FILE

CASE # 6639

EPA ID # TXD980810386

NAME SOUTH

CAVALCADE

116

1012279

003241

003241

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

REGION 6
First International Bldg., 1201 Elm St.
Dallas, Texas 75270

CHAIN OF CUSTODY RECORD

PROJ. NO.: 6639
PROJECT NAME: South Cavalcade
SAMPLERS: (Signature) (X) Michael Edgar

RMAL 56536-3 (tw waters 1,2 & GW-

STA. NO.	DATE 1986	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	1L Plastic, Metal	1L Plastic, Cyanide						REMARKS EPA #	REMARKS Tag #
MW9	12/11	0900		✓	SCK-CDM-MW9-001	2	1	1						MFC 375	6-21197, 6-21198
MW9	12/11	1200		✓	SCK-CDM-MW9-099	2	1	1						MFC 377	6-21195, 6-21196
MW06	12/11	1100		✓	SCK-CDM-MW06-001	2	1	1						MFC-376	6-21199, 6-21200

[redacted]

-56536-6-6639-4

Samples shipped initially to incorrect laboratory

Rec'd for laboratory by SRCommerford 12-13-86/800

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Michael Edgar	12/11/86 1705				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
		Matt Kelner	12/12/86 10:20	Inorganics RMAL FEC# 226 032 015	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

Fed Ex # will not match due to samples being shipped 6-7882

003242

U S ENVIRONMENTAL PROTECTION AGENCY HWI Sample Management Center

INORGANICS TRAFFIC REPORT

Sample Number

(1) Case Number: 6639
Sample Site Name/Code:

(2) SAMPLE CONCENTRATION
(Check One)
✓ Low Concentration
___ Medium Concentration

(3) SAMPLE MATRIX
(Check One)
✓ Water
___ Soil/Sediment

(4) Ship To:

Attn:

Transfer
Ship To:

(5) Sampling Office: Dallas

Sampling Personnel:

(Name) Michael Edgar

(Phone) 512/345-6645

Sampling Date:

(Begin) 12/11/86 (End) ___

(6) Shipping Information:

Name Of Carrier:
FEC

Date Shipped: 12/11/86

Airbill Number: 926632011

(9) ANALYSIS LAB:

Recd by: ___

Date Recd: ___

(10) Sample Condition On Receipt:

(eg broken, leakage, chain of custody, etc.)

(7) Sample Description:
(Check One)
___ Surface Water
✓ Ground Water
___ Leachate
___ Mixed Media
___ Solids
___ Other ___ (specify)

MATCHES ORGANIC SAMPLE NO. [illegible]

(8) Mark Volume Level On Sample Bottle
Check Analysis required
✓ Total Metals
✓ Cyanide

— S- 6677-7-[illegible]

LAB FILE COPY

U S ENVIRONMENTAL PROTECTION AGENCY HWI Sample

Sample Number

INORGANICS TRAFFIC REPORT

(1) Case Number: 6639
Sample Site Name/Code:

(2) SAMPLE CONCENTRATION
(Check One)
✓ Low Concentration
___ Medium Concentration

(3) SAMPLE MATRIX
(Check One)
✓ Water
___ Soil/Sediment

(4) Ship To:

Attn:

Transfer
Ship To:

(5) Sampling Office: Dallas

Sampling Personnel:

(Name) Michael Tilson

(Phone) 512/835-1651

Sampling Date:

(Begin) 12/10 (End) ___

(6) Shipping Information:

Name Of Carrier:
FEC

Date Shipped: 12/11/91

Airbill Number: 226032

(9) ANALYSIS LAB:

Recd by: ___

Date Recd: ___

(10) Sample Condition On Receipt:
(eg broken, leakage, chain of custody, etc)

(7) Sample Description:
(Check One)
___ Surface Water
✓ Ground Water
___ Leachate
___ Mixed Media
___ Solids
___ Other ___
(specify)

MATCHES ORGANIC SAMPLE NO. 50256

(8) Mark Volume Level On Sample Bottle
Check Analysis required
✓ Total Metals
✓ Cyanide

003244

LAB FILE COPY

U.S. ENVIRONMENTAL PROTECTION AGENCY HWI Sample Management Office

INORGANICS TRAFFIC REPORT

Sample Number
MFC 377

(1) Case Number: 1062
Sample Site Name/Code:

