3.82	5.4449794	45.62	231.59252	No
17DSB115	3.37	5.4449794	28.97	231.59252	No
17DSB215	4.28	5.4449794	72.05	231.59252	No
17DSB120	3.82	5.4449794	45.53	231.59252	No
17DSB220	4.05	5.4449794	57.42	231.59252	No
17DSB125	3.92	5.4449794	50.40	231.59252	No
17DSB225	4.48	5.4449794	87.82	231.59252	No
17DSB127	4.20	5.4449794	66.39	231.59252	No
17CSB240	4.04	5.4449794	56.83	231.59252	No
17DSB240	3.15	5.4449794	23.33	231.59252	No

366

Selenium horizon B

Poisson-based Tolerance Limit (K) Calculation for Selenium soil horizon B, SWMU 17BCD

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	2.34
2Tn+2	6.68
Chi Square (2Tn+2)	13.5992
n	8
Lambda Tn	0.84995
2(Lambda Tn)	1.6999
Chi Square0.05[2K+2]>=	1.6999

[2K+2] = 7
K = 2.5

FSampNo	Value	Limit	Limit Exceeded?
17CSB105	0.28	2.5	No
17CSB205	0.28	2.5	No
17DSB105	0.29	2.5	No
17DSB205	0.28	2.5	No

Selenium horizon C

Poisson-based Tolerance Limit (K) Calculation for Silver soil horizon C, SWMU 17BCD

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	2.34
2Tn+2	6.68
Chi Square (2Tn+2)	13.5992
n	8
Lambda Tn	0.84995
2(Lambda Tn)	1.6999
Chi Square0.05[2K+2]>=	1.6999
[2K+2] = 7	
K = 2.5	

FSampNo	Value	Limit	Limit Exceeded?
17CSB110	0.30	2.5	No
17CSB210	0.33	2.5	No
17DSB110	0.28	2.5	No
17DSB210	0.29	2.5	No
17CSB114	0.30	2.5	No
17CSB215	0.29	2.5	No
17DSB115	0.29	2.5	No
17DSB215	0.37	2.5	No
17DSB120	0.30	2.5	No
17DSB220	0.37	2.5	No
17DSB125	0.36	2.5	No
17DSB225	0.32	2.5	No
17DSB127	0.38	2.5	No
17CSB240	0.35	2.5	No
17DSB240	0.29	2.5	No

Silver horizon B

36f

Poisson-based Tolerance Limit (K) Calculation for Silver soil horizon B, SWMU 17BCD

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where

Lambda of Tn =	(1/2n)*((Chi Square at alpha) of (2Tn+2)
Where	
Tn =	Poisson count of background
n =	Background sample size
alpha =	Probability level test is conducted at (here, 0.05)

Tn	0.18
2Tn+2	2.36
Chi Square (2Tn+2)	6.67165
n	8
Lambda Tn	0.4169781
2(Lambda Tn)	0.8339563
Chi Square0.05[2K+2]>=	0.8339563
[2K+2] = 5	
K = 1.5	

FSampNo	Value	Limit	Limit Exceeded?
17CSB105	0.01	1.5	No
17CSB205	0.01	1.5	No
17DSB105	0.03	1.5	No
17DSB205	0.01	1.5	No

Silver horizon C

Poisson-based Tolerance Limit (K) Calculation for Silver soil horizon C, SWMU 17BCD

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	0.215
2Tn+2	2.43
Chi Square (2Tn+2)	6.80037
n	8
Lambda Tn	0.4250231
2(Lambda Tn)	0.8500463
Chi Square0.05[2K+2]>=	0.8500463
[2K+2] = 5	
K = 1.5	

FSampNo	Value	Limit	Limit Exceeded?
17CSB110	0.01	1.5	No
17CSB210	0.01	1.5	No
17DSB110	0.01	1.5	No
17DSB210	0.01	1.5	No
17CSB114	0.01	1.5	No
17CSB215	0.04	1.5	No
17DSB115	0.01	1.5	No
17DSB215	0.01	1.5	No
17DSB120	0.01	1.5	No
17DSB220	0.01	1.5	No
17DSB125	0.01	1.5	No
17DSB225	0.01	1.5	No
17DSB127	0.07	1.5	No
17CSB240	0.01	1.5	No
17DSB240	0.01	1.5	No

Thallium Horizon B

Poisson-based Tolerance Limit (K) Calculation for Thallium soil horizon B, SWMU 17BCD

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	176.62
2Tn+2	355.24
Chi Square (2Tn+2)	400.19
n	8
Lambda Tn	25.011875
2(Lambda Tn)	50.02375
Chi Square0.05[2K+2]>=	50.02375

[2K+2] = 69
K = 33.5

FSampNo	Value	Limit	Limit Exceeded?
17CSB105	21.10	33.5	No
17CSB205	21.36	33.5	No
17DSB105	21.93	33.5	No
17DSB205	21.12	33.5	No

Thallium horizon C

Poisson-based Tolerance Limit (K) Calculation for Thallium soil horizon C, SWMU 17BCD

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	177.36
2Tn+2	356.72
Chi Square (2Tn+2)	401.761
n	8
Lambda Tn	25.110063
2(Lambda Tn)	50.220125
Chi Square0.05[2K+2]>=	50.220125

[2K+2] = 69
K = 33.5

FSampNo	Value	Limit	Limit Exceeded?
17CSB110	23.43	33.5	No
17CSB210	25.37	33.5	No
17DSB110	21.23	33.5	No
17DSB210	22.10	33.5	No
17CSB114	22.78	33.5	No
17CSB215	21.79	33.5	No
17DSB115	21.99	33.5	No
17DSB215	27.71	33.5	No
17DSB120	22.90	33.5	No
17DSB220	27.98	33.5	No
17DSB125	27.35	33.5	No
17DSB225	24.29	33.5	No
17DSB127	28.54	33.5	No
17CSB240	26.63	33.5	No
17DSB240	21.63	33.5	No

Antimony horizon C

Poisson-based Tolerance Limit (K) Calculation for Antimony soil horizon C, SWMU 31

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	69.27
2Tn+2	140.54
Chi Square (2Tn+2)	169.204
n	6
Lambda Tn	14.100333
2(Lambda Tn)	28.200667
Chi Square0.05[2K+2]>=	28.200667
[2K+2] = 43	
K = 20.5	

FSampNo	Value	Limit	Limit Exceeded?
31MW3A1	9.80	20.5	No
31MW2A	12.13	20.5	No
31MW4A1	11.27	20.5	No
31MW3B2	9.80	20.5	No
31MW2B	10.89	20.5	No
31MW4B2	10.61	20.5	No
31MW1A2	10.24	20.5	No
31MW1B3	10.41	20.5	No
31MW4C4	11.38	20.5	No

Arsenic horizon C

Poisson-based Tolerance Limit (K) Calculation for Arsenic soil horizon C, SWMU 31

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	14.26
2Tn+2	30.52
Chi Square (2Tn+2)	44.4038
n	6
Lambda Tn	3.7003167
2(Lambda Tn)	7.4006333
Chi Square0.05[2K+2]>=	7.4006333
[2K+2] = 16	
K = 7	

FSampNo	Value	Limit	Limit Exceeded?
31MW3A1	1.46	7	No
31MW2A	1.55	7	No
31MW4A1	1.44	7	No
31MW3B2	1.39	7	No
31MW2B	4.40	7	No
31MW4B2	1.36	7	No
31MW1A2	1.31	7	No
31MW1B3	1.33	7	No
31MW4C4	1.45	7	No

Barium horizon C

Normal Tolerance Limit (K) Calculation for Barium soil horizon C, SWMU 31

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	4.53
Where		std. dev.	0.38
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	6.7064488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
31MW3A1	4.90	7.0784505	134.00	1186.1292	No
31MW2A	4.90	7.0784505	134.90	1186.1292	No
31MW4A1	4.92	7.0784505	136.78	1186.1292	No
31MW3B2	4.32	7.0784505	75.10	1186.1292	No
31MW2B	4.58	7.0784505	97.33	1186.1292	No
31MW4B2	4.42	7.0784505	82.68	1186.1292	No
31MW1A2	3.34	7.0784505	28.11	1186.1292	No
31MW1B3	4.07	7.0784505	58.39	1186.1292	No
31MW4C4	4.95	7.0784505	140.53	1186.1292	No

Beryllium C

Normal Tolerance Limit (K) Calculation for Beryllium soil horizon C, SWMU 31

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	-0.09993
Where		std. dev.	0.27
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	2.0765188

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
31MW3A1	-0.05	0.4607301	0.95	1	No
31MW2A	0.00	0.4607301	1.00	1	Yes
31MW4A1	0.17	0.4607301	1.18	1	Yes
31MW3B2	-0.29	0.4607301	0.75	1	No
31MW2B	0.06	0.4607301	1.06	1	Yes
31MW4B2	-0.19	0.4607301	0.83	1	No
31MW1A2	-0.06	0.4607301	0.94	1	No
31MW1B3	0.16	0.4607301	1.18	1	Yes
31MW4C4	0.20	0.4607301	1.22	1	Yes

Cadmium horizon C

Poisson-based Tolerance Limit (K) Calculation for Cadmium soil horizon C, SWMU 31

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	4.21
2Tn+2	10.42
Chi Square (2Tn+2)	18.8839
n	6
Lambda Tn	1.5736583
2(Lambda Tn)	3.1473167
Chi Square0.05[2K+2]>=	3.1473167
[2K+2] = 9	
K = 3.5	

FSampNo	Value	Limit	Limit Exceeded?
31MW3A1	0.60	3.5	No
31MW2A	0.75	3.5	No
31MW4A1	0.69	3.5	No
31MW3B2	0.60	3.5	No
31MW2B	0.67	3.5	No
31MW4B2	0.65	3.5	No
31MW1A2	0.63	3.5	No
31MW1B3	0.64	3.5	No
31MW4C4	0.70	3.5	No

Chromium horizon C

Normal Tolerance Limit (K) Calculation for Chromium soil horizon C, SWMU 31

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.55
Where		std. dev.	0.22
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	5.7264488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
31MW3A1	3.29	4.8098187	26.80	122.70937	No
31MW2A	3.78	4.8098187	43.94	122.70937	No
31MW4A1	3.78	4.8098187	43.91	122.70937	No
31MW3B2	2.97	4.8098187	19.50	122.70937	No
31MW2B	3.53	4.8098187	34.00	122.70937	No
31MW4B2	3.47	4.8098187	32.03	122.70937	No
31MW1A2	2.92	4.8098187	18.50	122.70937	No
31MW1B3	3.18	4.8098187	24.10	122.70937	No
31MW4C4	3.79	4.8098187	44.13	122.70937	No

Normal Tolerance Limit (K) Calculation for Lead soil horizon C, SWMU 31

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.77
Where		std. dev.	0.26
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	4.9464488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
31MW3A1	3.45	4.0560767	31.54	57.747305	No
31MW2A	3.05	4.0560767	21.16	57.747305	No
31MW4A1	2.87	4.0560767	17.70	57.747305	No
31MW3B2	3.69	4.0560767	40.00	57.747305	No
31MW2B	3.04	4.0560767	20.86	57.747305	No
31MW4B2	2.64	4.0560767	13.96	57.747305	No
31MW1A2	-0.46	4.0560767	0.63	57.747305	No
31MW1B3	1.99	4.0560767	7.32	57.747305	No
31MW4C4	2.99	4.0560767	19.98	57.747305	No

Mercury horizon C

379

Poisson-based Tolerance Limit (K) Calculation for Mercury soil horizon C, SWMU 31

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where

Tn =	Poisson count of background
n =	Background sample size
alpha =	Probability level test is conducted at (here, 0.05)

Tn	0.31
2Tn+2	2.62
Chi Square (2Tn+2)	7.14479
n	6
Lambda Tn	0.5953992
2(Lambda Tn)	1.1907983
Chi Square0.05[2K+2]>=	1.1907983
[2K+2] = 6	
K = 2	

FSampNo	Value	Limit	Limit Exceeded?
31MW3A1	0.18	2	No
31MW2A	0.03	2	No
31MW4A1	0.03	2	No
31MW3B2	0.03	2	No
31MW2B	0.07	2	No
31MW4B2	0.03	2	No
31MW1A2	0.03	2	No
31MW1B3	0.03	2	No
31MW4C4	0.03	2	No

Nickel horizon C

380

Normal Tolerance Limit (K) Calculation for Nickel soil horizon C, SWMU 31

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.69
Where		std. dev.	0.34
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	4.8664488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
31MW3A10	2.53	4.3445926	12.60	77.060635	No
31MW2A	2.59	4.3445926	13.37	77.060635	No
31MW4A12	3.01	4.3445926	20.23	77.060635	No
31MW3B20	2.59	4.3445926	13.30	77.060635	No
31MW2B	3.13	4.3445926	22.78	77.060635	No
31MW4B22	2.90	4.3445926	18.18	77.060635	No
31MW1A25	3.16	4.3445926	23.62	77.060635	No
31MW1B35	3.43	4.3445926	30.89	77.060635	No
31MW4C40	3.07	4.3445926	21.49	77.060635	No

Selenium horizon C

Poisson-based Tolerance Limit (K) Calculation for Selenium soil horizon C, SWMU 31

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where

Lambda of Tn =	(1/2n)*((Chi Square at alpha) of (2Tn+2)	Tn	1.61
Where		2Tn+2	5.22
Tn =	Poisson count of background	Chi Square (2	11.4097
n =	Background sample size	n	6
alpha =	Probability level test is conducted at (here, 0.05)	Lambda Tn	0.950808333
		2(Lambda Tn)	1.901616667
		Chi Square0.0	1.901616667
		[2K+2] = 7	
		K = 2.5	

FSampNo	Value	Limit	Limit Exceeded?
31MW3A10	0.26	2.5	No
31MW2A	0.28	2.5	No
31MW4A12	0.26	2.5	No
31MW3B20	0.25	2.5	No
31MW2B	0.27	2.5	No
31MW4B22	0.25	2.5	No
31MW1A25	0.24	2.5	No
31MW1B35	0.24	2.5	No
31MW4C40	0.26	2.5	No

