229 T

APPENDIX E

LABORATORY DATA

840

TRIGON

EPA Method 5 - Particulate Determination - Data Analysis

Client: EnVitCo
City/State: Anderson, South Carolina
Sampling Location: Melter and Exhaust Stack
Clean-Up Box Number: M29
Chain of Custody: Date Received: 01/21/1999
Analytical Balance ID: Sartorius Serial No. 39120051

Project No. 046-98-158
Samples Collected On: 01/20/1999
Samples Recovered By: PRJ
Sample Recovery Date: 01/20/1999
Received By: PRJ Locked?: Yes
Class S Weight Set ID: Troemner 4563

Analysis of Particulate Recovery

	Melter				Exhaust Stack			
Run Number	1	2	3	Filter Blank	1	2	3	Filter Blank
Sample ID Number	8158-08	8158-09	8158-10	8158-14a	8158-11	8158-12	8158-13	8158-14a
Filter Number	Q147	Q148	Q152	Q153	Q149	Q150	Q151	Q154
Final Weight, mg	365.6	363.3	359.8	323.9	333.6	340.2	332.7	314.4
Reweigh, Final, mg	365.7	363.5	359.9	324.1	333.7	340.2	332.9	314.5
Initial Weight, mg	334.6	336.9	327.4	324.0	328.1	338.4	332.6	314.5
Reweigh, Initial, mg	334.5	337.0	327.4	324.0	328.2	338.5	332.6	314.4
Average Final, mg	365.7	363.4	359.9	324.0	333.7	340.2	332.8	314.5
Average Initial, mg	334.6	337.0	327.4	324.0	328.2	338.5	332.6	314.5
Net Filter Catch, mg	31.1	26.4	32.5	0.0	5.5	1.7	0.2	0.0
Beaker Number	43	44	45		46	47	48	
Acetone Level Marked	Yes	Yes	Yes		Yes	Yes	Yes	
Final Weight, mg	101,415.4	101,269.6	103,949.8		109,049.4	103,302.9	98,068.9	
Reweigh, Final, mg	101,415.5	101,269.9	103,950.0		109,049.6	103,303.0	98,069.0	
Initial Weight, mg	101,406.0	101,262.6	103,941.9		109,048.4	103,301.8	98,067.6	
Reweigh, Initial, mg	101,406.2	101,262.7	103,941.8		109,048.3	103,301.6	98,067.6	
Average Final, mg	101,415.5	101,269.8	103,949.9		109,049.5	103,303.0	98,069.0	
Average Initial, mg	101,406.1	101,262.7	103,941.9		109,048.4	103,301.7	98,067.6	
Acetone Blank, mg	0.0	0.0	0.0		0.0	0.0	0.0	
Net Front Rinse, mg	9.4	7.1	8.0		1.1	1.3	1.4	
Total Particulate, mg	40.5	33.5	40.5		6.6	3.0	1.6	

Gravimetric Documentation

	Initial	Reweigh	Final	Reweigh
Date of Analysis	01/06/1999	01/07/1999	01/22/1999	01/22/1999
Time of Analysis	0841	1130	0820	1425
Analyst	PRJ	PRJ	PRJ	PRJ
Desic. Rel. Humidity,	20	20	20	20
Lab. Temperature, °F	74	72	73	72
Bar. Press., In. Hg	29.41	29.35	29.21	29.18
Lab. Rel. Humidity, %	23	23	30	34

Blank Acetone Analysis

Blank Beaker Number	1		Final Weight, mg	119,507.7
Beaker Volume, ml	100		Reweigh, Final, mg	119,507.9
Acetone Conc., %	< 0.0001		Initial Weight, mg	119,507.6
Analyst Initials	PRJ		Reweigh, Initial, mg	119,508.0
Auditor Initials	RFC		Acetone Residue, mg	0.0

841

PASSED QA

TRIGON

EPA Method 8 - Determination of Sulfuric Acid Mist & Sulfur Dioxide
Analytical Data Sheet

2291

Client: EnVitCo **Project Number:** 046-98-158

City/State: Anderson, South Carolina **Sample Date:** 01/20/1999

Sampling Location: Melter **Analyst:** PRJ **Date:** 02/01/1999

Volume & Normality of Standard Sulfuric Acid Solution: 25.00 ml 0.0100 N

Volume & Normality of Barium Perchlorate Titrant: 1.) 23.55 ml 0.0106 N
2.) 23.55 ml 0.0106 N
Average Volume & Normality: 23.55 ml 0.0106 N

Laboratory Data

Sample Number	Sample Identification	Total Sample Vol. Vsoln	Sample Aliquot Vol. Va	Volume of Titrant Vt, ml		
				1st Titration	2nd Titration	Average Volume
8158-01	Melter Run 1 H_2SO_4	250	100	3.60	3.65	3.63
8158-01	Melter Run 1 SO_2	1000	10	0.45	0.45	0.45
8158-02	Melter Run 2 H_2SO_4	250	100	2.50	2.70	2.60
8158-02	Melter Run 2 SO_2	1000	10	0.60	0.60	0.60
8158-03	Melter Run 3 H_2SO_4	250	100	3.00	3.00	3.00
8158-03	Melter Run 3 SO_2	1000	10	0.75	0.70	0.73
8158-04	Melter Run 4 H_2SO_4	250	100	4.20	4.40	4.30
8158-04	Melter Run 4 SO_2	1000	10	1.45	1.45	1.45
8158-05	Melter Run 5 H_2SO_4	250	100	4.20	4.15	4.18
8158-05	Melter Run 5 SO_2	1000	10	1.80	1.80	1.80
8158-06	Melter Run 6 H_2SO_4	250	100	4.40	4.25	4.33
8158-06	Melter Run 6 SO_2	1000	10	2.35	2.35	2.35
8158-07	Blank 80% IPA	NA	100	0.00	0.00	0.00
8158-07	Blank 3% H_2O_2	NA	10	0.05	0.05	0.05
4246	QC ID 0590	100	20	14.80	14.85	14.83

QC Sample True Values

Sample No.	True Value	Obtained Value	Percent Recovery	Percent Difference
4246	1200.0	1194.8 mg/dcsm	99.6 %	-0.4 %

Notes: The volume for the blank must be the same as that of the sample aliquot.
The absolute value for the 1st and 2nd titration must be equal to or less than 0.2 ml.

Analyst Signature: Paul Yenkey Reviewed By: Blat Collet

842

Remarks:

G:\0401\XLS\GRAV\4698158.xls

TRIGON

OXFORD Laboratories Inc.

Analytical and Consulting Chemists
1316 South Fifth Street
Wilmington, N.C. 28401
(910) 763-9793
Fax (910) 343-9688

DATE RECEIVED 01-25-99
DATE REPORTED 02-23-99
99W9350

E 2291

TRIGON ENGINEERING CONSULTANTS INC. P.O. # AM7909
6200 HARRIS TECHNOLOGY BLVD.
CHARLOTTE, NC 28269

ATTENTION: PAUL JENKINS

SAMPLE DESCRIPTION: ENVITCO (M29)

1. MELTER RUN 1 (8158-08) FRONT 1/2
2. MELTER RUN 1 (8158-08) BACK 1/2
3. MELTER RUN 2 (8158-09) FRONT 1/2
4. MELTER RUN 2 (8158-09) FRONT 1/2 DUPLICATE
5. MELTER RUN 2 (8158-09) BACK 1/2
6. MELTER RUN 2 (8158-09) BACK 1/2 DUPLICATE

RESULTS

	1	2	3	4	5	6
Aluminum, as Al, Total ug	372	27.8	330	350	25.3	25.6
Arsenic, as As, Total ug	47.0	<.500	33.6	33.4	<.500	<.50(
Barium, as Ba, Total ug	395	.501	411	411	2.02	2.07
Calcium, as Ca, Total ug	263	33.9	252	252	33.9	33.9
Cadmium, as Cd, Total ug	.491	<.200	.410	.415	<.200	<.20(
Chromium, as Cr, Total ug	102	1.77	72.4	73.2	1.70	1.76
Iron, as Fe, Total ug	414	19.1	178	178	21.1	21.1
Potassium, as K, Total ug	273	23.5	303	303	29.0	29.0
Lithium, as Li, Total ug	386	<.500	485	474	.911	.899
Magnesium, as Mg, Total ug	68.7	7.14	59.8	59.8	7.14	7.14
Molybdenum, as Mo, Total ug	250	<.500	189	192	<.500	<.50(
Sodium, as Na, Total ug	1600	277	1840	1850	297	292
Nickel, as Ni, Total ug	45.6	.850	30.6	31.0	.808	.805

843

OXFORD Laboratories Inc.

Analytical and Consulting Chemists
1316 South Fifth Street
Wilmington, N.C. 28401
(910) 763-9793
Fax (910) 343-9688

DATE RECEIVED 01-25-99
DATE REPORTED 02-23-99
99W9350

2291

TRIGON ENGINEERING CONSULTANTS INC. P.O. # AM7909
6200 HARRIS TECHNOLOGY BLVD.
CHARLOTTE, NC 28269

ATTENTION: PAUL JENKINS

SAMPLE DESCRIPTION: ENVITCO (M29)

1. MELTER RUN 1 (8158-08) FRONT 1/2
2. MELTER RUN 1 (8158-08) BACK 1/2
3. MELTER RUN 2 (8158-09) FRONT 1/2
4. MELTER RUN 2 (8158-09) FRONT 1/2 DUPLICATE
5. MELTER RUN 2 (8158-09) BACK 1/2
6. MELTER RUN 2 (8158-09) BACK 1/2 DUPLICATE

RESULTS

	1	2	3	4	5	6
Phosphorus, as P, Total ug	3490	15.4	3290	3410	15.9	14.5
Lead, as Pb, Total ug	13100	4.33	11400	11400	6.56	6.18
Sulfate, as S, Total ug	1070	22600	1370	X	19900	X
Selenium, as Se, Total ug	351	5060	300	318	5230	6170
Silicon, as Si, Total ug	X	120	X	X	290	280
Vanadium, as V, Total ug	<.500	<.500	.830	.882	<.500	<.500
Zinc, as Zn, Total ug	178	1.63	163	180	1.59	1.55

844

OXFORD Laboratories Inc.

Analytical and Consulting Chemists
1316 South Fifth Street
Wilmington, N.C. 28401
(910) 763-9793
Fax (910) 343-9688

DATE RECEIVED 01-25-99
DATE REPORTED 02-23-99
99W9350

2291

TRIGON ENGINEERING CONSULTANTS INC. P.O. # AM7909
6200 HARRIS TECHNOLOGY BLVD.
CHARLOTTE, NC 28269

ATTENTION: PAUL JENKINS

SAMPLE DESCRIPTION: ENVITCO (M29)

7. MELTER RUN 3 (8158-10) FRONT 1/2
8. MELTER RUN 3 (8158-10) FRONT 1/2 SPIKE
9. MELTER RUN 3 (8158-10) BACK 1/2
10. MELTER RUN 3 (8158-10) BACK 1/2 SPIKE
11. STACK RUN 1 (8158-11) FRONT 1/2
12. STACK RUN 1 (8158-11) BACK 1/2

RESULTS

	7	8	9	10	11	12
Aluminum, as Al, Total ug	247	95.6%	11.2	94.6%	104	22.6
Arsenic, as As, Total ug	17.3	103%	<.500	103%	.622	1.77
Barium, as Ba, Total ug	362	104%	<.500	97.2%	2.21	<.500
Calcium, as Ca, Total ug	237	90.2%	26.1	92.2%	62.8	36.7
Cadmium, as Cd, Total ug	<.200	86.6%	<.200	94.9%	<.200	<.200
Chromium, as Cr, Total ug	37.0	93.5%	1.49	94.3%	1.08	1.50
Iron, as Fe, Total ug	133	110%	<10.0	113%	23.1	13.0
Potassium, as K, Total ug	132	100%	18.5	100%	36.0	23.5
Lithium, as Li, Total ug	243	97.7%	<.500	109%	.550	<.50
Magnesium, as Mg, Total ug	48.7	90.0%	<5.55	98.0%	12.1	<5.5
Molybdenum, as Mo, Total ug	88.9	102%	<.500	103%	6.19	<.50
Sodium, as Na, Total ug	1140	98.0%	257	104%	262	287
Nickel, as Ni, Total ug	12.3	96.8%	.840	93.4%	1.11	1.13

845

OXFORD Laboratories Inc.

Analytical and Consulting Chemists
1316 South Fifth Street
Wilmington, N.C. 28401
(910) 763-9793
Fax (910) 343-9688

DATE RECEIVED 01-25-99
DATE REPORTED 02-23-99
99W9350

2291

TRIGON ENGINEERING CONSULTANTS INC. P.O. # AM7909
6200 HARRIS TECHNOLOGY BLVD.
CHARLOTTE, NC 28269

ATTENTION: PAUL JENKINS

SAMPLE DESCRIPTION: ENVITCO (M29)

7. MELTER RUN 3 (8158-10) FRONT 1/2
8. MELTER RUN 3 (8158-10) FRONT 1/2 SPIKE
9. MELTER RUN 3 (8158-10) BACK 1/2
10. MELTER RUN 3 (8158-10) BACK 1/2 SPIKE
11. STACK RUN 1 (8158-11) FRONT 1/2
12. STACK RUN 1 (8158-11) BACK 1/2

RESULTS

	7	8	9	10	11	12
Phosphorus, as P, Total ug	162	87.2%	10.7	94.8%	13.5	8.82
Lead, as Pb, Total ug	7070	97.1%	1.01	101%	25.9	.882
Sulfate, as S, Total ug	996	X	31800	X	<344	4530
Selenium, as Se, Total ug	214	96.2%	6160	107%	118	411
Silicon, as Si, Total ug	X	X	100	103%	X	180
Vanadium, as V, Total ug	3.66	102%	<.500	91.3%	<.500	<.500
Zinc, as Zn, Total ug	129	93.3%	1.36	84.3%	3.73	9.79

846

OXFORD Laboratories Inc.