(2) SAMPLE CONCENTRATION
(Check One)
✓ Low Concentration
___ Medium Concentration

(3) SAMPLE MATRIX
(Check One)
✓ Water
___ Soil/Sediment

(4) Ship To: RMAL
5530 Marshall St.
Arvada CO 80002
303/421-6611
Attn: Tony Moreno
Transfer Ship To:

(5) Sampling Office: Dallas
Sampling Personnel:
(Name) Michael Edgar
(Phone) 512/345-1051
Sampling Date:
(Begin) 12/11/86 (End)

(6) Shipping Information:
Name Of Carrier: FEC
Date Shipped: 12/11/86
Airbill Number: 226032015

(9) ANALYSIS LAB:
Recd by: [illegible]
Date Recd: 12-12-86

(10) Sample Condition On Receipt:
(eg broken, leakage, chain of custody, etc.)

(7) Sample Description:
(Check One)
___ Surface Water
✓ Ground Water
___ Leachate
___ Mixed Media
___ Solids
___ Other ___ (specify)
MATCHES ORGANIC SAMPLE NO. F0257

(8) Mark Volume Level On Sample Bottle
Check Analysis required
✓ Total Metals
✓ Cyanide

003245

LAB FILE COPY

00001

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

Date 1-8-87

COVER PAGE
INORGANIC ANALYSIS DATA PACKAGE

Lab Name ROCKY MOUNTAIN ANALYTICAL
SOW No. 784

Case No. 6639
QC Report No. 56536

Sample Numbers

EPA No.	Lab ID No.	EPA No.	Lab ID No.
MFC375			
MFC375D			
MFC376			
MFC376S			
MFC377			
[MFC999]			

003246

Comments: 3 LOW WATERS FOR TOTAL METALS & CYANIDE
SERIAL DILUTION OF SAMPLE MFC376 IS IDENTIFIED AS [MFC999]

ICP Interelement and background corrections applied? Yes X No ___
If yes, corrections applied before X or after ___ generation of raw data.

Footnotes:

NR - not required by contract at this time
Form I:
Value - If the result is a value greater than or equal to the instrument detection limit but less than the contract required detection limit, report the value in brackets (i.e., [10]). Indicate the method used with P (for ICP/Flame AA) or F (for furnace).
U - Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).
E - Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.
S - Indicates value determined by Method of Standard Addition.
R - Indicates spike sample recovery is not within control limits.
X - Indicates duplicate analysis is not within control limits.
+ - Indicates the correlation coefficient for method of standard addition is Less than 0.995
CV - Indicates Cold Vapor
AS - Indicates Automated Spectrophotom[redacted]

56536-6-6639-3

003246

00002

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No.
MFC375

Date 1-8-87

INORGANIC ANALYSIS DATA SHEET

LAB NAME ROCKY MOUNTAIN ANALYTICAL
SOW NO. 784
LAB SAMPLE ID. NO. -

CASE NO. 6639
QC REPORT NO. 56536

Elements Identified and Measured

Concentration: Low X Medium ____
Matrix: Water X Soil ____ Sludge ____ Other ____

UG/L

1.	ALUMINUM	5080	P	13.	MAGNESIUM	6510	P
2.	ANTIMONY	26U	P R	14.	MANGANESE	262	P
3.	ARSENIC	10U	F	15.	MERCURY	0.2U	CV
4.	BARIUM	244	P	16.	NICKEL	7U	P
5.	BERYLLIUM	[1.1]	P	17.	POTASSIUM	[2330]	P E
6.	CADMIUM	5U	P	18.	SELENIUM	50U	F R
7.	CALCIUM	104000	P	19.	SILVER	4U	P
8.	CHROMIUM	17	P	20.	SODIUM	39500	P
9.	COBALT	5U	P	21.	THALLIUM	10U	F
10.	COPPER	[22]	P	22.	TIN	24U	P
11.	IRON	5180	P	23.	VANADIUM	[17]	P
12.	LEAD	29	F XR	24.	ZINC	96	P

Cyanide ~~1(140U~~ 13 AS Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: SELENIUM VALUE REPORTED AT A 10X DILUTION

Lab Manager [illegible]