Silver horizon C

Poisson-based Tolerance Limit (K) Calculation for Silver soil horizon C, SWMU 31

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	0.04
2Tn+2	2.08
Chi Square (2Tn+2)	6.1455
n	6
Lambda Tn	0.512125
2(Lambda Tn)	1.02425
Chi Square0.05[2K+2]>=	1.02425
[2K+2] = 5	
K = 1.5	

FSampNo	Value	Limit	Limit Exceeded?
31MW3A1	0.005	1.5	No
31MW2A	0.01	1.5	No
31MW4A1	0.005	1.5	No
31MW3B2	0.11	1.5	No
31MW2B	0.005	1.5	No
31MW4B2	0.005	1.5	No
31MW1A2	0.005	1.5	No
31MW1B3	0.01	1.5	No
31MW4C4	0.005	1.5	No

Thallium horizon C

Poisson-based Tolerance Limit (K) Calculation for Thallium soil horizon C, SWMU 31

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where

Tn =	Poisson count of background
n =	Background sample size
alpha =	Probability level test is conducted at (here, 0.05)

Tn	121.19
2Tn+2	244.38
Chi Square (2Tn+2)	281.844
n	6
Lambda Tn	23.487
2(Lambda Tn)	46.974
Chi Square0.05[2K+2]>=	46.974
[2K+2] = 65	
K = 31.5	

FSampNo	Value	Limit	Limit Exceeded?
31MW3A1	17.15	31.5	No
31MW2A	21.23	31.5	No
31MW4A1	19.72	31.5	No
31MW3B2	17.15	31.5	No
31MW2B	19.06	31.5	No
31MW4B2	18.56	31.5	No
31MW1A2	17.92	31.5	No
31MW1B3	18.22	31.5	No
31MW4C4	19.92	31.5	No

Antimony horizon B

Poisson-based Tolerance Limit (K) Calculation for Antimony soil horizon B, SWMU 54

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where

Tn =	Poisson count of background
n =	Background sample size
alpha =	Probability level test is conducted at (here, 0.05)

Tn	70.65
2Tn+2	143.30
Chi Square (2Tn+2)	172.234
n	6
Lambda Tn	14.352833
2(Lambda Tn)	28.705667
Chi Square0.05[2K+2]>=	28.705667
[2K+2] = 43	
K = 20.5	

FSampNo	Value	Limit	Limit Exceeded?
54SB10A	11.85	20.5	No
54SB11A	11.91	20.5	No
54SB12A	12.24	20.5	No
54SB13A	12.03	20.5	No
54SB14A	11.56	20.5	No
54SB16A	12	20.5	No
54SB1A	11.52	20.5	No
54SB2A	10.99	20.5	No
54SB3A	11.27	20.5	No
54SB4A	12.15	20.5	No
54SB5A	12.22	20.5	No
54SB6A	11.93	20.5	No
54SB7A	11.2	20.5	No
54SB8A	11.85	20.5	No

Antimony horizon C

385

Poisson-based Tolerance Limit (K) Calculation for Antimony soil horizon C, SWMU 54

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where

Tn =	Poisson count of background
n =	Background sample size
alpha =	Probability level test is conducted at (here, 0.05)

Tn	69.27
2Tn+2	140.54
Chi Square (2Tn+2)	169.204
n	6
Lambda Tn	14.100333
2(Lambda Tn)	28.200667
Chi Square0.05[2K+2]>=	28.200667

[2K+2] = 43
K = 20.5

FSampNo	Value	Limit	Limit Exceeded?
54SB15A	12.2	20.5	No
54SB9A	11.95	20.5	No
54SB16B	12.1	20.5	No
54SB14B	11.81	20.5	No
54SB6B	13.61	20.5	No
54SB10B	12.01	20.5	No
54SB11B	11.87	20.5	No
54SB12B	13.02	20.5	No
54SB2B	12.03	20.5	No
54SB3B	12.9	20.5	No
54SB4B	11.8	20.5	No
54SB5B	12.49	20.5	No
54SB7B	13.14	20.5	No
54SB8B	12.22	20.5	No
54SB9B	12.31	20.5	No
54SB10D	11.22	20.5	No
54SB13B	11.87	20.5	No
54SB1B	10.72	20.5	No
54SB16D	12.19	20.5	No

Arsenic horizon B

Poisson-based Tolerance Limit (K) Calculation for Arsenic soil horizon B, SWMU 54

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where

Lambda of Tn =	(1/2n)*((Chi Square at alpha) of (2Tn+2)
Where	
Tn =	Poisson count of background
n =	Background sample size
alpha =	Probability level test is conducted at (here, 0.05)

Tn	13.85
2Tn+2	29.70
Chi Square (2Tn+2)	43.4086
n	6
Lambda Tn	3.6173833
2(Lambda Tn)	7.2347667
Chi Square0.05[2K+2]>=	7.2347667
[2K+2] = 15	
K = 6.5	

FSampNo	Value	Limit	Limit Exceeded?
54SB10A	4.28	6.5	No
54SB11A	1.57	6.5	No
54SB12A	1.56	6.5	No
54SB13A	1.54	6.5	No
54SB14A	1.48	6.5	No
54SB16A	1.53	6.5	No
54SB1A	1.47	6.5	No
54SB2A	3.27	6.5	No
54SB3A	1.44	6.5	No
54SB4A	1.55	6.5	No
54SB5A	1.56	6.5	No
54SB6A	4.08	6.5	No
54SB7A	1.43	6.5	No
54SB8A	1.51	6.5	No

Arsenic horizon C

Poisson-based Tolerance Limit (K) Calculation for Arsenic soil horizon C, SWMU 54

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where

Tn =	Poisson count of background
n =	Background sample size
alpha =	Probability level test is conducted at (here, 0.05)

Tn	14.26
2Tn+2	30.52
Chi Square (2Tn+2)	44.4038
n	6
Lambda Tn	3.7003167
2(Lambda Tn)	7.4006333
Chi Square0.05[2K+2]>=	7.4006333
[2K+2] = 16	
K = 7	

FSampNo	Value	Limit	Limit Exceeded?
54SB15A	1.55	7	No
54SB9A	1.53	7	No
54SB16B	1.55	7	No
54SB14B	1.51	7	No
54SB6B	1.74	7	No
54SB10B	1.53	7	No
54SB11B	1.52	7	No
54SB12B	1.66	7	No
54SB2B	1.54	7	No
54SB3B	1.65	7	No
54SB4B	1.51	7	No
54SB5B	1.59	7	No
54SB7B	1.68	7	No
54SB8B	1.56	7	No
54SB9B	1.57	7	No
54SB10D	1.43	7	No
54SB13B	1.52	7	No
54SB1B	1.37	7	No
54SB16D	1.56	7	No

Barium horizon B

Normal Tolerance Limit (K) Calculation for Barium soil horizon B, SWMU 54

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	4.95
Where		std. dev.	0.35
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	7.1264488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
54SB10A	5.77	7.4442571	319.23	1710.0144	No
54SB11A	5.41	7.4442571	223.57	1710.0144	No
54SB12A	5.46	7.4442571	235.96	1710.0144	No
54SB13A	5.42	7.4442571	226.99	1710.0144	No
54SB14A	5.03	7.4442571	153.30	1710.0144	No
54SB16A	5.44	7.4442571	231.33	1710.0144	No
54SB1A	5.10	7.4442571	164.51	1710.0144	No
54SB2A	5.41	7.4442571	224.22	1710.0144	No
54SB3A	5.18	7.4442571	178.16	1710.0144	No
54SB4A	5.75	7.4442571	313.51	1710.0144	No
54SB5A	5.64	7.4442571	281.80	1710.0144	No
54SB6A	6.98	7.4442571	1077.02	1710.0144	No
54SB7A	4.93	7.4442571	138.29	1710.0144	No
54SB8A	5.24	7.4442571	188.63	1710.0144	No

Barium horizon C

Normal Tolerance Limit (K) Calculation for Barium soil horizon C, SWMU 54

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	4.53
Where		std. dev.	0.38
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	6.7064488
Limit =	Avg. + K(std. dev.)		

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
54SB15A	5.82	7.0784505	338.27	1186.1292	No
54SB9A	5.27	7.0784505	193.90	1186.1292	No
54SB16B	5.32	7.0784505	203.70	1186.1292	No
54SB14B	5.11	7.0784505	166.27	1186.1292	No
54SB6B	5.89	7.0784505	362.50	1186.1292	No
54SB10B	5.06	7.0784505	158.09	1186.1292	No
54SB11B	5.17	7.0784505	175.54	1186.1292	No
54SB12B	5.51	7.0784505	248.34	1186.1292	No
54SB2B	5.17	7.0784505	175.46	1186.1292	No
54SB3B	4.47	7.0784505	87.63	1186.1292	No
54SB4B	4.68	7.0784505	108.30	1186.1292	No
54SB5B	5.50	7.0784505	244.59	1186.1292	No
54SB7B	6.04	7.0784505	420.91	1186.1292	No
54SB8B	5.49	7.0784505	243.14	1186.1292	No
54SB9B	5.30	7.0784505	201.01	1186.1292	No
54SB10D	4.95	7.0784505	141.88	1186.1292	No
54SB13B	4.78	7.0784505	118.64	1186.1292	No
54SB1B	5.73	7.0784505	307.44	1186.1292	No
54SB16D	5.47	7.0784505	237.56	1186.1292	No

Beryllium horizon B

390

Poisson-based Tolerance Limit (K) Calculation for Beryllium soil horizon B, SWMU 54

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	7.83
2Tn+2	17.66
Chi Square (2Tn+2)	28.4343
n	6
Lambda Tn	2.369525
2(Lambda Tn)	4.73905
Chi Square0.05[2K+2]>=	4.73905
[2K+2] = 12	
K = 5	

FSampNo	Value	Limit	Limit Exceeded?
54SB10A	1.81	5	No
54SB11A	1.49	5	No
54SB12A	1.54	5	No
54SB13A	1.42	5	No
54SB14A	0.89	5	No
54SB16A	1.47	5	No
54SB1A	0.93	5	No
54SB2A	1.76	5	No
54SB3A	1.11	5	No
54SB4A	1.78	5	No
54SB5A	1.55	5	No
54SB6A	1.11	5	No
54SB7A	0.82	5	No
54SB8A	1.15	5	No

Beryllium horizon C

Normal Tolerance Limit (K) Calculation for Beryllium soil horizon C, SWMU 54

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	-0.09993
Where		std. dev.	0.27
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	2.0765188

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
54SB15A	0.66	0.4607301	1.93	1.5852309	Yes
54SB9A	0.33	0.4607301	1.39	1.5852309	No
54SB16B	0.39	0.4607301	1.48	1.5852309	No
54SB14B	0.08	0.4607301	1.08	1.5852309	No
54SB6B	0.89	0.4607301	2.43	1.5852309	Yes
54SB10B	0.18	0.4607301	1.20	1.5852309	No
54SB11B	0.30	0.4607301	1.34	1.5852309	No
54SB12B	0.60	0.4607301	1.82	1.5852309	Yes
54SB2B	0.28	0.4607301	1.33	1.5852309	No
54SB3B	-1.27	0.4607301	0.28	1.5852309	No
54SB4B	-1.35	0.4607301	0.26	1.5852309	No
54SB5B	0.47	0.4607301	1.61	1.5852309	Yes
54SB7B	0.90	0.4607301	2.47	1.5852309	Yes
54SB8B	0.54	0.4607301	1.72	1.5852309	Yes
54SB9B	0.43	0.4607301	1.53	1.5852309	No
54SB10D	0.03	0.4607301	1.03	1.5852309	No
54SB13B	-1.35	0.4607301	0.26	1.5852309	No
54SB1B	-1.43	0.4607301	0.24	1.5852309	No
54SB16D	0.57	0.4607301	1.77	1.5852309	Yes

Cadmium horizon B

392

Poisson-based Tolerance Limit (K) Calculation for Cadmium soil horizon B, SWMU 54

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where

Tn =	Poisson count of background
n =	Background sample size
alpha =	Probability level test is conducted at (here, 0.05)

Tn	4.33
2Tn+2	10.66
Chi Square (2Tn+2)	19.212
n	6
Lambda Tn	1.601
2(Lambda Tn)	3.202
Chi Square0.05[2K+2]>=	3.202
[2K+2] = 9	
K = 3.5	

FSampNo	Value	Limit	Limit Exceeded?
54SB10A	0.73	3.5	No
54SB11A	0.73	3.5	No
54SB12A	0.75	3.5	No
54SB13A	0.74	3.5	No
54SB14A	0.71	3.5	No
54SB16A	0.74	3.5	No
54SB1A	2.4	3.5	No
54SB2A	0.68	3.5	No
54SB3A	0.69	3.5	No
54SB4A	0.75	3.5	No
54SB5A	0.75	3.5	No
54SB6A	11.75	3.5	Yes
54SB7A	0.69	3.5	No
54SB8A	0.73	3.5	No

Cadmium horizon C

Poisson-based Tolerance Limit (K) Calculation for Cadmium soil horizon C, SWMU 54

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	4.21
2Tn+2	10.42
Chi Square (2Tn+2)	18.8839
n	6
Lambda Tn	1.5736583
2(Lambda Tn)	3.1473167
Chi Square0.05[2K+2]>=	3.1473167
[2K+2] = 9	
K = 3.5	

FSampNo	Value	Limit	Limit Exceeded?
54SB15A	0.74	3.5	No
54SB9A	0.73	3.5	No
54SB16B	0.74	3.5	No
54SB14B	0.73	3.5	No
54SB6B	0.84	3.5	No
54SB10B	0.74	3.5	No
54SB11B	0.73	3.5	No
54SB12B	0.8	3.5	No
54SB2B	0.74	3.5	No
54SB3B	0.79	3.5	No
54SB4B	0.72	3.5	No
54SB5B	0.77	3.5	No
54SB7B	0.81	3.5	No
54SB8B	0.75	3.5	No
54SB9B	0.76	3.5	No
54SB10D	0.69	3.5	No
54SB13B	0.73	3.5	No
54SB1B	0.66	3.5	No
54SB16D	0.75	3.5	No