Analytical and Consulting Chemists
1316 South Fifth Street
Wilmington, N.C. 28401
(910) 763-9793
Fax (910) 343-9688

DATE RECEIVED 01-25-99
DATE REPORTED 02-23-99
99W9350

2291

TRIGON ENGINEERING CONSULTANTS INC. P.O. # AM7909
6200 HARRIS TECHNOLOGY BLVD.
CHARLOTTE, NC 28269

ATTENTION: PAUL JENKINS

SAMPLE DESCRIPTION: ENVITCO (M29)

13. STACK RUN 2 (8158-12) FRONT 1/2
14. STACK RUN 2 (8158-12) FRONT 1/2 DUPLICATE
15. STACK RUN 2 (8158-12) BACK 1/2
16. STACK RUN 2 (8158-12) BACK 1/2 DUPLICATE
17. STACK RUN 3 (8158-13) FRONT 1/2
18. STACK RUN 3 (8158-13) FRONT 1/2 SPIKE

RESULTS

	13	14	15	16	17	18
Aluminum, as Al, Total ug	104	102	32.8	32.3	105	101%
Arsenic, as As, Total ug	.553	.543	<.500	<.500	.778	80.4%
Barium, as Ba, Total ug	2.41	2.40	<.500	<.500	5.94	99.3%
Calcium, as Ca, Total ug	82.8	82.3	38.3	38.3	92.8	96.0%
Cadmium, as Cd, Total ug	<.200	<.200	<.200	<.200	<.200	94.2%
Chromium, as Cr, Total ug	1.00	.997	1.49	1.53	1.50	97.1%
Iron, as Fe, Total ug	21.6	21.1	15.0	15.0	31.1	114%
Potassium, as K, Total ug	36.0	35.5	22.0	22.0	38.0	93.8%
Lithium, as Li, Total ug	.809	.812	<.500	<.500	.756	117%
Magnesium, as Mg, Total ug	11.0	11.0	6.59	6.03	18.2	94.0%
Molybdenum, as Mo, Total ug	6.59	6.69	<.500	<.500	6.41	110%
Sodium, as Na, Total ug	322	317	337	332	277	98.0%
Nickel, as Ni, Total ug	9.34	9.48	.713	.703	.967	106%

847

OXFORD Laboratories Inc.

Analytical and Consulting Chemists
1316 South Fifth Street
Wilmington, N.C. 28401
(910) 763-9793
Fax (910) 343-9688

DATE RECEIVED 01-25-99
DATE REPORTED 02-23-99
99W9350

2291

TRIGON ENGINEERING CONSULTANTS INC. P.O. # AM7909
6200 HARRIS TECHNOLOGY BLVD.
CHARLOTTE, NC 28269

ATTENTION: PAUL JENKINS

SAMPLE DESCRIPTION: ENVITCO (M29)

13. STACK RUN 2 (8158-12) FRONT 1/2
14. STACK RUN 2 (8158-12) FRONT 1/2 DUPLICATE
15. STACK RUN 2 (8158-12) BACK 1/2
16. STACK RUN 2 (8158-12) BACK 1/2 DUPLICATE
17. STACK RUN 3 (8158-13) FRONT 1/2
18. STACK RUN 3 (8158-13) FRONT 1/2 SPIKE

RESULTS

	13	14	15	16	17	18
Phosphorus, as P, Total ug	17.2	15.8	11.4	9.50	9.32	89.1%
Lead, as Pb, Total ug	21.2	21.8	.957	.977	30.1	104%
Sulfate, as S, Total ug	<344	X	5740	X	344	X
Selenium, as Se, Total ug	101	102	622	643	128	105%
Silicon, as Si, Total ug	X	X	210	190	X	X
Vanadium, as V, Total ug	<.500	<.500	<.500	<.500	<.500	101%
Zinc, as Zn, Total ug	3.93	3.93	1.06	1.03	6.53	84.5%

848

OXFORD Laboratories Inc.

Analytical and Consulting Chemists
1316 South Fifth Street
Wilmington, N.C. 28401
(910) 763-9793
Fax (910) 343-9688

DATE RECEIVED 01-25-99
DATE REPORTED 02-23-99
99W9350

E 2291

TRIGON ENGINEERING CONSULTANTS INC. P.O. # AM7909
6200 HARRIS TECHNOLOGY BLVD.
CHARLOTTE, NC 28269

ATTENTION: PAUL JENKINS

SAMPLE DESCRIPTION: ENVITCO (M29)

19. STACK RUN 3 (8158-13) BACK 1/2
20. STACK RUN 3 (8158-13) BACK 1/2 SPIKE
21. FIELD BLANK FILTER A (8158-14a)
22. FIELD BLANK FILTER B (8158-14b)
23. BLANK FRONT 1/2
24. BLANK BACK 1/2

RESULTS

	19	20	21	22	23	24
Aluminum, as Al, Total ug	17.0	88.9%	94.2	95.2	3.40	8.93
Arsenic, as As, Total ug	<.500	104%	<.500	<.500	<.500	<.500
Barium, as Ba, Total ug	<.500	96.0%	1.72	1.76	<.500	<.500
Calcium, as Ca, Total ug	38.9	102%	33.9	33.9	25.0	22.8
Cadmium, as Cd, Total ug	<.200	102%	<.200	<.200	<.200	<.200
Chromium, as Cr, Total ug	1.59	96.2%	.800	.976	<.500	.887
Iron, as Fe, Total ug	25.1	114%	10.5	11.0	<10.0	<10.0
Potassium, as K, Total ug	24.0	104%	26.0	25.5	7.50	11.5
Lithium, as Li, Total ug	<.500	107%	<.500	<.500	<.500	<.500
Magnesium, as Mg, Total ug	<5.55	100%	7.70	7.14	<5.55	<5.55
Molybdenum, as Mo, Total ug	<.500	105%	6.15	5.80	<.500	<.500
Sodium, as Na, Total ug	267	102%	48.2	46.7	148	204
Nickel, as Ni, Total ug	.973	91.4%	<.500	<.500	<.500	<.500

849

OXFORD Laboratories Inc.

Analytical and Consulting Chemists
1316 South Fifth Street
Wilmington, N.C. 28401
(910) 763-9793
Fax (910) 343-9688

DATE RECEIVED 01-25-99
DATE REPORTED 02-23-99
99W9350

2291

TRIGON ENGINEERING CONSULTANTS INC. P.O. # AM7909
6200 HARRIS TECHNOLOGY BLVD.
CHARLOTTE, NC 28269

ATTENTION: PAUL JENKINS

SAMPLE DESCRIPTION: ENVITCO (M29)

19. STACK RUN 3 (8158-13) BACK 1/2
20. STACK RUN 3 (8158-13) BACK 1/2 SPIKE
21. FIELD BLANK FILTER A (8158-14a)
22. FIELD BLANK FILTER B (8158-14b)
23. BLANK FRONT 1/2
24. BLANK BACK 1/2

RESULTS

	19	20	21	22	23	24
Phosphorus, as P, Total ug	4.76	95.8%	7.79	6.80	3.42	10.2
Lead, as Pb, Total ug	1.38	106%	<.500	.642	<.500	<.500
Sulfate, as S, Total ug	8830	X	<344	344	<344	<344
Selenium, as Se, Total ug	682	97.3%	<.500	<.500	<.500	.660
Silicon, as Si, Total ug	130	100%	X	X	X	140
Vanadium, as V, Total ug	<.500	94.9%	<.500	<.500	<.500	<.500
Zinc, as Zn, Total ug	4.08	83.5%	1.80	1.16	.631	<.500

850

OXFORD Laboratories Inc.

Analytical and Consulting Chemists
1316 South Fifth Street
Wilmington, N.C. 28401
(910) 763-9793
Fax (910) 343-9688

DATE RECEIVED 01-25-99
DATE REPORTED 02-23-99
99W9350

2291

TRIGON ENGINEERING CONSULTANTS INC. P.O. # AM7909
6200 HARRIS TECHNOLOGY BLVD.
CHARLOTTE, NC 28269

ATTENTION: PAUL JENKINS

SAMPLE DESCRIPTION: ENVITCO (M29)

25. METHOD SW846-

	RESULTS
	25
Aluminum, as Al, Total ug	6020
Arsenic, as As, Total ug	6020
ium, as Ba, Total ug	6020
Calcium, as Ca, Total ug	7140
Cadmium, as Cd, Total ug	6020
Chromium, as Cr, Total ug	6020
Iron, as Fe, Total ug	7380
Potassium, as K, Total ug	7610
Lithium, as Li, Total ug	6020
Magnesium, as Mg, Total ug	7450
Molybdenum, as Mo, Total ug	6020
Sodium, as Na, Total ug	7770
Nickel, as Ni, Total ug	6020

851

OXFORD Laboratories Inc.

Analytical and Consulting Chemists
1316 South Fifth Street
Wilmington, N.C. 28401
(910) 763-9793
Fax (910) 343-9688

DATE RECEIVED 01-25-99
DATE REPORTED 02-23-99
99W9350

2291

TRIGON ENGINEERING CONSULTANTS INC. P.O. # AM7909
6200 HARRIS TECHNOLOGY BLVD.
CHARLOTTE, NC 28269

ATTENTION: PAUL JENKINS

SAMPLE DESCRIPTION: ENVITCO (M29)

25. METHOD SW846-

	RESULTS
	25
Phosphorus, as P, Total ug	6020
Lead, as Pb, Total ug	6020
[illegible]fate, as S, Total ug	*
Selenium, as Se, Total ug	6020
Silicon, as Si, Total ug	FAA
Vanadium, as V, Total ug	6020
Zinc, as Zn, Total ug	6020

NOTE: * SM (18TH ED) 4500D

KEN SMITH, SENIOR ANALYST

Trigon Engineering Consultants, Inc. *Chain of Custody* Sampler's Signature: Paul Kenkel

Company: EnVitCo	Laboratory: ~~Beta~~ Oxford Labs.	No. of Containers: M5 ~~23~~ 28 Total	Sampling Methods: 5/29
City, State: Anderson, SC	Project No. 046-98-158	M29 22 Total	
Contact: ~~Bob~~ KEN Hewlett	Purchase Order No. AM7909		

Sample Description	Sample ID	Date	Time	Sample Disposition and Remarks
Melter Run 1 Filter # Q147	8158-08	1-20-99	1000-1102	Each sample consists of one
Run 2 Filter # Q148	8158-09		1150-1252	petri dish with filter, two
Run 3 Filter # Q152	8158-10		1402-1505	250 ml amber bottles and one
Stack Run 1 Filter # Q149	8158-11		1000-1100	1000 ml amber bottle.
Run 2 Filter # Q150	8158-12		1150-1250	One amber bottle contains the
Run 3 Filter # Q151	8158-13		1402-1502	acetone rinse of front half, the
Field Blank Filter # Q153	8158-14a		1220	other 250 ml amber bottle contains
Filter Q154	8158-14b		1220	the 0.1 N nitric acid rinse
Oxford Labs: Note acetone	fraction			from the front half. The 1000 ml
has been analyzed for particulate				amber bottle contains the
matter - reconstituted with	0.1 N HNO_3			back half fraction. Each
and added to front half	nitric rinse.			bottle is labeled according
No. of containers = 22 for Oxford				to designation in Method 29.

Relinquished By:	Date/Time	Received By:	Date/Time
Paul Kenkel	01/25/99 10800		/
Relinquished By:	Date/Time	Received By:	Date/Time
	/		/
Received for Laboratory By: Laurie Kelly	Date/Time 1/25/99 / 12:10 /	Analyze for the Following Compounds: Al, As, Ba, Ca, Cd, Cr, Fe, K, Li, Mg, Mo, Na, Ni, P, Pb, S, Se, Si, V and Zn	

→ NOTE: Analyze and report Front & Back half fractions

229

E-14

453

OXFORD LABORATORY INC.