003247

003247

00003

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No.
MFC376

Date 1-8-87

INORGANIC ANALYSIS DATA SHEET

LAB NAME ROCKY MOUNTAIN ANALYTICAL
SOW NO. 784
LAB SAMPLE ID. NO. -

CASE NO. 6639
QC REPORT NO. 56536

Elements Identified and Measured

Concentration: Low X Medium ____
Matrix: Water X Soil ____ Sludge ____ Other ____

UG/L

1.	ALUMINUM	45600	P	13.	MAGNESIUM	38700	P
2.	ANTIMONY	26U	P R	14.	MANGANESE	1140	P
3.	ARSENIC	90	F	15.	MERCURY	0.2U	CV
4.	BARIUM	590	P	16.	NICKEL	45	P
5.	BERYLLIUM	[3.9]	P	17.	POTASSIUM	5860	P E
6.	CADMIUM	5U	P	18.	SELENIUM	50U	F R
7.	CALCIUM	146000	P	19.	SILVER	4U	P
8.	CHROMIUM	84	P	20.	SODIUM	104000	P
9.	COBALT	[33]	P	21.	THALLIUM	10U	F
10.	COPPER	39	P	22.	TIN	24U	P
11.	IRON	46200	P	23.	VANADIUM	136	P
12.	LEAD	43	F XR	24.	ZINC	149	P

Cyanide 10U AS Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ARSENIC VALUE REPORTED AT A 5X DILUTION
SELENIUM VALUE REPORTED AT A 10X DILUTION

Lab Manager KLD

003248

00004

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No.
MFC377

Date 1-8-87

INORGANIC ANALYSIS DATA SHEET

LAB NAME ROCKY MOUNTAIN ANALYTICAL
SOW NO. 784
LAB SAMPLE ID. NO. -

CASE NO. 6639
QC REPORT NO. 56536

Elements Identified and Measured

Concentration: Low X Medium ____
Matrix: Water X Soil ____ Sludge ____ Other ____

UG/L

1.	ALUMINUM	29U	P	13.	MAGNESIUM	76U	P
2.	ANTIMONY	26U	P R	14.	MANGANESE	4U	P
3.	ARSENIC	10U	F	15.	MERCURY	0.2U	CV
4.	BARIUM	2U	P	16.	NICKEL	7U	P
5.	BERYLLIUM	1U	P	17.	POTASSIUM	[154]	P E
6.	CADMIUM	5U	P	18.	SELENIUM	5U	F R
7.	CALCIUM	55U	P	19.	SILVER	4U	P
8.	CHROMIUM	5U	P	20.	SODIUM	[2560]	P
9.	COBALT	5U	P	21.	THALLIUM	10U	F
10.	COPPER	4U	P	22.	TIN	24U	P
11.	IRON	25U	P	23.	VANADIUM	5U	P
12.	LEAD	5U	F XR	24.	ZINC	2U	P
Cyanide		10U	AS	Percent Solids (%)			

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments:

Lab Manager MO

003249

003249

1/2

00005

Form II

Q.C. Report No. 56536

INITIAL AND CONTINUING CALIBRATION VERIFICATION[3]

LAB NAME ROCKY MOUNTAIN ANALYTICAL

CASE NO. 6639

SOW NO. 784

DATE 1-8-87

UNITS ug/L

Compound	Initial Calib.[1,5]			Continuing Calibration[2]					
Metals:	True Value	Found	%R	True Value	Found	%R	Found	%R	Method[4]
1. ALUMINUM	2160	2030	94	1000	930	93			P
2. ANTIMONY	807	764	95	1000	973	97			P
3. ARSENIC	41	40	98	20	21	105	21	105	F
4. BARIUM	2120	2110	99	1000	966	97			P
5. BERYLLIUM	527	505	96	1000	971	97			P
6. CADMIUM	488	511	105	1000	962	96			P
7. CALCIUM	51800	53200	103	100000	99800	100			P
8. CHROMIUM	529	517	98	1000	954	95			P
9. COBALT	496	509	103	1000	958	96			P
10. COPPER	524	557	106	1000	985	98			P
11. IRON	2060	2000	97	1000	937	94			P
12. LEAD	92	88	96	20	22	110	22	110	F
13. MAGNESIUM	25500	25900	102	100000	98200	98			P
14. MANGANESE	520	510	98	1000	979	98			P
15. MERCURY	1.00	1.1	110	1.00	1.1	110			CV
16. NICKEL	495	499	101	1000	966	97			P
17. POTASSIUM	51300	51700	101	100000	95400	95			P
18. SELENIUM	86	86	100	20	20	100	22	110	F
19. SILVER	495	515	104	1000	947	95			P
20. SODIUM	50300	52600	105	100000	98400	98			P
21. THALLIUM	95	90	95	20	22	110	22	110	F
22. TIN	2000	1860	93	1000	999	100			P
23. VANADIUM	520	502	97	1000	932	93			P
24. ZINC	3070	3140	102	1000	974	97			P
Other:									
CYANIDE	58	64	110	100	97	97			AS