Chromium horizon B

Normal Tolerance Limit (K) Calculation for Chromium soil horizon B, SWMU 54

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.76
Where		std. dev.	0.21
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	5.9364488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
54SB10A	3.52	5.0066542	33.86	149.40403	No
54SB11A	3.50	5.0066542	33.17	149.40403	No
54SB12A	3.59	5.0066542	36.08	149.40403	No
54SB13A	3.44	5.0066542	31.29	149.40403	No
54SB14A	3.02	5.0066542	20.52	149.40403	No
54SB16A	3.53	5.0066542	34.27	149.40403	No
54SB1A	3.23	5.0066542	25.38	149.40403	No
54SB2A	3.33	5.0066542	27.91	149.40403	No
54SB3A	3.34	5.0066542	28.16	149.40403	No
54SB4A	3.57	5.0066542	35.56	149.40403	No
54SB5A	3.54	5.0066542	34.54	149.40403	No
54SB6A	4.92	5.0066542	136.92	149.40403	No
54SB7A	3.18	5.0066542	24.00	149.40403	No
54SB8A	3.32	5.0066542	27.69	149.40403	No

Chromium horizon C

Normal Tolerance Limit (K) Calculation for Chromium soil horizon C, SWMU 54

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	3.55
Where		std. dev.	0.22
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	5.7264488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
54SB15A	3.83	4.8098187	45.93	122.70937	No
54SB9A	3.33	4.8098187	27.93	122.70937	No
54SB16B	3.53	4.8098187	34.20	122.70937	No
54SB14B	3.53	4.8098187	34.10	122.70937	No
54SB6B	4.25	4.8098187	70.14	122.70937	No
54SB10B	3.39	4.8098187	29.78	122.70937	No
54SB11B	3.49	4.8098187	32.93	122.70937	No
54SB12B	3.84	4.8098187	46.48	122.70937	No
54SB2B	3.38	4.8098187	29.45	122.70937	No
54SB3B	3.63	4.8098187	37.76	122.70937	No
54SB4B	3.06	4.8098187	21.30	122.70937	No
54SB5B	3.70	4.8098187	40.64	122.70937	No
54SB7B	4.04	4.8098187	57.10	122.70937	No
54SB8B	3.69	4.8098187	40.15	122.70937	No
54SB9B	3.63	4.8098187	37.56	122.70937	No
54SB10D	3.30	4.8098187	27.23	122.70937	No
54SB13B	3.48	4.8098187	32.32	122.70937	No
54SB1B	2.28	4.8098187	9.80	122.70937	No
54SB16D	3.77	4.8098187	43.53	122.70937	No

Lead horizon B

Normal Tolerance Limit (K) Calculation for Lead soil horizon B, SWMU 54

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.91
Where		std. dev.	0.35
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	5.0864488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
54SB10A	5.33	4.6902571	205.56	108.88117	Yes
54SB11A	4.51	4.6902571	91.13	108.88117	No
54SB12A	3.06	4.6902571	21.22	108.88117	No
54SB13A	4.91	4.6902571	134.97	108.88117	Yes
54SB14A	3.60	4.6902571	36.56	108.88117	No
54SB16A	3.46	4.6902571	31.82	108.88117	No
54SB1A	6.57	4.6902571	716.80	108.88117	Yes
54SB2A	7.76	4.6902571	2354.26	108.88117	Yes
54SB3A	5.77	4.6902571	321.84	108.88117	Yes
54SB4A	4.43	4.6902571	84.26	108.88117	No
54SB5A	3.69	4.6902571	39.90	108.88117	No
54SB6A	8.24	4.6902571	3789.73	108.88117	Yes
54SB7A	3.92	4.6902571	50.29	108.88117	No
54SB8A	5.44	4.6902571	229.75	108.88117	Yes

Lead horizon C

Normal Tolerance Limit (K) Calculation for Lead soil horizon C

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.77
Where		std. dev.	0.26
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	4.9464488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
54SB15A	3.35	4.0560767	28.40	57.747305	No
54SB9A	3.04	4.0560767	20.85	57.747305	No
54SB16B	2.70	4.0560767	14.81	57.747305	No
54SB14B	2.58	4.0560767	13.25	57.747305	No
54SB6B	6.07	4.0560767	430.56	57.747305	Yes
54SB10B	2.46	4.0560767	11.69	57.747305	No
54SB11B	2.49	4.0560767	12.11	57.747305	No
54SB12B	2.59	4.0560767	13.28	57.747305	No
54SB2B	2.66	4.0560767	14.23	57.747305	No
54SB3B	2.69	4.0560767	14.74	57.747305	No
54SB4B	2.12	4.0560767	8.36	57.747305	No
54SB5B	2.82	4.0560767	16.82	57.747305	No
54SB7B	3.13	4.0560767	22.79	57.747305	No
54SB8B	3.05	4.0560767	21.20	57.747305	No
54SB9B	2.76	4.0560767	15.83	57.747305	No
54SB10D	2.58	4.0560767	13.16	57.747305	No
54SB13B	2.11	4.0560767	8.23	57.747305	No
54SB1B	1.75	4.0560767	5.77	57.747305	No
54SB16D	2.62	4.0560767	13.68	57.747305	No

Mercury horizon B

Poisson-based Tolerance Limit (K) Calculation for Mercury soil horizon B, SWMU 54

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	0.22
2Tn+2	2.44
Chi Square (2Tn+2)	6.81867
n	6
Lambda Tn	0.5682225
2(Lambda Tn)	1.136445
Chi Square0.05[2K+2]>=	1.136445
[2K+2] = 5	
K = 1.5	

FSampNo	Value	Limit	Limit Exceeded?
54SB10A	0.03	1.5	No
54SB11A	0.03	1.5	No
54SB12A	0.03	1.5	No
54SB13A	0.03	1.5	No
54SB14A	0.03	1.5	No
54SB16A	0.03	1.5	No
54SB1A	0.09	1.5	No
54SB2A	0.13	1.5	No
54SB3A	5.06	1.5	Yes
54SB4A	0.03	1.5	No
54SB5A	0.03	1.5	No
54SB6A	72.13	1.5	Yes
54SB7A	0.03	1.5	No
54SB8A	0.03	1.5	No

Mercury Horizon C

Poisson-based Tolerance Limit (K) Calculation for Mercury soil horizon C, SWMU 54

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	0.31
2Tn+2	2.62
Chi Square (2Tn+2)	7.14479
n	6
Lambda Tn	0.5953992
2(Lambda Tn)	1.1907983
Chi Square0.05[2K+2]>=	1.1907983
[2K+2] = 6	
K = 2	

FSampNo	Value	Limit	Limit Exceeded?
54SB15A	0.03	2	No
54SB9A	0.03	2	No
54SB16B	0.03	2	No
54SB14B	0.03	2	No
54SB6B	0.04	2	No
54SB10B	0.12	2	No
54SB11B	0.03	2	No
54SB12B	0.04	2	No
54SB2B	0.03	2	No
54SB3B	0.21	2	No
54SB4B	0.03	2	No
54SB5B	0.03	2	No
54SB7B	0.04	2	No
54SB8B	0.03	2	No
54SB9B	0.03	2	No
54SB10D	0.03	2	No
54SB13B	0.03	2	No
54SB1B	0.03	2	No
54SB16D	0.03	2	No

400

Nickel horizon B

Normal Tolerance Limit (K) Calculation for Nickel soil horizon B, SWMU 54

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.98
Where		std. dev.	0.4
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	5.1564488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
54SB10A	2.98	5.0425795	19.71	154.86898	No
54SB11A	3.00	5.0425795	20.05	154.86898	No
54SB12A	3.00	5.0425795	20.10	154.86898	No
54SB13A	2.94	5.0425795	18.90	154.86898	No
54SB14A	2.52	5.0425795	12.38	154.86898	No
54SB16A	3.02	5.0425795	20.56	154.86898	No
54SB1A	2.46	5.0425795	11.66	154.86898	No
54SB2A	2.33	5.0425795	10.25	154.86898	No
54SB3A	2.60	5.0425795	13.45	154.86898	No
54SB4A	3.07	5.0425795	21.44	154.86898	No
54SB5A	3.05	5.0425795	21.20	154.86898	No
54SB6A	2.83	5.0425795	16.99	154.86898	No
54SB7A	2.51	5.0425795	12.34	154.86898	No
54SB8A	2.75	5.0425795	15.60	154.86898	No

Nickel horizon C

Normal Tolerance Limit (K) Calculation for Nickel soil horizon C, SWMU 54

K =average+ t((N-1),alpha)*SQRT(1+(1/N))		average	2.69
Where		std. dev.	0.34
t =	Critical value of Student's t distribution	t	2.015
N =	Sample size	N	6
alpha =	Probability level test is conducted at (here, 0.05)	K	4.8664488

FSampNo	LN Value	LN Limit	Value	Limit	Limit Exceeded?
54SB15A	3.26	4.3445926	26.05	77.060635	No
54SB9A	2.87	4.3445926	17.68	77.060635	No
54SB16B	3.00	4.3445926	20.12	77.060635	No
54SB14B	3.00	4.3445926	20.12	77.060635	No
54SB6B	3.41	4.3445926	30.14	77.060635	No
54SB10B	2.89	4.3445926	18.01	77.060635	No
54SB11B	2.94	4.3445926	18.89	77.060635	No
54SB12B	3.27	4.3445926	26.43	77.060635	No
54SB2B	2.81	4.3445926	16.69	77.060635	No
54SB3B	2.33	4.3445926	10.26	77.060635	No
54SB4B	2.22	4.3445926	9.19	77.060635	No
54SB5B	3.20	4.3445926	24.46	77.060635	No
54SB7B	3.55	4.3445926	34.72	77.060635	No
54SB8B	3.24	4.3445926	25.56	77.060635	No
54SB9B	3.12	4.3445926	22.61	77.060635	No
54SB10D	2.74	4.3445926	15.45	77.060635	No
54SB13B	2.58	4.3445926	13.20	77.060635	No
54SB1B	1.83	4.3445926	6.23	77.060635	No
54SB16D	3.19	4.3445926	24.25	77.060635	No

Selenium horizon B

Poisson-based Tolerance Limit (K) Calculation for Selenium soil horizon B, SWMU 54

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where

Tn =	Poisson count of background
n =	Background sample size
alpha =	Probability level test is conducted at (here, 0.05)

Tn	1.62
2Tn+2	5.24
Chi Square (2Tn+2)	11.4404
n	6
Lambda Tn	0.9533667
2(Lambda Tn)	1.9067333
Chi Square0.05[2K+2]>=	1.9067333
[2K+2] = 7	
K = 2.5	

FSampNo	Value	Limit	Limit Exceeded?
54SB10A	0.27	2.5	No
54SB11A	0.28	2.5	No
54SB12A	0.28	2.5	No
54SB13A	0.28	2.5	No
54SB14A	0.27	2.5	No
54SB16A	0.28	2.5	No
54SB1A	0.27	2.5	No
54SB2A	0.25	2.5	No
54SB3A	0.26	2.5	No
54SB4A	0.28	2.5	No
54SB5A	0.28	2.5	No
54SB6A	0.28	2.5	No
54SB7A	0.26	2.5	No
54SB8A	0.27	2.5	No

Selenium horizon C

Poisson-based Tolerance Limit (K) Calculation for Selenium soil horizon C, SWMU 54

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where

Tn =	Poisson count of background
n =	Background sample size
alpha =	Probability level test is conducted at (here, 0.05)

Tn	1.61
2Tn+2	5.22
Chi Square (2Tn+2)	11.4097
n	6
Lambda Tn	0.9508083
2(Lambda Tn)	1.9016167
Chi Square0.05[2K+2]>=	1.9016167
[2K+2] = 7	
K = 2.5	

FSampNo	Value	Limit	Limit Exceeded?
54SB15A	0.28	2.5	No
54SB9A	0.28	2.5	No
54SB16B	0.28	2.5	No
54SB14B	0.27	2.5	No
54SB6B	0.31	2.5	No
54SB10B	0.28	2.5	No
54SB11B	0.27	2.5	No
54SB12B	0.3	2.5	No
54SB2B	0.28	2.5	No
54SB3B	0.3	2.5	No
54SB4B	0.27	2.5	No
54SB5B	0.29	2.5	No
54SB7B	0.3	2.5	No
54SB8B	0.28	2.5	No
54SB9B	0.28	2.5	No
54SB10D	0.26	2.5	No
54SB13B	0.27	2.5	No
54SB1B	0.25	2.5	No
54SB16D	0.28	2.5	No

Silver horizon B

Poisson-based Tolerance Limit (K) Calculation for Silver soil horizon B, SWMU 54

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	0.585
2Tn+2	3.17
Chi Square (2Tn+2)	8.10743
n	6
Lambda Tn	0.6756192
2(Lambda Tn)	1.3512383
Chi Square0.05[2K+2]>=	1.3512383
[2K+2] = 6	
K = 2	

FSampNo	Value	Limit	Limit Exceeded?
54SB10A	0.07	2	No
54SB11A	0.01	2	No
54SB12A	0.01	2	No
54SB13A	0.07	2	No
54SB14A	0.005	2	No
54SB16A	0.01	2	No
54SB1A	0.07	2	No
54SB2A	0.03	2	No
54SB3A	0.03	2	No
54SB4A	0.04	2	No
54SB5A	0.04	2	No
54SB6A	0.3	2	No
54SB7A	0.005	2	No
54SB8A	0.02	2	No

405

Silver horizon C

Poisson-based Tolerance Limit (K) Calculation for Silver soil horizon C, SWMU 54

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	0.04
2Tn+2	2.08
Chi Square (2Tn+2)	6.1455
n	6
Lambda Tn	0.512125
2(Lambda Tn)	1.02425
Chi Square0.05[2K+2]>=	1.02425
[2K+2] = 5	
K = 1.5	