SAMPLE NARRATIVE SUMMARY OLI #: 99W9350
REPORT DATE: 02-19-99

CLIENT: TRIGON
PROJECT #: AM7909
SAMPLE ARRIVAL DATE: 01-25-99 CHAIN OF CUSTODY: YES
SAMPLE ARRIVAL CONDITION/COMMENT: SHIPPED via PRIORITY TRANSPORT.
NO PROBLEMS NOTED.
OBSERVED DISCREPANCY/COMMENT: ALL VOLUMES MARKED.
NO SAMPLE LOSS OBSERVED. pH <2
REQUESTED METHOD OF ANALYSIS: EPA METHOD 29

SAMPLE PREPARATION PER: METHOD 29
SAMPLE ANALYSIS PER: STANDARD METHODS 18th ed 4500D,
SW846-6020 & WS846-7000 series

INSTRUMENTATION USED:
PE AANALYST 100.....YES
PE FIMS.....NO
PE ZEEMAN 5100 GFAA.....NO
PE ICP-MS ELAN 5000.....YES
PE ICP-MS ELAN 6000.....YES

QC REQUIREMENTS: OLI SPIKE RECOVERY OF 90-110 PERCENT HAS BEEN MET
WITH THE FOLLOWING EXCEPTION;

#8 Cd @ 86.6% pg 49	#8 P @ 87.2% pg 59
#10 Fe @ 113% pg 69	#10 Zn @ 84.3% pg 42
#18 As @ 80.4% pg 44	#18 Fe @ 114% pg 69
#18 Li @ 117% pg 52	#18 P @ 89.1% pg 59
#18 Zn @ 84.5% pg 43	#20 Al @ 88.9% pg 54
#20 Fe @ 114% pg 69	#20 Zn @ 83.5% pg 43

NOTE: EPA METHOD 29 ACCEPTABLE CRITERIA OF 75-125 PERCENT WAS MET

FOR DUPLICATES: RELATIVE PERCENT DIFFERENCE OF + OR - 10 PERCENT
WAS MET

POSITIVE RESULTS REPORTED FOR SUBMITTED REAGENT BLANKS :

FILTER BLANK A (8158-14a)
#21 Al @ 94.2ug pg 54; #21 Ba @ 1.72ug pg 21
#21 Ca @ 33.9ug pg 67; #21 Cr @ .800ug pg 38
#21 Fe @ 10.5ug pg 69; #21 K @ 26.0ug pg 71
#21 Mg @ 7.70ug pg 73; #21 Mo @ 6.15ug pg 19
#21 Na @ 48.2ug pg 75; #21 P @ 7.79ug pg 59
#21 Zn @ 1.80ug pg 43

FILTER BLANK B (8158-14b)
#22 Al @ 95.2ug pg 54; #22 Ba @ 1.76ug pg 21
#22 Ca @ 33.9ug pg 67; #22 Cr @ .976ug pg 39
#22 Fe @ 11.0ug pg 69; #22 K @ 25.5ug pg 71
#22 Mg @ 7.14ug pg 73; #22 Mo @ 5.80ug pg 19
#22 Na @ 46.7ug pg 75; #22 P @ 6.80ug pg 59
#22 Pb @ .642ug pg 22; #22 Zn @ 1.16ug pg 43
#22 S @ 344ug pg 79

854

FRONT HALF HNO3 BLANK
#23 Al @ 3.40ug pg 10; #23 Ca @ 25.0ug pg 67
#23 K @ 7.50ug pg 71; #23 Na @ 148ug pg 75
#23 P @ 3.42ug pg 59; #23 Zn @ .631ug pg 43

BACK HALF H2O2 BLANK
#24 Al @ 8.93ug pg 10; #24 Ca @ 22.8ug pg 67
#24 Cr @ .887ug pg 39; #24 K @ 11.5ug pg 71
#24 Na @ 204ug pg 75; #24 P @ 10.2ug pg 59
#24 Se @ .660ug pg 46; #24 Si @ 140ug pg 77

SAMPLE DATA IS NOT BLANK CORRECTED

SAMPLE NOTE: FRONT HALF SAMPLES CONSIST OF HNO3 & GLASS FIBER FILTERS; THEREFORE Si ANALYSES WERE NOT PERFORMED ON THE FRONT HALF SAMPLES (THIS IS INDICATED BY AN X ON THE REPORT PAGE).
THERE WAS INSUFFICIENT SAMPLE TO PERFORM SULFATE DUPLICATE OR SPIKE ANALYSES (THIS IS INDICATED BY AN X ON THE REPORT PAGE).

LABORATORY CONTROL BLANK: ALL LESS THAN WITH THE FOLLOWING EXCEPTION;

FRONT HALF
Al @ 4.61ug pg 10 Pb @ 2.70ug pg 21
Al @ 4.42ug pg 23 Pb @ 2.84ug pg 30
Al @ 5.05ug pg 54 Al @ 4.07ug pg 56
P @ 5.58ug pg 59

BACK HALF
Al @ 2.28ug pg 10 Al @ 2.46ug pg 23
Al @ 2.32ug pg 54 Al @ 2.36ug pg 56
P @ 5.73ug pg 59

SAMPLE DATA IS NOT BLANK CORRECTED

LABORATORY CONTROL SPIKE: 90-110 PERCENT HAS BEEN MET WITH THE FOLLOWING EXCEPTION;

FRONT HALF
Cd @ 89.0% pg 20 Pb @ 70.6% pg 21
Zn @ 75.3% pg 23 Se @ 72.1% pg 24
Se @ 72.1% pg 28 Pb @ 69.2% pg 30
Zn @ 71.7% pg 42 As @ 78.9% pg 43
Se @ 70.6% pg 45 Cd @ 85.9% pg 49
Li @ 115% pg 52 As @ 83.9% pg 57
P @ 144% pg 59 Se @ 71.4% pg 63

BACK HALF
V @ 89.6% pg 12 Zn @ 84.4% pg 23
Se @ 81.4% pg 24 Se @ 82.0% pg 28
Zn @ 83.2% pg 42 Se @ 81.7% pg 45
P @ 80.2% pg 59 Se @ 80.9% pg 63
As @ 86.6% pg 65

page 8779

2291

DETECTION LIMIT: ALL HAVE BEEN MET WITH THE FOLLOWING EXCEPTION;
K .050ug/mL = .064ug/mL (128%) pg 72
K .050ug/mL = .060ug/mL (120%) pg 72
K .050ug/mL = .065ug/mL (130%) pg 72
As 2.00ug/L = 1.72ug/L (86.0%) pg 65

CALIBRATION VERIFICATION: OUTSIDE QC WAS MET (90% TO 110%)
Ba 10.0ug/L = 11.2ug/L (112%) pg 26
As 10.0ug/L = 11.4ug/L (114%) pg 57
As 10.0ug/L = 11.6ug/L (116%) pg 57

CALIBRATION COEFFICIENT: ALL ELEMENTS AT LEAST .996

THIS DATA PACKAGE CONTAINS 79 SUMMARY PAGES TO INCLUDE THE NARRATIVE SUMMARY; ALL PERTINENT DATA ON FILE AT OLI.

SAMPLE VOLUMES SUBMITTED FOR TESTING ARE:

	FRONT HALF B.V.	BACK HALF B.V.	HNO3 B.V.	KMnO4 B.V.	HCl B.V.
#1	88mL	———	———	———	———
#2	———	395mL	———	———	———
#3 & #4	97mL	———	———	———	———
#5 & #6	———	396mL	———	———	———
#7 & #8	96mL	———	———	———	———
#9 & #10	———	404mL	———	———	———
#11	110mL	———	———	———	———
#12	———	318mL	———	———	———
#13 & #14	92mL	———	———	———	———
#15 & #16	———	375mL	———	———	———
#17 & #18	101mL	———	———	———	———
#19 & #20	———	345mL	———	———	———
#21	FILTER ONLY	———	———	———	———
#22	FILTER ONLY	———	———	———	———
#23	100mL	———	———	———	———
#24	———	200mL	———	———	———

FRONT HALF FINAL VOLUMES USED FOR CALCULATIONS ARE: 100mL

BACK HALF FINAL VOLUMES USED FOR CALCULATIONS ARE: 100mL

CALCULATION FOR TOTAL ug REPORTED

FAA ug/mL * DILUTION FACTOR * FINAL VOLUME = TOTAL ug

ICP-MS ug/L * DILUTION FACTOR * FINAL VOLUME / 1000 = TOTAL ug

856

page 9/79

FILE NAME = 9350-a ON DRIVE a:

14:15:48 Feb 12 1999

QUANTITATIVE ANALYSIS: DATA SET SUMMARY

Set: 02-12-99-1

2291

Data Set Description:

	Intensity	Intensity Std Dev	Conc.	Conc. Std Dev	Units	Int Std

ANALYTE:Li 7

Total ug

	PPB	PPB X DF X .1	PROTOCOL RECOVERY
029 D.L.	2.1814		
030 DIL BLANK	0.0347		
031 QC=10PPB	10.0046		
032 QC=50PPB	49.2472		
033 D.L.	2.0849		
034 9350-FHB X2	1.4500	0.2900	
035 9350-FHB X2+50	53.4507	104.00%	103.8886 %
036 9350-BHB X2	1.4610	0.2922	
037 9350-BHB X2+50	51.5479	100.17%	100.1689 %
038 9350-2 X2	2.0305	0.4061	
039 9350-5 X2	5.0073	1.0015	
040 9350-5 X2DUP	5.0436	1.0087	
041 9350-9 X2	1.7094	0.3419	
042 9350-9 X2+20	20.6257	94.58%	95.00816 %
043 DIL BLANK	1.4452		
044 QC=10PPB	11.2093		
[illegible] QC=50PPB	48.7867		
[illegible] 9350-11 X2	3.0467	0.6093	
047 9350-12 X2	1.5999	0.3200	
048 9350-13 X2	4.2473	0.8495	
049 9350-13 X2DUP	4.2355	0.8471	
050 9350-15 X2	1.6698	0.3340	
051 9350-15 X2DUP	1.6273	0.3255	
052 9350-17 X2	3.9909	0.7982	
053 9350-17 X2+20	23.3229	96.66%	97.21561 %
054 9350-19 X2	1.5485	0.3097	
055 9350-19 X2+20	20.9462	96.99%	97.20491 %
056 DIL BLANK	1.3930		
057 QC=10PPB	11.4769		
058 QC=50PPB	51.7001		
059 9350-21 X2	1.4464	0.2893	
060 9350-22 X2	1.6724	0.3345	
061 9350-23 X2	1.3856	0.2771	
062 9350-24 X2	1.4386	0.2877	
063 DIL BLANK	1.3712		
064 QC=10PPB	11.5081		
065 QC=50PPB	52.2479		
066 9350-INTA X10	1.4170	1.4170	
067 9350-INTA X10	1.7494	1.7494	
068 9350-INTAB X10	1.7247	1.7247	
069 DIL BLANK	1.3938		
[illegible] QC=10PPB	11.9091		
[illegible] QC=50PPB	54.1107		

Total ug = ppb X FV X dil / 1000

857

ANALYTE:Al 27

	PPB	PPB X DF X .1	PROTOCOL RECOVERY
029 D.L.	2.1489		

a

Al

a-

page 10 of 79

2291

030	DIL BLANK		-0.2391		
031	QC=10PPB		9.8767		
[illegible]	QC=50PPB		52.3997		
[illegible]	D.L.		7.9750		
034	9350-FHB X2		23.0720	4.6144	
035	9350-FHB X2+50		75.2090	104.27%	102.9245 %
036	9350-BHB X2		11.3989	2.2798	
037	9350-BHB X2+50		59.2413	95.68%	96.48592 %
038	9350-2 X2		88.1205	17.6241	
039	9350-5 X2		106.3215	21.2643	
040	9350-5 X2DUP		105.6784	21.1357	
041	9350-9 X2		56.1200	11.2240 11.2	
042	9350-9 X2+20		75.0414	94.61%	98.58302 %
043	DIL BLANK		0.5474		
044	QC=10PPB		10.4117		
045	QC=50PPB		49.3820		
046	9350-11 X2	>	612.5093	0.0000	
047	9350-12 X2		81.5589	16.3118	
048	9350-13 X2	>	658.4277	0.0000	
049	9350-13 X2DUP	>	660.1321	0.0000	
050	9350-15 X2		83.3519	16.6704	
051	9350-15 X2DUP		86.1412	17.2282	
052	9350-17 X2	>	664.8657	0.0000	
053	9350-17 X2+20	>	1004.3824	0.00%	0 %
054	9350-19 X2		68.3474	13.6695	
055	9350-19 X2+20		87.4382	95.45%	98.97089 %
056	DIL BLANK		0.6473		
057	QC=10PPB		10.8030		
[illegible]	QC=50PPB		51.1012		
[illegible]	9350-21 X2	>	683.9310	0.0000	
060	9350-22 X2		363.8217	72.7643	
061	9350-23 X2		16.9980	3.3996 3.40	
062	9350-24 X2		44.6521	8.9304 8.93	
063	DIL BLANK		0.6739		
064	QC=10PPB		11.0639		
065	QC=50PPB		54.0575		
066	9350-INTA X10		0.8897	0.8897	
067	9350-INTA X10	>	1092.9603	0.0000	
068	9350-INTAB X10	>	1044.6683	0.0000	
069	DIL BLANK		6.9103		
070	QC=10PPB		11.7322		
071	QC=50PPB		54.7465		

ANALYTE:P 31

			PPB	PPB X DF X .1		PROTOCOL RECOVERY
029	D.L.		2.1203			
030	DIL BLANK		1.1381			
031	QC=10PPB		11.1996			
032	QC=50PPB		55.3666		QC's out	
033	D.L.		2.4989			
034	9350-FHB X2		32.1562	6.4312		
035	9350-FHB X2+50		102.8949	141.48%		125.243 %
[illegible]	9350-BHB X2		27.4673	5.4935		
[illegible]	9350-BHB X2+50		73.0047	91.07%		94.23937 %
038	9350-2 X2		64.3658	12.8732		
039	9350-5 X2		69.2439	13.8488		858
040	9350-5 X2DUP		67.0534	13.4107		
041	9350-9 X2		59.4363	11.8873		
042	9350-9 X2+20		77.5135	90.39%		97.57944 %