[1] Initial Calibration Source ICV-1&3 [2] Continuing Calibration Source NCB

[3] Control Limits: Mercury and Tin 80-120; All Other Compounds 90-110

[4] Indicate Analytical Method Used: P - ICP/Flame AA; F - Furnace
CV - Cold Vapor AS - Automated Spectrophotometric

[5] Furnace Initial Calibration Source ICV 2&4

[6] Cyanide Initial Calibration Source ERA 9907

003250

FORM II

Q.C. Report No. 56536
INITIAL AND CONTINUING CALIBRATION VERIFICATION[3]

LAB NAME ROCKY MOUNTAIN ANALYTICAL

CASE NO. 6639
SOW NO. 784
UNITS ug/L

DATE 1-8-87

Compound	Initial Calib.[1,5]			Continuing Calibration[2]					
Metals:	True Value	Found	%R	True Value	Found	%R	Found	%R	Method[4]
1. ALUMINUM	2160			1000					P
2. ANTIMONY	807			1000					P
3. ARSENIC	41								
4. BARIUM	2120			1000					P
5. BERYLLIUM	527			1000					P
6. CADMIUM	488			1000					P
7. CALCIUM	51800			100000					P
8. CHROMIUM	529			1000					P
9. COBALT	496			1000					P
10. COPPER	524			1000					P
11. IRON	2060			1000					P
12. LEAD	92								
13. MAGNESIUM	25500			100000					P
14. MANGANESE	520			1000					P
15. MERCURY	1.0			1					CV
16. NICKEL	495			1000					P
17. POTASSIUM	51300			100000					P
18. SELENIUM	86			20	21	105			F
19. SILVER	495			1000					P
20. SODIUM	50300			100000					P
21. THALLIUM	95			20	22	110			F
22. TIN	2000			1000					P
23. VANADIUM	520			1000					P
24. ZINC	3070			1000					P
Other:									
CYANIDE									AS

[1] Initial Calibration Source ICV-1&3 [2] Continuing Calibration Source MCB
[3] Control Limits: Mercury and Tin 80-120; All Other Compounds 90-110
[4] Indicate Analytical Method Used: P - ICP/Flame AA; F - Furnace
CV - Cold Vapor AS - Automated Spectrophotometric
[5] Furnace Initial Calibration Source ICV 2&4
[6] Cyanide Initial Calibration Source ERA 9907

003251

Form III

Q.C. Report No. 56536

BLANKS

LAB NAME ROCKY MOUNTAIN ANALYTICAL
DATE 1-8-87

CASE NO. 6639
UNITS ug/L

Matrix WATER

Preparation Compound	Initial Calibration Blank Value	Continuing Calibration Blank Value 1	2	3	4	Preparation Blank 1	2
Metals:							
1. ALUMINUM	[35]	29U				29U	
2. ANTIMONY	26U	26U				26U	
3. ARSENIC	10U	10U	10U			10U	
4. BARIUM	2U	2U				2U	
5. BERYLLIUM	1U	1U				1U	
6. CADMIUM	5U	5U				5U	
7. CALCIUM	55U	[130]				55U	
8. CHROMIUM	5U	5U				5U	
9. COBALT	5U	5U				5U	
10. COPPER	4U	4U				[4.1]	
11. IRON	[35]	25U				25U	
12. LEAD	5U	5U	5U			5U	
13. MAGNESIUM	76U	76U				76U	
14. MANGANESE	4U	4U				4U	
15. MERCURY	0.2U	0.2U				0.2U	
16. NICKEL	7U	7U				7U	
17. POTASSIUM	69U	[164]				69U	
18. SELENIUM	5U	5U	5U	5U		5U	
19. SILVER	4U	4U				4U	
20. SODIUM	1530U	[2670]				1530U	
21. THALLIUM	10U	10U	10U	10U		10U	
22. TIN	24U	24U				24U	
23. VANADIUM	5U	5U				5U	
24. ZINC	2U	2U				2U	
Other:							
Cyanide	10U	10U				10U	

