

DRAFT

**Voluntary Lead Management Report
Cherry Creek State Park, Family Shooting Center**



Prepared For:

**Mr. Shawn Krier
Colorado Division of Parks and Outdoor Recreation
1313 Sherman Street
Room 618
Denver, Colorado 80203**

Prepared by:

***Versar* INC.**

**11990 Grant Street, Suite 500
Northglenn, Colorado 80233**

Project Number 111244.1244.002

June 2005

TABLE OF CONTENTS

SECTION	PAGE
1.0 INTRODUCTION.....	1
1.1 Project Objectives and Scope of Work	1
2.0 SITE LOCATION.....	1
3.0 PRE-SAMPLING RESEARCH	2
4.0 SOIL SAMPLING AND ANALYSIS.....	2
4.1 Sampling Locations	2
4.2 Sampling Protocol.....	3
4.3 Analytical Results	3
4.4 Treatability Study.....	6
5.0 LEAD-IMPACTED SOIL REMOVAL, TREATMENT, AND DISPOSAL	6
5.1 Pistol and Rifle Range Voluntary Lead Management	6
5.2 Transportation and Disposal	8
6.0 CONCLUSIONS.....	8

FIGURES

Figure 1	Site Location Map
Figure 2	Sampling Locations, Rifle Range
Figure 3	Sampling Locations, Pistol Range

TABLES

Table 1	GPS Coordinates, Rifle Range
Table 2	GPS Coordinates, Pistol Range
Table 3	XRF and TCLP Analysis Results, Rifle Range
Table 4	XRF and TCLP Analysis Results, Pistol Range
Table 5	Treatability Study Results
Table 6	Approximate Volume of Soil Removed, Rifle Range
Table 7	Approximate Volume of Soil Removed, Pistol Range
Table 8	Treated Soil Stockpiles TCLP Results

APPENDICES

A	Trap Range Sampling
B	Laboratory Analytical Data
C	Treatability Study
D	Photo Log
E	Field Forms

LIST OF ACRONYMS

EPA	Environmental Protection Agency
GPS	Global Positioning System
HDPE	High-density polyethylene
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MT ²	Metals Treatment Technology
RCRA	Resource Conservation and Recovery Act
TCLP	Toxicity Characteristic Leaching Procedure
Versar	Versar, Inc.
XRF	X-ray fluorescence

1.0 INTRODUCTION

This report details the work conducted as part of the voluntary lead management activities as detailed in the *Final Voluntary Lead Management Report, Cherry Creek State Park, Family Shooting Center* (Versar, 2005), and as modified by the April 29, 2005 Versar, Inc. (Versar) letter to Colorado State Parks.

For this project, Versar performed all of the environmental engineering aspects, as well as all project, construction, and administrative management. Our team partner, Metals Treatment Technology (MT²) performed all field remedial and lead treatment activities under contract to Versar.

1.1 Project Objectives and Scope of Work

The project objective was the removal of lead impacted soil from selected areas of both the pistol and rifle ranges. The Colorado Department of Public Health and Environment's proposed residential cleanup standard and the Environmental Protection Agency's (EPA) screening level for total lead of 400 milligrams per kilogram (mg/kg) and the Toxicity Characteristic Leaching Procedure (TCLP) limit for lead of 5 milligrams per liter (mg/L) were used to determine soil to be removed, treated and disposed of at an off-site location. The project scope included:

- Pre-sampling research on historical firing patterns and range boundaries.
- Soil sampling and analysis to determine the extent of lead contamination, defined as lead levels exceeding 400 mg/kg (the Colorado Department of Public Health and Environment's proposed residential cleanup standard and the EPA's screening level) and TCLP exceeding 5 mg/L for lead.
- Removal, stockpiling, and treatment with ECOBOND[®] for metal stabilization of lead impacted soil.
- Replacement of removed lead-impacted soil with cleanfill sourced from an off-site provider.
- Off-site disposal of ECOBOND[®] treated soil at a licensed solid-waste facility.
- Additional sampling was conducted on the adjacent trap range, however removal and treatment actions were not conducted on identified impacted soils. Sampling and analysis details are included in Appendix A.

2.0 SITE LOCATION

The Family Shooting Center, located within Cherry Creek State Park, has been an active outdoor public shooting venue for approximately 40 years. The center consists of 22 rifle/pistol stations.

Figure 1, Site Location Map shows the location of Cherry Creek State Park.

3.0 PRE-SAMPLING RESEARCH

Prior to lead impacted soil sampling and analysis, Versar researched and gathered information regarding the historical use of the Family Shooting Center. Information was obtained from historical aerial photographs and through interviews with persons familiar with past operations, including the current range operator. Based on the results of this research, sampling locations were selected to determine the extent of lead contamination at both the pistol and rifle ranges.

4.0 SOIL SAMPLING AND ANALYSIS

Soil sampling and analysis was conducted to determine the extent and depth of lead contamination in order to establish those areas requiring removal, treatment and off-site disposal. Sample locations were selected based on data obtained from the pre-sampling research, visual observations, lines of fire, and in consultation with range operators and Cherry Creek State Park personnel. Sampling was conducted from January 27 to February 1, 2005 and on February 8 and 11, 2005.

4.1 Sampling Locations

All sampling locations were clearly marked with a painted stake and sited with a Global Positioning System (GPS) handheld receiver. The coordinates of the sampling locations for the rifle and pistol ranges are listed in Tables 1 and 2, respectively.

Table 1, GPS Coordinates, Rifle Range		
Sample ID	GPS Coordinates	Location Notes
RR1	N 39° 37.175'	First berm, middle
	W 104° 50.470'	
RR2	N 39° 37.172'	Eastern berm, middle, approximately 4 feet up slope
	W 104° 50.430'	
RR3	N 39° 37.154'	Final backstop, eastern edge, approximately 4 feet up slope
	W 104° 50.444'	
RR4	N 39° 37.157'	Lower final backstop, middle
	W 104° 50.458'	
RR5	N 39° 37.148'	Final backstop, middle, approximately 4 feet up slope
	W 104° 50.462'	
RR6	N 39° 37.144'	Final backstop, middle, top of berm
	W 104° 50.464'	
RR7	N 39° 37.156'	Soil stockpile, western area, middle
	W 104° 50.480'	
RR8	N 39° 37.165'	Final pistol range backstop, top of berm, middle
	W 104° 50.485'	
RR9	N 39° 37.148'	Western berm, middle, approximately 4 feet up slope
	W 104° 50.485'	

Table 2, GPS Coordinates, Pistol Range		
Sample ID	GPS Coordinates	Location Notes
PR1	N 39° 37.188'	First bullet backstop, center
	W 104° 50.487'	
PR2	N 39° 37.181'	Second bullet backstop, center
	W 104° 50.485'	
PR3	N 39° 37.172'	Eastern soil stockpile abutting final bullet backstop, front center
	W 104° 50.483'	
PR4	N 39° 37.170'	Eastern edge of final bullet backstop, approximately 4 feet up slope
	W 104° 50.487'	
PR5	N 39° 37.171'	Center of final bullet backstop, approximately 4 feet up slope
	W 104° 50.479'	
PR6	N 39° 37.168'	Western soil stockpile abutting final bullet backstop, front center
	W 104° 50.494'	
PR7	N 39° 37.179'	Western berm, middle, approximately 4 feet up slope
	W 104° 50.496'	

Figure 2 shows the sampling locations at the rifle range and Figure 3 shows the sampling locations at the pistol range.

4.2 Sampling Protocol

A shovel, and in selected accessible locations, a backhoe were used to collect composite samples at predetermined depths, generally surface, 1 foot, and 2 feet. In line of fire areas, sampling pits were advanced along a horizontal access to best approximate bullet penetration. In areas outside the line of fire, sample pits were advance in a vertical direction to best approximate bullet and debris depth caused by soil mixing. Each gross sample was screened to remove rocks, debris and bullet casings and blended in a plastic bag to render it homogeneous. Samples were then delivered to MT², following proper chain-of-custody protocol, for analysis using a multi-element X-ray fluorescence (XRF) analyzer for total lead. Five samples with total lead concentration above 400 mg/kg were further analyzed by TCLP for lead as specified in EPA SW-846, Method 1311/6010.

4.3 Analytical Results

Tables 3 and 4 present the analytical results for the rifle and pistol ranges, respectively.

Table 3, XRF and TCLP Analysis Results, Rifle Range			
Sample Identification	Depth (feet)	XRF Lead (mg/kg)	TCLP (mg/L)
RR1-S	Surface	424 ± 68	-
RR1-1	1	301 ± 82	-
RR1-2	2	291 ± 80	-
RR2-S	Surface	<83	-
RR2-1	1	<83	-
RR2-2	2	<79	-
RR3-S	Surface	5,010 ± 270	-
RR3-1	1	2,240 ± 160	-
RR3-2	2	1,440 ± 140	82
RR4-S	Surface	2,710 ± 180	-
RR4-1	1	272 ± 85	-
RR4-2	2	<120	-
RR5-S	Surface	>14,000 ± 1500	-
RR5-1	1	>25,000 ± 2400	1045
RR5-2	2	9,960 ± 800	-
RR5-2.5	2.5	10,700 ± 910	-
RR5-3	3	7,920 ± 480	-
RR5-3.5	3.5	3,060 ± 130	-
RR5-4	4	<53	-
RR6-S	Surface	6,910 ± 430	550
RR6-1	1	296 ± 120	-
RR6-2	2	1,050 ± 120	-
RR6-2 (2)	2	440 ± 85	-
RR7-S	Surface	273 ± 100	-
RR7-1	1	<130	-
RR7-2	2	<130	-
RR8-S	Surface	1,100 ± 110	-
RR8-1	1	<130	-
RR8-2	2	<110	-
RR9-S	Surface	715 ± 89	-
RR9-1	1	<130	-
RR10-S	Surface	568 ± 75	-
RR10-1	1	<91	-

Note:

The last digit of the sample identification indicates the depth, in feet (S is for surface)

TCLP = Toxicity Characteristic Leaching Procedure

mg/kg = milligrams per kilogram

mg/L = milligrams per liter

XRF = x-ray fluorescence

Table 4, XRF and TCLP Analysis Results, Pistol Range			
Sample Identification	Depth (feet)	XRF Lead (mg/kg)	TCLP (mg/L)
PR1-S	Surface	1,440 ± 95	-
PR1-1	1	1,430 ± 100	-
PR1-2	2	1,080 ± 82	-
PR2-S	Surface	3,750 ± 170	-
PR2-1	1	2,170 ± 130	-
PR2-2	2	1,790 ± 120	-
PR3-S	Surface	2,530 ± 130	-
PR3-1	1	1,490 ± 98	-
PR3-2	2	648 ± 64	-
PR4-S	Surface	10,900 ± 650	-
PR4-1	1	3,790 ± 230	-
PR4-2	2	3,240 ± 210	412
PR5-S	Surface	7,510 ± 270	-
PR5-1	1	7,490 ± 280	-
PR5-2	2	2,380 ± 140	370
PR5-2.5	2.5	<100	
PR5-3	3	<96	
PR6-S	Surface	1,370 ± 94	-
PR6-1	1	776 ± 71	-
PR6-2	2	736 ± 71	
PR6-2.5	2.5	177 ± 100	
PR6-3	3	106 ± 59	-
PR7-S	Surface	289 ± 52	-
PR7-1	1	195 ± 74	-
PR7-2	2	379 ± 68	-

Note:

The last digit of the sample identification indicates the depth, in feet (S is for surface)

TCLP = Toxicity Characteristic Leaching Procedure

mg/kg = milligrams per kilogram

mg/L = milligrams per liter

XRF = x-ray fluorescence

Based on the above results, the location and depth of soil to be removed were used to estimate removal areas. Soil with total lead concentrations above 400 mg/kg, the Colorado Department of Public Health and Environment's proposed residential cleanup standard, and the EPA's screening level, was selected for removal.

Please see Appendix B for laboratory results.

4.4 Treatability Study

A treatability study was conducted by MT² to determine application volumes of ECOBOND[®] on lead impacted soil. One sample from both the rifle range and pistol range were selected for application. ECOBOND[®] was added to these samples in varying by weight percentages and allowed to incubate and stabilize overnight. Samples were then analyzed by TCLP to determine the availability of leachable lead. Based on these results, a field application rate was determined to ensure leachable lead concentrations were below 5 mg/L. Table 5 presents the treatability study results.

Sample Identification	Sample Treatment Weight (grams)	ECOBOND[®] Addition	TCLP (mg/L)
PR5-2	NA	Untreated	370
PR5-2	100	1.0%	6.6
PR5-2	100	2.0%	1.1
PR5-2	100	3.0%	2.1
RR5-2	NA	Untreated	898
RR5-2	100	1.0%	582
RR5-2	100	2.0%	315
RR5-2	100	3.0%	55
RR5-2	100	4.0%	3.4

The complete treatability study is presented in Appendix C.

5.0 LEAD-IMPACTED SOIL REMOVAL, TREATMENT, AND DISPOSAL

This section addresses the events that were performed to accomplish the voluntary lead management at both the pistol and firing ranges. The activities occurred May 16 to 19, 2005 and May 31 to June 1, 2005. A photo log depicting the activities before, during, and after the work is presented in Appendix D and on the attached compact disc. All applicable field forms are included in Appendix E.

5.1 Pistol and Rifle Range Voluntary Lead Management

Versar and MT² personnel arrived on site on May 16, 2005. A site walkthrough was conducted to determine any hazards or inaccessible areas. A tailgate safety meeting was held to brief personnel on the work to be conducted and any inherent safety issues, anticipated problems, and emergency procedures. These procedures were followed each day work was conducted on-site.