FSampNo	Value	Limit	Limit Exceeded?
54SB15A	0.01	1.5	No
54SB9A	0.02	1.5	No
54SB16B	0.01	1.5	No
54SB14B	0.005	1.5	No
54SB6B	0.01	1.5	No
54SB10B	0.03	1.5	No
54SB11B	0.01	1.5	No
54SB12B	0.01	1.5	No
54SB2B	0.03	1.5	No
54SB3B	0.04	1.5	No
54SB4B	0.03	1.5	No
54SB5B	0.05	1.5	No
54SB7B	0.01	1.5	No
54SB8B	0.01	1.5	No
54SB9B	0.04	1.5	No
54SB10D	0.03	1.5	No
54SB13B	0.01	1.5	No
54SB1B	0.005	1.5	No
54SB16D	0.01	1.5	No

Thallium Horizon B

Poisson-based Tolerance Limit (K) Calculation for Thallium soil horizon B, SWMU 54

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	123.64
2Tn+2	249.28
Chi Square (2Tn+2)	287.107
n	6
Lambda Tn	23.925583
2(Lambda Tn)	47.851167
Chi Square0.05[2K+2]>=	47.851167
[2K+2] = 66	
K = 32	

FSampNo	Value	Limit	Limit Exceeded?
54SB10A	20.74	32	No
54SB11A	20.84	32	No
54SB12A	21.41	32	No
54SB13A	21.05	32	No
54SB14A	20.23	32	No
54SB16A	20.99	32	No
54SB1A	20.16	32	No
54SB2A	19.23	32	No
54SB3A	19.72	32	No
54SB4A	21.25	32	No
54SB5A	21.39	32	No
54SB6A	20.97	32	No
54SB7A	19.6	32	No
54SB8A	20.74	32	No

Thallium horizon C

Poisson-based Tolerance Limit (K) Calculation for Thallium soil horizon C

K = Poisson based tolerance limit
Where
Chi square at alpha [2K+2] >= 2(Lambda of Tn)
Where
Lambda of Tn = (1/2n)*((Chi Square at alpha) of (2Tn+2)
Where
Tn = Poisson count of background
n = Background sample size
alpha = Probability level test is conducted at (here, 0.05)

Tn	121.19
2Tn+2	244.38
Chi Square (2Tn+2)	281.844
n	6
Lambda Tn	23.487
2(Lambda Tn)	46.974
Chi Square0.05[2K+2]>=	46.974
[2K+2] = 65	
K = 31.5	

FSampNo	Value	Limit	Limit Exceeded?
54SB15A	21.18	31.5	No
54SB9A	20.92	31.5	No
54SB16B	21.18	31.5	No
54SB14B	20.67	31.5	No
54SB6B	23.82	31.5	No
54SB10B	21.02	31.5	No
54SB11B	20.77	31.5	No
54SB12B	22.78	31.5	No
54SB2B	21.05	31.5	No
54SB3B	22.57	31.5	No
54SB4B	20.64	31.5	No
54SB5B	21.85	31.5	No
54SB7B	22.99	31.5	No
54SB8B	21.39	31.5	No
54SB9B	21.55	31.5	No
54SB10D	19.62	31.5	No
54SB13B	20.77	31.5	No
54SB1B	18.77	31.5	No
54SB16D	21.33	31.5	No

408

TAIL AREA PROBABILITY CALCULATIONS

New River Surface Water, Barium

Tail Area Probabilities

Distributions available:

(1) Bernoulli	(7) Beta	(13) Lognormal
(2) Binomial	(8) Chi-square	(14) Normal
(3) Discrete uniform	(9) Erlang	(15) Student's t
(4) Geometric	(10) Exponential	(16) Triangular
(5) Negative binomial	(11) F	(17) Uniform
(6) Poisson	(12) Gamma	(18) Weibull

Distribution number: 13

Mean: 3.22

Standard deviation: 0.004619

Area at or below 3.27	= 1.	Sample: NRSW4
Area at or below 3.05	= 0.	Sample: NRSW5
Area at or below 3.21	= 0.015094	Sample: NRSW6
Area at or below 3.28	= 1.	Sample: SPG3SW1

New River Sediment, Barium

Tail Area Probabilities

Distributions available:

(1) Bernoulli	(7) Beta	(13) Lognormal
(2) Binomial	(8) Chi-square	(14) Normal
(3) Discrete uniform	(9) Erlang	(15) Student's t
(4) Geometric	(10) Exponential	(16) Triangular
(5) Negative binomial	(11) F	(17) Uniform
(6) Poisson	(12) Gamma	(18) Weibull

Distribution number: 13

Mean: 5.49

Standard deviation: 0.506317

Area at or below 4.58	= 0.027226	Sample: NRSE4
Area at or below 5.19	= 0.286173	Sample: NRSE5
Area at or below 4.70	= 0.050275	Sample: NRSE6
Area at or below 6.55	= 0.97525	Sample: SPGSE1

95th Percentile of Background = 6.36

New River Sediment, Benz(a) anthracene

Tail Area Probabilities

Distributions available:

(1) Bernoulli	(7) Beta	(13) Lognormal
(2) Binomial	(8) Chi-square	(14) Normal
(3) Discrete uniform	(9) Erlang	(15) Student's t
(4) Geometric	(10) Exponential	(16) Triangular
(5) Negative binomial	(11) F	(17) Uniform
(6) Poisson	(12) Gamma	(18) Weibull

Distribution number: 14

Mean: 0.54

Standard deviation: 0.202672

Area at or below 0.03	= 0.005928	Sample: NRSE4
Area at or below 0.09	= 0.013198	Sample: NRSE5
Area at or below 0.40	= 0.244853	Sample: NRSE6

95th Percentile of Background = 0.87

New River Sediment, Beryllium

Tail Area Probabilities

Distributions available:

(1) Bernoulli	(7) Beta	(13) Lognormal
(2) Binomial	(8) Chi-square	(14) Normal
(3) Discrete uniform	(9) Erlang	(15) Student's t
(4) Geometric	(10) Exponential	(16) Triangular
(5) Negative binomial	(11) F	(17) Uniform
(6) Poisson	(12) Gamma	(18) Weibull

Distribution number: 14

Mean: 1.26

Standard deviation: 1.536045

Area at or below 0.99	= 0.430233	Sample: NRSE4
Area at or below 1.31	= 0.512987	Sample: NRSE5
Area at or below 0.33	= 0.272438	Sample: NRSE6
Area at or below 4.23	= 0.973415	Sample: SPG3SE1

95th Percentile of Background = 3.79

New River Sediment, Chromium

Tail Area Probabilities

Distributions available:

(1) Bernoulli	(7) Beta	(13) Lognormal
(2) Binomial	(8) Chi-square	(14) Normal
(3) Discrete uniform	(9) Erlang	(15) Student's t
(4) Geometric	(10) Exponential	(16) Triangular
(5) Negative binomial	(11) F	(17) Uniform
(6) Poisson	(12) Gamma	(18) Weibull

Distribution number: 13

Mean: 3.88

Standard deviation: 0.443074

Area at or below 3.63	= 0.298672	Sample: NRSE4
Area at or below 3.45	= 0.164771	Sample: NRSE5
Area at or below 3.21	= 0.053863	Sample: NRSE6
Area at or below 4.14	= 0.734587	Sample: SPG3SE1

95th Percentile of Background = 4.65

New River Sediment, Chrysene

Tail Area Probabilities

Distributions available:

(1) Bernoulli	(7) Beta	(13) Lognormal
(2) Binomial	(8) Chi-square	(14) Normal
(3) Discrete uniform	(9) Erlang	(15) Student's t
(4) Geometric	(10) Exponential	(16) Triangular
(5) Negative binomial	(11) F	(17) Uniform
(6) Poisson	(12) Gamma	(18) Weibull

Distribution number: 14

Mean: 0.90

Standard deviation: 0.686824

Area at or below 0.02	= 0.100051	Sample: NRSE4
Area at or below 0.10	= 0.122053	Sample: NRSE5
Area at or below 0.53	= 0.295041	Sample: NRSE6

95th Percentile of Background = 2.04

New River Sediment, Fluoranthene

Tail Area Probabilities

Distributions available:

(1) Bernoulli	(7) Beta	(13) Lognormal
(2) Binomial	(8) Chi-square	(14) Normal
(3) Discrete uniform	(9) Erlang	(15) Student's t
(4) Geometric	(10) Exponential	(16) Triangular
(5) Negative binomial	(11) F	(17) Uniform
(6) Poisson	(12) Gamma	(18) Weibull

Distribution number: 14

Mean: 0.41

Standard deviation: 0.345881

Area at or below 0.08	= 0.170019	Sample: NRSE4
Area at or below 0.11	= 0.192874	Sample: NRSE5
Area at or below 0.50	= 0.602649	Sample: NRSE6

95th Percentile of Background = 0.98

New River Sediment, Lead

Tail Area Probabilities

Distributions available:

(1) Bernoulli	(7) Beta	(13) Lognormal
(2) Binomial	(8) Chi-square	(14) Normal
(3) Discrete uniform	(9) Erlang	(15) Student's t
(4) Geometric	(10) Exponential	(16) Triangular
(5) Negative binomial	(11) F	(17) Uniform
(6) Poisson	(12) Gamma	(18) Weibull

Distribution number: 13

Mean: 5.07

Standard deviation: 0.20

Area at or below 8.39	= 1.	Sample: NRSE4
Area at or below 5.39	= 0.942008	Sample: NRSE5
Area at or below 4.96	= 0.295786	Sample: NRSE6
Area at or below 6.31	= 1.	Sample: SPG3SE1

95th Percentile of Background = 5.41

New River Sediment, Nickel

Tail Area Probabilities

Distributions available:

(1) Bernoulli	(7) Beta	(13) Lognormal
(2) Binomial	(8) Chi-square	(14) Normal
(3) Discrete uniform	(9) Erlang	(15) Student's t
(4) Geometric	(10) Exponential	(16) Triangular
(5) Negative binomial	(11) F	(17) Uniform
(6) Poisson	(12) Gamma	(18) Weibull

Distribution number: 13

Mean: 3.24

Standard deviation: 0.61909

Area at or below 2.58	= 0.13389	Sample: NRSE4
Area at or below 2.76	= 0.22601	Sample: NRSE5
Area at or below 2.52	= 0.108891	Sample: NRSE6
Area at or below 3.97	= 0.878536	Sample: SPG3SE1

95th Percentile of Background = 4.35

New River Sediment, Phenanthrene

Tail Area Probabilities

Distributions available:

(1) Bernoulli	(7) Beta	(13) Lognormal
(2) Binomial	(8) Chi-square	(14) Normal
(3) Discrete uniform	(9) Erlang	(15) Student's t
(4) Geometric	(10) Exponential	(16) Triangular
(5) Negative binomial	(11) F	(17) Uniform
(6) Poisson	(12) Gamma	(18) Weibull

Distribution number: 14

Mean: 0.69

Standard deviation: 0.164939

Area at or below 0.02	= 0.000024	Sample: NRSE4
Area at or below 0.11	= 0.000219	Sample: NRSE4
Area at or below 0.35	= 0.019634	Sample: NRSE4

95th Percentile of Background = 0.96

New River Sediment, Pyrene

Tail Area Probabilities

Distributions available:

(1) Bernoulli	(7) Beta	(13) Lognormal
(2) Binomial	(8) Chi-square	(14) Normal
(3) Discrete uniform	(9) Erlang	(15) Student's t
(4) Geometric	(10) Exponential	(16) Triangular
(5) Negative binomial	(11) F	(17) Uniform
(6) Poisson	(12) Gamma	(18) Weibull

Distribution number: 14

Mean: 0.73

Standard deviation: 0.307338

Area at or below 0.06	= 0.014628	Sample: NRSE4
Area at or below 0.15	= 0.029568	Sample: NRSE5
Area at or below 0.76	= 0.538883	Sample: NRSE6

95th Percentile of Background = 1.24

4-20

New River Sediment, Silver

Tail Area Probabilities

Distributions available:

(1) Bernoulli	(7) Beta	(13) Lognormal
(2) Binomial	(8) Chi-square	(14) Normal
(3) Discrete uniform	(9) Erlang	(15) Student's t
(4) Geometric	(10) Exponential	(16) Triangular
(5) Negative binomial	(11) F	(17) Uniform
(6) Poisson	(12) Gamma	(18) Weibull

Distribution number: 14

Mean: 0.13

Standard deviation: 0.036502

Area at or below 0.10	= 0.205574	Sample: NRSE4
Area at or below 0.10	= 0.205574	Sample: NRSE5
Area at or below 0.11	= 0.291874	Sample: NRSE6
Area at or below 0.22	= 0.993161.	Sample: SPG3SE1

95th Percentile of Background = 0.19

APPENDIX I

RISK CALCULATION TABLES

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 17
Exposure Scenario: Commercial Worker Exposure to GROUNDWATER--Ingestion

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Antimony	4.13E-02	0.25	1.01	0.00E+00	0.00E+00
Barium	7.71E-02	0.00	0.01	0.00E+00	0.00E+00
Beryllium	1.55E-03	0.00	0.00	1.16E-06	2.32E-05

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.26
Total Hazard Index-RME: 1.02
Total Cancer Risk-CT: 1.16E-06
Total Cancer Risk-RME: 2.32E-05

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 17
Exposure Scenario: Commercial Worker Exposure to GROUNDWATER--Dermal (Showering)

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Antimony	4.13E-02	0.11	0.46	0.00E+00	0.00E+00
Barium	7.71E-02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	1.55E-03	0.00	0.00	5.27E-07	1.06E-05

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.12
Total Hazard Index-RME: 0.46
Total Cancer Risk-CT: 5.27E-07
Total Cancer Risk-RME: 1.06E-05