003252

Form IV

00008

Q.C. Report No. 56536

ICP INTERFERENCE CHECK SAMPLE

LAB NAME ROCKY MOUNTAIN ANALYTICAL

DATE 1-8-87

CASE NO 6639
Check Sample I.D. INT CHK
Check Sample Source EMSL-LV
Units mg/L

Compound	Control Limits[1] Mean	Std. Dev.	True[2]	Initial Observed	%R	Final Observed	%R
Metals:							
1. ALUMINUM			503	514	102	476	95
2. ANTIMONY				0.026U		0.026U	
3. ARSENIC				0.108		0.246	
4. BARIUM			0.472	0.454	96	0.441	93
5. BERYLLIUM			0.456	0.489	107	0.464	102
6. CADMIUM			0.964	1.01	105	0.976	101
7. CALCIUM			499	524	105	502	101
8. CHROMIUM			0.985	1.01	103	0.961	98
9. COBALT			0.478	0.5	105	0.476	100
10. COPPER			0.509	0.546	107	0.51	100
11. IRON			198	189	95	180	91
12. LEAD	4.7	0.14	4.63	4.95	105	4.84	103
13. MAGNESIUM			497	526	106	501	101
14. MANGANESE			0.522	0.53	102	0.524	100
15. MERCURY							
16. NICKEL			0.913	0.940	103	0.905	99
17. POTASSIUM				0.069U		0.069U	
18. SELENIUM							
19. SILVER			0.986	1.01	102	0.959	97
20. SODIUM				6.58		8.63	
21. THALLIUM			1.09				
22. TIN				0.024U		0.024U	
23. VANADIUM			0.471	0.487	103	0.459	97
24. ZINC			0.948	0.991	105	0.963	102
Other:							

[1] Mean value based on n = 37.
[2] True value of EPA ICP Interference Check Sample or contractor standard.

003253

Form V

00009

Q.C. Report No. 56536

SPIKE SAMPLE RECOVERY

LAB NAME ROCKY MOUNTAIN ANALYTICAL

DATE 1-8-87

CASE NO. 6639
EPA Sample No. MFC376
Lab Sample ID No.
Units UG/L

MATRIX WATER

Compound	Control Limit %R	Spiked Sample Result (SSR)	Sample Result (SR)	Spike Added (SA)	%R[1]	
Metals:						
1. ALUMINUM	75-125	60900	45600	2000	765	
2. ANTIMONY	75-125	281	26U	500	56	R
3. ARSENIC	75-125	110	90	20	100	
4. BARIUM	75-125	2510	590	2000	96	
5. BERYLLIUM	75-125	55	[3.9]	50	102	
6. CADMIUM	75-125	50	5U	50	100	
7. CALCIUM	75-125	245000	146000	100000	99	
8. CHROMIUM	75-125	317	84	200	116	
9. COBALT	75-125	476	[33]	500	89	
10. COPPER	75-125	284	39	250	98	
11. IRON	75-125	52100	46200	1000	590	
12. LEAD	75-125	57	43	20	70	R
13. MAGNESIUM	75-125	77500	38700	50000	78	
14. MANGANESE	75-125	1310	1140	200	85	
15. MERCURY	75-125	0.9	0.2U	1.0	90	
16. NICKEL	75-125	426	45	400	95	
17. POTASSIUM	75-125	52300	5860	50000	93	
18. SELENIUM	75-125	50U	50U	10	0	R
19. SILVER	75-125	47	4U	50	94	
20. SODIUM	75-125	197000	104000	100000	93	
21. THALLIUM	75-125	54 S	10U	50	108	
22. TIN	75-125	373	24U	400	93	
23. VANADIUM	75-125	604	136	500	94	
24. ZINC	75-125	344	149	200	98	
Other:						
Cyanide	75-125	101	10U	100	101	