Identified lead contaminated soils were removed using a backhoe with a 3-yard bucket, a small bobcat with a 2-yard bucket, and a 6-yard front-end loader. The front-end loader was used to transport contaminated soil to the stockpile location, located on the northern edge of the facilities parking lot. Contaminated soil was stockpiled on 6-millimeter high-density polyethylene

(HDPE), and surrounded by a constructed soil berm of approximately 2 feet in height. The berm was covered with 6-millimeter HDPE for additional containment. Daily, upon completion of work, the stockpiles were covered with additional 6-millimeter HDPE to minimize possible rainwater infiltration and/or dust emissions. During the course of soil removal, two soil stockpiles were created, with volumes estimated at approximately 460 cubic yards each. Final volumes will be determined in coordination with Colorado State Parks and after a review of waste transportation manifests and tickets.

The following tables identify the locations lead impacted soil was removed from, the representative samples, and the approximate volume of soil removed.

Location	Representative Sample	Length (ft)	Height (ft)	Depth (ft)	Cubic Yards
First Berm	RR1	65	3	1	7.2
First Tier of Terminal Berm	RR4	70	5	1	13.0
Terminal Berm - Eastern Side	RR3, RR5, RR6	140	25	4	518.5
Terminal Berm Out of Line Of Fire- Western Side	RR10	50	25	1	46.3
Western Berm	RR9	75	10	1	27.8
Backside of Pistol Range Terminal Berm	RR8	50	5	1	9.3
Total					622.0

Location	Representative Sample	Length (ft)	Height (ft)	Depth (ft)	Cubic Yards
First Berm - Entire Berm	PR1	55	1	6	12.2
Second Berm	PR2	55	4	7	57.0
Soil Stockpile- Eastern Side - Entire Stockpile	PR3	15	15	6	50.0
Terminal Berm	PR4, PR5	70	25	2.5	162.0
Soil Stockpile- Western Side - Partial Stockpile	PR6	10	10	3	11.1
Total					292.4

Concurrently, during the contaminated soil removal from the pistol and rifle ranges, clean soil was placed on the berms to replace the removed lead-impacted soil. The clean soil was placed to approximately resemble the shape of the previous berm, and modifications to both berm shape and height were made at the suggestion of range personnel. The soil was then compacted to minimize slumping. Clean soil was sourced from Pioneer Sand and Gravel Company, an off-site location.

Upon completion of contaminated soil removal from the pistol and rifle ranges, the contaminated soil stockpiles were treated with ECOBOND[®] for metal stabilization, at the prescribed average rate of 2.4% by weight of soil. A composite sample was then taken from each of the two soil stockpiles for analysis by EPA SW-846, Method 1311/6010, TCLP for lead. The composite

sample was collected by taking soil samples from random locations within the stockpile, combining the collected samples within a large, plastic bag and vigorously mixing. A sample was then taken from the plastic bag for analysis. The following table presents the laboratory results.

Table 8, Treated Soil Stockpiles TCLP Results	
Sample Identification	TCLP (mg/L)
West Stockpile	0.120
East Stockpile	1.04

Notes:

mg/L = milligrams per liter

Based on the above results, both of which were below the Resource Conservation and Recovery Act (RCRA) regulatory threshold of 5 mg/L, the soil was classified as non-hazardous waste for transportation and disposal.

Laboratory results are presented in Appendix B.

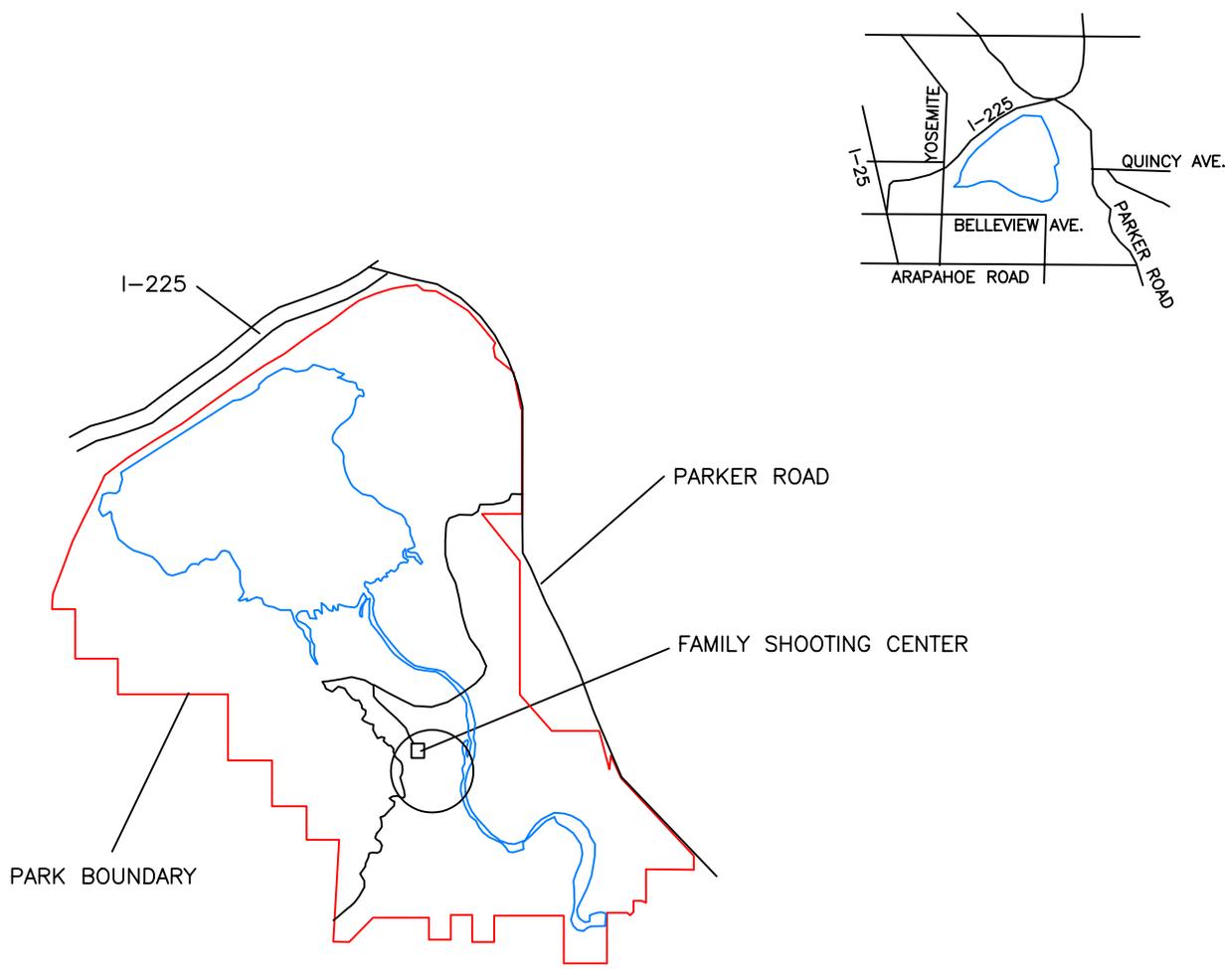
5.2 Transportation and Disposal

All soil removed from both the pistol and rifle ranges was transported to Tower Landfill facility for proper disposal. Both soil import and waste manifests have been provided to Colorado State Parks.

6.0 CONCLUSIONS

All identified lead impacted soil was successfully removed from the rifle and pistol ranges. All areas where lead-impacted soil was removed were backfilled, compacted, and finished to their original condition using imported cleanfill.

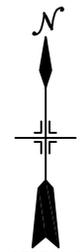
Figures



CHERRY CREEK STATE PARK

EXPLANATION

NOT TO SCALE

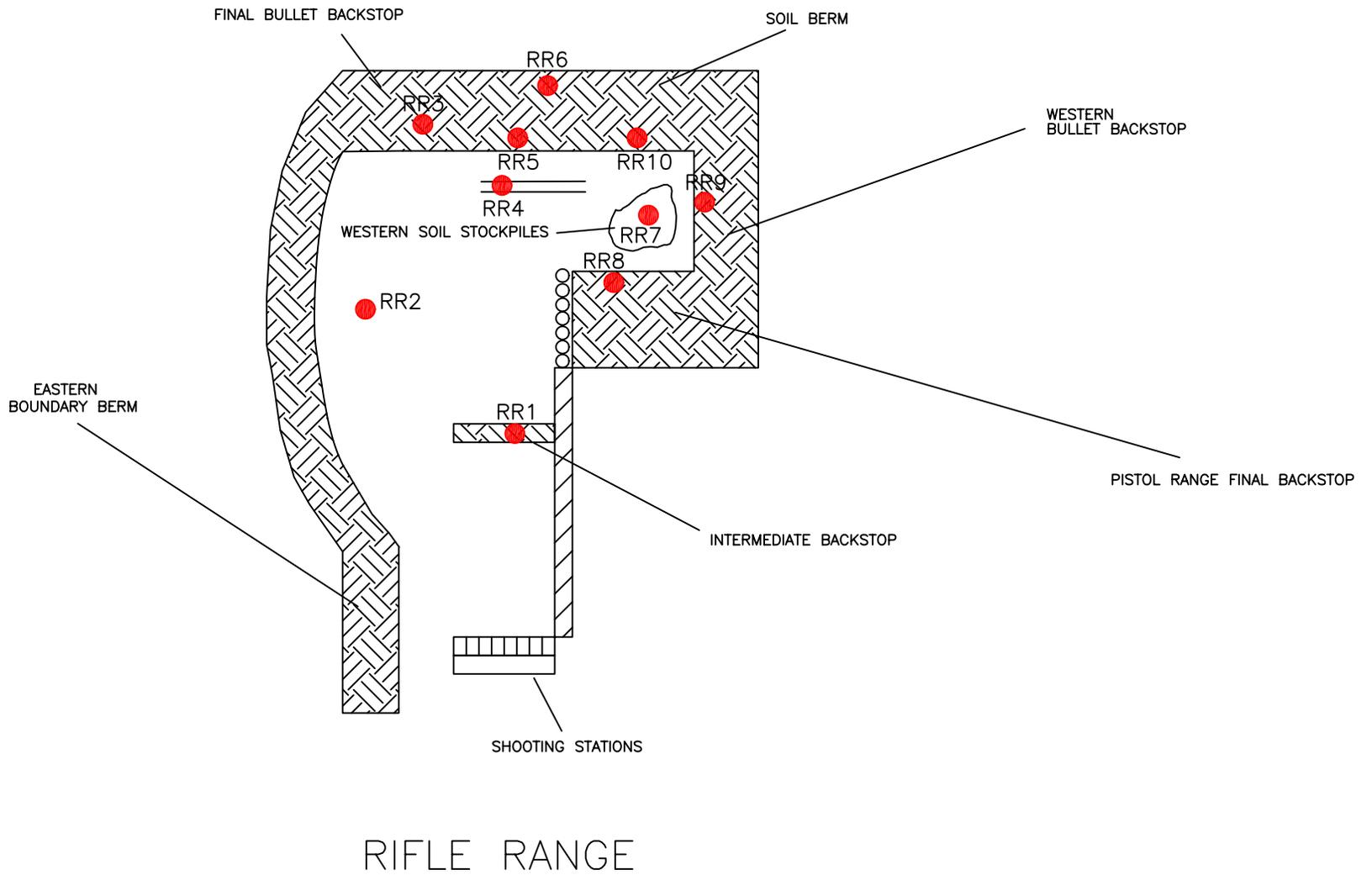


**FIGURE 1
SITE LOCATION MAP**

DATE:	6/05
REV:	DRAFT
APPROVED:	ME
DRAWN:	MJ

Versar Inc.

**CHERRY CREEK STATE PARK
COLORADO**



EXPLANATION

-  SOIL SAMPLING LOCATION
-  MASONRY WALL
-  SOIL BERM

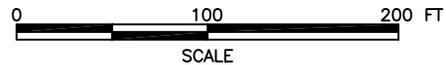
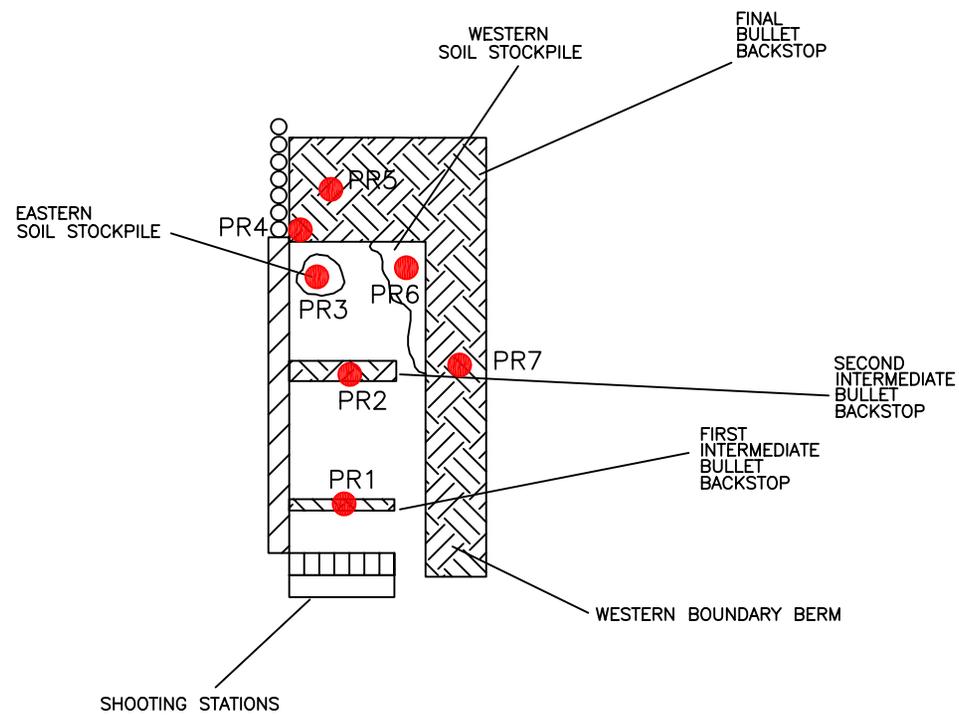