Facility **Radford Army Ammunition Plant, VA**
Site Name: **SWMU 17A**
Exposure Scenario: **Commercial Worker Exposure to Surface Soil--Ingestion**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	1.02E+02	0.08	0.33	2.67E-06	5.33E-05
Barium	5.77E+02	0.00	0.01	0.00E+00	0.00E+00
Beryllium	9.84E-01	0.00	0.00	7.40E-08	1.48E-06
Cadmium	4.29E+00	0.00	0.01	0.00E+00	0.00E+00
Chromium III	2.23E+02	0.00	0.00	0.00E+00	0.00E+00
Lead	4.72E+03	0.00	0.00	0.00E+00	0.00E+00
Mercury	3.29E-01	0.00	0.00	0.00E+00	0.00E+00
Nickel	6.91E+01	0.00	0.00	0.00E+00	0.00E+00
Silver	2.18E+00	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.09
Total Hazard Index-RME: 0.35
Total Cancer Risk-CT: 2.74E-06
Total Cancer Risk-RME: 5.48E-05

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 17A
Exposure Scenario: Commercial Worker Exposure to Surface Soil--Dermal

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	1.02E+02	0.07	0.17	2.46E-06	3.19E-05
Barium	5.77E+02	0.03	0.07	0.00E+00	0.00E+00
Beryllium	9.84E-01	0.00	0.01	4.67E-06	6.06E-05
Cadmium	4.29E+00	0.07	0.17	0.00E+00	0.00E+00
Chromium III	2.23E+02	0.00	0.00	0.00E+00	0.00E+00
Lead	4.72E+03	0.00	0.00	0.00E+00	0.00E+00
Mercury	3.29E-01	0.02	0.04	0.00E+00	0.00E+00
Nickel	6.91E+01	0.01	0.03	0.00E+00	0.00E+00
Silver	2.18E+00	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.19
Total Hazard Index-RME: 0.50
Total Cancer Risk-CT: 7.13E-06
Total Cancer Risk-RME: 9.25E-05

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 17A
Exposure Scenario: Commercial Worker Exposure to Surface Soil--Inhalation of Particulates

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	1.02E+02	0.00	0.00	6.46E-14	9.73E-13
Barium	5.77E+02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	9.84E-01	0.00	0.00	3.49E-16	5.26E-15
Cadmium	4.29E+00	0.00	0.00	1.14E-15	1.72E-14
Chromium III	2.23E+02	0.00	0.00	0.00E+00	0.00E+00
Lead	4.72E+03	0.00	0.00	0.00E+00	0.00E+00
Mercury	3.29E-01	0.00	0.00	0.00E+00	0.00E+00
Nickel	6.91E+01	0.00	0.00	0.00E+00	0.00E+00
Silver	2.18E+00	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 6.61E-14
Total Cancer Risk-RME: 9.96E-13

Facility **Radford Army Ammunition Plant, VA**
Site Name: **SWMU 17A**
Exposure Scenario: **Hunter Exposure to Surface Soil--Ingestion**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	1.02E+02	0.02	0.05	9.60E-07	1.66E-05
Barium	5.77E+02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	9.84E-01	0.00	0.00	2.66E-08	4.61E-07
Cadmium	4.29E+00	0.00	0.00	0.00E+00	0.00E+00
Chromium III	2.23E+02	0.00	0.00	0.00E+00	0.00E+00
Lead	4.72E+03	0.00	0.00	0.00E+00	0.00E+00
Mercury	3.29E-01	0.00	0.00	0.00E+00	0.00E+00
Nickel	6.91E+01	0.00	0.00	0.00E+00	0.00E+00
Silver	2.18E+00	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.02
Total Hazard Index-RME: 0.06
Total Cancer Risk-CT: 9.86E-07
Total Cancer Risk-RME: 1.71E-05

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 17A
Exposure Scenario: Hunter Exposure to Surface Soil--Dermal

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	1.02E+02	0.01	0.02	5.54E-07	6.04E-06
Barium	5.77E+02	0.00	0.01	0.00E+00	0.00E+00
Beryllium	9.84E-01	0.00	0.00	1.05E-06	1.15E-05
Cadmium	4.29E+00	0.01	0.02	0.00E+00	0.00E+00
Chromium III	2.23E+02	0.00	0.00	0.00E+00	0.00E+00
Lead	4.72E+03	0.00	0.00	0.00E+00	0.00E+00
Mercury	3.29E-01	0.00	0.00	0.00E+00	0.00E+00
Nickel	6.91E+01	0.00	0.00	0.00E+00	0.00E+00
Silver	2.18E+00	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.02
Total Hazard Index-RME: 0.05
Total Cancer Risk-CT: 1.61E-06
Total Cancer Risk-RME: 1.75E-05

Facility	**Radford Army Ammunition Plant, VA**
Site Name:	**SWMU 17A**
Exposure Scenario:	**Construction Worker Exposure to Surface Soil--Ingestion**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	1.02E+02	0.33	1.59	1.07E-06	2.05E-05
Barium	5.77E+02	0.01	0.04	0.00E+00	0.00E+00
Beryllium	9.84E-01	0.00	0.00	2.96E-08	5.68E-07
Cadmium	4.29E+00	0.01	0.04	0.00E+00	0.00E+00
Chromium III	2.23E+02	0.00	0.00	0.00E+00	0.00E+00
Lead	4.72E+03	0.00	0.00	0.00E+00	0.00E+00
Mercury	3.29E-01	0.00	0.01	0.00E+00	0.00E+00
Nickel	6.91E+01	0.00	0.02	0.00E+00	0.00E+00
Silver	2.18E+00	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks

Total Hazard Index-CT: 0.35
Total Hazard Index-RME: 1.70
Total Cancer Risk-CT: 1.10E-06
Total Cancer Risk-RME: 2.10E-05

Facility	**Radford Army Ammunition Plant, VA**
Site Name:	**SWMU 17A**
Exposure Scenario:	**Construction Worker Exposure to Surface Soil--Dermal**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	1.02E+02	0.13	0.17	4.91E-07	2.55E-06
Barium	5.77E+02	0.05	0.07	0.00E+00	0.00E+00
Beryllium	9.84E-01	0.01	0.01	9.35E-07	4.85E-06
Cadmium	4.29E+00	0.13	0.17	0.00E+00	0.00E+00
Chromium III	2.23E+02	0.00	0.00	0.00E+00	0.00E+00
Lead	4.72E+03	0.00	0.00	0.00E+00	0.00E+00
Mercury	3.29E-01	0.03	0.04	0.00E+00	0.00E+00
Nickel	6.91E+01	0.03	0.03	0.00E+00	0.00E+00
Silver	2.18E+00	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks

Total Hazard Index-CT: 0.39
Total Hazard Index-RME: 0.50
Total Cancer Risk-CT: 1.43E-06
Total Cancer Risk-RME: 7.40E-06

Facility **Radford Army Ammunition Plant, VA**
Site Name: **SWMU 17A**
Exposure Scenario: **Construction Worker Exposure to Surface Soil--Inhalation of Particulates**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	1.02E+02	0.00	0.00	3.12E-14	2.18E-13
Barium	5.77E+02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	9.84E-01	0.00	0.00	1.68E-16	1.18E-15
Cadmium	4.29E+00	0.00	0.00	5.50E-16	3.85E-15
Chromium III	2.23E+02	0.00	0.00	0.00E+00	0.00E+00
Lead	4.72E+03	0.00	0.00	0.00E+00	0.00E+00
Mercury	3.29E-01	0.00	0.00	0.00E+00	0.00E+00
Nickel	6.91E+01	0.00	0.00	0.00E+00	0.00E+00
Silver	2.18E+00	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 3.19E-14
Total Cancer Risk-RME: 2.23E-13

Facility **Radford Army Ammunition Plant, VA**
Site Name: **SWMU 17A**
Exposure Scenario: **Construction Worker Exposure to Subsurface Soil--Ingestion**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Antimony	7.16E+01	0.09	0.84	0.00E+00	0.00E+00
Arsenic	9.49E+01	0.15	1.49	4.97E-07	1.91E-05
Barium	5.13E+03	0.04	0.34	0.00E+00	0.00E+00
Benzo (a) anthracene	9.21E-02	0.00	0.00	2.35E-10	9.02E-09
Benzo (b) fluoranthene	4.43E-01	0.00	0.00	1.13E-09	4.34E-08
Benzo (g,h,i) perylene	4.22E-01	0.00	0.00	0.00E+00	0.00E+00
Benzo (k) fluoranthene	1.65E-01	0.00	0.00	4.21E-11	1.62E-09
bis (2-Ethyl hexyl) Phthalate	5.91E+00	0.00	0.00	2.89E-10	1.11E-08
Cadmium	1.37E+01	0.01	0.13	0.00E+00	0.00E+00
Chromium III	2.05E+03	0.00	0.01	0.00E+00	0.00E+00
Chrysene	7.94E-02	0.00	0.00	2.03E-12	7.78E-11
Fluoranthene	7.30E-02	0.00	0.00	0.00E+00	0.00E+00
Lead	5.26E+03	0.00	0.00	0.00E+00	0.00E+00
Nickel	9.03E+02	0.02	0.21	0.00E+00	0.00E+00
Phenanthrene	9.30E-02	0.00	0.00	0.00E+00	0.00E+00
Pyrene	1.71E-01	0.00	0.00	0.00E+00	0.00E+00
Silver	4.23E+01	0.00	0.04	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.32
Total Hazard Index-RME: 3.06
Total Cancer Risk-CT: 4.99E-07
Total Cancer Risk-RME: 1.92E-05

Facility **Radford Army Ammunition Plant, VA**
Site Name: **SWMU 17A**
Exposure Scenario: **Construction Worker Exposure to Subsurface Soil--Dermal**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Antimony	7.16E+01	2.77	7.18	0.00E+00	0.00E+00
Arsenic	9.49E+01	0.06	0.16	2.29E-07	2.38E-06
Barium	5.13E+03	0.23	0.59	0.00E+00	0.00E+00
Benzo (a) anthracene	9.21E-02	0.00	0.00	9.28E-09	9.63E-08
Benzo (b) fluoranthene	4.43E-01	0.00	0.00	4.47E-08	4.64E-07
Benzo (g,h,i) perylene	4.22E-01	0.00	0.00	0.00E+00	0.00E+00
Benzo (k) fluoranthene	1.65E-01	0.00	0.00	1.66E-09	1.73E-08
bis (2-Ethyl hexyl) Phthalate	5.91E+00	0.00	0.01	4.57E-09	4.74E-08
Cadmium	1.37E+01	0.21	0.55	0.00E+00	0.00E+00
Chromium III	2.05E+03	0.02	0.04	0.00E+00	0.00E+00
Chrysene	7.94E-02	0.00	0.00	1.07E-11	1.11E-10
Fluoranthene	7.30E-02	0.00	0.00	0.00E+00	0.00E+00
Lead	5.26E+03	0.00	0.00	0.00E+00	0.00E+00
Nickel	9.03E+02	0.17	0.45	0.00E+00	0.00E+00
Phenanthrene	9.30E-02	0.00	0.00	0.00E+00	0.00E+00
Pyrene	1.71E-01	0.00	0.00	0.00E+00	0.00E+00
Silver	4.23E+01	0.01	0.02	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 3.47
Total Hazard Index-RME: 8.99
Total Cancer Risk-CT: 2.89E-07
Total Cancer Risk-RME: 3.00E-06

Facility **Radford Army Ammunition Plant, VA**
Site Name: **SWMU 17A**
Exposure Scenario: **Construction Worker Exposure to Subsurface Soil--Inhalation of Particulates**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Antimony	7.16E+01	0.00	0.00	0.00E+00	0.00E+00
Arsenic	9.49E+01	0.00	0.00	6.03E-15	7.27E-14
Barium	5.13E+03	0.00	0.00	0.00E+00	0.00E+00
Cadmium	1.37E+01	0.00	0.00	3.65E-16	4.40E-15
Chromium III	2.05E+03	0.00	0.00	0.00E+00	0.00E+00
Lead	5.26E+03	0.00	0.00	0.00E+00	0.00E+00
Nickel	9.03E+02	0.00	0.00	0.00E+00	0.00E+00
Silver	4.23E+01	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 6.40E-15
Total Cancer Risk-RME: 7.70E-14

Facility **Radford Army Ammunition Plant, VA**
Site Name: **SWMU 17A**
Exposure Scenario: **Construction Worker Exposure to Subsurface Soil--Inhalation of Volatiles**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Benzo (a) anthracene	9.21E-02	0.00	0.00	5.64E-10	6.79E-09
Benzo (b) fluoranthene	4.43E-01	0.00	0.00	3.23E-09	3.89E-08
Benzo (g,h,i) perylene	4.22E-01	0.00	0.00	0.00E+00	0.00E+00
Benzo (k) fluoranthene	1.65E-01	0.00	0.00	5.05E-09	6.09E-08
bis (2-Ethyl hexyl) Phthalate	5.91E+00	0.00	0.00	0.00E+00	0.00E+00
Chrysene	7.94E-02	0.00	0.00	1.50E-18	1.80E-17
Fluoranthene	7.30E-02	0.00	0.00	0.00E+00	0.00E+00
Phenanthrene	9.30E-02	0.00	0.00	0.00E+00	0.00E+00
Pyrene	1.71E-01	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 8.85E-09
Total Cancer Risk-RME: 1.07E-07

Facility **Radford Army Ammunition Plant, VA**
Site Name: **SWMU 17BCD**
Exposure Scenario: **Commercial Worker Exposure to Surface Soil--Ingestion**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	4.82E+01	0.04	0.16	1.26E-06	2.53E-05
Barium	1.61E+02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	2.82E+00	0.00	0.00	2.12E-07	4.23E-06
Cadmium	1.64E+00	0.00	0.00	0.00E+00	0.00E+00
Chromium III	1.05E+02	0.00	0.00	0.00E+00	0.00E+00
Lead	2.90E+02	0.00	0.00	0.00E+00	0.00E+00
Mercury	9.41E-02	0.00	0.00	0.00E+00	0.00E+00
Nickel	4.58E+01	0.00	0.00	0.00E+00	0.00E+00
Silver	4.88E-01	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.04
Total Hazard Index-RME: 0.17
Total Cancer Risk-CT: 1.47E-06
Total Cancer Risk-RME: 2.95E-05

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 17BCD
Exposure Scenario: Commercial Worker Exposure to Surface Soil--Dermal