[1] %R = [(SSR - SR)/SA] x 100
"R"- out of control

Comments: TL VALUE DETERMINED BY MSA / AS VALUE REPORTED AT A 5X DILUTION / SE VALUE REPORTED AT A 10X DILUTION

The following elements reported unflagged due to sample concentration greater than 4 times the Spike Added value:
ALUMINUM, IRON

003254

Form VI

00010

Q.C. Report No. 56536

DUPLICATES

LAB NAME ROCKY MOUNTAIN ANALYTICAL

DATE 1-8-87

CASE NO. 6639
EPA Sample No. MFC375
Lab Sample ID No. -
Units UG/L

Matrix WATER

Compound	Control Limit[1]	Sample(S)	Duplicate(D)	RPD[2]	
Metals:					
1. ALUMINUM		5080	4250	18	
2. ANTIMONY		26U	26U	NC	
3. ARSENIC		10U	10U	NC	
4. BARIUM		244	249	2	
5. BERYLLIUM		[1.1]	[1.4]	NC	
6. CADMIUM		5U	5U	NC	
7. CALCIUM		104000	107000	2.8	
8. CHROMIUM		17	15	12	
9. COBALT		5U	5U	NC	
10. COPPER		[22]	26	NC	
11. IRON		5180	4680	10	
12. LEAD		29	38	27	X
13. MAGNESIUM		6510	6730	3.3	
14. MANGANESE		262	270	3	
15. MERCURY		0.2U	0.2U	NC	
16. NICKEL		7U	7U	NC	
17. POTASSIUM		[2330]	[2270]	NC	
18. SELENIUM		50U	50U	NC	
19. SILVER		4U	4U	NC	
20. SODIUM		39500	40500	2.5	
21. THALLIUM		10U	10U	NC	
22. TIN		24U	24U	NC	
23. VANADIUM		[17]	[15]	NC	
24. ZINC		96	99	3.1	
Other:					
Cyanide		13	14	7.4	

X Out of Control

[1] To be added at a later date.

[2] RPD = [|S-D|/((S+D)/2)] x 100

NC - Non calculable RPD due to value(s) less than CRDL

003255

Form VII

00011

Q.C. Report No. 56536
INSTRUMENT DETECTION LIMITS AND
LABORATORY CONTROL SAMPLE

LAB NAME ROCKY MOUNTAIN ANALYTICAL
DATE 1-8-87

CASE NO 6639
UNITS ug/L

Compound	Required Detection Limits (CRDL)-ug/l	Instrument Detection Limits (IDL)-ug/l ICP/AA	Furnace	Lab Control Sample True	Found	%R
Metals:						
1. ALUMINUM	200	29		2160	1800	83
2. ANTIMONY	60	26		807	769	95
3. ARSENIC	10	44	2	41	36	88
4. BARIUM	200	2		2120	1930	91
5. BERYLLIUM	5	1		527	484	92
6. CADMIUM	5	5		488	459	94
7. CALCIUM	5000	55		51800	48600	94
8. CHROMIUM	10	5		529	473	89
9. COBALT	50	5		496	467	94
10. COPPER	25	4		524	514	98
11. IRON	100	25		2060	1850	90
12. LEAD	5	28	1	92	92	100
13. MAGNESIUM	5000	76		25500	23300	91
14. MANGANESE	15	4		520	476	92
15. MERCURY	0.2		0.2CV	1.0	1.1	110
16. NICKEL	40	7		495	455	92
17. POTASSIUM	5000	69		51300	44600	87
18. SELENIUM	5		1	86	84	98
19. SILVER	10	4		495	457	92
20. SODIUM	5000	1530		50300	46900	93
21. THALLIUM	10		1	95	94	99
22. TIN	40	24		2000	2030	102
23. VANADIUM	50	5		520	448	86
24. ZINC	20	2		3070	2850	93
Other:						
Cyanide	10		10AS	58	68	117

CV - Cold Vapor
AS - Automated Spectrophotometric

003256

FORM VIII

00012

Q.C. Report No. 56536

STANDARD ADDITION RESULTS

LAB NAME RMAL

CASE NO. 6639

DATE 1-7-87

UNITS ug/l

Sample #	Element	0 ADD ABS.	1 ADD CON./ABS.[1]	2 ADD CON./ABS.[1]	3 ADD CON./ABS.[1]	DF	FINAL CON.[2]	r*
MFC3765	Ti	29.4	+15/37.3	+30/46.3	+45/53.6	1	54	.999
		slope	1.8356	intercept	-53.9518			

[1] CON is the concentration added, ABS. is the instrument readout in absorbance or concentration.