FIGURE 2
SAMPLING LOCATIONS
RIFLE RANGE

DATE: 6/05
REV: DRAFT
APPROVED: ME
DRAWN: MJ



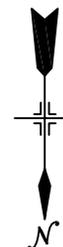
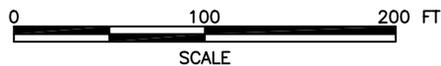
CHERRY CREEK STATE PARK
COLORADO



PISTOL RANGE

EXPLANATION

-  SOIL SAMPLING LOCATION
-  MASONRY WALL
-  SOIL BERM



**FIGURE 3
SAMPLING LOCATIONS
PISTOL RANGE**

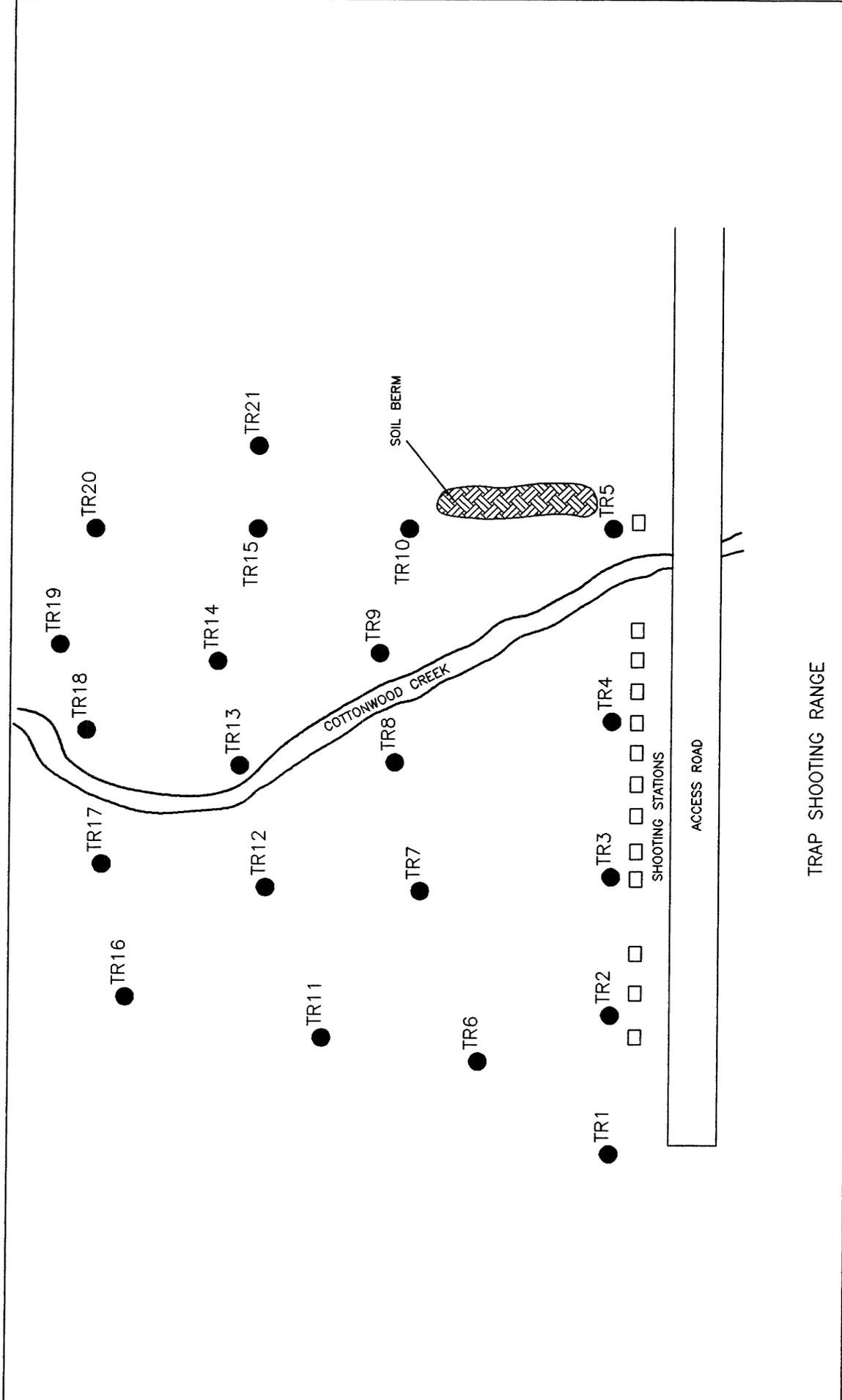
DATE: 6/05
REV: DRAFT
APPROVED: ME
DRAWN: MJ



**CHERRY CREEK STATE PARK
COLORADO**

Appendix A

Trap Range Sampling



- EXPLANATION**
- PROPOSED SOIL SAMPLING
 - SHOOTING STATION



FIGURE 1
SAMPLING LOCATIONS
TRAP SHOOTING RANGE

DATE:	2/05
REV:	DRAFT
APPROVED:	ME
DRAWN:	MJ



CHERRY CREEK STATE PARK
 COLORADO

Sample ID	GPS Coordinates	Location Notes
TR1	N 39° 37.219' W 104° 50.761'	Western Boundary
TR2	N 39° 37.215' W 104° 50.726'	Southern Boundary
TR3	N 39° 37.203' W 104° 50.670'	Southern Boundary
TR4	N 39° 37.217' W 104° 50.623'	Northern Boundary
TR5	N 39° 37.240' W 104° 50.573'	Eastern Boundary
TR6	N 39° 37.257' W 104° 50.779'	Western Boundary
TR7	N 39° 37.273' W 104° 50.731'	Center
TR8	N 39° 37.270' W 104° 50.689'	Northern Boundary
TR9	N 39° 37.274' W 104° 50.649'	Center
TR10	N 39° 37.282' W 104° 50.611'	Eastern Boundary
TR11	N 39° 37.297' W 104° 50.786'	Western Boundary

Sample ID	GPS Coordinates	Location Notes
TR12	N 39° 37.298' W 104° 50.737'	Northern Boundary
TR13	N 39° 37.305' W 104° 50.693'	Center
TR14	N 39° 37.306' W 104° 50.656'	Center
TR15	N 39° 37.317' W 104° 50.625'	Eastern Boundary
TR16	N 39° 37.339' W 104° 50.783'	Western Boundary
TR17	N 39° 37.357' W 104° 50.745'	Center
TR18	N 39° 37.335' W 104° 50.687'	Center
TR19	N 39° 37.349' W 104° 50.667'	Center
TR20	N 39° 37.358' W 104° 50.632'	Eastern Boundary
TR21	N 39° 37.321' W 104° 50.589'	Eastern Boundary

Date: 1/27/05

XRF Analysis Of Cherry Creek Field Samples (3) Feb. 1, 05

	Client/Field I.D. (a)	MT ² I.D. (b)	Analyst I.D. (c)	XRF Analysis # (d)	XRF time (e) sec	XRF Pb mg/kg	S.D. (std. dev.)	DL (det. lim.)
	Quartz Sand Blank		1	351	30	<37		37
	Prepared standard in quartz sand		1	352	30	1210	± 110	35
	5532 mg/kg NIST Pb ^(f)		1	354	30	4820	± 320	107
36	RR6-S		1	357	20	6910	± 430	
37	RR6-1		1	358	10	296	± 120	
38	RR6-2		1	359	30	1050	± 120	
39	RR7-S		1	360	15	273	± 100	
40	RR7-1		1	361	10	<130		130
43	RR7-2		1	362	10	<130		130
44	RR8-S		1	363	30	1100	± 110	
45	RR8-1		1	364	10	<130		130
46	RR8-2		1	365	10	<110		110
47	RR9-S			366	30	715	± 89	
48	RR9-1			367	10	<130		130
	Change XRF battery, recalibrate XRF internally							
	Quartz Sand Blank		1	369	30	<35		35
	Prepared standard in quartz sand		1	370	30	1110	± 100	33
	5532 mg/kg NIST Pb ^(f)		1	372	30	4860	± 330	110
49	TR5-5		1	375	10	<120		120
50	TR5-1		1	376	15	<100		100
51	TR10-5		1	377	20	<70		70
52	TR10-1		1	378	20	<86		86
53	TR15-5		1	379	30	558	± 70	
54	TR15-1		1	381	30	67	± 44	
55	TR20-5		1	382	30	382	± 76	
56	TR20-1		1	383	30	<70		70

a: Samples collected and identified by Matt Eyer of Versar on Feb. 1, 05

b:

c: Analyst #1 is T. E. Moody, Niton Certified Operator, MT².

d: the analysis or reading number that is stored in the XRF

e: the amount of time that XRF is exposed to the sample

f: XRF soil standards supplied by Niton and traceable to NIST

XRF Analysis Of Cherry Creek Field Samples (4) Feb. 3, 05

Client/Field I.D. (a)	MT ² I.D. (b)	Analyst I.D. (c)	XRF Analysis # (d)	XRF time (e) sec	XRF Pb mg/kg	S.D. (std. dev.)	DL (det. lim.)
		1	385	30	<41		37
		1	386	30	1050	± 110	35
		1	388	30	4800	± 320	107
57	TR1-.5	1	389	10	<100		100
58	TR1-1	1	390	10	<120		120
59	TR2-.5	1	391	15	<75		75
60	TR2-1	1	393	15	<87		87
61	TR3-.5	1	393	15	<91		91
62	TR3-1	1	394	15	<100		100
63	TR4-.5	1	395	15	114	± 68	
64	TR4-1	1	396	15	<100		100
65	TR6-.5	1	397	15	<99		99
66	TR6-1	1	398	15	<75		75
Change XRF battery, recalibrate XRF internally							
		1	400	30	<42		42
		1	401	30	1180	± 110	
		1	403	30	4830	± 330	
49	TR7-.5	1	404	15	355	± 97	
67	TR7-1	1	405	30	<68		68
68	TR11-.5	1	406	15	<98		98
69	TR11-1	1	407	15	<95		95
70	TR12-.5	1	408	15	162	± 78	
71	TR12-1	1	409	20	<96		96
72	TR16-.5	1	410	15	<63		63
73	TR16-1	1	411	15	<130		130
74	TR17-.5	1	412	28	<64		64
75	TR17-1	1	413	20	<73		73

- a: Samples collected and identified by Matt Eyer of Versar on Feb. 1, 05
- b:
- c: Analyst #1 is T. E. Moody, Niton Certified Operator, MT²
- d: the analysis or reading number that is stored in the XRF
- e: the amount of time that XRF is exposed to the sample
- f: XRF soil standards supplied by Niton and traceable to NIST

XRF Analysis Of Cherry Creek Field Samples (7) Feb. 12, 05

Client/Field I.D. (a)	MT ² I.D. (b)	Analyst I.D. (c)	XRF Analysis # (d)	XRF time (e) sec	XRF Pb mg/kg	S.D. (std. dev.)	DL (det. lim.)
Quartz Sand Blank		1	450	30	<40		40
Prepared standard in quartz sand		1	451	30	1260	± 110	
5532 mg/kg NIST Pb ^(f)		1	452	30	4860	± 540	
TR21-1	Hold						
93 TR21-2		1	453	15	<110		110
94 TR22-5		1	455	15	<100		100
95 TR22-1		1	456	30	77	± 48	
96 TR23-5		1	457	30	83	± 50	
97 TR23-1		1	459	30	<72		72
98 RR5-2.5		1	460	15	10.7k	± 910	
99 RR5-3		1	461	25	7920	± 480	
RR5-3.5	Hold				3,060	± 130	
RR5-4	Hold				<53		
100 RR10-S		1	462	30	568	± 75	
101 RR10-1		1	463	15	<91		91
RR10-2	Hold						
RR10-3	Hold						
102 PR5-2.5		1	464	15	<100		100
103 PR5-3		1	465	15	<96		96
PR5-3.5	Hold						
PR5-4	Hold						
104 PR6-2.5		1	466	30	736	± 100	
105 PR6-3		1	467	30	177	± 59	
PR6-3.5	Hold						
PR6-4	Hold						

analyzed 2/17

a: Samples collected and identified by Matt Eyer of Versar on Feb. 11, 05
 b:
 c: Analyst #1 is T. E. Moody, Niton Certified Operator, MT²
 d: the analysis or reading number that is stored in the XRF
 e: the amount of time that XRF is exposed to the sample
 f: XRF soil standards supplied by Niton and traceable to NIST

KEMRON ENVIRONMENTAL SERVICES
ANALYSES DATA SHEET 2
RESULTS

Analytical Method : 6010B Preparatory Method: 3050B AAB # : WG182949
 Lab Name : Kemron Environmental Services Contract#: Gary Torf
 Field Sample ID: TR20-6 Lab Sample ID: L0502227-01 Matrix: Soil
 % Solids: 100 Initial Calibration ID: IRIS-ICP 16-FEB-05
 Date Received: 10-FEB-05 Date Extracted: 11-FEB-05 Date Analyzed: 16-FEB-05 13:38:00
 Concentration Units: mg/kg File ID: IR.021605.133800 Pre-Prep Method/Date: /

Analyte	MDL	RL	Concentration	Dilution	Qualifier
Lead, Total	0.481	4.81	147	1	

Comments:

All results, MDLs, and RLs have been corrected to dry weight, where applicable.