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	4.82E+01	0.03	0.08	1.16E-06	1.51E-05
Barium	1.61E+02	0.01	0.02	0.00E+00	0.00E+00
Beryllium	2.82E+00	0.01	0.02	1.34E-05	1.74E-04
Cadmium	1.64E+00	0.03	0.07	0.00E+00	0.00E+00
Chromium III	1.05E+02	0.00	0.00	0.00E+00	0.00E+00
Lead	2.90E+02	0.00	0.00	0.00E+00	0.00E+00
Mercury	9.41E-02	0.00	0.01	0.00E+00	0.00E+00
Nickel	4.58E+01	0.01	0.02	0.00E+00	0.00E+00
Silver	4.88E-01	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.09
Total Hazard Index-RME: 0.23
Total Cancer Risk-CT: 1.45E-05
Total Cancer Risk-RME: 1.89E-04

Facility **Radford Army Ammunition Plant, VA**
Site Name: **SWMU 17BCD**
Exposure Scenario: **Commercial Worker Exposure to Surface Soil--Inhalation of Particulates**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	4.82E+01	0.00	0.00	3.06E-14	4.61E-13
Barium	1.61E+02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	2.82E+00	0.00	0.00	9.99E-16	1.50E-14
Cadmium	1.64E+00	0.00	0.00	4.37E-16	6.59E-15
Chromium III	1.05E+02	0.00	0.00	0.00E+00	0.00E+00
Lead	2.90E+02	0.00	0.00	0.00E+00	0.00E+00
Mercury	9.41E-02	0.00	0.00	0.00E+00	0.00E+00
Nickel	4.58E+01	0.00	0.00	0.00E+00	0.00E+00
Silver	4.88E-01	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 3.21E-14
Total Cancer Risk-RME: 4.83E-13

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 17BCD
Exposure Scenario: Hunter Exposure to Surface Soil--Ingestion

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	4.82E+01	0.01	0.02	4.55E-07	7.88E-06
Barium	1.61E+02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	2.82E+00	0.00	0.00	7.62E-08	1.32E-06
Cadmium	1.64E+00	0.00	0.00	0.00E+00	0.00E+00
Chromium III	1.05E+02	0.00	0.00	0.00E+00	0.00E+00
Lead	2.90E+02	0.00	0.00	0.00E+00	0.00E+00
Mercury	9.41E-02	0.00	0.00	0.00E+00	0.00E+00
Nickel	4.58E+01	0.00	0.00	0.00E+00	0.00E+00
Silver	4.88E-01	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.01
Total Hazard Index-RME: 0.03
Total Cancer Risk-CT: 5.31E-07
Total Cancer Risk-RME: 9.20E-06

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 17BCD
Exposure Scenario: Hunter Exposure to Surface Soil--Dermal

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	4.82E+01	0.00	0.01	2.63E-07	2.86E-06
Barium	1.61E+02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	2.82E+00	0.00	0.00	3.02E-06	3.29E-05
Cadmium	1.64E+00	0.00	0.01	0.00E+00	0.00E+00
Chromium III	1.05E+02	0.00	0.00	0.00E+00	0.00E+00
Lead	2.90E+02	0.00	0.00	0.00E+00	0.00E+00
Mercury	9.41E-02	0.00	0.00	0.00E+00	0.00E+00
Nickel	4.58E+01	0.00	0.00	0.00E+00	0.00E+00
Silver	4.88E-01	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.01
Total Hazard Index-RME: 0.02
Total Cancer Risk-CT: 3.28E-06
Total Cancer Risk-RME: 3.57E-05

Facility **Radford Army Ammunition Plant, VA**
Site Name: **SWMU 17BCD**
Exposure Scenario: **Construction Worker Exposure to Surface Soil--Ingestion**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	4.82E+01	0.16	0.75	5.05E-07	9.70E-06
Barium	1.61E+02	0.00	0.01	0.00E+00	0.00E+00
Beryllium	2.82E+00	0.00	0.00	8.47E-08	1.63E-06
Cadmium	1.64E+00	0.00	0.02	0.00E+00	0.00E+00
Chromium III	1.05E+02	0.00	0.00	0.00E+00	0.00E+00
Lead	2.90E+02	0.00	0.00	0.00E+00	0.00E+00
Mercury	9.41E-02	0.00	0.00	0.00E+00	0.00E+00
Nickel	4.58E+01	0.00	0.01	0.00E+00	0.00E+00
Silver	4.88E-01	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.17
Total Hazard Index-RME: 0.80
Total Cancer Risk-CT: 5.90E-07
Total Cancer Risk-RME: 1.13E-05

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 17BCD
Exposure Scenario: Construction Worker Exposure to Surface Soil--Dermal

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	4.82E+01	0.06	0.08	2.33E-07	1.21E-06
Barium	1.61E+02	0.01	0.02	0.00E+00	0.00E+00
Beryllium	2.82E+00	0.02	0.02	2.68E-06	1.39E-05
Cadmium	1.64E+00	0.05	0.07	0.00E+00	0.00E+00
Chromium III	1.05E+02	0.00	0.00	0.00E+00	0.00E+00
Lead	2.90E+02	0.00	0.00	0.00E+00	0.00E+00
Mercury	9.41E-02	0.01	0.01	0.00E+00	0.00E+00
Nickel	4.58E+01	0.02	0.02	0.00E+00	0.00E+00
Silver	4.88E-01	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.17
Total Hazard Index-RME: 0.23
Total Cancer Risk-CT: 2.91E-06
Total Cancer Risk-RME: 1.51E-05

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 17BCD
Exposure Scenario: Construction Worker Exposure to Surface Soil--Inhalation of Particulates

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	4.82E+01	0.00	0.00	1.48E-14	1.03E-13
Barium	1.61E+02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	2.82E+00	0.00	0.00	4.82E-16	3.37E-15
Cadmium	1.64E+00	0.00	0.00	2.11E-16	1.48E-15
Chromium III	1.05E+02	0.00	0.00	0.00E+00	0.00E+00
Lead	2.90E+02	0.00	0.00	0.00E+00	0.00E+00
Mercury	9.41E-02	0.00	0.00	0.00E+00	0.00E+00
Nickel	4.58E+01	0.00	0.00	0.00E+00	0.00E+00
Silver	4.88E-01	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 1.55E-14
Total Cancer Risk-RME: 1.08E-13

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 17BCD
Exposure Scenario: Construction Worker Exposure to Subsurface Soil--Ingestion

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	8.13E+00	0.03	0.13	8.52E-08	1.64E-06
Lead	2.74E+01	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.03
Total Hazard Index-RME: 0.13
Total Cancer Risk-CT: 8.52E-08
Total Cancer Risk-RME: 1.64E-06

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 17BCD
Exposure Scenario: Construction Worker Exposure to Subsurface Soil--Dermal

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	8.13E+00	0.01	0.01	3.93E-08	2.04E-07
Lead	2.74E+01	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.01
Total Hazard Index-RME: 0.01
Total Cancer Risk-CT: 3.93E-08
Total Cancer Risk-RME: 2.04E-07

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 17BCD
Exposure Scenario: Construction Worker Exposure to Subsurface Soil--Inhalation of Particulates

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	8.13E+00	0.00	0.00	2.49E-15	1.74E-14
Lead	2.74E+01	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 2.49E-15
Total Cancer Risk-RME: 1.74E-14

Facility | **Radford Army Ammunition Plant, VA**
Site Name: | **SWMU 31**
Exposure Scenario: | **Commercial Worker Exposure to GROUNDWATER--Ingestion**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Antimony	4.23E-02	0.26	1.03	0.00E+00	0.00E+00
Barium	4.32E-02	0.00	0.01	0.00E+00	0.00E+00
Beryllium	1.61E-03	0.00	0.00	1.21E-06	2.42E-05
Seleniur	1.82E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks

Total Hazard Index-CT: 0.26
Total Hazard Index-RME: 1.05
To'al Cancer Risk-CT: 1.21E-06
Total Cancer Risk-RME: 2.42E-05

Facility	**Radford Army Ammunition Plant, VA**
Site Name:	**SWMU 31**
Exposure Scenario:	**Commercial Worker Exposure to GROUNDWATER--Dermal (Showering)**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Antimony	4.23E-02	0.12	0.47	0.00E+00	0.00E+00
Barium	4.32E-02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	1.61E-03	0.00	0.00	5.50E-07	1.10E-05
Selenium	1.82E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks

Total Hazard Index-CT:	0.12
Total Hazard Index-RME:	0.47
Total Cancer Risk-CT:	5.50E-07
Total Cancer Risk-RME:	1.10E-05

Facility	**Radford Army Ammunition Plant, VA**
Site Name:	**SWMU 48**
Exposure Scenario:	**Commercial Worker Exposure to GROUNDWATER--Ingestion**

EXPSOURE ASSUMPTIONS

Chemical concentration (mg/L)	chem-specific	chem-specific
Ingestion Rate (L/day)	0.5	1
Exposure Frequency (days/yr)	125	250
Exposure Duration (yrs.)	5	25
Conversion Factor	1	1
Body Weight (Kg)	70	70
Averaging Time Non-carcinogenic (days)	1825	9125
Averaging Time Carcinogenic (days)	25550	25550

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
1,1,1-Trichloroethane	1.00E-03	0.00	0.00	0.00E+00	0.00E+00
1,1-Dichloroethane	7.32E-04	0.00	0.00	0.00E+00	0.00E+00
1,1-Dichloroethene	6.09E-04	0.00	0.00	6.38E-08	1.28E-06
Barium	1.85E-01	0.01	0.03	0.00E+00	0.00E+00
Beryllium	1.36E-03	0.00	0.00	1.02E-06	2.04E-05
bis (2-Ethyl hexyl) phthalate	1.02E-02	0.00	0.00	2.50E-08	4.99E-07
Carbon tetrachloride	6.93E-03	0.02	0.10	1.57E-07	3.15E-06
Chloroform	2.66E-03	0.00	0.00	2.85E-09	5.70E-08
Methylene chloride	6.09E-04	0.00	0.00	7.98E-10	1.60E-08
Tetrachloroethene	6.22E-04	0.00	0.00	0.00E+00	0.00E+00
Trichloroethene	7.67E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks

Total Hazard Index-CT:	0.03
Total Hazard Index-RME:	0.13
Total Cancer Risk-CT:	1.27E-06
Total Cancer Risk-RME:	2.54E-05

450

Facility	**Radford Army Ammunition Plant, VA**
Site Name:	**SWMU 48**
Exposure Scenario:	**Commercial Worker Exposure to GROUNDWATER--Dermal (Showering)**

EXPOSURE ASSUMPTIONS

Chemical concentration (mg/L)	chem-specific	chem-specific
Exposure Time (hrs/day)	0.117	0.2
Exposure Frequency (days/yr)	125	250
Skin Surface Area (cm^2)	19400	22800
Exposure Duration (yrs.)	5	25
Conversion Factor	0.001	0.001
Body Weight (Kg)	70	70
Averaging Time Non-carcinogenic (days)	1825	9125
Averaging Time Carcinogenic (days)	25550	25550

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
1,1,1-Trichloroethane	1.00E-03	0.00	0.00	0.00E+00	0.00E+00
1,1-Dichloroethane	7.32E-04	0.00	0.00	0.00E+00	0.00E+00
1,1-Dichloroethene	6.09E-04	0.00	0.00	5.15E-09	1.04E-07
Barium	1.85E-01	0.00	0.00	0.00E+00	0.00E+00
Beryllium	1.36E-03	0.00	0.00	4.64E-07	9.32E-06
bis (2-Ethyl hexyl) Phthalate	1.02E-02	0.00	0.00	0.00E+00	0.00E+00
Carbon tetrachloride	6.93E-03	0.00	0.00	8.40E-10	1.69E-08
Chloroform	2.66E-03	0.00	0.00	1.15E-10	2.31E-09
Methylene chloride	6.09E-04	0.00	0.00	1.66E-11	3.34E-10
Tetrachloroethene	6.22E-04	0.00	0.00	0.00E+00	0.00E+00
Trichloroethene	7.67E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks

Total Hazard Index-CT:	0.00
Total Hazard Index-RME:	0.00
Total Cancer Risk-CT:	4.70E-07
Total Cancer Risk-RME:	9.44E-06

Facility	**Radford Army Ammunition Plant, VA**
Site Name:	**SWMU 48**
Exposure Scenario:	**Commercial Worker Exposure to GROUNDWATER--Inhalation of Volatiles (Showerin**

EXPSOURE ASSUMPTIONS

Chemical concentration (mg/L)	chem-specific	chem-specific
Exposure Time (hrs/day)	0.117	0.2
Exposure Frequency (days/yr)	125	250
Inhalation Rate (m^3/hour)	1.4	2
Exposure Duration (yrs.)	5	25
Conversion Factor	1	1
Body Weight (Kg)	70	70
Averaging Time Non-carcinogenic (days)	1825	9125
Averaging Time Carcinogenic (days)	25550	25550

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
1,1,1-Trichloroethane	1.00E-03	0.00	0.00	0.00E+00	0.00E+00
1,1-Dichloroethane	7.32E-04	0.00	0.00	0.00E+00	0.00E+00
1,1-Dichloroethene	6.09E-04	0.00	0.00	1.78E-08	4.35E-07
Barium	1.85E-01	0.00	0.00	0.00E+00	0.00E+00
Beryllium	1.36E-03	0.00	0.00	0.00E+00	0.00E+00
bis (2-Ethyl hexyl) Phthalate	1.02E-02	0.00	0.00	0.00E+00	0.00E+00
Carbon tetrachloride	6.93E-03	0.00	0.00	6.07E-08	1.48E-06
Chloroform	2.66E-03	0.00	0.00	7.56E-09	1.85E-07
Methylene chloride	6.09E-04	0.00	0.00	2.97E-11	7.25E-10
Tetrachloroethene	6.22E-04	0.00	0.00	0.00E+00	0.00E+00
Trichloroethene	7.67E-03	0.69	3.38	0.00E+00	0.00E+00

Total Pathway Exposure Risks

Total Hazard Index-CT:	0.69
Total Hazard Index-RME:	3.38
Total Cancer Risk-CT:	8.61E-08
Total Cancer Risk-RME:	2.10E-06