[2] Concentration as determined by MSA

*"r" is the correlation coefficient.

+ - correlation coefficient is outside of control window of 0.995.

003257

003257

Form IX (Quarterly)
Instrument Detection Limits

Laboratory Name Rocky Mtn. Analytical Lab ICP/Flame AA (Circle One) Model Number IA9000

Date October 15, 1986 Furnace AA Number PE2380

Element	Wavelength (nm)	CRDL (µg/L)	IDL (µg/L)	Element	Wavelength (nm)	CRDL (µg/L)	IDL (µg/L)
1. Aluminum	237.3	200	29P	13. Magnesium	279.1	5000	76P
2. Antimony	206.8	60	26P	14. Manganese	294.9	15	4P
3. Arsenic	193.7B	10	2F/44P	15. Mercury	253.7	0.2	0.2CV
4. Barium	233.5	200	2P	16. Nickel	231.6	40	7P
5. Beryllium	313.0	5	1P	17. Potassium	766.5	5000	69P
6. Cadmium	228.8	5	5P	18. Selenium	196.0B	5	1F
7. Calcium	370.6	5000	55P	19. Silver	328.1	10	4P
8. Chromium	267.7	10	5P	20. Sodium	588.9	5000	1530P
9. Cobalt	228.6	50	5P	21. Thallium	276.8B	10	1F
10. Copper	324.7	25	4P	22. Tin	190.0	40	24P
11. Iron	259.8	100	25P	23. Vanadium	292.4	50	5P
12. Lead	283.3B	5	1F/28P	24. Zinc	213.8	20	2P

Footnotes:

- Indicate the instrument for which the IDL applies with a P (for ICP/Flame AA) or a F (for Furnace AA) behind the IDL value.
- Indicate elements commonly run with background correction (AA) with a B behind the analytical wavelength.
- If more than one ICP/Flame or Furnace AA is used, submit separate Forms IX-XI for each instrument.

Comments:

Lab Manager LKO

FORM X (Quarterly)

ICP Interelement Correction Factors

ACT "EPA2E"

Laboratory: ROCKY MOUNTAIN ANALYTICAL

ICP Model Number JA9000

Date October 15, 1986

Analyte	Analyte Wavelength (nm)	Interelement Correction Factors			
		Aluminum	Antimony	Arsenic	Barium
Antimony	206.8				
Arsenic	193.7	0.00443200			
Barium	233.5				
Beryllium	313.0				
Cadmium	228.8			0.00882400	
Chromium	267.7				
Cobalt	228.6				0.00022798
Copper	324.7				
Lead	220.3	0.0006000			
Manganese	294.9				
Mercury					
Nickel	231.6		0.00040200		
Potassium	766.5				
Selenium	196.0				
Silver	328.1		0.00015900		
Sodium	588.9				
Thallium					
Tin	190.0		-0.00046500		
Vanadium	292.4				
Zinc	213.8				

Comments:

Lab Manager

003259

FORM X (Quarterly)

ICP Interelement Correction Factors
ACT "EPA2E"

Laboratory: ROCKY MOUNTAIN ANALYTICAL

ICP Model Number JA9000

Date October 15, 1986

Analyte	Analyte Wavelength (nm)	Interelement Correction Factors			
		Chromium	Cobalt	Copper	Iron
Antimony	206.8	0.01104600			
Arsenic	193.7		0.00145900		0.00030900
Barium	233.5				0.00003300
Beryllium	313.0				
Cadmium	228.8		0.00010900		0.00001600
Chromium	267.7				
Cobalt	228.6				
Copper	324.7		-0.0005560		-0.0000469
Lead	220.3		-0.0081699		0.00026500
Manganese	294.9				
Mercury					
Nickel	231.6		0.00216199		-0.0000608
Potassium	766.5				
Selenium	196.0				
Silver	328.1				
Sodium	588.9				
Thallium					
Tin	190.0				0.00007569
Vanadium	292.4	-0.0026239			0.00002270
Zinc	213.8			0.00264790	0.00010460