E 19

a

page 47 79

2291

043	DIL BLANK	15.3914		
044	QC=10PPB	24.0209		
[illegible]	QC=50PPB	65.0757		
[illegible]	9350-11 X2	45.3594	9.0719	
047	9350-12 X2	49.2460	9.8492	
048	9350-13 X2	55.1117	11.0223	
049	9350-13 X2DUP	54.7918	10.9584	
050	9350-15 X2	48.3237	9.6647	
051	9350-15 X2DUP	49.1083	9.8217	
052	9350-17 X2	60.7568	12.1514	
053	9350-17 X2+20	82.9036	110.73%	102.6584 %
054	9350-19 X2	50.3441	10.0688	
055	9350-19 X2+20	71.7471	107.01%	101.9945 %
056	DIL BLANK	14.7726		
057	QC=10PPB	26.6109		
058	QC=50PPB	69.1010		
059	9350-21 X2	42.3414	8.4683	
060	9350-22 X2	38.3636	7.6727	
061	9350-23 X2	25.1629	5.0326	
062	9350-24 X2	49.1563	9.8313	
063	DIL BLANK	16.0292		
064	QC=10PPB	28.3317		
065	QC=50PPB	73.1679		
066	9350-INTA X10	16.7795	16.7795	
067	9350-INTA X10	> 1.758E+04	0.0000	
068	9350-INTAB X10	> 1.680E+04	0.0000	
069	DIL BLANK	26.7528		
070	QC=10PPB	31.5848		
[illegible]	QC=50PPB	77.6764		

ANALYTE:V 51

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
029	D.L.	-1.3385		
030	DIL BLANK	-1.4140		
031	QC=10PPB	8.6702		
032	QC=50PPB	46.0937		
033	D.L.	-0.9925		
034	9350-FHB X2	18.0875	3.6175	
035	9350-FHB X2+50	61.5809	86.99%	90.44376 %
036	9350-BHB X2	16.9336	3.3867	
037	9350-BHB X2+50	61.8855	89.90%	92.45805 %
038	9350-2 X2	13.5386	2.7077	
039	9350-5 X2	13.5376	2.7075	
040	9350-5 X2DUP	13.1599	2.6320	
041	9350-9 X2	14.5243	2.9049	
042	9350-9 X2+20	32.8652	91.70%	95.1944 %
043	DIL BLANK	20.3653		
044	QC=10PPB	30.5837		
045	QC=50PPB	66.2153		
046	9350-11 X2	11.5165	2.3033	
047	9350-12 X2	11.8285	2.3657	
048	9350-13 X2	11.7879	2.3576	
[illegible]	9350-13 X2DUP	11.4561	2.2912	
[illegible]	9350-15 X2	10.9312	2.1862	
051	9350-15 X2DUP	11.0944	2.2189	
052	9350-17 X2	11.2919	2.2584	
053	9350-17 X2+20	29.1117	89.10%	93.0327 %
054	9350-19 X2	11.6402	2.3280	
055	9350-19 X2+20	29.8383	90.99%	94.30503 %

859

a

page 12 of 79

2291

056	DIL BLANK	16.9476	
057	QC=10PPB	26.7375	
[illegible]	QC=50PPB	61.1566	
[illegible]	9350-21 X2	9.8518	1.9704
060	9350-22 X2	9.8053	1.9611
061	9350-23 X2	10.8523	2.1705
062	9350-24 X2	12.9215	2.5843
063	DIL BLANK	18.6737	
064	QC=10PPB	28.0624	
065	QC=50PPB	62.0439	
066	9350-INTA X10	18.2521	18.2521
067	9350-INTA X10	28.3555	28.3555
068	9350-INTAB X10	51.1928	51.1928
069	DIL BLANK	27.4565	
070	QC=10PPB	36.4173	
071	QC=50PPB	70.4750	

ANALYTE:V 51

w/factor

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
029	D.L.	1.5884 See *Below		
030	DIL BLANK	-5.094E-03		
031	QC=10PPB	10.7282		
032	QC=50PPB	47.0106		
033	D.L.	2.1981*		
034	9350-FHB X2	0.8595	0.1719	
035	9350-FHB X2+50	46.3659	91.01%	91.16467 %
036	9350-BHB X2	0.8089	0.1618	
[illegible]	9350-BHB X2+50	45.6100	89.60%	89.76774 %
[illegible]	9350-2 X2	0.8617	0.1723 < .500	
039	9350-5 X2	0.7909	0.1582	
040	9350-5 X2DUP	0.6220	0.1244	
041	9350-9 X2	0.8323	0.1665	
042	9350-9 X2+20	19.0939	91.31%	91.65527 %
043	DIL BLANK	0.4372		
044	QC=10PPB	10.4085		
045	QC=50PPB	46.5736		
046	9350-11 X2	0.6316	0.1263	
047	9350-12 X2	0.7491	0.1498	
048	9350-13 X2	0.7715	0.1543	
049	9350-13 X2DUP	0.6974	0.1395	
050	9350-15 X2	0.5633	0.1127	
051	9350-15 X2DUP	0.6290	0.1258	
052	9350-17 X2	0.6603	0.1321	
053	9350-17 X2+20	17.8382	85.89%	86.34047 %
054	9350-19 X2	0.5866	0.1173	
055	9350-19 X2+20	17.4691	84.41%	84.85666 %
056	DIL BLANK	0.6141		
057	QC=10PPB	9.8423		
058	QC=50PPB	86.27 43.0814		
059	9350-21 X2	0.5336	0.1067	
060	9350-22 X2	0.5018	0.1004	
061	9350-23 X2	0.3934	0.0787	
[illegible]	9350-24 X2	0.4729	0.0946	
[illegible]	DIL BLANK	0.8504		
064	QC=10PPB	9.9321		
065	QC=50PPB	42.4999		
066	9350-INTA X10	0.8923	0.8923	
067	9350-INTA X10	-0.9278	-0.9278	
068	9350-INTAB X10	19.8813	19.8813	

860

a

page 13 of 79

2291

069 DIL BLANK	1.1952	
070 QC=10PPB	10.2813	
[illegible] QC=50PPB	44.9825	

ANALYTE:Cr 52

	PPB	PPB X DF X .1	PROTOCOL RECOVERY
029 D.L.	1.9957		
030 DIL BLANK	-4.071E-03		
031 QC=10PPB	10.1188		
032 QC=50PPB	47.2795		
033 D.L.	2.0543		
034 9350-FHB X2	3.1108	0.6222	
035 9350-FHB X2+50	48.0705	89.92%	90.50984 %
036 9350-BHB X2	1.8661	0.3732	
037 9350-BHB X2+50	47.1755	90.62%	90.95633 %
038 9350-2 X2	10.0398	2.0080	
039 9350-5 X2	9.8508	1.9702	
040 9350-5 X2DUP	9.5379	1.9076	
041 9350-9 X2	8.9215	1.7843	
042 9350-9 X2+20	27.1396	91.09%	93.83884 %
043 DIL BLANK	1.4571		
044 QC=10PPB	11.3190		
045 QC=50PPB	46.5660		
046 9350-11 X2	5.5832	1.1166	
047 9350-12 X2	7.9937	1.5987	
048 9350-13 X2	5.5267	1.1053	
049 9350-13 X2DUP	5.5390	1.1078	
[illegible] 9350-15 X2	8.0763	1.6153	
[illegible] 9350-15 X2DUP	8.1248	1.6250	
052 9350-17 X2	7.1322	1.4264	
053 9350-17 X2+20	24.5758	87.22%	90.57799 %
054 9350-19 X2	8.0035	1.6007	
055 9350-19 X2+20	25.1679	85.82%	89.87412 %
056 DIL BLANK	0.6980		
057 QC=10PPB	9.6974		
058 QC=50PPB	43.2346		
059 9350-21 X2	4.3111	0.8622	
060 9350-22 X2	4.9965	0.9993	
061 9350-23 X2	1.4237	0.2847	
062 9350-24 X2	4.9069	0.9814	
063 DIL BLANK	0.6855		
064 QC=10PPB	9.5577		
065 QC=50PPB	42.3661		
066 9350-INTA X10	0.6855	0.6855	
067 9350-INTA X10	2.1565	2.1565	
068 9350-INTAB X10	12.6437	12.6437	
069 DIL BLANK	2.7103		
070 QC=10PPB	12.2701		
071 QC=50PPB	47.5859		

ANALYTE:Ni 60

	PPB	PPB X DF X .1	PROTOCOL RECOVERY
[illegible] D.L.	2.0992		
030 DIL BLANK	-0.0525		
031 QC=10PPB	9.3144		
032 QC=50PPB	46.9166		
033 D.L.	2.4156	E-22	
034 9350-FHB X2	0.9132	0.1826	

861

a

page 140/79

035 9350-FHB X2+50	45.6792	89.53%	89.71976 %
036 9350-BHB X2	0.5170	0.1034	
037 9350-BHB X2+50	46.7232	92.41%	92.49006 %
038 9350-2 X2	4.1915	0.8383	
039 9350-5 X2	3.9603	0.7921	
040 9350-5 X2DUP	3.9166	0.7833	
041 9350-9 X2	4.1668	0.8334	
042 9350-9 X2+20	21.9855	89.09%	90.97398 %
043 DIL BLANK	0.0948		
044 QC=10PPB	9.6886		
045 QC=50PPB	89.1% 44.5443		
046 9350-11 X2	4.9386	0.9877	
047 9350-12 X2	5.3760	1.0752	
048 9350-13 X2	43.2057	8.6411	
049 9350-13 X2DUP	43.3723	8.6745	
050 9350-15 X2	3.4734	0.6947	
051 9350-15 X2DUP	3.4377	0.6875	
052 9350-17 X2	4.2983	0.8597	
053 9350-17 X2+20	21.5890	86.45%	88.84984 %
054 9350-19 X2	4.4922	0.8984	
055 9350-19 X2+20	22.3407	89.24%	91.21557 %
056 DIL BLANK	0.1262		
057 QC=10PPB	9.5037		
058 QC=50PPB	44.3973		
059 9350-21 X2	2.2190	0.4438	
060 9350-22 X2	1.8017	0.3603	
061 9350-23 X2	0.7945	0.1589	
062 9350-24 X2	2.2943	0.4589	
063 DIL BLANK	0.1034		
064 QC=10PPB	9.6015		
065 QC=50PPB	45.1138		
066 9350-INTA X10	0.1973	0.1973	
067 9350-INTA X10	1.7034	1.7034	
068 9350-INTAB X10	22.3380	22.3380	
069 DIL BLANK	0.6964		
070 QC=10PPB	11.0610		
071 QC=50PPB	50.4576		

2291

ANALYTE:Ni 62

	PPB	PPB X DF X .1	PROTOCOL RECOVERY
029 D.L.	2.0734		
030 DIL BLANK	-0.0547		
031 QC=10PPB	9.4516		
032 QC=50PPB	46.1334		
033 D.L.	2.3534		
034 9350-FHB X2	1.0434	0.2087	
035 9350-FHB X2+50	46.1407	90.19%	90.39504 %
036 9350-BHB X2	0.5821	0.1164	
037 9350-BHB X2+50	46.9780	92.79%	92.87476 %
038 9350-2 X2	4.3308	0.8662	
039 9350-5 X2	4.0619	0.8124	
040 9350-5 X2DUP	3.9622	0.7924	
041 9350-9 X2	4.4127	0.8825	
042 9350-9 X2+20	21.9902	87.89%	90.07689 %
043 DIL BLANK	0.2172		
044 QC=10PPB	9.6201		
045 QC=50PPB	45.0749		
046 9350-11 X2	4.9330	0.9866	
047 9350-12 X2	5.6686	1.1337	

862

page 150 of 79

229

048 9350-13 X2	43.1707	8.6341	
049 9350-13 X2DUP	43.5074	8.7015	
0[illegible] 9350-15 X2	3.5340	0.7068	
0[illegible] 9350-15 X2DUP	3.5879	0.7176	
052 9350-17 X2	4.3159	0.8632	
053 9350-17 X2+20	21.2555	84.70%	87.414 %
054 9350-19 X2	4.7320	0.9464	
055 9350-19 X2+20	22.1786	87.23%	89.67573 %
056 DIL BLANK	0.2136		
057 QC=10PPB	9.3466		
058 QC=50PPB	44.9076		
059 9350-21 X2	2.2544	0.4509	
060 9350-22 X2	1.8909	0.3782	
061 9350-23 X2	0.8623	0.1725	
062 9350-24 X2	2.3227	0.4645	
063 DIL BLANK	0.1839		
064 QC=10PPB	9.5088		
065 QC=50PPB	45.3907		
066 9350-INTA X10	0.2849	0.2849	
067 9350-INTA X10	3.9743	3.9743	
068 9350-INTAB X10	24.1754	24.1754	
069 DIL BLANK	0.8437		
070 QC=10PPB	10.8016		
071 QC=50PPB	50.5129		