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 48
Exposure Scenario: Commercial Worker Exposure to Surface Soil--Ingestion

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	9.78E+00	0.01	0.03	2.56E-07	5.13E-06
Barium	7.58E+02	0.00	0.01	0.00E+00	0.00E+00
Beryllium	2.15E+00	0.00	0.00	1.61E-07	3.22E-06
bis (2-Ethyl hexyl) phthalate	1.99E+00	0.00	0.00	4.86E-10	9.72E-09
Chromium III	5.87E+01	0.00	0.00	0.00E+00	0.00E+00
Chrysene	2.82E-01	0.00	0.00	3.60E-11	7.20E-10
Di-n-butyl phthalate	1.23E+01	0.00	0.00	0.00E+00	0.00E+00
Lead	1.96E+02	0.00	0.00	0.00E+00	0.00E+00
Mercury	1.47E+00	0.00	0.00	0.00E+00	0.00E+00
Nickel	3.12E+01	0.00	0.00	0.00E+00	0.00E+00
Phenanthrene	1.00E+00	0.00	0.00	0.00E+00	0.00E+00
Selenium	1.00E+00	0.00	0.00	0.00E+00	0.00E+00
Silver	6.45E-02	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks

Total Hazard Index-CT: 0.01
Total Hazard Index-RME: 0.05
Total Cancer Risk-CT: 4.18E-07
Total Cancer Risk-RME: 8.36E-06

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 48
Exposure Scenario: Commercial Worker Exposure to Surface Soil--Dermal

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	9.78E+00	0.01	0.02	2.36E-07	3.06E-06
Barium	7.58E+02	0.03	0.09	0.00E+00	0.00E+00
Beryllium	2.15E+00	0.01	0.02	1.02E-05	1.32E-04
bis (2-Ethyl hexyl) phthalate	1.99E+00	0.00	0.00	0.00E+00	0.00E+00
Chromium III	5.87E+01	0.00	0.00	0.00E+00	0.00E+00
Chrysene	2.82E-01	0.00	0.00	3.79E-10	4.92E-09
Di-n-butyl phthalate	1.23E+01	0.00	0.00	0.00E+00	0.00E+00
Lead	1.96E+02	0.00	0.00	0.00E+00	0.00E+00
Mercury	1.47E+00	0.08	0.20	0.00E+00	0.00E+00
Nickel	3.12E+01	0.01	0.02	0.00E+00	0.00E+00
Phenanthrene	1.00E+00	0.00	0.00	0.00E+00	0.00E+00
Selenium	1.00E+00	0.00	0.00	0.00E+00	0.00E+00
Silver	6.45E-02	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.13
Total Hazard Index-RME: 0.33
Total Cancer Risk-CT: 1.04E-05
Total Cancer Risk-RME: 1.35E-04

Facility **Radford Army Ammunition Plant, VA**
Site Name: **SWMU 48**
Exposure Scenario: **Commercial Worker Exposure to Surface Soil--Inhalation of Volatiles**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
bis (2-Ethyl hexyl) phthalate	1.99E+00	0.00	0.00	0.00E+00	0.00E+00
Chrysene	2.82E-01	0.00	0.00	5.32E-17	8.01E-16
Di-n-butyl phthalate	1.23E+01	0.00	0.00	0.00E+00	0.00E+00
Phenanthrene	1.00E+00	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 5.32E-17
Total Cancer Risk-RME: 8.01E-16

455

Facility	**Radford Army Ammunition Plant, VA**
Site Name:	**SWMU 48**
Exposure Scenario:	**Commercial Worker Exposure to Surface Soil--Inhalation of Particulates**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	9.78E+00	0.00	0.00	6.22E-15	9.36E-14
Barium	7.58E+02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	2.15E+00	0.00	0.00	7.61E-16	1.15E-14
Chromium III	5.87E+01	0.00	0.00	0.00E+00	0.00E+00
Lead	1.96E+02	0.00	0.00	0.00E+00	0.00E+00
Mercury	1.47E+00	0.00	0.00	0.00E+00	0.00E+00
Nickel	3.12E+01	0.00	0.00	0.00E+00	0.00E+00
Selenium	1.00E+00	0.00	0.00	0.00E+00	0.00E+00
Silver	6.45E-02	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks

Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 6.98E-15
Total Cancer Risk-RME: 1.05E-13

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 48
Exposure Scenario: Hunter Exposure to Surface Soil--Ingestion

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	9.78E+00	0.00	0.00	9.23E-08	1.60E-06
Barium	7.58E+02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	2.15E+00	0.00	0.00	5.80E-08	1.01E-06
bis (2-Ethyl hexyl) phthalate	1.99E+00	0.00	0.00	1.75E-10	3.03E-09
Chromium III	5.87E+01	0.00	0.00	0.00E+00	0.00E+00
Chrysene	2.82E-01	0.00	0.00	1.30E-11	2.25E-10
Di-n-butyl phthalate	1.23E+01	0.00	0.00	0.00E+00	0.00E+00
Lead	1.96E+02	0.00	0.00	0.00E+00	0.00E+00
Mercury	1.47E+00	0.00	0.00	0.00E+00	0.00E+00
Nickel	3.12E+01	0.00	0.00	0.00E+00	0.00E+00
Phenanthrene	1.00E+00	0.00	0.00	0.00E+00	0.00E+00
Selenium	1.00E+00	0.00	0.00	0.00E+00	0.00E+00
Silver	6.45E-02	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.01
Total Cancer Risk-CT: 1.50E-07
Total Cancer Risk-RME: 2.61E-06

Facility	**Radford Army Ammunition Plant, VA**
Site Name:	**SWMU 48**
Exposure Scenario:	**Hunter Exposure to Surface Soil--Dermal**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	9.78E+00	0.00	0.00	5.33E-08	5.81E-07
Barium	7.58E+02	0.00	0.01	0.00E+00	0.00E+00
Beryllium	2.15E+00	0.00	0.00	2.30E-06	2.50E-05
bis (2-Ethyl hexyl) phthalate	1.99E+00	0.00	0.00	0.00E+00	0.00E+00
Chromium III	5.87E+01	0.00	0.00	0.00E+00	0.00E+00
Chrysene	2.82E-01	0.00	0.00	8.55E-11	9.32E-10
Di-n-butyl phthalate	1.23E+01	0.00	0.00	0.00E+00	0.00E+00
Lead	1.96E+02	0.00	0.00	0.00E+00	0.00E+00
Mercury	1.47E+00	0.01	0.02	0.00E+00	0.00E+00
Nickel	3.12E+01	0.00	0.00	0.00E+00	0.00E+00
Phenanthrene	1.00E+00	0.00	0.00	0.00E+00	0.00E+00
Selenium	1.00E+00	0.00	0.00	0.00E+00	0.00E+00
Silver	6.45E-02	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks

Total Hazard Index-CT:	0.02
Total Hazard Index-RME:	0.03
Total Cancer Risk-CT:	2.35E-06
Total Cancer Risk-RME:	2.56E-05

458

Facility **Radford Army Ammunition Plant, VA**
Site Name: **SWMU 48**
Exposure Scenario: **Construction Worker Exposure to Surface Soil--Ingestion**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	9.78E+00	0.03	0.15	1.03E-07	1.97E-06
Barium	7.58E+02	0.01	0.05	0.00E+00	0.00E+00
Beryllium	2.15E+00	0.00	0.00	6.45E-08	1.24E-06
bis (2-Ethyl hexyl) phthalate	1.99E+00	0.00	0.00	1.94E-10	3.73E-09
Chromium III	5.87E+01	0.00	0.00	0.00E+00	0.00E+00
Chrysene	2.82E-01	0.00	0.00	1.44E-11	2.76E-10
Di-n-butyl phthalate	1.23E+01	0.00	0.00	0.00E+00	0.00E+00
Lead	1.96E+02	0.00	0.00	0.00E+00	0.00E+00
Mercury	1.47E+00	0.00	0.02	0.00E+00	0.00E+00
Nickel	3.12E+01	0.00	0.01	0.00E+00	0.00E+00
Phenanthrene	1.00E+00	0.00	0.00	0.00E+00	0.00E+00
Selenium	1.00E+00	0.00	0.00	0.00E+00	0.00E+00
Silver	6.45E-02	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.05
Total Hazard Index-RME: 0.24
Total Cancer Risk-CT: 1.67E-07
Total Cancer Risk-RME: 3.21E-06

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 48
Exposure Scenario: Construction Worker Exposure to Surface Soil--Dermal

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	9.78E+00	0.01	0.02	4.72E-08	2.45E-07
Barium	7.58E+02	0.07	0.09	0.00E+00	0.00E+00
Beryllium	2.15E+00	0.01	0.02	2.04E-06	1.06E-05
bis (2-Ethyl hexyl) phthalate	1.99E+00	0.00	0.00	0.00E+00	0.00E+00
Chromium III	5.87E+01	0.00	0.00	0.00E+00	0.00E+00
Chrysene	2.82E-01	0.00	0.00	7.58E-11	3.93E-10
Di-n-butyl phthalate	1.23E+01	0.00	0.00	0.00E+00	0.00E+00
Lead	1.96E+02	0.00	0.00	0.00E+00	0.00E+00
Mercury	1.47E+00	0.15	0.20	0.00E+00	0.00E+00
Nickel	3.12E+01	0.01	0.02	0.00E+00	0.00E+00
Phenanthrene	1.00E+00	0.00	0.00	0.00E+00	0.00E+00
Selenium	1.00E+00	0.00	0.00	0.00E+00	0.00E+00
Silver	6.45E-02	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks

Total Hazard Index-CT: 0.26
Total Hazard Index-RME: 0.33
Total Cancer Risk-CT: 2.09E-06
Total Cancer Risk-RME: 1.08E-05

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 48
Exposure Scenario: Construction Worker Exposure to Surface Soil--Inhalation of Volatiles

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
bis (2-Ethyl hexyl) phthalate	1.99E+00	0.00	0.00	0.00E+00	0.00E+00
Chrysene	2.82E-01	0.00	0.00	2.56E-17	1.79E-16
Di-n-butyl phthalate	1.23E+01	0.00	0.00	0.00E+00	0.00E+00
Phenanthrene	1.00E+00	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 2.56E-17
Total Cancer Risk-RME: 1.79E-16

Facility **Radford Army Ammunition Plant, VA**
Site Name: **SWMU 48**
Exposure Scenario: **Construction Worker Exposure to Surface Soil--Inhalation of Particulates**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	9.78E+00	0.00	0.00	3.00E-15	2.10E-14
Barium	7.58E+02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	2.15E+00	0.00	0.00	3.67E-16	2.57E-15
Chromium III	5.87E+01	0.00	0.00	0.00E+00	0.00E+00
Lead	1.96E+02	0.00	0.00	0.00E+00	0.00E+00
Mercury	1.47E+00	0.00	0.00	0.00E+00	0.00E+00
Nickel	3.12E+01	0.00	0.00	0.00E+00	0.00E+00
Selenium	1.00E+00	0.00	0.00	0.00E+00	0.00E+00
Silver	6.45E-02	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 3.36E-15
Total Cancer Risk-RME: 2.35E-14

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 54
Exposure Scenario: Commercial Worker Exposure to GROUNDWATER--Ingestion

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Antimony	4.44E-02	0.27	1.09	0.00E+00	0.00E+00
Arsenic	2.75E-03	0.02	0.09	7.21E-07	1.44E-05
Barium	1.70E-01	0.01	0.02	0.00E+00	0.00E+00
Beryllium	4.79E-03	0.00	0.01	3.60E-06	7.20E-05
Chromium III	1.23E-02	0.00	0.00	0.00E+00	0.00E+00
HMX	1.58E-03	0.00	0.00	0.00E+00	0.00E+00
Lead	3.16E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.30
Total Hazard Index-RME: 1.21
Total Cancer Risk-CT: 4.32E-06
Total Cancer Risk-RME: 8.65E-05

Facility **Radford Army Ammunition Plant, VA**
Site Name: **SWMU 54**
Exposure Scenario: **Commercial Worker Exposure to GROUNDWATER--Dermal (Showering)**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Antimony	4.44E-02	0.12	0.50	0.00E+00	0.00E+00
Arsenic	2.75E-03	0.00	0.00	4.78E-09	9.59E-08
Barium	1.70E-01	0.00	0.00	0.00E+00	0.00E+00
Beryllium	4.79E-03	0.00	0.00	1.64E-06	3.28E-05
Chromium III	1.23E-02	0.00	0.00	0.00E+00	0.00E+00
HMX	1.58E-03	0.00	0.00	0.00E+00	0.00E+00
Lead	3.16E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks

Total Hazard Index-CT: 0.13
Total Hazard Index-RME: 0.50
Total Cancer Risk-CT: 1.64E-06
Total Cancer Risk-RME: 3.29E-05

Facility **Radford Army Ammunition Plant, VA**
Site Name: **SWMU 54**
Exposure Scenario: **Construction Worker Exposure to Subsurface Soil--Ingestion**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
2,4,6-Trinitrotoluene	3.87E+02	0.76	3.64	8.12E-08	1.56E-06
2,4-Dinitrotoluene	5.14E+00	0.00	0.01	0.00E+00	0.00E+00
HMX	1.65E+00	0.00	0.00	0.00E+00	0.00E+00
Lead	2.21E+03	0.00	0.00	0.00E+00	0.00E+00
Mercury	1.72E+01	0.06	0.27	0.00E+00	0.00E+00
RDX	9.43E-01	0.00	0.00	7.25E-10	1.39E-08

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.82
Total Hazard Index-RME: 3.92
Total Cancer Risk-CT: 8.20E-08
Total Cancer Risk-RME: 1.57E-06

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 54
Exposure Scenario: Construction Worker Exposure to Subsurface Soil--Dermal