KEMRON ENVIRONMENTAL SERVICES
ANALYSES DATA SHEET 2
RESULTS

Analytical Method : 6010B Preparatory Method: 3050B AAB # : WG182949
 Lab Name : Kemron Environmental Services Contract#: Gary Torf
 Field Sample ID: TR18-1 Lab Sample ID: L0502227-02 Matrix: Soil
 % Solids: 100 Initial Calibration ID: IRIS-ICP 16-FEB-05
 Date Received: 10-FEB-05 Date Extracted: 11-FEB-05 Date Analyzed: 16-FEB-05 13:44:00
 Concentration Units: mg/kg File ID: IR.021605.134400 Pre-Prep Method/Date: /

Analyte	MDL	RL	Concentration	Dilution	Qualifier
Lead, Total	0.481	4.81	21.2	1	

Comments:

All results, MDLs, and RLs have been corrected to dry weight, where applicable.

LABORATORY REPORT

L0502227

02/17/05 12:18

Submitted By

KEMRON Environmental Services

156 Starlite Drive

Marietta , OH 45750

(740) 373 - 4071

For

Account Name: Versar Denver, Colorado

11990 Grant St.

Suite 500

Northglenn, CO 80233

Attention: Garv Torf

Account Number: 467-CO-454

Work ID: VOLUNTARY LAND MANAGEMENT

Sample Summary

Client ID	Lab ID	Date Collected	Date Received
TR20-6	L0502227-01	01-FEB-05	10-FEB-05
TR18-1	L0502227-02	04-FEB-05	10-FEB-05
RR6-2	L0502227-03	01-FEB-05	10-FEB-05
PR4-2	L0502227-04	28-JAN-05	10-FEB-05

Appendix B
Laboratory Analytical Data

XRF Analysis Of Cherry Creek Field Samples (1) Jan. 27, 05

	Client/Field I.D. (a)	MT ² I.D. (b)	Analyst I.D. (c)	XRF Analysis # (d)	XRF time (e) (sec)	XRF Pb (mg/kg)	S.D. (std. dev.)	DL (det. lim.)
	Quartz Sand Blank		1	295	60sec	<28		DL = 28
	5532 mg/kg NIST Pb ^(f)		1	297	60 sec	4730		DL = 73
1	PR1-S		1	300	60sec	1440	± 95	
2	PR1-1		1	301	60sec	1430	± 100	
3	PR1-2		1	302	60sec	1080	± 82	
4	PR2-S		1	303	60sec	3750	± 170	
5	PR2-1		1	304	60sec	2170	± 130	
6	PR2-2		1	305	60sec	1790	± 120	
7	PR3-S		1	306	60sec	2530	± 130	
8	PR3-1		1	307	60sec	1490	± 98	
9	PR3-2		1	309	60sec	648	± 64	
10	PR4-S		1	310	20sec	10,900	± 650	
Change XRF battery, recalibrate XRF internally								
	Quartz Sand Blank		1	312	60sec	<34		DL = 34
	5532 mg/kg NIST Pb ^(f)		1	313	60sec	4810		DL = 77
11	PR5-S		1	314	60sec	7510	± 270	
12	PR5-1		1	315	60sec	7490	± 280	
13	PR6-S		1	316	60sec	1370	± 94	
14	PR6-1		1	317	60sec	776	± 71	
15	PR6-2		1	318	20sec	106	± 60	
16	PR7-S		1	319	40sec	289	± 52	
17	PR7-1		1	320	20sec	195	± 74	
18	PR7-2		1	321	30sec	379	± 68	

a: Samples collected and identified by Matt Eyer of Versar on Jan. 27, 05

b:

c: Analyst #1 is T. E. Moody, Niton Certified Operator, MT²

d: the analysis or reading number that is stored in the XRF

e: the amount of time that XRF is exposed to the sample

f: XRF soil standards supplied by Niton and traceable to NIST

XRF Analysis Of Cherry Creek Field Samples (3) Feb. 1, 05

Client/Field I.D. (a)	MT ² I.D. (b)	Analyst I.D. (c)	XRF Analysis # (d)	XRF time(e) sec	XRF Pb mg/kg	S.D. (std. dev.)	DL (det. lim.)
		1	351	30	<37		37
		1	352	30	1210	± 110	35
		1	354	30	4820	± 320	107
36	RR6-S	1	357	20	6910	± 430	
37	RR6-1	1	358	10	296	± 120	
38	RR6-2	1	359	30	1050	± 120	
39	RR7-S	1	360	15	273	± 100	
40	RR7-1	1	361	10	<130		130
43	RR7-2	1	362	10	<130		130
44	RR8-S	1	363	30	1100	± 110	
45	RR8-1	1	364	10	<130		130
46	RR8-2	1	365	10	<110		110
47	RR9-S		366	30	715	± 89	
48	RR9-1		367	10	<130		130
Change XRF battery, recalibrate XRF internally							
		1	369	30	<35		35
		1	370	30	1110	± 100	33
		1	372	30	4860	± 330	110
49	TR5-.5	1	375	10	<120		120
50	TR5-1	1	376	15	<100		100
51	TR10-.5	1	377	20	<70		70
52	TR10-1	1	378	20	<86		86
53	TR15-.5	1	379	30	558	± 70	
54	TR15-1	1	381	30	67	± 44	
55	TR20-.5	1	382	30	382	± 76	
56	TR20-1	1	383	30	<70		70

a: Samples collected and identified by Matt Eyer of Versar on Feb. 1, 05

b:

c: Analyst #1 is T. E. Moody, Niton Certified Operator, MT².

d: the analysis or reading number that is stored in the XRF

e: the amount of time that XRF is exposed to the sample

f: XRF soil standards supplied by Niton and traceable to NIST

XRF Analysis Of Cherry Creek Field Samples (4) Feb. 3, 05

Client/Field I.D. (a)	MT ² I.D. (b)	Analyst I.D. (c)	XRF Analysis # (d)	XRF time(e) sec	XRF Pb mg/kg	S.D. (std. dev.)	DL (det. lim.)
Quartz Sand Blank		1	385	30	<41		37
Prepared standard in quartz sand		1	386	30	1050	± 110	35
5532 mg/kg NIST Pb ^(f)		1	388	30	4800	± 320	107
57	TR1-.5	1	389	10	<100		100
58	TR1-1	1	390	10	<120		120
59	TR2-.5	1	391	15	<75		75
60	TR2-1	1	393	15	<87		87
61	TR3-.5	1	393	15	<91		91
62	TR3-1	1	394	15	<100		100
63	TR4-.5	1	395	15	114	± 68	
64	TR4-1	1	396	15	<100		100
65	TR6-.5	1	397	15	<99		99
66	TR6-1	1	398	15	<75		75
Change XRF battery, recalibrate XRF internally							
Quartz Sand Blank		1	400	30	<42		42
Prepared standard in quartz sand		1	401	30	1180	± 110	
5532 mg/kg NIST Pb ^(f)		1	403	30	4830	± 330	
49	TR7-.5	1	404	15	355	± 97	
67	TR7-1	1	405	30	<68		68
68	TR11-.5	1	406	15	<98		98
69	TR11-1	1	407	15	<95		95
70	TR12-.5	1	408	15	162	± 78	
71	TR12-1	1	409	20	<96		96
72	TR16-.5	1	410	15	<63		63
73	TR16-1	1	411	15	<130		130
74	TR17-.5	1	412	28	<64		64
75	TR17-1	1	413	20	<73		73

- a: Samples collected and identified by Matt Eyer of Versar on Feb. 1, 05
- b:
- c: Analyst #1 is T. E. Moody, Niton Certified Operator, MT².
- d: the analysis or reading number that is stored in the XRF
- e: the amount of time that XRF is exposed to the sample
- f: XRF soil standards supplied by Niton and traceable to NIST

XRF Analysis Of Cherry Creek Field Samples (7) Feb. 12, 05

Client/Field I.D. (a)	MT ² I.D. (b)	Analyst I.D. (c)	XRF Analysis # (d)	XRF time (e) sec	XRF Pb mg/kg	S.D. (std. dev.)	DL (det. lim.)
Quartz Sand Blank		1	450	30	<40		40
Prepared standard in quartz sand		1	451	30	1260	± 110	
5532 mg/kg NIST Pb ^(f)		1	452	30	4860	± 540	
	TR21-1	Hold					
93	TR21-2	1	453	15	<110		110
94	TR22-5	1	455	15	<100		100
95	TR22-1	1	456	30	77	± 48	
96	TR23-5	1	457	30	83	± 50	
97	TR23-1	1	459	30	<72		72
98	RR5-2.5	1	460	15	10.7k	± 910	
99	RR5-3	1	461	25	7920	± 480	
	RR5-3.5	Hold			3,060	± 130	
	RR5-4	Hold			<53		
100	RR10-S	1	462	30	568	± 75	
101	RR10-1	1	463	15	<91		91
	RR10-2	Hold					
	RR10-3	Hold					
102	PR5-2.5	1	464	15	<100		100
103	PR5-3	1	465	15	<96		96
	PR5-3.5	Hold					
	PR5-4	Hold					
104	PR6-2.5	1	466	30	736	± 100	
105	PR6-3	1	467	30	177	± 59	
	PR6-3.5	Hold					
	PR6-4	Hold					

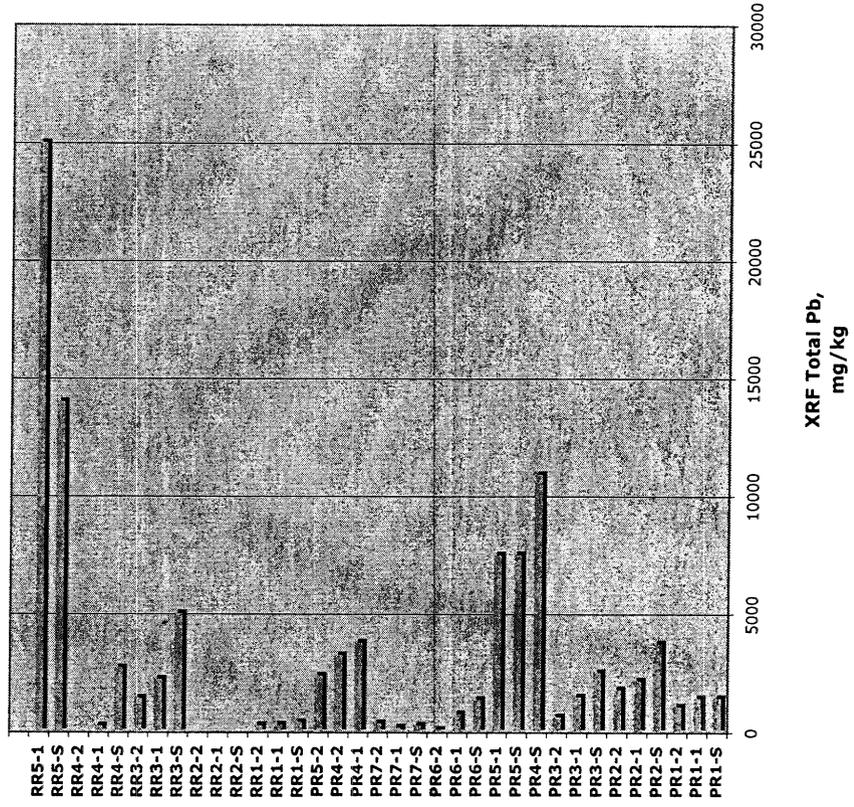
analyzed 2/17

a: Samples collected and identified by Matt Eyer of Versar on Feb. 11, 05
 b:
 c: Analyst #1 is T. E. Moody, Niton Certified Operator, MT²
 d: the analysis or reading number that is stored in the XRF
 e: the amount of time that XRF is exposed to the sample
 f: XRF soil standards supplied by Niton and traceable to NIST

PR1-S	1440
PR1-1	1430
PR1-2	1080
PR2-S	3750
PR2-1	2170
PR2-2	1790
PR3-S	2530
PR3-1	1490
PR3-2	648
PR4-S	10,900
PR5-S	7510
PR5-1	7490
PR6-S	1370
PR6-1	776
PR6-2	106
PR7-S	289
PR7-1	195
PR7-2	379
PR4-1	3790
PR4-2	3240
PR5-2	2380
RR1-S	424
RR1-1	301
RR1-2	291
RR2-S	<83
RR2-1	<83
RR2-2	<79
RR3-S	5010
RR3-1	2240
RR3-2	1440
RR4-S	2710
RR4-1	272
RR4-2	<120
RR5-S	14,000
RR5-1	25,000

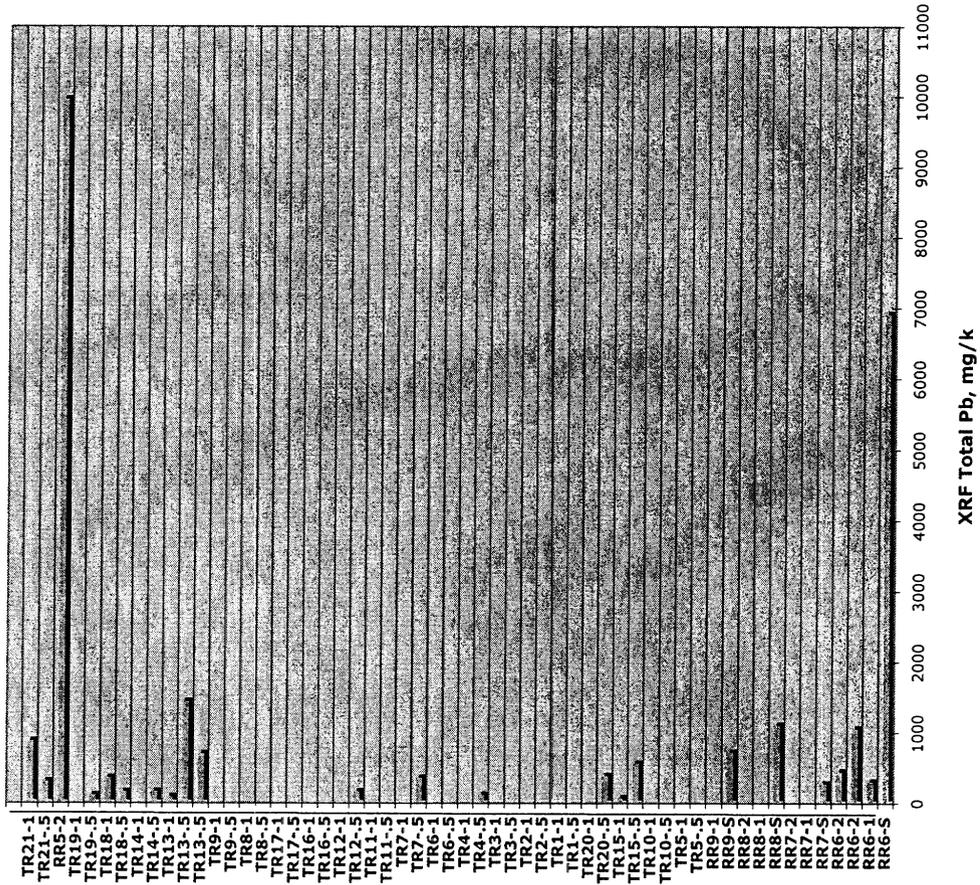
XRF Total Pb for Field Sample lots 1 & 2

Field Sample I.D.