ANALYTE:Zn 66

	PPB	PPB X DF X .1	PROTOCOL RECOVERY
[illegible] D.L.	1.9774		
0[illegible] DIL BLANK	-0.1304		
031 QC=10PPB	9.3607		
032 QC=50PPB	48.8877		
033 D.L.	3.6947		
034 9350-FHB X2	2.4047	0.4809	
035 9350-FHB X2+50	37.6116	70.41%	71.77142 %
036 9350-BHB X2	0.9007	0.1801	
037 9350-BHB X2+50	40.9784	80.16%	80.50655 %
038 9350-2 X2	7.8107	1.5621	
039 9350-5 X2	8.3043	1.6609	
040 9350-5 X2DUP	7.8544	1.5709	
041 9350-9 X2	5.8030	1.1606	
042 9350-9 X2+20	21.6052	79.01%	83.73135 %
043 DIL BLANK	0.5384		
044 QC=10PPB	10.1407		
045 QC=50PPB	46.6994		
046 9350-11 X2	17.4134	3.4827	
047 9350-12 X2	50.4537	10.0907	
048 9350-13 X2	19.4545	3.8909	
049 9350-13 X2DUP	19.1126	3.8225	
050 9350-15 X2	5.5858	1.1172	
051 9350-15 X2DUP	5.5041	1.1008	
052 9350-17 X2	30.4101	6.0820	
053 9350-17 X2+20	45.8072	76.99%	90.86909 %
[illegible] 9350-19 X2	20.3889	4.0778	
[illegible] 9350-19 X2+20	37.3330	84.72%	92.43381 %
056 DIL BLANK	0.5603		
057 QC=10PPB	10.0268		
058 QC=50PPB	46.1986		
059 9350-21 X2	8.6440	1.7288	
060 9350-22 X2	5.8200	1.1640	

863

a

-page 16 of 79

229 T

061 9350-23 X2	3.3408	0.6682	
062 9350-24 X2	2.3726	0.4745	
063 DIL BLANK	0.4306		
064 QC=10PPB	9.9039		
065 QC=50PPB	47.0711		
066 9350-INTA X10	0.7115	0.7115	
067 9350-INTA X10	4.3256	4.3256	
068 9350-INTAB X10	13.6162	13.6162	
069 DIL BLANK	0.6105		
070 QC=10PPB	10.9733		
071 QC=50PPB	49.9406		

ANALYTE:As 75

	PPB	PPB X DF X .1	PROTOCOL RECOVERY
029 D.L.	1.7012		
030 DIL BLANK	-0.3543		
031 QC=10PPB	9.3995		
032 QC=50PPB	46.8718		
033 D.L.	1.9621		
034 9350-FHB X2	2.1885	0.4377	
035 9350-FHB X2+50	38.7312	73.09%	74.21405 %
036 9350-BHB X2	2.1057	0.4211	
037 9350-BHB X2+50	44.2480	84.28%	84.91969 %
038 9350-2 X2	> -675.2578	0.0000	
039 9350-5 X2	> -708.4864	0.0000	
040 9350-5 X2DUP	> -662.4232	0.0000	
041 9350-9 X2	>-7056.5254	0.0000	
042 9350-9 X2+20	>-7062.4146	0.00%	0 %
043 DIL BLANK	2.2641		
044 QC=10PPB	12.0775		
045 QC=50PPB	47.5528		
046 9350-11 X2	2.9781	0.5956	
047 9350-12 X2	-2.1041	-0.4208	
048 9350-13 X2	2.9466	0.5893	
049 9350-13 X2DUP	3.4743	0.6949	
050 9350-15 X2	-5.8357	-1.1671	
051 9350-15 X2DUP	-9.8640	-1.9728	
052 9350-17 X2	2.8219	0.5644	
053 9350-17 X2+20	17.9628	75.70%	78.7086 %
054 9350-19 X2	-15.1445	-3.0289	
055 9350-19 X2+20	5.3363	102.40%	109.9022 %
056 DIL BLANK	2.0955		
057 QC=10PPB	11.2833		
058 QC=50PPB	46.9237		
059 9350-21 X2	1.7001	0.3400	
060 9350-22 X2	1.6341	0.3268	
061 9350-23 X2	1.7775	0.3555	
062 9350-24 X2	1.5060	0.3012	
063 DIL BLANK	1.8237		
064 QC=10PPB	11.6275		
065 QC=50PPB	48.4614		
066 9350-INTA X10	1.9856	1.9856	
067 9350-INTA X10	3.1638	3.1638	
068 9350-INTAB X10	13.2414	13.2414	
069 DIL BLANK	2.6064		
070 QC=10PPB	12.5845		
071 QC=50PPB	48.9871		

864

ANALYTE:Se 78

a

page 17 of 79

Se 78

2291

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
[illegible]	D.L.	1.6737		
[illegible]	DIL BLANK	0.1603		
031	QC=10PPB	9.3252		
032	QC=50PPB	46.0661		
033	D.L.	2.0861		
034	9350-FHB X2	0.9600	0.1920	
035	9350-FHB X2+50	34.0832	66.25%	66.88226 %
036	9350-BHB X2	0.8898	0.1780	
037	9350-BHB X2+50	38.9089	76.04%	76.45717 %
038	9350-2 X2	> 1.197E+04	0.0000	
039	9350-5 X2	> 1.274E+04	0.0000	
040	9350-5 X2DUP	> 1.174E+04	0.0000	
041	9350-9 X2	> 1.198E+04	0.0000	
042	9350-9 X2+20	> 1.202E+04	0.00%	0 %
043	DIL BLANK	6.5000		
044	QC=10PPB	12.8620		
045	QC=50PPB	46.8677		
046	9350-11 X2	388.5823	77.7165	
047	9350-12 X2	1623.7614	324.7523	
048	9350-13 X2	345.5833	69.1167	
049	9350-13 X2DUP	341.4299	68.2860	
050	9350-15 X2	2334.0808	466.8162	
051	9350-15 X2DUP	2363.1316	472.6263	
052	9350-17 X2	412.1771	82.4354	
053	9350-17 X2+20	437.3167	125.70%	101.1892 %
054	9350-19 X2	2717.7581	543.5516	
[illegible]	9350-19 X2+20	2776.5190	293.80%	101.4158 %
[illegible]	DIL BLANK	2.3727		
057	QC=10PPB	10.4469		
058	QC=50PPB	44.9656		
059	9350-21 X2	1.8025	0.3605	
060	9350-22 X2	1.4718	0.2944	
061	9350-23 X2	1.2562	0.2512	
062	9350-24 X2	3.6112	0.7222	
063	DIL BLANK	1.3774		
064	QC=10PPB	10.7239		
065	QC=50PPB	46.8094		
066	9350-INTA X10	1.1119	1.1119	
067	9350-INTA X10	1.6096	1.6096	
068	9350-INTAB X10	10.5485	10.5485	
069	DIL BLANK	1.4140		
070	QC=10PPB	11.2619		
071	QC=50PPB	48.0503		

ANALYTE:Se 82

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
029	D.L.	1.7680		
030	DIL BLANK	1.936E-03		
031	QC=10PPB	9.2262		
032	QC=50PPB	45.9235		
[illegible]	D.L.	1.8749		
[illegible]	9350-FHB X2	1.0936	0.2187	
035	9350-FHB X2+50	34.5561	66.92%	67.63293 %
036	9350-BHB X2	0.8623	0.1725	
037	9350-BHB X2+50	38.9054	76.09%	76.49162 %
038	9350-2 X2	> 3.317E+04	0.0000	
039	9350-5 X2	> 3.304E+04	0.0000	

865

a

page 18 of 79

2291

040	9350-5 X2DUP	> 3.255E+04	0.0000	
041	9350-9 X2	> 3.321E+04	0.0000	
0[illegible]	9350-9 X2+20	> 3.332E+04	0.00%	0.[illegible]
0[illegible]	DIL BLANK	6.6359		
044	QC=10PPB	13.1363		
045	QC=50PPB	46.7677		
046	9350-11 X2	397.5841	79.5168	
047	9350-12 X2	1682.4414	336.4883	
048	9350-13 X2	352.9315	70.5863	
049	9350-13 X2DUP	350.2910	70.0582	
050	9350-15 X2	2438.0735	487.6147	
051	9350-15 X2DUP	2475.5164	495.1033	
052	9350-17 X2	419.8047	83.9609	
053	9350-17 X2+20	449.8151	150.05%	102.2761 %
054	9350-19 X2	2860.2683	572.0536	
055	9350-19 X2+20	2931.0276	353.80%	101.7623 %
056	DIL BLANK	2.8846		
057	QC=10PPB	11.2160		
058	QC=50PPB	46.7356		
059	9350-21 X2	3.5792	0.7158	
060	9350-22 X2	2.8740	0.5748	
061	9350-23 X2	1.4090	0.2818	
062	9350-24 X2	3.7366	0.7473	
063	DIL BLANK	1.7815		
064	QC=10PPB	11.1586		
065	QC=50PPB	47.1675		
066	9350-INTA X10	1.3505	1.3505	
0[illegible]	9350-INTA X10	1.7905	1.7905	
[illegible]	9350-INTAB X10	11.1230	11.1230	
0[illegible]	DIL BLANK	1.5560		
070	QC=10PPB	11.5651		
071	QC=50PPB	48.4991		

ANALYTE:Mo 98

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
029	D.L.	2.2330		
030	DIL BLANK	0.0196		
031	QC=10PPB	10.6484		
032	QC=50PPB	48.9815		
033	D.L.	2.1672		
034	9350-FHB X2	0.1814	0.0363	
035	9350-FHB X2+50	48.3320	96.30%	96.31458 %
036	9350-BHB X2	0.0680	0.0136	
037	9350-BHB X2+50	49.3547	98.57%	98.57533 %
038	9350-2 X2	1.2849	0.2570 <.500	
039	9350-5 X2	1.2422	0.2484	
040	9350-5 X2DUP	1.1790	0.2358	
041	9350-9 X2	1.0228	0.2046	
042	9350-9 X2+20	21.6696	103.23%	103.0767 %
043	DIL BLANK	0.0266		
044	QC=10PPB	10.5293		
045	QC=50PPB	49.9715		
[illegible]	9350-11 X2	30.9388	6.1878 6.19	
[illegible]	9350-12 X2	0.6896	0.1379 <.500	
048	9350-13 X2	32.9417	6.5883 6.59	
049	9350-13 X2DUP	33.4406	6.6881 6.69	
050	9350-15 X2	0.7469	0.1494 <.500	
051	9350-15 X2DUP	0.7521	E0.2504 <.500	
052	9350-17 X2	32.0601	6.4120 6.41	

866

a

page 19 of 7

229

053	9350-17 X2+20	54.0586	109.99%	103.8388 %
054	9350-19 X2	0.6824	0.1365 <.500	
[illegible]	9350-19 X2+20	21.6546	104.86%	104.7006 %
[illegible]	DIL BLANK	0.0296		
057	QC=10PPB	10.5071		
058	QC=50PPB	50.1157		
059	9350-21 X2	30.7631	6.1526 6.15	
060	9350-22 X2	29.0236	5.8047 5.80	
061	9350-23 X2	0.1000	0.0200 <.500	
062	9350-24 X2	0.3868	0.0774 <.500	
063	DIL BLANK	0.0169		
064	QC=10PPB	10.5486		
065	QC=50PPB	49.6967		
066	9350-INTA X10	0.0713	0.0713	
067	9350-INTA X10	> 1619.9099	0.0000	
068	9350-INTAB X10	> 1578.5677	0.0000	
069	DIL BLANK	0.5415		
070	QC=10PPB	10.5523		
071	QC=50PPB	49.5183		

ANALYTE:Cd 111

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
029	D.L.	0.4911		
030	DIL BLANK	-1.180E-03		
031	QC=10PPB	9.9764		
032	QC=50PPB	49.3517		
[illegible]	D.L.	0.5945		
[illegible]	9350-FHB X2	0.0408	0.0082	
[illegible]	9350-FHB X2+50	44.6584	89.24%	89.24398 %
036	9350-BHB X2	0.0443	0.0089	
037	9350-BHB X2+50	46.1225	92.16%	92.16335 %
038	9350-2 X2	0.1914	0.0383	
039	9350-5 X2	0.1463	0.0293	
040	9350-5 X2DUP	0.1316	0.0263	
041	9350-9 X2	0.1997	0.0399	
042	9350-9 X2+20	19.1562	94.78%	94.83408 %
043	DIL BLANK	0.0176		
044	QC=10PPB	10.7102		
045	QC=50PPB	49.9791		
046	9350-11 X2	0.4939	0.0988	
047	9350-12 X2	0.1761	0.0352	
048	9350-13 X2	1.1102	0.2220	
049	9350-13 X2DUP	1.1069	0.2214	
050	9350-15 X2	0.2004	0.0401	
051	9350-15 X2DUP	0.1856	0.0371	
052	9350-17 X2	0.6447	0.1289	
053	9350-17 X2+20	19.4668	94.11%	94.29443 %
054	9350-19 X2	0.6776	0.1355	
055	9350-19 X2+20	21.0860	102.04%	101.9751 %
056	DIL BLANK	0.0191		
057	QC=10PPB	11.0278		
058	QC=50PPB	52.3342		
[illegible]	9350-21 X2	0.0966	0.0193	
[illegible]	9350-22 X2	0.0726	0.0145	
061	9350-23 X2	0.1124	0.0225	
062	9350-24 X2	0.0312	0.0062	
063	DIL BLANK	0.0177		
064	QC=10PPB	11.1520		
065	QC=50PPB	52.4445		