Comments:

Lab Manager

FORM X (Quarterly)

ICP Interelement Correction Factors

ACT "EPA2E"

Laboratory: ROCKY MOUNTAIN ANALYTICAL

ICP Model Number JA9000

Date October 15, 1986

Analyte	Analyte Wavelength (nm)	Interelement Correction Factors			
		Lead	Manganese	Magnesium	Molybdenum
Antimony	206.8				
Arsenic	193.7				
Barium	233.5				
Beryllium	313.0				-0.0005320
Cadmium	228.8			-0.0000170	
Chromium	267.7				
Cobalt	228.6				
Copper	324.7				-0.0006180
Lead	220.3				0.00057400
Manganese	294.9				
Mercury					
Nickel	231.6				
Potassium	766.5				-0.0021560
Selenium	196.0				
Silver	328.1		0.00015200		
Sodium	588.9				
Thallium					
Tin	190.0	-0.0002150			
Vanadium	292.4				
Zinc	213.8				-0.0026040

Comments:

Lab Manager

010326

FORM X (Quarterly)

ICP Interelement Correction Factors

ACT "EPA2E"

Laboratory: ROCKY MOUNTAIN ANALYTICAL

ICP Model Number JA9000

Date October 15, 1986

Analyte	Analyte Wavelength (nm)	Interelement Correction Factors			
		Nickel	Tin	Titanium	Vanadium
Antimony	206.8		-0.0017099	0.00115400	-0.0094840
Arsenic	193.7				0.00954900
Barium	233.5		-0.0029979		
Beryllium	313.0				0.00128300
Cadmium	228.8	-0.0001200			
Chromium	267.7				-0.0014560
Cobalt	228.6		-0.0010119	0.00169200	
Copper	324.7				
Lead	220.3				
Manganese	294.9			-0.0042179	0.00304700
Mercury					
Nickel	231.6				
Potassium	766.5				
Selenium	196.0				
Silver	328.1				-0.0061870
Sodium	588.9				
Thallium					
Tin	190.0				
Vanadium	292.4			0.00040000	-0.0043079
Zinc	213.8	0.00340200			

Comments:

Lab Manager

003262

FORM X (Quarterly)

ICP Interelement Correction Factors

ACT "EPA2E"

Laboratory: ROCKY MOUNTAIN ANALYTICAL

ICP Model Number JA9000

Date October 15, 1986

Analyte	Analyte Wavelength (nm)	Interelement Correction Factors			
		Zinc	Calcium		
Antimony	206.8				
Arsenic	193.7				
Barium	233.5		0.00004498		
Beryllium	313.0				
Cadmium	228.8				
Chromium	267.7				
Cobalt	228.6				
Copper	324.7				
Lead	220.3				
Manganese	294.9				
Mercury					
Nickel	231.6				
Potassium	766.5				
Selenium	196.0				
Silver	328.1				
Sodium	588.9	0.33112700			
Thallium					
Tin	190.0				
Vanadium	292.4				
Zinc	213.8				

Comments:

Lab Manager

003263

Form XI (Quarterly)
ICP Linear Ranges

Laboratory Name: Rocky Mountain Analytical

ICP Model Number: [illegible]

Date: October 15, 1986

ACT "EPA2E"

Upper ICP Linearity Limits

Analyte	Integration Time (Seconds)	Concentration (ug/L)	Analyte	Integration Time (Seconds)	Concentration (ug/L)
1. Aluminum	10	600000	13. Magnesium	10	1000000
2. Antimony	10	100000	14. Manganese	10	100000
3. Arsenic	10	100000	15. Mercury	NA	
4. Barium	10	100000	16. Nickel	10	100000
5. Beryllium	10	50000	17. Potassium	10	1000000
6. Cadmium	10	1000000	18. Selenium	10	NA
7. Calcium	10	1000000	19. Silver	10	100000
8. Chromium	10	100000	20. Sodium	10	1000000
9. Cobalt	10	100000	21. Thallium	NA	
10. Copper	10	100000	22. Tin	10	100000
11. Iron	10	500000	23. Vanadium	10	100000
12. Lead	10	100000	24. Zinc	10	100000

FOOTNOTES: 0 Indicate elements not analysed by ICP with the notation NA.

COMMENTS:

Lab Manager: [signature]