XRF Total Pb for Field Sample Lots 3, 4, 5 & 6

Field Sample I.D.

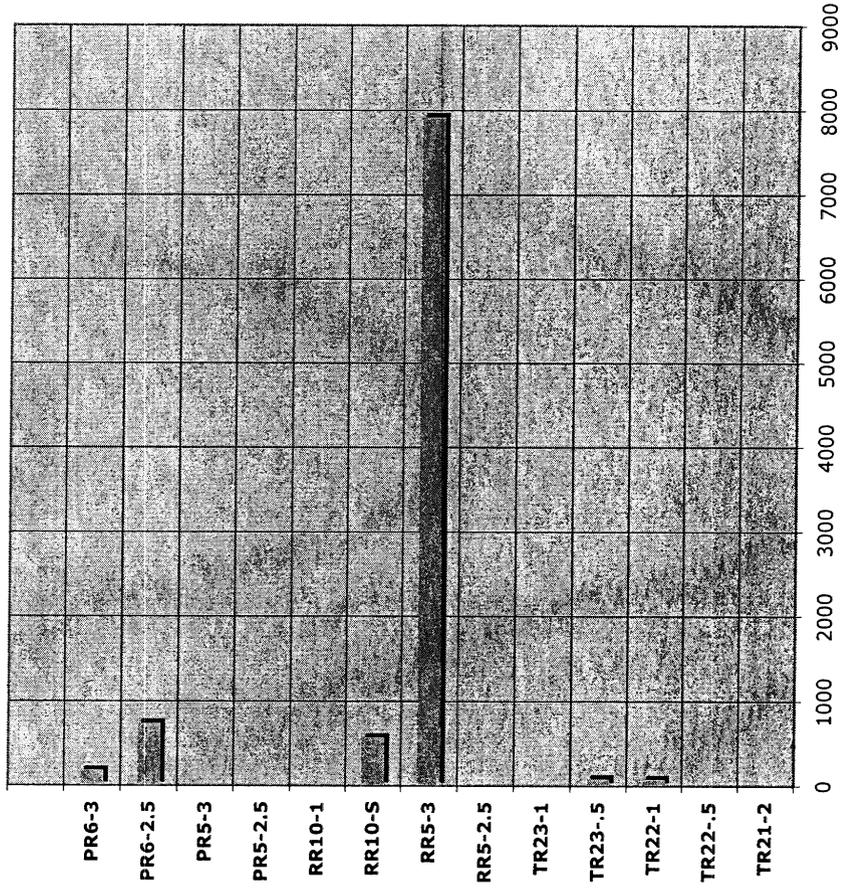


RR6-S	6910
RR6-1	296
RR6-2	1050
RR7-S	273
RR7-1	<130
RR7-2	<130
RR8-S	1100
RR8-1	<130
RR8-2	<110
RR9-S	715
RR9-1	<130
TR5-5	<120
TR5-1	<100
TR10-5	<70
TR10-1	<86
TR15-5	558
TR15-1	67
TR20-5	382
TR20-1	<70
TR1-5	<100
TR1-1	<120
TR2-5	<75
TR2-1	<87
TR3-5	<91
TR3-1	<100
TR4-5	114
TR4-1	<100
TR6-5	<99
TR6-1	<75
TR7-5	355
TR7-1	<68
TR11-5	<98
TR11-1	<95
TR12-5	182
TR12-1	<96
TR16-5	<83
TR16-1	<130
TR17-5	<64
TR17-1	<73
TR8-5	<89
TR8-1	<130
TR9-1	<130
TR13-5	695
TR13-1	1440
TR14-5	90
TR14-1	160
TR18-5	157
TR18-1	356
TR19-5	111
TR19-1	<68
RR5-2	9860
TR21-5	300
TR21-1	876

TR21-2	<110
TR22-5	<100
TR22-1	77
TR23-5	83
TR23-1	<72
RR5-2.5	10.7k
RR5-3	7920
RR10-S	568
RR10-1	<91
PR5-2.5	<100
PR5-3	<96
PR6-2.5	736
PR6-3	177

XRF Total Pb for Field Sample lot 7

Field Sample I.D.



XRF Total Pb, mg/kg

Gary Torf/Chris Purcell/Versar Inc/CRC
 11990 Grant Street Suite 500
 Northglenn CO 80233-1136

DATE RECEIVED: 06-10-2005
 DATE REPORTED: 06-10-2005

RESEARCH SOIL ANALYSIS

Colorado State University
 Soil, Water and Plant Testing Laboratory
 Natural & Environmental Sciences Bldg - A319
 Fort Collins, CO 80523-1120

(970) 491-5061 FAX: 491-2930

BILLING:

Lab #	Sample ID #	% moisture	-----As Received-----	
			bulk density g/cm ³	bulk density lbs/ft ³
R5194	PR2-surface	6.7	1.22	76.3
R5195	RR5 PR5 3.5	6.1	1.36	85.0

KEMRON REPORT L0502227

PREPARED FOR: VERSAR

**WORK ID: VOLUNTARY LAND MANAGEMENT FAMILY
SHOOTING CENTER**

Summary Report	2
Attachments	10
Full Sample Data Package	16
Metals Data	17
Metals I C P Data	18
<i>QC Summary</i>	19
<i>Raw Data</i>	55



156 Starlite Drive, Marietta, OH 45750 • TEL 740-373-4071 • FAX 740-373-4835 • <http://www.kemron.com>

Laboratory Report Number: L0502227

Please find enclosed the analytical results for the samples you submitted to KEMRON Environmental Services.

Review and compilation of your report was completed by KEMRON's Sales and Service Team. If you have questions, comments or require further assistance regarding this report, please contact our team member noted in the Reviewed box below at 800-373-4071. Team member e-mail addresses also appear here for your convenience.

Debra Elliott - Team Leader
delliott@kemron-lab.com

Amanda Fickiesen - Client Services Specialist
afickiesen@kemron-lab.com

Cheryl Koelsch - Team Chemist/Data Specialist
ckoelsch@kemron-lab.com

Nina Scott - Client Services Specialist
ascott@kemron-lab.com

Stephanie Mossburg - Team Chemist/Data Specialist
smossburg@kemron-lab.com

Vicki Lauer - Client Services Specialist
vlauer@kemron-lab.com

Kathy Albertson - Team Chemist/Data Specialist
kalbertson@kemron-lab.com

Micalyn Harris - Team Chemist/Data Specialist
mharris@kemron-lab.com

This report was reviewed on February 17, 2005:

I certify that all test results meet all of the requirements of the NELAP standards and other applicable contract terms and conditions. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on an 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of KEMRON Environmental Services.

This report was certified on February 17, 2005:

FL DOH NELAP ID: E87551

This report contains a total of **208** pages.

Protecting Our Environmental Future

1.0 Summary Report

KEMRON ENVIRONMENTAL SERVICES
REPORT NARRATIVE

KEMRON Login No.: L0502227

CHAIN OF CUSTODY: The chain of custody number was 992753.

SHIPMENT CONDITIONS: The chain of custody forms were received sealed in a cooler.

SAMPLE MANAGEMENT: All samples received were intact.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and KEMRON Environmental Services, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Approved: 14-FEB-05
<i>Stephanie Mosberg</i>

**REPORT NARRATIVE
METALS**

KEMRON Login No: L0502227

METHOD

Analysis: SW-846 6010

HOLDING TIMES

Sample Preparation: All holding times were met.

Sample Analysis: All holding times were met.

PREPARATION

Sample preparation proceeded normally.

CALIBRATION

Initial calibrations: All acceptance criteria were met.

Alternate Source Standards: All acceptance criteria were met.

Continuing Calibration : All acceptance criteria were met.

BATCH QA/QC

Method Blank: All acceptance criteria were met.

Laboratory Control Sample: All acceptance criteria were met.

Serial Dilution/Post Digestion Spike: WG182949(6010) - All acceptance criteria were met.

SAMPLES

WG182949(6010) - Lead for sample 04 yielded a result which exceeded the linear range upon initial analysis. The sample was reanalyzed at a dilution for lead.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and KEMRON Environmental Services, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Analyst: JYH/MMB

Rev. 6/00

Approved: February 17, 2005

Maren Beery

KEMRON ENVIRONMENTAL SERVICES
ANALYSES DATA PACKAGE

Analytical Method : 6010B

AAB # : WG182949

Lab Name : Kemron Environmental Services

Contract # : _____

Base/Command : Riverdale Rd. Properties

Prime Contractor : Versar Denver, Colorado

Field sample ID

Lab Sample ID

TR20-6

L0502227-01

TR18-1

L0502227-02

RR6-2

L0502227-03

PR4-2

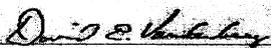
L0502227-04

Comments:

RS=Parent Sample, MS or SS=Matrix Spike, SD=Spike Duplicate, DS=Duplicate Sample.

Suffix Matches parent to QC

I certify this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or the Manager's designee,

Signature: 

Name: David E. Vandenberg

Date: 17-FEB-05

Title: Laboratory Director

KEMRON ENVIRONMENTAL SERVICES
ANALYSES DATA SHEET 2
RESULTS

Analytical Method : 6010B Preparatory Method: 3050B AAB # : WG182949
 Lab Name : Kemron Environmental Services Contract#: Gary Torf
 Field Sample ID: TR20-6 Lab Sample ID: L0502227-01 Matrix: Soil
 % Solids: 100 Initial Calibration ID: IRIS-ICP 16-FEB-05
 Date Received: 10-FEB-05 Date Extracted: 11-FEB-05 Date Analyzed: 16-FEB-05 13:38:00
 Concentration Units: mg/kg File ID: IR.021605.133800 Pre-Prep Method/Date: /

Analyte	MDL	RL	Concentration	Dilution	Qualifier
Lead, Total	0.481	4.81	147	1	

Comments:

All results, MDLs, and RLs have been corrected to dry weight, where applicable.

KEMRON ENVIRONMENTAL SERVICES

ANALYSES DATA SHEET 2

RESULTS

Analytical Method : 6010B Preparatory Method: 3050B AAB # : WG182949
 Lab Name : Kemron Environmental Services Contract#: Gary Torf
 Field Sample ID: TR18-1 Lab Sample ID: L0502227-02 Matrix: Soil
 % Solids: 100 Initial Calibration ID: IRIS-ICP 16-FEB-05
 Date Received: 10-FEB-05 Date Extracted: 11-FEB-05 Date Analyzed: 16-FEB-05 13:44:00
 Concentration Units: mg/kg File ID: IR.021605.134400 Pre-Prep Method/Date: /

Analyte	MDL	RL	Concentration	Dilution	Qualifier
Lead, Total	0.481	4.81	21.2	1	

Comments:

All results, MDLs, and RLs have been corrected to dry weight, where applicable.

KEMRON ENVIRONMENTAL SERVICES

ANALYSES DATA SHEET 2

RESULTS

Analytical Method : 6010B Preparatory Method: 3050B AAB # : WG182949
Lab Name : Kemron Environmental Services Contract#: Gary Torf
Field Sample ID: RR6-2 Lab Sample ID: L0502227-03 Matrix: Soil
% Solids: 100 Initial Calibration ID: IRIS-ICP 16-FEB-05
Date Received: 10-FEB-05 Date Extracted: 11-FEB-05 Date Analyzed: 16-FEB-05 13:49:00
Concentration Units: mg/kg File ID: IR.021605.134900 Pre-Prep Method/Date: /

Analyte	MDL	RL	Concentration	Dilution	Qualifier
Lead, Total	0.476	4.76	2700	1	

Comments:

All results, MDLs, and RLs have been corrected to dry weight, where applicable.

KEMRON ENVIRONMENTAL SERVICES

ANALYSES DATA SHEET 2

RESULTS

Analytical Method : 6010B Preparatory Method: 3050B AAB # : WG182949

Lab Name : Kemron Environmental Services Contract#: Gary Torf

Field Sample ID: PR4-2 Lab Sample ID: L0502227-04 Matrix: Soil

% Solids: 100 Initial Calibration ID: IRIS-ICP 16-FEB-05

Date Received: 10-FEB-05 Date Extracted: 11-FEB-05 Date Analyzed: 16-FEB-05 18:19:00

Concentration Units: mg/kg File ID: IR.021605.181900 Pre-Prep Method/Date: /

Analyte	MDL	RL	Concentration	Dilution	Qualifier
Lead, Total	24.3	243	23700	50	

Comments:

All results, MDLs, and RLs have been corrected to dry weight, where applicable.