867

a

page 20 of 79

2291

066 9350-INTA X10	0.0285	0.0285	
067 9350-INTA X10	1.4022	1.4022	
068 9350-INTAB X10	6.4741	6.4741	
069 DIL BLANK	0.0214		
070 QC=10PPB	10.3661		
071 QC=50PPB	49.3837		

ANALYTE:Cd 111

w/factor

	PPB	PPB X DF X .1	PROTOCOL RECOVERY
029 D.L.	0.5003		
030 DIL BLANK	3.128E-03		
031 QC=10PPB	9.9498		
032 QC=50PPB	49.2594		
033 D.L.	0.5937		
034 9350-FHB X2	5.915E-03	0.0012	
035 9350-FHB X2+50	44.5261	89.04%	89.04166 %
036 9350-BHB X2	0.0205	0.0041	
037 9350-BHB X2+50	46.0407	92.04% <.200	92.04366 %
038 9350-2 X2	0.0480	0.0096 <.~~002~~ * TP 211+199	
039 9350-5 X2	-0.0418	-0.0084	
040 9350-5 X2DUP	-0.0684	-0.0137	
041 9350-9 X2	0.0956	0.0191	
042 9350-9 X2+20	19.0810	94.93%	94.95113 %
043 DIL BLANK	5.858E-03		
044 QC=10PPB	10.7068		
045 QC=50PPB	49.8288		
046 9350-11 X2	0.1982	0.0396 <.200	
047 9350-12 X2	0.0653	0.0131	
048 9350-13 X2	0.8066	0.1613	
049 9350-13 X2DUP	0.7986	0.1597	
050 9350-15 X2	0.1310	0.0262	
051 9350-15 X2DUP	0.1008	0.0202	
052 9350-17 X2	0.3349	0.0670	
053 9350-17 X2+20	19.1702	94.18%	94.27241 %
054 9350-19 X2	0.6446	0.1289	
055 9350-19 X2+20	21.0553	102.05%	101.9894 %
056 DIL BLANK	4.438E-03		
057 QC=10PPB	11.0415		
058 QC=50PPB	52.4360		
059 9350-21 X2	-0.2017	-0.0403	
060 9350-22 X2	-0.2368	-0.0474	
061 9350-23 X2	0.0780	0.0156	
062 9350-24 X2	-0.0243	-0.0049	
063 DIL BLANK	6.919E-03		
064 QC=10PPB	11.1974		
065 QC=50PPB	52.4419		
066 9350-INTA X10	0.0180	0.0180	
067 9350-INTA X10	0.0936	0.0936	
068 9350-INTAB X10	4.8313	4.8313	
069 DIL BLANK	6.327E-03		
070 QC=10PPB	10.3831		
071 QC=50PPB	49.2512		

ANALYTE:Ba 135

	PPB	PPB X DF X .1	PROTOCOL RECOVERY
029 D.L.	2.1673		
030 DIL BLANK	3.718E-03		
031 QC=10PPB	10.9880		

866

a

page 21 of 27

2291

032	QC=50PPB	53.1797		
033	D.L.	2.5042		
034	9350-FHB X2	0.4357	0.0871	
[illegible]	9350-FHB X2+50	51.8548	102.84%	102.8137 %
[illegible]	9350-BHB X2	0.2267	0.0453	
037	9350-BHB X2+50	49.8504	99.25%	99.25079 %
038	9350-2 X2	2.5057	0.5011 .501	
039	9350-5 X2	10.1126	2.0225 2.02	
040	9350-5 X2DUP	10.3298	2.0660 2.07	
041	9350-9 X2	1.1756	0.2351 <.500	
042	9350-9 X2+20	20.6238	97.24%	97.39417 %
043	DIL BLANK	0.1200		
044	QC=10PPB	10.9182		
045	QC=50PPB	53.7866		
046	9350-11 X2	11.0405	2.2081 2.21	
047	9350-12 X2	1.4595	0.2919 <.500	
048	9350-13 X2	12.0381	2.4076 2.41	
049	9350-13 X2DUP	11.9917	2.3983 ~~2.3~~ 2/12/99 2.40	
050	9350-15 X2	1.5454	0.3091 <.500	
051	9350-15 X2DUP	1.5532	0.3106 <.500	
052	9350-17 X2	29.7054	5.9411 5.94	
053	9350-17 X2+20	49.5582	99.26%	99.70386 %
054	9350-19 X2	1.6493	0.3299 <.500	
055	9350-19 X2+20	20.8426	95.97%	96.27378 %
056	DIL BLANK	0.1424		
057	QC=10PPB	10.6912		
058	QC=50PPB	53.7488		
059	9350-21 X2	8.5899	1.7180 1.72	
[illegible]	9350-22 X2	8.7770	1.7554 1.76	
[illegible]	9350-23 X2	0.5055	0.1011 <.500	
062	9350-24 X2	0.4198	0.0840 <.500	
063	DIL BLANK	0.1439		
064	QC=10PPB	10.8196		
065	QC=50PPB	54.4673		
066	9350-INTA X10	0.1551	0.1551	
067	9350-INTA X10	1.3039	1.3039	
068	9350-INTAB X10	1.4020	1.4020	
069	DIL BLANK	0.1400		
070	QC=10PPB	11.2645		
071	QC=50PPB	55.8250		

ANALYTE:Pb 208

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
029	D.L.	2.1348		
030	DIL BLANK	-0.0111		
031	QC=10PPB	11.0424		
032	QC=50PPB	47.8584		
033	D.L.	2.1953		
034	9350-FHB X2	13.5073	2.7015	
035	9350-FHB X2+50	48.8216	70.63%	76.87557 %
036	9350-BHB X2	0.1361	0.0272	
037	9350-BHB X2+50	46.9776	93.68%	93.70015 %
[illegible]	9350-2 X2	21.6427	4.3285 4.33	
[illegible]	9350-5 X2	32.7785	6.5557 6.56	
[illegible]	9350-5 X2DUP	30.8838	6.1768 6.18	
041	9350-9 X2	5.0414	1.0083	
042	9350-9 X2+20	25.3226	101.41% 1.01	101.1229 %
043	DIL BLANK	0.0268	E-30	
044	QC=10PPB	10.9752		

869

a

page 22 of 74

2291

*TP 2/12/99

045	QC=50PPB	51.2275		
046	9350-11 X2	114.9784	22.9957	
047	9350-12 X2	4.4075	0.8815 .882	
048	9350-13 X2	97.1917	19.4383	
049	9350-13 X2DUP	96.7245	19.3449	
050	9350-15 X2	4.7847	0.9569 ~~.960~~ .957	
051	9350-15 X2DUP	4.8829	0.9766 .977	
052	9350-17 X2	132.3755	26.4751	
053	9350-17 X2+20	157.1536	123.89%	103.1357 %
054	9350-19 X2	6.8915	1.3783 1.38	
055	9350-19 X2+20	28.0710	105.90%	104.3861 %
056	DIL BLANK	0.0282		
057	QC=10PPB	11.0735		
058	QC=50PPB	53.0704		
059	9350-21 X2	1.6681	0.3336 <.500	
060	9350-22 X2	3.2110	0.6422 .642	
061	9350-23 X2	0.9235	0.1847 <.500	
062	9350-24 X2	0.3785	0.0757 <.500	
063	DIL BLANK	0.0202		
064	QC=10PPB	11.0496		
065	QC=50PPB	52.1207		
066	9350-INTA X10	0.0391	0.0391	
067	9350-INTA X10	0.2727	0.2727	
068	9350-INTAB X10	0.2596	0.2596	
069	DIL BLANK	0.0244		
070	QC=10PPB	10.8402		
071	QC=50PPB	52.2870		

page 23 of 79

FILE NAME = 9350-b ON DRIVE a:

16:44:14 Feb 12 1999

QUANTITATIVE ANALYSIS: DATA SET SUMMARY

Set: 02-12-99-1

2291

Data Set Description:

JP

	Intensity	Intensity Std Dev	Conc.	Conc. Std Dev	Units	Int Std

****

ANALYTE:Al 27

Total ug

	PPB	PPB X DF X .1		PROTOCOL RECOVERY
076 D.L.	2.1093			
077 D.L.	1.8572			
078 DIL BLANK	0.2632			
079 QC=10PPB	10.2049			
080 QC=50PPB	52.9669			
081 9350-FHB X2	22.0953	4.4191		
082 9350-FHB X2+50	75.0643	105.94%		104.1182 %
083 9350-BHB X2	12.3153	2.4631		
084 9350-BHB X2+50	60.3090	95.99%		96.7804 %
085 9350-1 X100	37.2264	372.2640	372.	
086 9350-2 X100	1.9485	19.4850		
087 9350-3 X100	32.9604	329.6040	330	
088 9350-3 X100DUP	35.0452	350.4520	350	
089 9350-5 X100	2.0649	20.6490		
090 9350-5 X100DUP	1.9387	19.3870		
091 DIL BLANK	-0.1926			
[illegible] QC=10PPB	10.0550			
[illegible] QC=50PPB	52.1777			
094 9350-7 X100	24.6660	246.6600	247.	
095 9350-7 X100+20	43.7817	95.58%		98.02019 %
096 9350-7 X50	44.8830	224.4150	~~224.~~ To 2/12/99	
097 9350-7 X50+20	62.7220	89.20%		96.6694 %
098 9350-9 X100	0.9615	9.6150		
099 9350-9 X100+20	20.0613	95.50%		95.70546 %
100 9350-11 X100	1621.8906	16218.9063	NO IS	
101 9350-11 X50	2952.8201	14764.1006		
102 9350-12 X100	441.3768	4413.7681		
103 9350-13 X100	1397.4650	13974.6504		
104 9350-13 X100DUP	1671.3142	16713.1426		
105 DIL BLANK	-0.0364			
106 QC=10PPB	9.7636			
107 QC=50PPB	51.2222			

Total ug = ppb x FV x dil / 1000

ANALYTE:Zn 66

	PPB	PPB X DF X .1	PROTOCOL RECOVERY
076 D.L.	1.9488		
077 D.L.	1.7148		
078 DIL BLANK	0.6100		
079 QC=10PPB	9.9952		
080 QC=50PPB	49.4424		
[illegible] 9350-FHB X2	1.3056	0.2611	
[illegible] 9350-FHB X2+50	38.9609	75.31%	75.93888 %
083 9350-BHB X2	-0.2050	-0.0410	
084 9350-BHB X2+50	42.0133	84.44%	84.37253 %
085 9350-1 X100	17.8182	178.1820	178
086 9350-2 X100	-0.4345	-4.3450	
087 9350-3 X100	16.3430	163.4300	163

871

page 24 of 79

2291

088	9350-3 X100DUP	18.0338	180.3380 180.	
089	9350-5 X100	-0.3288	-3.2880	
0[illegible]	9350-5 X100DUP	-0.3983	-3.9830	
0[illegible]	DIL BLANK	-0.6931		
0[illegible]	QC=10PPB	9.9777		
093	QC=50PPB	49.5823		
094	9350-7 X100	12.9243	129.2430 129	
095	9350-7 X100+20	31.5907	93.33%	95.94949 %
096	9350-7 X50	24.0049	120.0245	
097	9350-7 X50+20	43.5505	97.73%	98.96738 %
098	9350-9 X100	-0.3437	-3.4370	
099	9350-9 X100+20	20.2020	102.73%	102.7762 %
100	9350-11 X100	3064.1780	30641.7813	
101	9350-11 X50	1.063E+04	53150.0000	
102	9350-12 X100	1.623E+04	%162300.0000	NO IS
103	9350-13 X100	1.008E+04	%100800.0000	
104	9350-13 X100DUP	1.125E+04	%112500.0000	
105	DIL BLANK	-0.6703		
106	QC=10PPB	9.5494		
107	QC=50PPB	50.1438		

ANALYTE:Se 78

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
076	D.L.	2.2539		
077	D.L.	1.9781		
078	DIL BLANK	0.2922		
079	QC=10PPB	10.1410		
[illegible]	QC=50PPB	47.8942		
[illegible]	9350-FHB X2	0.4659	0.0932	
082	9350-FHB X2+50	36.4915	72.05%	72.30923 %
083	9350-BHB X2	0.4871	0.0974	
084	9350-BHB X2+50	41.1877	81.40%	81.58064 %
085	9350-1 X100	35.1056	351.0560 351	
086	9350-2 X100	515.8719	5158.7192 X1000	
087	9350-3 X100	29.9563	299.5630 300.	
088	9350-3 X100DUP	31.7680	317.6800 318	
089	9350-5 X100	530.9620	5309.6201 X1000	
090	9350-5 X100DUP	517.9556	5179.5562	
091	DIL BLANK	0.1964		
092	QC=10PPB	10.4563		
093	QC=50PPB	48.3432		
094	9350-7 X100	21.4091	214.0910 214	
095	9350-7 X100+20	40.6544	96.23%	98.17745 %
096	9350-7 X50	41.7799	208.8995	
097	9350-7 X50+20	60.7758	94.98%	98.37471 %
098	9350-9 X100	601.3099	6013.0991	
099	9350-9 X100+20	618.6862	86.88%	99.57771 %
100	9350-11 X100	3.471E+04	%347100.0000	
101	9350-11 X50	1.480E+05	%740000.0000	
102	9350-12 X100	3.515E+05	%3515000.0000	NO IS
103	9350-13 X100	9.733E+04	%973300.0000	
104	9350-13 X100DUP	1.023E+05	%1023000.0000	
[illegible]	DIL BLANK	-8.751E-03		
[illegible]	QC=10PPB	9.8965		
1[illegible]	QC=50PPB	47.8302		