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
2,4,6-Trinitrotoluene	3.87E+02	1.20	1.55	1.28E-07	6.66E-07
2,4-Dinitrotoluene	5.14E+00	0.00	0.01	0.00E+00	0.00E+00
HMX	1.65E+00	0.00	0.00	0.00E+00	0.00E+00
Lead	2.21E+03	0.00	0.00	0.00E+00	0.00E+00
Mercury	1.72E+01	1.77	2.29	0.00E+00	0.00E+00
RDX	9.43E-01	0.00	0.00	1.15E-09	5.94E-09

Total Pathway Exposure Risks
Total Hazard Index-CT: 2.97
Total Hazard Index-RME: 3.85
Total Cancer Risk-CT: 1.29E-07
Total Cancer Risk-RME: 6.72E-07

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 54
Exposure Scenario: Construction Worker Exposure to Subsurface Soil--Inhalation of Particulates

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
2,4,6-Trinitrotoluene	3.87E+02	0.00	0.00	0.00E+00	0.00E+00
HMX	1.65E+00	0.00	0.00	0.00E+00	0.00E+00
Lead	2.21E+03	0.00	0.00	0.00E+00	0.00E+00
Mercury	1.72E+01	0.00	0.00	0.00E+00	0.00E+00
RDX	9.43E-01	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 0.00E+00
Total Cancer Risk-RME: 0.00E+00

Facility Radford Army Ammunition Plant, VA
Site Name: SWMU 54
Exposure Scenario: Construction Worker Exposure to Subsurface Soil--Inhalation of Volatiles

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
2,4-Dinitrotoluene	5.14E+00	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 0.00E+00
Total Cancer Risk-RME: 0.00E+00

Facility Radford Army Ammunition Plant, VA
Site Name: STROUBLES CREEK
Exposure Scenario: Commercial Worker Exposure to SURFACE WATER--Ingestion

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Barium	4.60E-02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	2.08E-03	0.00	0.00	3.13E-08	3.13E-07
Chromium III	1.61E-02	0.00	0.00	0.00E+00	0.00E+00
HMX	5.30E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 3.13E-08
Total Cancer Risk-RME: 3.13E-07

Facility Radford Army Ammunition Plant, VA
Site Name: STROUBLES CREEK
Exposure Scenario: Commercial Worker Exposure to SURFACE WATER--Dermal

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Barium	4.60E-02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	2.08E-03	0.00	0.00	7.88E-09	1.06E-07
Chromium III	1.61E-02	0.00	0.00	0.00E+00	0.00E+00
HMX	5.30E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks

Total Hazard Index-CT:	0.00
Total Hazard Index-RME:	0.00
Total Cancer Risk-CT:	7.88E-09
Total Cancer Risk-RME:	1.06E-07

Facility **Radford Army Ammunition Plant, VA**
Site Name: **STROUBLES CREEK**
Exposure Scenario: **Commercial Worker Exposure to SEDIMENT--Ingestion**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	9.78E+00	0.00	0.01	5.13E-08	1.03E-06
Barium	1.84E+02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	1.41E+00	0.00	0.00	2.12E-08	4.25E-07
Chromium III	3.31E+01	0.00	0.00	0.00E+00	0.00E+00
Chrysene	6.60E-02	0.00	0.00	1.68E-12	3.37E-11
Di-n-butyl phthalate	2.50E+00	0.00	0.00	0.00E+00	0.00E+00
Fluoranthene	7.23E-02	0.00	0.00	0.00E+00	0.00E+00
Lead	3.59E+01	0.00	0.00	0.00E+00	0.00E+00
Nickel	2.97E+01	0.00	0.00	0.00E+00	0.00E+00
Phenanthrene	7.62E-02	0.00	0.00	0.00E+00	0.00E+00
Silver	7.47E-02	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks

Total Hazard Index-CT:	0.00
Total Hazard Index-RME:	0.01
Total Cancer Risk-CT:	7.25E-08
Total Cancer Risk-RME:	1.45E-06

Facility Radford Army Ammunition Plant, VA
Site Name: STROUBLES CREEK
Exposure Scenario: Commercial Worker Exposure to SEDIMENT--Dermal

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Arsenic	9.78E+00	0.00	0.00	1.26E-08	1.69E-07
Barium	1.84E+02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	1.41E+00	0.00	0.00	3.57E-07	4.80E-06
Chromium III	3.31E+01	0.00	0.00	0.00E+00	0.00E+00
Chrysene	6.60E-02	0.00	0.00	4.71E-12	6.34E-11
Di-n-butyl phthalate	2.50E+00	0.00	0.00	0.00E+00	0.00E+00
Fluoranthene	7.23E-02	0.00	0.00	0.00E+00	0.00E+00
Lead	3.59E+01	0.00	0.00	0.00E+00	0.00E+00
Nickel	2.97E+01	0.00	0.00	0.00E+00	0.00E+00
Phenanthrene	7.62E-02	0.00	0.00	0.00E+00	0.00E+00
Silver	7.47E-02	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 3.69E-07
Total Cancer Risk-RME: 4.97E-06

Facility Radford Army Ammunition Plant, VA
Site Name: STROUBLES CREEK
Exposure Scenario: Fisherman Exposure to SURFACE WATER--Dermal

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Barium	4.60E-02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	2.08E-03	0.00	0.01	4.55E-07	1.18E-04
Chromium III	1.61E-02	0.00	0.00	0.00E+00	0.00E+00
HMX	5.30E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.02
Total Cancer Risk-CT: 4.55E-07
Total Cancer Risk-RME: 1.18E-04

Facility Radford Army Ammunition Plant, VA
Site Name: STROUBLES CREEK
Exposure Scenario: Fisherman Exposure to SURFACE WATER--Ingestion

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Barium	4.60E-02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	2.08E-03	0.00	0.00	7.20E-10	1.80E-08
Chromium III	1.61E-02	0.00	0.00	0.00E+00	0.00E+00
HMX	5.30E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 7.20E-10
Total Cancer Risk-RME: 1.80E-08

Facility — **Radford Army Ammunition Plant, VA**
Site Name: — **STROUBLES CREEK**
Exposure Scenario: — **Recreational User Exposure to SURFACE WATER--Dermal**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Barium	4.60E-02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	2.08E-03	0.00	0.00	3.41E-09	2.63E-07
Chromium III	1.61E-02	0.00	0.00	0.00E+00	0.00E+00
HMX	5.30E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks

Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 3.41E-09
Total Cancer Risk-RME: 2.63E-07

Facility Radford Army Ammunition Plant, VA
Site Name: STROUBLES CREEK
Exposure Scenario: Recreational User Exposure to SURFACE WATER--Ingestion

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Barium	4.60E-02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	2.08E-03	0.00	0.00	6.75E-09	5.25E-08
Chromium III	1.61E-02	0.00	0.00	0.00E+00	0.00E+00
HMX	5.30E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks

Total Hazard Index-CT:	0.00
Total Hazard Index-RME:	0.00
Total Cancer Risk-CT:	6.75E-09
Total Cancer Risk-RME:	5.25E-08

Facility Radford Army Ammunition Plant, VA
Site Name: STROUBLES CREEK
Exposure Scenario: Construction Worker Exposure to SURFACE WATER--Dermal

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Barium	4.60E-02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	2.08E-03	0.00	0.00	1.48E-08	1.54E-07
Chromium III	1.61E-02	0.00	0.00	0.00E+00	0.00E+00
HMX	5.30E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 1.48E-08
Total Cancer Risk-RME: 1.54E-07

Facility Radford Army Ammunition Plant, VA
Site Name: STROUBLES CREEK
Exposure Scenario: Construction Worker Exposure to SURFACE WATER--Ingestion

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Barium	4.60E-02	0.00	0.01	0.00E+00	0.00E+00
Beryllium	2.08E-03	0.00	0.00	3.13E-07	2.50E-06
Chromium III	1.61E-02	0.00	0.00	0.00E+00	0.00E+00
HMX	5.30E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.01
Total Hazard Index-RME: 0.01
Total Cancer Risk-CT: 3.13E-07
Total Cancer Risk-RME: 2.50E-06

Facility Radford Army Ammunition Plant, VA
Site Name: NEW RIVER
Exposure Scenario: Commercial Worker Exposure to SURFACE WATER--Ingestion

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Barium	2.46E-02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	7.33E-04	0.00	0.00	1.10E-08	1.10E-07
Lead	5.93E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 1.10E-08
Total Cancer Risk-RME: 1.10E-07

Facility **Radford Army Ammunition Plant, VA**
Site Name: **NEW RIVER**
Exposure Scenario: **Commercial Worker Exposure to SURFACE WATER--Dermal**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Barium	2.46E-02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	7.33E-04	0.00	0.00	2.77E-09	3.73E-08
Lead	5.93E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 2.77E-09
Total Cancer Risk-RME: 3.73E-08

Facility **Radford Army Ammunition Plant, VA**
Site Name: **NEW RIVER**
Exposure Scenario: **Commercial Worker Exposure to SEDIMENT--Ingestion**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
2,4,6-Trinitrotoluene	2.86E+01	0.00	0.01	2.99E-09	5.99E-08
Arsenic	1.74E+01	0.00	0.01	9.12E-08	1.82E-06
Barium	7.01E+02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	4.23E+00	0.00	0.00	6.36E-08	1.27E-06
bis (2-Ethyl hexyl) Phthalate	6.62E+00	0.00	0.00	3.24E-10	6.48E-09
Di-n-butyl phthalate	1.30E+01	0.00	0.00	0.00E+00	0.00E+00
Diethyl phthalate	6.23E+00	0.00	0.00	0.00E+00	0.00E+00
Dimethyl phthalate	8.31E+00	0.00	0.00	0.00E+00	0.00E+00
Lead	3.40E+03	0.00	0.00	0.00E+00	0.00E+00
Mercury	9.36E-02	0.00	0.00	0.00E+00	0.00E+00
n-Diphenylnitrosamine	2.60E+00	0.00	0.00	4.45E-11	8.90E-10
Silver	1.78E-01	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.01
Total Hazard Index-RME: 0.02
Total Cancer Risk-CT: 1.58E-07
Total Cancer Risk-RME: 3.16E-06

Facility Radford Army Ammunition Plant, VA
Site Name: NEW RIVER
Exposure Scenario: Commercial Worker Exposure to SEDIMENT--Dermal

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
2,4,6-Trinitrotoluene	2.86E+01	0.00	0.01	2.52E-09	3.38E-08
Arsenic	1.74E+01	0.00	0.00	2.23E-08	3.01E-07
Barium	7.01E+02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	4.23E+00	0.00	0.00	1.07E-06	1.44E-05
bis (2-Ethyl hexyl) Phthalate	6.62E+00	0.00	0.00	2.72E-09	3.66E-08
Di-n-butyl phthalate	1.30E+01	0.00	0.00	0.00E+00	0.00E+00
Diethyl phthalate	6.23E+00	0.00	0.00	0.00E+00	0.00E+00
Dimethyl phthalate	8.31E+00	0.00	0.00	0.00E+00	0.00E+00
Lead	3.40E+03	0.00	0.00	0.00E+00	0.00E+00
Mercury	9.36E-02	0.00	0.00	0.00E+00	0.00E+00
n-Diphenylnitrosamine	2.60E+00	0.00	0.00	0.00E+00	0.00E+00
Silver	1.78E-01	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.01
Total Hazard Index-RME: 0.02
Total Cancer Risk-CT: 1.10E-06
Total Cancer Risk-RME: 1.47E-05

Facility Radford Army Ammunition Plant, VA
Site Name: NEW RIVER
Exposure Scenario: Fisherman Exposure to SURFACE WATER--Ingestion

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Barium	2.46E-02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	7.33E-04	0.00	0.00	2.54E-10	5.07E-08
Lead	5.93E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 2.54E-10
Total Cancer Risk-RME: 5.07E-08

Facility Radford Army Ammunition Plant, VA
Site Name: NEW RIVER
Exposure Scenario: Fisherman Exposure to SURFACE WATER--Dermal

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Barium	2.46E-02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	7.33E-04	0.00	0.00	1.60E-07	4.16E-05
Lead	5.93E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.01
Total Cancer Risk-CT: 1.60E-07
Total Cancer Risk-RME: 4.16E-05

Facility Radford Army Ammunition Plant, VA
Site Name: NEW RIVER
Exposure Scenario: Construction Worker Exposure to SURFACE WATER--Ingestion

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Barium	2.46E-02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	7.33E-04	0.00	0.00	5.50E-09	4.40E-08
Lead	5.93E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 5.50E-09
Total Cancer Risk-RME: 4.40E-08

Facility	**Radford Army Ammunition Plant, VA**
Site Name:	**NEW RIVER**
Exposure Scenario:	**Construction Worker Exposure to SURFACE WATER--Dermal**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Barium	2.46E-02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	7.33E-04	0.00	0.00	1.04E-08	5.42E-08
Lead	5.93E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks

Total Hazard Index-CT:	0.00
Total Hazard Index-RME:	0.00
Total Cancer Risk-CT:	1.04E-08
Total Cancer Risk-RME:	5.42E-08

Facility **Radford Army Ammunition Plant, VA**
Site Name: **NEW RIVER**
Exposure Scenario: **Recreational User Exposure to SURFACE WATER--Ingestion**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Barium	2.46E-02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	7.33E-04	0.00	0.00	3.09E-11	2.03E-09
Lead	5.93E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 3.09E-11
Total Cancer Risk-RME: 2.03E-09

Facility **Radford Army Ammunition Plant, VA**
Site Name: **NEW RIVER**
Exposure Scenario: **Recreational User Exposure to SURFACE WATER--Dermal**

CHEMICAL	EP CONCENTRATIONS	HAZARD INDEX-CT	HAZARD INDEX-RME	CANCER RISK-CT	CANCER RISK-RME
Barium	2.46E-02	0.00	0.00	0.00E+00	0.00E+00
Beryllium	7.33E-04	0.00	0.00	1.20E-09	9.28E-08
Lead	5.93E-03	0.00	0.00	0.00E+00	0.00E+00

Total Pathway Exposure Risks
Total Hazard Index-CT: 0.00
Total Hazard Index-RME: 0.00
Total Cancer Risk-CT: 1.20E-09
Total Cancer Risk-RME: 9.28E-08