1.2 Attachments

Kemron Environmental Services
Analyst Listing
February 17, 2005

AJF - AMANDA J. FICKIESEN	ALB - ANNIE L. BOCK	ALT - ANN L. THAYER
ARS - ANGELINA R. SCOTT	BRG - BRENDA R. GREGORY	CAF - CHERYL A. FLOWERS
CAK - CHERYL A. KOELSCH	CEB - CHAD E. BARNES	CLC - CHRYS L. CRAWFORD
CLK - CARL L. KING	CLS - CARA L. STRICKLER	CLW - CHARISSA L. WINTERS
CM - CHARLIE MARTIN	CMS - CRYSTAL M. STEPHENS	CPD - CHAD P. DAVIS
CRC - CARLA R. COCHRAN	CSH - CHRIS S. HILL	DAS - DALLAS A. SULLIVAN
DD - DIANE M. DENNIS	DDE - DEBRA D. ELLIOTT	DEL - DON E. LIGHTFRITZ
DEV - DAVID E. VANDENBERG	DGB - DOUGLAS G. BUTCHER	DIH - DEANNA I. HESSON
DLB - DAVID L. BUMGARNER	DLP - DOROTHY L. PAYNE	DLR - DIANNA L. RAUCH
DMV - DAVID M. VANDEVELDE	DP - DEANNA L. PIERSON	DR - DEANNA ROBERTS
DRB - DOUG R. BARNETT	DSM - DAVID S. MOSSOR	DST - DENNIS S. TEPE
ECL - ERIC C. LAWSON	EED - EMILY E. DECKER	ELW - ERICA L. WEBB
HV - HEMA VILASAGAR	JAL - JOHN A. LENT	JJG - JOHN J. GREUEY
JKT - JANE K. THOMPSON	JLS - JANICE L. SCHIMMEL	JWR - JOHN W. RICHARDS
JWS - JACK W. SHEAVES	JYH - JI Y. HU	KHR - KIM H. RHODES
KRA - KATHY R. ALBERTSON	LKN - LINDA K. NEDEFF	LSA - LUCINDA S. ARNOLD
LSB - LESLIE S. BUCINA	MAH - MICALYN A. HARRIS	MDA - MICHAEL D. ALBERTSON
MDC - MICHAEL D. COCHRAN	MES - MARY E. SCHILLING	MKZ - MARILYN K. ZUMBRO
MLR - MARY L. ROCHOTTE	MLS - MICHAEL L. SCHIMMEL	MMB - MAREN M. BEERY
MSW - MATT S. WILSON	NJB - NATALIE J. BOOTH	OGT - OKEY G. TUCKER
PAS - PATRICK A. STREET	RB - ROBERT BUCHANAN	RDC - REBECCA D. CUTLIP
REK - ROBERT E. KYER	RJW - RHONDA J. WITTEKIND	RP - RICHARD PETTY
RWC - ROD W. CAMPBELL	SCM - SUSAN C. MOELLENDICK	SH - SHAUNA M. HYDE
SK - SANDRA KEENER	SLM - STEPHANIE L. MOSSBURG	SLP - SHERI L. PFALZGRAF
TD - TIMOTHY DYSERT	TMM - TAMMY M. MORRIS	VC - VICKI COLLIER
VKL - VICKY K. LAUER		

KEMRON Environmental Services, Inc.
List of Valid Qualifiers
February 17, 2005

These are KEMRON's standard report qualifiers:

B	Present in the method blank	NS	Not spiked
C	Confirmed by GC/MS	P	Concentration >40% difference between the two GC columns
CG	Confluent growth	QNS	Quantity not sufficient to perform analysis
D	The analyte was quantified as a secondary dilution factor	RA	Reanalysis confirms reported results
DL	Surrogate or spike was diluted out	RE	Reanalysis confirms sample matrix interference
E	Estimated concentration due to sample matrix interference	S	Analyzed by method of standard addition
FL	Free liquid	SMI	Sample matrix interference on surrogate
I	Semi-quantitative result, out of instrument calibration range	SP	Reported results are for spike compounds only
J	Present below normal reporting limit	TNTC	Too numerous to count
L	Sample reporting limits elevated due to matrix interference	U	Analyzed for but not detected
N	Tentatively Identified Compound (TIC)	W	Post-digestion spike for furnace AA out of control limits
NA	Not applicable	X	Exceeds regulatory limit
ND	Not detected at or above the reporting limit (RL)	Z	Can not be resolved from isomer.***
NF	Not found	+	Correlation coefficient for the MSA is less than 0.995
NFL	No free liquid	<	Less than
NI	Non-ignitable	>	Greater than
		*	Surrogate or spike compound out of range

*****Special Notes for Organic Analytes**

1. Acrolein and acrylonitrile by method 624 are semi-quantitative screens only.
2. 1,2-Diphenylhydrazine is unstable and is reported as azobenzene.
3. N-nitrosodiphenylamine cannot be separated from diphenylamine.
4. 3-Methylphenol and 4-Methylphenol are unresolvable compounds.
5. m-Xylene and p-Xylene are unresolvable compounds.
6. The reporting limits for Appendix II/IX compounds by method 8270 are based on EPA estimated PQLs referenced in 40 CFR Part 264, Appendix IX. They are not always achievable for every compound and are matrix dependent.

AFCEE Qualifiers

These are KEMRON's AFCEE Report Qualifiers

- J** The analyte was positively identified, the quantitation is an estimation.
- U** The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL
- F** The analyte was positively identified by the associated numerical value is below the RL
- R** The data is unusable due to deficiencies in the ability to analyze the sample and meet QC criteria
- B** The analyte was found in an associated blank, as well as in the sample
- M** The matrix effect was present
- S** To be applied to all field screening data
- T** Tentatively identified compound (using GC/MS)

KEMRON Environmental Services
Internal Chain of Custody Report

Login: L0502227
Account: VERSAR-CO-454
Project: 454-TORF
Samples: 4
Due Date: 17-FEB-2005

Samplenum **Container ID** **Products**
L0502227-01 **114827** **PB DIG-ICP ICP-PE ICP-IRIS ICP-MS**

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN			10-FEB-2005 12:57	BRG	
2	PREP	W1	DIG	10-FEB-2005 15:41	REK	BRG
3	STORE	DIG	A1	11-FEB-2005 14:13	BRG	REK

Samplenum **Container ID** **Products**
L0502227-02 **114828** **DIG-ICP ICP-IRIS ICP-MS ICP-PE PB**

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN			10-FEB-2005 12:57	BRG	
2	PREP	W1	DIG	10-FEB-2005 15:41	REK	BRG
3	STORE	DIG	A1	11-FEB-2005 14:13	BRG	REK

Samplenum **Container ID** **Products**
L0502227-03 **114829** **DIG-ICP ICP-IRIS ICP-MS ICP-PE PB**

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN			10-FEB-2005 12:57	BRG	
2	PREP	W1	DIG	10-FEB-2005 15:41	REK	BRG
3	STORE	DIG	A1	11-FEB-2005 14:13	BRG	REK

Samplenum **Container ID** **Products**
L0502227-04 **114830** **DIG-ICP ICP-IRIS ICP-MS ICP-PE PB**

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN			10-FEB-2005 12:57	BRG	
2	PREP	W1	DIG	10-FEB-2005 15:41	REK	BRG
3	STORE	DIG	A1	11-FEB-2005 14:13	BRG	REK

LABORATORY REPORT

L0502227

02/17/05 12:18

Submitted By

KEMRON Environmental Services

156 Starlite Drive

Marietta , OH 45750

(740) 373 - 4071

For

Account Name: Yersar Denver, Colorado
1190 Grant St.
Suite 500
Northglenn, CO 80233
Attention: Garv Torf

Account Number: 467-CO-454
Work ID: VOLUNTARY LAND MANAGEMENT

Sample Summary

Client ID	Lab ID	Date Collected	Date Received
TR20-6	L0502227-01	01-FEB-05	10-FEB-05
TR18-1	L0502227-02	04-FEB-05	10-FEB-05
RR6-2	L0502227-03	01-FEB-05	10-FEB-05
PR4-2	L0502227-04	28-JAN-05	10-FEB-05

KEMRON ENVIRONMENTAL SERVICES

Report Number: L0502227

Report Date : February 17, 2005

Sample Number: L0502227-01
 Client ID: TR20-6
 Matrix: Soil
 Workgroup Number: WG182949
 Collect Date: 01-FEB-05
 Sample Tag: 01

Prep Method: 3050B
 Analytical Method: 6010B
 Analyst: JYH
 Dilution: 1
 Units: mg/kg
 Percent Solid: 100

Instrument: IRIS-ICP
 Prep Date: 02/11/2005 06:00
 Cal Date: 02/16/2005 10:27
 Run Date: 02/16/2005 13:38
 File ID: IR.021605.133800

Analyte	CAS. Number	Result	Qual	RL	MDL
Lead, Total	7439-92-1	147		4.81	0.481

Sample Number: L0502227-02
 Client ID: TR18-1
 Matrix: Soil
 Workgroup Number: WG182949
 Collect Date: 04-FEB-05
 Sample Tag: 01

Prep Method: 3050B
 Analytical Method: 6010B
 Analyst: JYH
 Dilution: 1
 Units: mg/kg
 Percent Solid: 100

Instrument: IRIS-ICP
 Prep Date: 02/11/2005 06:00
 Cal Date: 02/16/2005 10:27
 Run Date: 02/16/2005 13:44
 File ID: IR.021605.134400

Analyte	CAS. Number	Result	Qual	RL	MDL
Lead, Total	7439-92-1	21.2		4.81	0.481

Sample Number: L0502227-03
 Client ID: RR6-2
 Matrix: Soil
 Workgroup Number: WG182949
 Collect Date: 01-FEB-05
 Sample Tag: 01

Prep Method: 3050B
 Analytical Method: 6010B
 Analyst: JYH
 Dilution: 1
 Units: mg/kg
 Percent Solid: 100

Instrument: IRIS-ICP
 Prep Date: 02/11/2005 06:00
 Cal Date: 02/16/2005 10:27
 Run Date: 02/16/2005 13:49
 File ID: IR.021605.134900

Analyte	CAS. Number	Result	Qual	RL	MDL
Lead, Total	7439-92-1	2700		4.76	0.476

Sample Number: L0502227-04
 Client ID: PR4-2
 Matrix: Soil
 Workgroup Number: WG182949
 Collect Date: 28-JAN-05
 Sample Tag: DL01

Prep Method: 3050B
 Analytical Method: 6010B
 Analyst: JYH
 Dilution: 50
 Units: mg/kg
 Percent Solid: 100

Instrument: IRIS-ICP
 Prep Date: 02/11/2005 06:00
 Cal Date: 02/16/2005 10:27
 Run Date: 02/16/2005 18:19
 File ID: IR.021605.181900

Analyte	CAS. Number	Result	Qual	RL	MDL
Lead, Total	7439-92-1	23700		243	24.3



No 992954

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME		PARAMETERS				INDUSTRIAL HYGIENE SAMPLE	V	N
	112441244-001	(Printed)							
SAMPLERS: (Signature)		Hunting Lead Management - Family Shooting Center		NO. OF CONTAINERS					
(Printed)		Mathew Eber							
FIELD SAMPLE NUMBER	DATE	TIME	MATRIX	METH.	STATION LOCATION				
PR1 - Surface	7/20/05	7:30	Soil		Pistol Range	1	X		
PR1 - 1'		7:40				1	X		
PR2 - Surface		7:45				1			
PR2 - 1'		8:00				1	X	Hold	
PR2 - 2'		8:15				1	X		
PR3 - Surface		8:20				1			
PR3 - 1'		8:30				1	X	Hold	
PR3 - 2'		8:40				1	X		
PR4 - Surface		8:50				1	X		
PR4 - 1'		9:00				1			
PR4 - 2'		9:10				1	X	Hold	
PR5 - Surface		9:20				1	X		
PR5 - 1'		9:50				1	X		
Relinquished by: (Signature)		Date / Time		Relinquished by: (Signature)		Date / Time		Received by: (Signature)	
(Printed)		7/20/05 2:10 PM		(Printed)		(Printed)		(Printed)	
Mathew Eber				S.E. Meary		7/21/05			
(Printed)				(Printed)		(Printed)		(Printed)	
Relinquished by: (Signature)		Date / Time		Received for Laboratory by: (Signature)		Date / Time		Remarks	
(Printed)				(Printed)		(Printed)			