872

ANALYTE:Se 82

		PPB	PPB X DF X .1	PROTOCOL RECOVERY

076	D.L.	2.1448		
077	D.L.	1.9451		
078	DIL BLANK	0.2149		
079	QC=10PPB	10.3894		
080	QC=50PPB	48.4104		
081	9350-FHB X2	0.8316	0.1663	
082	9350-FHB X2+50	37.4108	73.16%	73.59753 %
083	9350-BHB X2	0.2750	0.0550	
084	9350-BHB X2+50	41.7242	82.90%	82.99194 %
085	9350-1 X100	35.5079	355.0790	
086	9350-2 X100	526.4826	5264.8262	
087	9350-3 X100	30.8203	308.2030	
088	9350-3 X100DUP	31.9802	319.8020	
089	9350-5 X100	544.1051	5441.0513	
090	9350-5 X100DUP	530.5573	5305.5732	
091	DIL BLANK	0.4327		
092	QC=10PPB	10.4452		
093	QC=50PPB	50.3077		
094	9350-7 X100	21.4763	214.7630	
095	9350-7 X100+20	42.1521	103.38%	101.6294 %
096	9350-7 X50	42.3706	211.8530	
097	9350-7 X50+20	61.2285	94.29%	98.16885 %
098	9350-9 X100	612.1454	6121.4541	
099	9350-9 X100+20	632.4688	101.62%	100.0512 %
100	9350-11 X100	3.628E+04	%362800.0000	
101	9350-11 X50	1.537E+05	%768500.0000	NO IS
102	9350-12 X100	3.574E+05	%3574000.0000	
103	9350-13 X100	9.991E+04	%999100.0000	
[illegible]	9350-13 X100DUP	1.069E+05	%1069000.0000	
[illegible]	DIL BLANK	0.0472		
106	QC=10PPB	10.0567		
107	QC=50PPB	48.8505		

ANALYTE:Mo 98

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
076	D.L.	2.1802		
077	D.L.	2.1015		
078	DIL BLANK	0.0333		
079	QC=10PPB	10.3564		
080	QC=50PPB	49.0892		
081	9350-FHB X2	0.2722	0.0544	
082	9350-FHB X2+50	48.5079	96.47%	96.49051 %
083	9350-BHB X2	0.0516	0.0103	
084	9350-BHB X2+50	49.3951	98.69%	98.68835 %
085	9350-1 X100	25.0275	250.2750 250	
086	9350-2 X100	0.0377	0.3770	
087	9350-3 X100	18.8712	188.7120 189	
088	9350-3 X100DUP	19.2269	192.2690 192	
089	9350-5 X100	0.0342	0.3420	
090	9350-5 X100DUP	0.0187	0.1870	
091	DIL BLANK	3.807E-03		
092	QC=10PPB	10.4382		
[illegible]	QC=50PPB	49.7612		
[illegible]	9350-7 X100	9.1373	91.3730	
095	9350-7 X100+20	29.5127	101.88%	101.2884 %
096	9350-7 X50	17.7879	88.9395 88.9	
097	9350-7 X50+20	38.1938	102.03%	101.0741 % 873
098	9350-9 X100	0.0714	0.7140	
099	9350-9 X100+20	20.6471	102.88%	102.8683 %

page 26 of 79

E 2291

100	9350-11 X100	1890.6044	18906.0449
101	9350-11 X50	8325.9600	41629.8008
1[illegible]	9350-12 X100	330.6952	3306.9519
[illegible]	9350-13 X100	6315.8955	63158.9570
104	9350-13 X100DUP	6543.3301	65433.3008
105	DIL BLANK	-1.504E-04	
106	QC=10PPB	10.2214	
107	QC=50PPB	49.9376	

No IS

ANALYTE:Ba 135

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
076	D.L.	2.3493		
077	D.L.	2.2176		
078	DIL BLANK	-3.998E-03		
079	QC=10PPB	11.0239		
080	QC=50PPB	55.1248		
081	9350-FHB X2	0.2793	0.0559	
082	9350-FHB X2+50	50.8307	101.10%	101.0967 %
083	9350-BHB X2	0.0818	0.0164	
084	9350-BHB X2+50	50.8386	101.51%	101.5111 %
085	9350-1 X100	39.5302	395.3020 395	
086	9350-2 X100	0.0458	0.4580	
087	9350-3 X100	41.0667	410.6670 411	
088	9350-3 X100DUP	41.1126	411.1260 411	
089	9350-5 X100	0.2225	2.2250	
090	9350-5 X100DUP	0.1952	1.9520	
091	DIL BLANK	-0.0101		
[illegible]	QC=10PPB	11.1910		
[illegible]	QC=50PPB	54.9366		
094	9350-7 X100	36.1573	361.5730 362	
095	9350-7 X100+20	56.9260	103.84%	101.3688 %
096	9350-7 X50	70.5490	352.7450	
097	9350-7 X50+20	91.1943	103.23%	100.7127 %
098	9350-9 X100	0.0237	0.2370	
099	9350-9 X100+20	20.5887	102.83%	102.8217 %
100	9350-11 X100	1391.6544	13916.5439	
101	9350-11 X50	4781.0024	23905.0137	
102	9350-12 X100	2901.4475	29014.4746	
103	9350-13 X100	3790.9065	37909.0664	
104	9350-13 X100DUP	5775.6533	57756.5313	
105	DIL BLANK	-0.0185		
106	QC=10PPB	10.8718		
107	QC=50PPB	53.7005		

No IS

ANALYTE:Pb 208

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
076	D.L.	2.1869		
077	D.L.	2.1947		
078	DIL BLANK	-0.0513		
079	QC=10PPB	10.7224		
080	QC=50PPB	50.9980		
[illegible]	9350-FHB X2	13.8876	2.7775	
[illegible]	9350-FHB X2+50	49.2869	70.80%	77.14627 %
083	9350-BHB X2	0.0621	0.0124	
084	9350-BHB X2+50	47.9358	95.75%	95.75267 % 874
085	9350-1 X100	> 1128.4038	0.0000	
086	9350-2 X100	0.6411	0.4210	
087	9350-3 X100	> 1168.0581	0.0000	

page 27 of 7

2291

088	9350-3 X100DUP	>	1096.6123	0.0000	
089	9350-5 X100		0.9304	9.3040	
0[illegible]	9350-5 X100DUP		0.6498	6.4980	
[illegible]	DIL BLANK		-0.0432		
092	QC=10PPB		10.5332		
093	QC=50PPB		50.7269		
094	9350-7 X100	>	805.7476	0.0000	
095	9350-7 X100+20	>	918.3518	0.00%	0 %
096	9350-7 X50	>	1137.2418	0.0000	
097	9350-7 X50+20	>	1129.0127	0.00%	0 %
098	9350-9 X100		0.5331	5.3310	
099	9350-9 X100+20		21.3807	104.24%	104.128 %
100	9350-11 X100		8569.8818	85698.8203	
101	9350-11 X50		3.820E+04	%191000.0000	
102	9350-12 X100		3211.1504	32111.5039	
103	9350-13 X100		1.759E+04	%175900.0000	
104	9350-13 X100DUP		2.616E+04	%261600.0000	
105	DIL BLANK		-0.0387		
106	QC=10PPB		10.5651		
107	QC=50PPB		50.4135		

NO IS

875

page 280/79

FILE NAME = 9350-c ON DRIVE a:

13:53:04 Feb 15 1999

QUANTITATIVE ANALYSIS: DATA SET SUMMARY

Data Set: 02-15-99-1

Data Set Description:

E 2291

ANALYTE:Se 78

Total ug

	Intensity	Intensity Std Dev	Conc.	Conc. Std Dev	Units	Int Std	PPB	PPB X DF X .1	PROTOCOL RECOVERY
003 CAL BLANK							0.0000		
005 D.L.							2.1272 ✓		
006 DIL BLANK							0.2077 ✓		
007 QC=10PPB							10.2752 ✓		
008 QC=50PPB							48.8674 ✓		
009 9350-FHB X2							0.6375	0.1275	
010 9350-FHB X2+50							36.6728	72.07%	72.42221 %
011 9350-BHB X2							0.6323	0.1265	
012 9350-BHB X2+50							41.6238	81.98%	82.20799 %
013 9350-1 X500							6.4818	324.0900	
014 9350-1 X100							31.6159	316.1590	
015 9350-2 X1000							50.5916	5059.1602 5060	
016 9350-3 X500							5.6998	284.9900	
017 9350-3 X500DUP							5.8802	294.0100	
018 DIL BLANK							0.1356 ✓		
019 QC=10PPB							9.7945 ✓		
020 QC=50PPB							47.1105 ✓		
021 9350-3 X100							27.7606	277.6060	
022 9350-3 X100DUP							27.0529	270.5290	
023 9350-5 X1000							52.2913 +-8%	5229.1304 5230	
024 9350-5 X1000DUP							61.6652	6166.5200 6170	
025 9350-7 X500							4.0457	202.2850	
026 9350-7 X500+20							22.9852	94.70%	95.58965 %
027 9350-7 X100							19.6232	196.2320	
028 9350-7 X100+20							39.1867	97.82%	98.89837 %
029 9350-9 X100							577.0998	5770.9980	
030 9350-9 X100+20							605.7659	143.33%	101.4514 %
031 DIL BLANK							0.0972 ✓		
032 QC=10PPB							9.9900 ✓		
033 QC=50PPB							47.7329 ✓		
034 9350-11 X100							11.8211	118.2110 118	
035 9350-11 X50							23.2839	116.4195	
036 9350-12 X100							41.1330	411.3300 411	
037 9350-13 X100							10.1332	101.3320 101	
038 9350-13 X100DUP							10.2207	102.2070 102	
039 9350-13 X50							20.4928	102.4640	
040 9350-13 X50DUP							20.3567	101.7835	
041 9350-15 X100							62.2181	622.1810 622	
042 9350-15 X100DUP							64.3422	643.4221 643	
043 DIL BLANK							0.1305 ✓		
044 QC=10PPB							9.8879 ✓		
045 QC=50PPB							47.4896 ✓		
046 9350-17 X100							12.8436	128.4360 128	
047 9350-17 X100+20							33.7430	104.50%	102.7384 %
048 9350-17 X50							25.7703	128.8515	
049 9350-17 X50+20							45.2567	97.43%	98.87788 % 876
050 9350-19 X100							68.1610	681.6170 682	
051 9350-19 X100+20							87.6250	97.32%	99.39201 %

Total ug = ppb x FV x d.f. / 1

052	DIL BLANK	0.2010		
053	QC=10PPB	9.4124		
054	QC=50PPB	48.0497		
055	9350-1 X2500	1.4473	361.8250	
056	9350-3 X2500	1.1930	298.2500	
057	9350-3 X2500DUP	1.2818	320.4500	
058	9350-7 X2500	1.0028	250.7000	
059	9350-7 X2500+20	20.6715	98.34%	98.42259 %
060	9350-9 X2000	27.8478	5569.5601	
061	9350-9 X2000+20	51.0882	116.20%	106.7723 %
062	DIL BLANK	0.1126		
063	QC=10PPB	9.9427		
064	QC=50PPB	49.0893		

ANALYTE:Se 82

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
003	CAL BLANK	0.0000		
005	D.L.	2.1504		
006	DIL BLANK	0.1637		
007	QC=10PPB	10.0613		
008	QC=50PPB	49.0987		
009	9350-FHB X2	0.5651	0.1130	
010	9350-FHB X2+50	36.4628	71.80%	72.1106 %
011	9350-BHB X2	0.3985	0.0797	
012	9350-BHB X2+50	41.4601	82.12%	82.26455 %
013	9350-1 X500	6.7750	338.7500	
014	9350-1 X100	31.6585	316.5850	
015	9350-2 X1000	50.3071	5030.7104	
016	9350-3 X500	5.4937	274.6850	
017	9350-3 X500DUP	5.7107	285.5350	
018	DIL BLANK	0.0926		
019	QC=10PPB	9.8803		
020	QC=50PPB	46.9937		
021	9350-3 X100	27.2712	272.7120	
022	9350-3 X100DUP	27.2578	272.5780	
023	9350-5 X1000	51.7649	5176.4897	
024	9350-5 X1000DUP	61.0365	6103.6499	
025	9350-7 X500	3.9600	198.0000	
026	9350-7 X500+20	22.3378	91.89%	93.22955 %
027	9350-7 X100	19.2979	192.9790	
028	9350-7 X100+20	38.6574	96.80%	98.37014 %
029	9350-9 X100	578.1287	5781.2871	
030	9350-9 X100+20	607.3269	145.99%	101.5378 %
031	DIL BLANK	0.0689		
032	QC=10PPB	9.7984		
033	QC=50PPB	47.8178		
034	9350-11 X100	11.3941	113.9410	
035	9350-11 X50	23.1888	115.9440	
036	9350-12 X100	40.4799	404.7990	
037	9350-13 X100	10.1355	101.3550	
038	9350-13 X100DUP	10.0999	100.9990	
039	9350-13 X50	20.6783	103.3915	
040	9350-13 X50DUP	20.2546	101.2730	
041	9350-15 X100	61.3336	613.3360	
042	9350-15 X100DUP	63.4021	634.0210	
043	DIL BLANK	0.1399		
044	QC=10PPB	9.5068		
045	QC=50PPB	46.7942		
046	9350-17 X100	12.5554	125.5540	