CHAIN OF CUSTODY RECORD

No. 992903

PROJECT NO.	PROJECT NAME		PARAMETERS				INDUSTRIAL HYGIENE SAMPLE	Y	
	SAMPLERS: (Signature)		NO. OF CONTAINERS						REMARKS
FIELD SAMPLE NUMBER	DATE	TIME	MATRIX	METH.	STATION LOCATION				
110441741.001	Voluntary Lead Management - Family Shanty Centre								
SAMPLERS: (Signature)		Mathias Eyr							
PR5-01	7:00	7:00	Soil		Distal Range	1	X		
PR4-11	7:00	7:00	Soil		Proximal Range	1	X		
PR4-21	7:05	7:05	Soil		Proximal Range	1	X		
RR1-Surface	7:55	7:55	Surface		Proximal Range	1	X	Hold	
RR1-Surface	8:00	8:00	Surface		Proximal Range	1	X	Hold	
RR2-1	8:10	8:10	Surface		Proximal Range	1	X	Hold	
RR2-Surface	8:15	8:15	Surface		Proximal Range	1	X	Hold	
RR2-1	8:25	8:25	Surface		Proximal Range	1	X	Hold	
RR2-2	8:35	8:35	Surface		Proximal Range	1	X	Hold	
RR3-Surface	8:45	8:45	Surface		Proximal Range	1	X	Hold	
RR3-1	9:05	9:05	Surface		Proximal Range	1	X	Hold	
RR3-2	9:30	9:30	Surface		Proximal Range	1	X	Hold	
Relinquished by: (Signature)		Date / Time	Received by: (Signature)		Date / Time	Relinquished by: (Signature)		Date / Time	Received by: (Signature)
(Printed)		01/26/12 12:30	M. Buehler			(Printed)			(Printed)
Relinquished by: (Signature)		Date / Time	Received for Laboratory by: (Signature)		Date / Time	Relinquished by: (Signature)		Date / Time	Remarks
(Printed)			(Printed)			(Printed)			



No 992967

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME		PARAMETERS				INDUSTRIAL HYGIENE SAMPLE	Y	N	
	SAMPLERS: (Signature)		NO. OF CONTAINERS							
FIELD SAMPLE NUMBER	DATE	TIME	METH.	MATRIX	STATION LOCATION	REMARKS				
R04-Surface	11/21/85	9:40		Soil	Rifle Range	1				Hold
R04-1'	11/21/85	10:00				1	X			
R04-2'	11/21/85	10:20				1	X			
R05-Surface	11/21/85	10:30				1	X			
R05-1'	11/21/85	11:35				1	X			
Relinquished by: (Signature) <i>[Signature]</i> Date / Time 11/21/85 11:30 Received by: (Signature) <i>M. Beckert</i> Date / Time (Printed) (Printed)										
Relinquished by: (Signature) (Printed) Date / Time Received for Laboratory by: (Signature) (Printed) Date / Time (Printed) (Printed)										



No 992965

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME	INDUSTRIAL HYGIENE SAMPLE		REMARKS
		Y	N	
100241244	Voluntary Load Management Facility, Chicago, Ill			
SAMPLERS: (Signature) <i>MLG</i>		NO. OF CONTAINERS		
FIELD SAMPLE NUMBER	DATE	TIME	METH.	STATION LOCATION
R06-Sub	9/24/05	9:05	Sa	Risk Range
R06-1	9/24/05	9:05		
R06-2	9/24/05	9:05		
R07-Sub	9/24/05	9:20		
R07-1	9/24/05	9:24		
R07-2	9/24/05	9:30		
R08-Sub	9/24/05	9:42		
R08-1	9/24/05	9:50		
R09-Sub	10/2/05	10:00		
R09-1	10/2/05	10:05		
Relinquished by: (Signature) <i>Mathie J...</i>	Date / Time	Received by: (Signature) <i>AM B...</i>	Date / Time	Relinquished by: (Signature)
(Printed)	10/2/05 11:00	(Printed)		(Printed)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks
(Printed)		(Printed)		



CHAIN OF CUSTODY RECORD

No 992958

PROJECT NO.	PROJECT NAME		PARAMETERS		INDUSTRIAL HYGIENE SAMPLE	Y			
1004104-201	Voluntary Lead Measurement - Family Security Center					N			
SAMPLERS: (Signature)		STATION LOCATION		NO. OF CONTAINERS		REMARKS			
<i>[Signature]</i>		Tide Range		30X					
FIELD SAMPLE NUMBER	DATE	TIME	MATRIX	METH.	RELINQUISHED BY: (Signature)	DATE / TIME	RECEIVED BY: (Signature)	DATE / TIME	RECEIVED BY: (Signature)
TR4-1'	7-15-00	7:05	Soil		<i>[Signature]</i>	7/15/00	<i>[Signature]</i>	7/15/00	<i>[Signature]</i>
TR3-6"	7-15-00	7:10			<i>[Signature]</i>	7/15/00	<i>[Signature]</i>	7/15/00	<i>[Signature]</i>
TR3-1'	7-15-00	7:15			<i>[Signature]</i>	7/15/00	<i>[Signature]</i>	7/15/00	<i>[Signature]</i>
TR2-6"	7-15-00	7:20			<i>[Signature]</i>	7/15/00	<i>[Signature]</i>	7/15/00	<i>[Signature]</i>
TR2-1'	7-15-00	7:25			<i>[Signature]</i>	7/15/00	<i>[Signature]</i>	7/15/00	<i>[Signature]</i>
TR1-6"	7-15-00	7:30			<i>[Signature]</i>	7/15/00	<i>[Signature]</i>	7/15/00	<i>[Signature]</i>
TR1-1'	7-15-00	7:35			<i>[Signature]</i>	7/15/00	<i>[Signature]</i>	7/15/00	<i>[Signature]</i>
TR6-6"	7-15-00	8:00			<i>[Signature]</i>	7/15/00	<i>[Signature]</i>	7/15/00	<i>[Signature]</i>
TR6-1'	7-15-00	8:05			<i>[Signature]</i>	7/15/00	<i>[Signature]</i>	7/15/00	<i>[Signature]</i>
TR11-6"	7-15-00	8:25			<i>[Signature]</i>	7/15/00	<i>[Signature]</i>	7/15/00	<i>[Signature]</i>
TR11-1'	7-15-00	8:30			<i>[Signature]</i>	7/15/00	<i>[Signature]</i>	7/15/00	<i>[Signature]</i>
Relinquished by: (Signature)	Date / Time		Date / Time		Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Received by: (Signature)
<i>[Signature]</i>	7/15/00		7/15/00		<i>[Signature]</i>	7/15/00	<i>[Signature]</i>	7/15/00	<i>[Signature]</i>
Relinquished by: (Signature)	Date / Time		Date / Time		Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Received by: (Signature)
<i>[Signature]</i>	7/15/00		7/15/00		<i>[Signature]</i>	7/15/00	<i>[Signature]</i>	7/15/00	<i>[Signature]</i>

CHAIN OF CUSTODY RECORD

PROJECT NAME		PARAMETERS				INDUSTRIAL HYGIENE SAMPLE	Y	N
(Printed) Voluntary Lead Management - Family Shelter Center Mathias		NO. OF CONTAINERS		REMARKS				
		FIELD SAMPLE NUMBER	DATE	TIME	MATRIX	METH.	STATION LOCATION	
TRK-6	02/11/05	7:30	Soil			TRK Range	1	
TRK-7	7:35						1	
TR 14-6	7:45						1	
TR 14-1	7:50						1	
TR 14-8	8:00						1	
TR 14-11	8:05						1	
TR 14-6	8:15						1	
TR 14-1	8:20						1	
TR 13-6	8:30						1	
TR 13-1	8:35						1	
TR 4-6	8:45						1	
TR 4-1	8:50						1	
Relinquished by: (Signature) (Printed)		Date / Time	Received by: (Signature) (Printed)	Relinquished by: (Signature) (Printed)	Date / Time	Received by: (Signature) (Printed)		
Relinquished by: (Signature) (Printed)		02/11/05 8:30	Mathias					
Relinquished by: (Signature) (Printed)		Date / Time	Received for Laboratory by: (Signature) (Printed)	Date / Time	Remarks			
Relinquished by: (Signature) (Printed)								



CHAIN OF CUSTODY RECORD

No 992961

PROJECT NO.	PROJECT NAME		INDUSTRIAL HYGIENE SAMPLE	Y						
	Voluntary Lead Management - Family Shooting Center									
SAMPLERS: (Signature)			PARAMETERS	REMARKS						
Mother Eye										
FIELD SAMPLE NUMBER	DATE	TIME	METH.	MATRIX	NO. OF CONTAINERS	STATION LOCATION	Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time
805-05	8/16/05	8:00			1	75	(Signature)			
805-03	8/16/05	8:00			1					
805-05	8/16/05	8:00			1					
805-04	8/16/05	8:00			1					
805-06	8/16/05	8:00			1					
805-07	8/16/05	8:00			1					
805-08	8/16/05	8:00			1					
805-09	8/16/05	8:00			1					
805-10	8/16/05	8:00			1					
805-11	8/16/05	8:00			1					
805-12	8/16/05	8:00			1					
805-13	8/16/05	8:00			1					
805-14	8/16/05	8:00			1					
805-15	8/16/05	8:00			1					
805-16	8/16/05	8:00			1					
805-17	8/16/05	8:00			1					
805-18	8/16/05	8:00			1					
805-19	8/16/05	8:00			1					
805-20	8/16/05	8:00			1					
805-21	8/16/05	8:00			1					
805-22	8/16/05	8:00			1					
805-23	8/16/05	8:00			1					
805-24	8/16/05	8:00			1					
Relinquished by: (Signature)			Date / Time		Relinquished by: (Signature)		Date / Time		Received by: (Signature)	
(Printed)					(Printed)				(Printed)	
Relinquished by: (Signature)			Date / Time		Relinquished by: (Signature)		Date / Time		Remarks	
(Printed)					(Printed)					



CHAIN OF CUSTODY RECORD

No 992962

PROJECT NO.	PROJECT NAME				INDUSTRIAL HYGIENE SAMPLE	Y
	FIELD SAMPLE NUMBER	DATE	TIME	METH.		
11024-104-001	Voting Booth Measurements - Family Shooting Center					
SAMPLERS: (Signature) <i>[Signature]</i>						
NO. OF CONTAINERS						
STATION LOCATION						
PA6-25	10/16/00	10:00	Soil			
PA6-3	10/16/00	10:00				
PA6-25	10/16/00	10:00				
PA6-4	10/16/00	10:00				
TR 21-1	10/16/00	10:00				Hold
TR 22-1	10/16/00	10:00				Hold
TR 22-2	10/16/00	10:00				
TR 22-3	10/16/00	10:00				
TR 22-4	10/16/00	10:00				
TR 22-5	10/16/00	10:00				
TR 22-6	10/16/00	10:00				
TR 22-7	10/16/00	10:00				
TR 22-8	10/16/00	10:00				
TR 22-9	10/16/00	10:00				
TR 22-10	10/16/00	10:00				
TR 22-11	10/16/00	10:00				
TR 22-12	10/16/00	10:00				
TR 22-13	10/16/00	10:00				
TR 22-14	10/16/00	10:00				
TR 22-15	10/16/00	10:00				
TR 22-16	10/16/00	10:00				
TR 22-17	10/16/00	10:00				
TR 22-18	10/16/00	10:00				
TR 22-19	10/16/00	10:00				
TR 22-20	10/16/00	10:00				
TR 22-21	10/16/00	10:00				
TR 22-22	10/16/00	10:00				
TR 22-23	10/16/00	10:00				
TR 22-24	10/16/00	10:00				
TR 22-25	10/16/00	10:00				
TR 22-26	10/16/00	10:00				
TR 22-27	10/16/00	10:00				
TR 22-28	10/16/00	10:00				
TR 22-29	10/16/00	10:00				
TR 22-30	10/16/00	10:00				
TR 22-31	10/16/00	10:00				
TR 22-32	10/16/00	10:00				
TR 22-33	10/16/00	10:00				
TR 22-34	10/16/00	10:00				
TR 22-35	10/16/00	10:00				
TR 22-36	10/16/00	10:00				
TR 22-37	10/16/00	10:00				
TR 22-38	10/16/00	10:00				
TR 22-39	10/16/00	10:00				
TR 22-40	10/16/00	10:00				
TR 22-41	10/16/00	10:00				
TR 22-42	10/16/00	10:00				
TR 22-43	10/16/00	10:00				
TR 22-44	10/16/00	10:00				
TR 22-45	10/16/00	10:00				
TR 22-46	10/16/00	10:00				
TR 22-47	10/16/00	10:00				
TR 22-48	10/16/00	10:00				
TR 22-49	10/16/00	10:00				
TR 22-50	10/16/00	10:00				
TR 22-51	10/16/00	10:00				
TR 22-52	10/16/00	10:00				
TR 22-53	10/16/00	10:00				
TR 22-54	10/16/00	10:00				
TR 22-55	10/16/00	10:00				
TR 22-56	10/16/00	10:00				
TR 22-57	10/16/00	10:00				
TR 22-58	10/16/00	10:00				
TR 22-59	10/16/00	10:00				
TR 22-60	10/16/00	10:00				
TR 22-61	10/16/00	10:00				
TR 22-62	10/16/00	10:00				
TR 22-63	10/16/00	10:00				
TR 22-64	10/16/00	10:00				
TR 22-65	10/16/00	10:00				
TR 22-66	10/16/00	10:00				
TR 22-67	10/16/00	10:00				
TR 22-68	10/16/00	10:00				
TR 22-69	10/16/00	10:00				
TR 22-70	10/16/00	10:00				
TR 22-71	10/16/00	10:00				
TR 22-72	10/16/00	10:00				
TR 22-73	10/16/00	10:00				
TR 22-74	10/16/00	10:00				
TR 22-75	10/16/00	10:00				
TR 22-76	10/16/00	10:00				
TR 22-77	10/16/00	10:00				
TR 22-78	10/16/00	10:00				
TR 22-79	10/16/00	10:00				
TR 22-80	10/16/00	10:00				
TR 22-81	10/16/00	10:00				
TR 22-82	10/16/00	10:00				
TR 22-83	10/16/00	10:00				
TR 22-84	10/16/00	10:00				
TR 22-85	10/16/00	10:00				
TR 22-86	10/16/00	10:00				
TR 22-87	10/16/00	10:00				
TR 22-88	10/16/00	10:00				
TR 22-89	10/16/00	10:00				
TR 22-90	10/16/00	10:00				
TR 22-91	10/16/00	10:00				
TR 22-92	10/16/00	10:00				
TR 22-93	10/16/00	10:00				
TR 22-94	10/16/00	10:00				
TR 22-95	10/16/00	10:00				
TR 22-96	10/16/00	10:00				
TR 22-97	10/16/00	10:00				
TR 22-98	10/16/00	10:00				
TR 22-99	10/16/00	10:00				
TR 22-100	10/16/00	10:00				
TR 22-101	10/16/00	10:00				
TR 22-102	10/16/00	10:00				
TR 22-103	10/16/00	10:00				
TR 22-104	10/16/00	10:00				
TR 22-105	10/16/00	10:00				
TR 22-106	10/16/00	10:00				
TR 22-107	10/16/00	10:00				
TR 22-108	10/16/00	10:00				
TR 22-109	10/16/00	10:00				
TR 22-110	10/16/00	10:00				
TR 22-111	10/16/00	10:00				
TR 22-112	10/16/00	10:00				
TR 22-113	10/16/00	10:00				
TR 22-114	10/16/00	10:00				
TR 22-115	10/16/00	10:00				
TR 22-116	10/16/00	10:00				
TR 22-117	10/16/00	10:00				
TR 22-118	10/16/00	10:00				
TR 22-119	10/16/00	10:00				
TR 22-120	10/16/00	10:00				
TR 22-121	10/16/00	10:00				
TR 22-122	10/16/00	10:00				
TR 22-123	10/16/00	10:00				
TR 22-124	10/16/00	10:00				
TR 22-125	10/16/00	10:00				
TR 22-126	10/16/00	10:00				
TR 22-127	10/16/00	10:00				
TR 22-128	10/16/00	10:00				
TR 22-129	10/16/00	10:00				
TR 22-130	10/16/00	10:00				
TR 22-131	10/16/00	10:00				
TR 22-132	10/16/00	10:00				
TR 22-133	10/16/00	10:00				
TR 22-134	10/16/00	10:00				
TR 22-135	10/16/00	10:00				
TR 22-136	10/16/00	10:00				
TR 22-137	10/16/00	10:00				
TR 22-138	10/16/00	10:00				
TR 22-139	10/16/00	10:00				
TR 22-140	10/16/00	10:00				
TR 22-141	10/16/00	10:00				
TR 22-142	10/16/00	10:00				
TR 22-143	10/16/00	10:00				
TR 22-144	10/16/00	10:00				
TR 22-145	10/16/00	10:00				
TR 22-146	10/16/00	10:00				
TR 22-147	10/16/00	10:00				
TR 22-148	10/16/00	10:00				
TR 22-149	10/16/00	10:00				
TR 22-150	10/16/00	10:00				
TR 22-151	10/16/00	10:00				
TR 22-152	10/16/00	10:00				
TR 22-153	10/16/00	10:00				
TR 22-154	10/16/00	10:00				
TR 22-155	10/16/00	10:00				
TR 22-156	10/16/00	10:00				
TR 22-157	10/16/00	10:00				
TR 22-158	10/16/00	10:00				
TR 22-159	10/16/00	10:00				
TR 22-160	10/16/00	10:00				
TR 22-161	10/16/00	10:00				
TR 22-162	10/16/00	10:00				
TR 22-163	10/16/00	10:00				
TR 22-164	10/16/00	10:00				
TR 22-165	10/16/00	10:00				
TR 22-166	10/16/00	10:00				
TR 22-167	10/16/00	10:00				
TR 22-168	10/16/00	10:00				
TR 22-169	10/16/00	10:00				
TR 22-170	10/16/00	10:00				
TR 22-171	10/16/00	10:00				
TR 22-172	10/16/00	10:00				
TR 22-173	10/16/00	10:00				
TR 22-174	10/16/00	10:00				
TR 22-175	10/16/00	10:00				
TR 22-176	10/16/00	10:00				
TR 22-177	10/16/00	10:00				
TR 22-178	10/16/00	10:00				

Appendix C

Treatability Study

Versar Environmental Services
TREATABILITY REPORT
(Cherry Creek State Park)

T. E. Moody, Ph.D
Metals Treatment Technologies, LLC
March 1, 2005

1.0 OBJECTIVE

The objective of this report is to present the findings of a laboratory treatability study conducted by MT² designed to determine RCRA leachable lead (Pb) concentrations from Pb contaminated material. Determinations of leachable Pb will be made from untreated and ECOBOND[®] Pb treated material.

2.0 PRE-TREATMENT TCLP ANALYSIS

Samples of Pb contaminated soils were delivered to MT² sample receiving by Matt Eyer of Versar Environmental. The samples were delivered in plastic zip-lock bags. The soil types ranged from sandy loam to clay loam and were consistent in particle size. The samples were delivered to the MT² treatability laboratory January 27, 2005 through February 11, 2005. Before analysis, samples were placed onto a clean plastic sheet and mixed thoroughly to ensure homogeneity. XRF analysis was done in-house using a Niton model XL 700 multi-element XRF spectrophotometer. The analysis time for each reading ranged from 30 to 60 seconds. Per contract agreement, ten soils were selected for untreated TCLP analysis. The Pb contaminated soil material was then tested for hazardous Pb by using EPA's SW-846 Method No. 1311 "Toxicity Characteristic Leaching Procedure" (TCLP). The TCLP extraction fluids were then filtered and analyzed by atomic absorption spectrophotometry. The atomic absorption Pb analysis was implemented in-house using a Perkin-Elmer model 5100. Pb standards approved by NIST were used to construct the atomic absorption standard curve. All pH measurements were made after calibrating the pH meter with NIST pH standard solutions. The results of the subsequent analysis are presented in Table 1.

Table 1. PRE-TREATMENT TCLP RESULTS

MT ² Test #	Field ID.	Soil pH	XRF Pb mg/kg	TCLP Pb mg/l
14-12-1	TR13-6"	8.0	1068	64
14-12-2	TR15-6"	8.0	558	67
14-12-3	TR20-6"	7.9	382	2.4
14-12-4	TR18-1'	8.4	356	0.6
14-12-5	TR7-6"	8.9	355	1.3
14-12-6	PR4-2'	8.5	3240	412
14-12-7	PR5-2'	8.6	2380	370
14-12-8	RR3-2'	9.0	1440	82
14-12-9	RR5-1'	9.1	>25,000	1045
14-12-11	RR5-2'	8.9	9960	898
14-12-10	RR6-S	9.1	6910	550
RCRA Criteria				5.0



The 18 hour TCLP extraction values indicate that 8 of the 11 samples are hazardous according to RCRA classification. Of this group, 3 soils were selected for ECOBOND® Pb stabilization treatment and subsequent TCLP testing. Samples PR5-2, RR5-2 and TR15-6” were selected to be representative of the Pb contamination across the site. Table 2 lists characterization and chemical properties for the selected soils.

Table 2. SAMPLE DESCRIPTION and CHARACTERIZATION

Field I.D.	Soil pH	Description	XRF Pb mg/kg	TCLP Pb mg/l
PR5-2ft	8.6	Loamy, with sand, uniform particle size, brown in color	~2380	370
RR5-2ft	8.9	Loamy, with clay, large clumps, brownish in color	~9960	898
TR15-6 inches	8.0	Loamy, with clay, uniform particle size, dark grayish color	~558	67

The untreated TCLP Pb extraction values of 370 mg/l, 898 mg/l and 67 mg/l for samples PR5-2, RR5-2 and TR15-6, respectively, indicate that the selected soils are above the RCRA criteria for leachable Pb (the TCLP analyses are greater than 5.0 mg/l) and hazardous by RCRA standards. Therefore, these selected samples were treated with ECOBOND® Pb to eliminate RCRA leachable Pb.

3.0 TREATMENT STUDIES

Samples PR5-2, RR5-2 and TR15-6” were implemented for treatment studies. Each ECOBOND® Pb treatment was implemented using 100g of the contaminated material. No irregularities were discovered in the treated soil material. ECOBOND® Pb formula was applied and mixed with the sample in increasing amounts. After weighing measurements and complete mixing with the treatment materials, the sample and treatment materials were allowed to incubate and stabilize overnight. The following day, sub-samples were taken and extracted for Pb implementing EPA’s SW-846 Method No. 1311 “Toxicity Characteristic Leaching Procedure” (TCLP). The TCLP extraction fluids were then filtered and analyzed by atomic absorption spectrophotometry. The atomic absorption Pb analysis was implemented in-house using a Perkin-Elmer model 5100. Pb standards approved by NIST were used to construct the atomic absorption standard curve. All pH measurements were made after calibrating the pH meter with NIST pH standard solutions. The results of the ECOBOND® Pb treatment tests are presented in Table 3.

Table 3. ECOBOND® Pb TCLP Treatment Data

MT ² Test #	Field I.D.	Sample Treatment Weight	ECOBOND® Pb Addition	TCLP Pb mg/l
14-12-7	PR5-2’	NA	untreated	370
14-13-4	PR5-2’	100g	1.0%	6.6
14-13-5	PR5-2’	100g	2.0%	1.1
14-13-6	PR5-2’	100g	3.0%	2.1
14-12-11	RR5-2’	NA	untreated	898
14-13-7	RR5-2’	100g	1.0%	582
14-13-8	RR5-2’	100g	2.0%	315
14-13-9	RR5-2’	100g	3.0%	55
14-13-13	RR5-2’	100g	4.0%	3.4



14-13-14	RR5-2'	100g	4.5%	3.9
14-12-2	TR15-6"	NA	untreated	67
14-13-10	TR15-6"	100g	1.0%	3.8
14-13-11	TR15-6"	100g	2.0%	0.2
14-13-12	TR15-6"	100g	3.0%	0.1
RCRA Criteria				5.0

4.0 CONCLUSIONS

The addition of ECOBOND[®] Pb to samples PR5-2, RR5-2 and TR15-6" to stabilize and reduce leachable Pb to below the hazardous RCRA level was successful. A trend is observed for treating samples with ECOBOND[®] Pb. The higher the untreated TCLP value, the more ECOBOND[®] Pb is required to reduce the RCRA leachable Pb. The increasing treatment % is proportionally effective relative to untreated TCLP Pb and also ensures treatment efficacy. The highest untreated TCLP Pb value of 898 mg/l is exhibited by sample RR5-2'. By no coincidence, this sample also required the highest percentage of ECOBOND[®] Pb (4.0%) to reduce the RCRA leachable Pb. Sample PR5-2 exhibited the next highest untreated TCLP Pb value of 370 mg/l Pb. The 1% addition of ECOBOND[®] Pb was not sufficient to reduce the leachable Pb to below the non-hazardous level of 5 mg/l. The 2% addition of ECOBOND[®] Pb reduced the leachable Pb to 1.1 mg/l, which is well below the 5 mg/l limit. Sample TR15-6" exhibited the lowest untreated TCLP Pb value of 67 mg/l. As to be expected, the leachable Pb from this sample was reduced to the non-hazardous level of 3.8 mg/l by the addition of 1% ECOBOND[®] Pb.

5.0 RECOMMENDATION

MT² recommends a 4.0% addition of ECOBOND[®] Pb to the RR5-2' soil for stabilizing the Pb to below the RCRA non-hazardous level. For the other two selected soils, PR5-2 and TR15-6", MT² recommends a 2% addition of ECOBOND[®] Pb.

Appendix D

Photo Log



1) Soil Sample Screening



2) Soil Sample Screening



3) GPS Unit



4) Sample Location Marking



5) Sample Chain of Custody



6) Depth of Bullet Penetration



7) Treated Soil Containment Berm



8) HDPE Underlying Treated Soil Stockpile



9) Dumping of Excavated Soil on HDPE



10) Excavator Removing Soil from Pistol Range Berm



11) Excavator Removing Soil from Pistol Range Berm



12) Clean Soil Dumping



13) Front End Loader Removing Soil from Pistol Range Berm



14) ECOBOND Management



15) Application of Clean Soils to Berm



16) Compaction of Clean Soil on Pistol Range Berm



17) Clean Soil on First Berm, Rifle Range



18) Rifle Range from Final Berm



19) Pistol Range from Final Berm



20) Stockpile removal

Appendix E

Field Forms



Tailgate Safety Meeting Form

Date: 05/16/05	Time: 6:30 Am	Project Number: 11244.1244-002
Site Location: Family Shooting Center - Cherry Creek State Park		
Task: Lead Impacted Soil Removal & Disposal		
SAFETY TOPICS PRESENTED		
Protective Clothing/Equipment: Level D		
Chemical Hazards: Lead		
Physical Hazards: Machinery		
Special Equipment: None		
Emergency Procedures: As Detailed in Health & Safety Plan		
Other:		

Hospital: Centennial Healthcare Plaza	Phone: 303-699-3000	Ambulance Phone: 911
---------------------------------------	---------------------	----------------------

ATTENDEES

Printed Name:	Signature:	Company:
Ralph Smith		MT ²
Joe Burgett		MT ²

Meeting Conducted By: Matthew Egan

Signature:

Tailgate Safety Meeting Form

Date: 05/11/05 Time: 7:30am Project Number: 111244.1244.002

Site Location: Family Shooting Center

Task: Lead Impacted Soil Removal & D-30-gal

SAFETY TOPICS PRESENTED

Protective Clothing/Equipment: Level D

Chemical Hazards: Lead

Physical Hazards: Machinery

Special Equipment: None

Emergency Procedures: As Detailed in HES Plan

Other:

Hospital: Centennial
Healthcare Plaza

Phone: 303 644 3000

Ambulance
Phone: 911

ATTENDEES

Printed Name:

Signature:

Company:

JOE BARILETT

Joe Bariletta

MT²

RALPH SMITH

Ralph Smith

MT²

Meeting Conducted By: _____

Signature: _____