877

page 29 r

2291

047	9350-17 X100-20	33.4126	104.29%	102.633 %
048	9350-17 X50	25.7727	128.8635	
049	9350-17 X50+20	45.4522	98.40%	99.2998 %
050	9350-19 X100	67.8286	678.2860	
051	9350-19 X100-20	89.1985	106.85%	101.5597 %
052	DIL BLANK	0.2193		
053	QC=10PPB	9.5293		
054	QC=50PPB	47.5727		
055	9350-1 X2500	1.3986	324.6500	
056	9350-3 X2500	1.0770	269.2500	
057	9350-3 X2500DUP	1.0703	267.5750	
058	9350-7 X2500	0.8984	224.6000	
059	9350-7 X2500-20	20.7887	99.30%	99.33153 %
060	9350-9 X2000	27.2716	5454.3198	
061	9350-9 X2000-20	50.4329	115.81%	106.6878 %
062	DIL BLANK	0.1336		
063	QC=10PPB	10.1712		
064	QC=50PPB	48.2558		

ANALYTE:Pb 208

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
073	CAL BLANK	0.0000		
105	D.I.	0.1385		
106	DIL BLANK	0.0109		
107	QC=10PPB	10.3499		
108	QC=50PPB	49.9455		
009	9350-FHB X2	14.2011	2.8402	
110	9350-FHB X2+50	48.7959	69.19%	76.00477 %
[illegible]	9350-BHB X2	0.1971	0.0394	
[illegible]	9350-BHB X2-50	46.1510	95.91%	95.92387 %
013	9350-1 X500	244.5486	12227.4297	
014	9350-1 X100	> 1456.3678	0.0000	
015	9350-2 X1000	0.5269	52.6900	
016	9350-3 X500	214.6472	10732.3604	
017	9350-3 X500DUP	220.8343	11041.7148	
018	DIL BLANK	0.0682		
019	QC=10PPB	10.2263		
020	QC=50PPB	49.3895		
021	9350-3 X100	> 1426.7550	0.0000	
022	9350-3 X100DUP	> 1385.1508	0.0000	
023	9350-5 X1000	0.2331	23.3100	
024	9350-5 X1000DUP	0.2104	21.0400	
025	9350-7 X500	136.4972	6824.8604	
026	9350-7 X500-20	158.5358	110.19%	101.3026 %
027	9350-7 X100	> 942.6727	0.0000	
028	9350-7 X100+20	> 792.1569	0.00%	0 %
029	9350-9 X100	0.2895	2.8950	
030	9350-9 X100+20	20.0426	98.77%	98.78311 %
031	DIL BLANK	9.685E-03		
032	QC=10PPB	10.2720		
033	QC=50PPB	49.0602		
034	9350-11 X100	2.5658	25.6580	
035	9350-11 X50	5.1746	25.8730 ~~25.8~~ 25.9	*TP 2/16/99
[illegible]	9350-12 X100	0.5678	5.6780	
[illegible]	9350-13 X100	2.2408	22.4080	
[illegible]	9350-13 X100DUP	2.1365	21.3650	
039	9350-13 X50	4.2453	21.2265 21.2	
040	9350-13 X50DUP	4.3628	21.8140 21.8	
041	9350-15 X100	0.2449	2.4490	

878

page 24 of 79

2291

042	9350-15 X100DUP	0.3200	3.2000	
043	DIL BLANK	4.660E-03		
044	QC=10PPB	10.2963		
045	QC=50PPB	49.5530		
046	9350-17 X100	2.9731	29.7310	
047	9350-17 X100+20	23.3521	101.89%	101.6498 %
048	9350-17 X50	6.0192	30.0960 30.1	
049	9350-17 X50+20	26.8055	103.93%	103.022 %
050	9350-19 X100	0.2643	2.6430	
051	9350-19 X100+20	20.5439	101.40%	101.3798 %
052	DIL BLANK	3.935E-03		
053	QC=10PPB	10.3074		
054	QC=50PPB	49.6766		
055	9350-1 X2500	52.2861	13071.5254 13100	
056	9350-3 X2500	45.6615	11415.3750 11400	
057	9350-3 X2500DUP	45.5667	11391.6748 11400	
058	9350-7 X2500	28.2959	7073.9751 7070	
059	9350-7 X2500+20	47.7163	97.10%	98.7999 %
060	9350-9 X2000	0.0423	8.4600	
061	9350-9 X2000+20	20.5107	102.34%	102.3371 %
062	DIL BLANK	9.548E-03		
063	QC=10PPB	10.2204		
064	QC=50PPB	49.3536		

879

page 32 of 79

FILE NAME = 9350-d ON DRIVE a:

19:13:46 Feb 15 1999

TP 3/4 st

QUANTITATIVE ANALYSIS: DATA SET SUMMARY

2291

Data Set: 02-15-99-1

Data Set Description:

ANALYTE:Li 6

Total ug

Total ug = ppb x FV x d.1 / 1000

		Intensity	Intensity Std Dev	Conc.	Conc. Std Dev Units	Int Std	PPB	PPB X DF X .1	PROTOCOL RECOVERY
088	D.L.						108.3822		
089	DIL BLANK						7.2099		
090	QC=10PPB						-16.1212		
091	QC=50PPB						63.6059		
092	D.L.						61.0393		
094	9350-FHB X2						175.2399	35.0480	
095	9350-FHB X2+50						66.2446	-217.99%	29.41069 %
096	9350-BHB X2						46.7675	9.3535	
097	9350-BHB X2+50						-26.1012	-145.74%	-26.9731 %
098	9350-1 X20						-346.9768	-693.9536	
099	9350-1 X2						>-1439.2092	0.0000	
100	9350-2 X5						300.1522	150.0761	
101	9350-2 X2						359.2547	71.8509	
102	9350-3 X20						-366.8072	-733.6144	
103	9350-3 X20DUP						-388.8863	-777.7726	
104	DIL BLANK						-472.3745		
1[illegible]	QC=10PPB						40.2004		
1[illegible]	QC=50PPB						-281.8515		
107	9350-3 X2						> 5259.7163	0.0000	
108	9350-3 X2DUP						> 4517.7314	0.0000	
109	9350-5 X5						230.4860	115.2430	
110	9350-5 X5DUP						510.1002	255.0501	
111	9350-5 X2						559.9199	111.9840	
112	9350-5 X2DUP						584.4549	116.8910	
113	9350-7 X20						-395.8012	-791.6024	
114	9350-7 X20+20						-478.4736	-413.36%	127.3209 %
115	9350-7 X5						>-7764.4810	0.0000	
116	9350-7 X5+20						>-1.632E+04	0.00%	0 %
117	DIL BLANK						-12.1700		
118	QC=10PPB						-224.8453		
119	QC=50PPB						-586.3713		
120	9350-7 X2						>-6611.8911	0.0000	
121	9350-7 X2+20						>-8503.7988	0.00%	0 %
122	9350-9 X5						20.4748	10.2374	
123	9350-9 X5+20						-50.8979	-356.86%	-125.7521 %
124	9350-9 X2						35.1574	7.0315	
125	9350-9 X2+20						-45.2711	-402.14%	-82.0762 %
126	9350-11 X20						-3325.6042	-6651.2085	
127	9350-11 X2						307.0481	61.4096	
128	9350-12 X10						-3328.6389	-3328.6392	
129	9350-12 X5						-3328.3628	-1664.1815	
1[illegible]	DIL BLANK						-537.5558		
1[illegible]	QC=10PPB						-475.1260		
132	QC=50PPB						-201.5850		
133	9350-12 X2						-18.8608	-3.7722	
134	9350-13 X5						-3329.9104	-1664.9553	
135	9350-13 X5DUP						-3331.5105	-1665.7552	
136	9350-13 X2						-166.0548	-33.2110	

880

2291

137	9350-13 X2DUP	-99.0146	-19.8029	
138	9350-15 X10	-3329.0132	-3329.0134	
13[illegible]	9350-15 X10DUP	-3327.5894	-3327.5896	
1[illegible]	350-15 X2	-59.3341	-11.8668	
141	9350-15 X2DUP	41.0806	8.2161	
142	DIL BLANK	-174.7060		
143	QC=10PPB	-222.4294		
144	QC=50PPB	-96.4272		
145	9350-17 X5	-3329.8005	-1664.9003	
146	9350-17 X5+20	-3363.4412	-168.20%	101.6207 %
147	9350-17 X2	418.7842	83.7568	
148	9350-17 X2+20	209.8555	-1044.64%	47.82658 %
149	9350-19 X5	-3329.0278	-1664.5139	
150	9350-19 X5+20	-3375.5129	-232.43%	102.0092 %
151	9350-19 X2	336.0295	67.2059	
152	9350-19 X2+20	294.7351	-206.47%	82.7839 %
153	9350-21 X20	-20.8640	-41.7280	
154	9350-21 X2	433.7770	86.7554	
155	DIL BLANK	-130.2251		
156	QC=10PPB	-29.4894		
157	QC=50PPB	-167.2020		
158	9350-22 X20	82.0991	164.1982	
159	9350-22 X2	295.9077	59.1815	
160	9350-23 X2	148.8470	29.7694	
161	9350-24 X2	-39.8871	-7.9774	
162	DIL BLANK	-204.0901		
163	QC=10PPB	-475.1449		
164	QC=50PPB	-649.6224		
[illegible]	INTA X10	-986.5504	-986.5504	
1[illegible]	INTAB X10	-759.2961	-759.2961	
167	DIL BLANK	-835.3280		
168	QC=10PPB	-661.0226		
169	QC=50PPB	-687.0053		

ANALYTE:Li 7

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
088	D.L.	2.2263		
089	DIL BLANK	0.0237		
090	QC=10PPB	10.3709		
091	QC=50PPB	49.9631		
092	D.L.	2.2947		
094	9350-FHB X2	0.0743	0.0149	
095	9350-FHB X2+50	55.9141	111.68%	111.6623 %
096	9350-BHB X2	0.0752	0.0150	
097	9350-BHB X2+50	54.1313	108.11%	108.1 %
098	9350-1 X20	196.7857	393.5714	
099	9350-1 X2	> 1591.0486	0.0000	
100	9350-2 X5	0.4417	0.2208	
101	9350-2 X2	0.7976	0.1595	
102	9350-3 X20	242.2734	484.5468	
103	9350-3 X20DUP	245.9430	491.8860	
104	DIL BLANK	0.1996		
[illegible]	QC=10PPB	10.6643		
[illegible]	QC=50PPB	50.7260		
107	9350-3 X2	> 1541.1293	0.0000	
108	9350-3 X2DUP	> 1558.5999	0.0000	
109	9350-5 X5	1.9980	0.9990	
110	9350-5 X5DUP	1.8457	0.9229	
111	9350-5 X2	4.1337	0.8267	

881

229 T page 34 of 79

112	9350-5 X2DUP		4.1142	0.8228	
113	9350-7 X20		118.6799	237.3598	
114	9350-7 X20+20		137.6770	94.99%	99.27683 %
1[illegible]	9350-7 X5	>	923.6664	0.0000	
1[illegible]	9350-7 X5+20		468.7186	2343.59%	2343.593 %
117	DIL BLANK		0.4141		
118	QC=10PPB		10.8015		
119	QC=50PPB		47.8797		
120	9350-7 X2	>	1446.1724	0.0000	
121	9350-7 X2+20	>	1567.7855	0.00%	0 %
122	9350-9 X5		0.4270	0.2135	
123	9350-9 X5+20		20.0304	98.02%	98.05845 %
124	9350-9 X2		0.4841	0.0968	
125	9350-9 X2+20		20.0742	97.95%	97.99893 %
126	9350-11 X20		2411.1179	4822.2358	
127	9350-11 X2		2.2182	0.4436	
128	9350-12 X10		2726.5723	2726.5723	
129	9350-12 X5		3636.2476	1818.1239	
130	DIL BLANK		0.1924		
131	QC=10PPB		9.9173		
132	QC=50PPB		49.0322		
133	9350-12 X2		0.2775	0.0555	
134	9350-13 X5		5838.9321	2919.4661	
135	9350-13 X5DUP		7387.3970	3693.6985	
136	9350-13 X2		3.2632	0.6526	
137	9350-13 X2DUP		3.2154	0.6431	
138	9350-15 X10		3406.6194	3406.6196	
139	9350-15 X10DUP		4302.6655	4302.6655	
1[illegible]	9350-15 X2		0.2749	0.0550	
1[illegible]	9350-15 X2DUP		0.3016	0.0603	
142	DIL BLANK		0.1614		
143	QC=10PPB		10.1880		
144	QC=50PPB		48.7434		
145	9350-17 X5		5259.8799	2629.9402	
146	9350-17 X5+20		8.393E+04	393350.59%	1589.619 %
147	9350-17 X2		3.1899	0.6380	
148	9350-17 X2+20		23.7745	102.92%	102.5209 %
149	9350-19 X5		2720.4929	1360.2465	
150	9350-19 X5+20		8.949E+04	433847.53%	3265.471 %
151	9350-19 X2		0.2865	0.0573	
152	9350-19 X2+20		19.4808	95.97%	96.0284 %
153	9350-21 X20		0.1536	0.3072	
154	9350-21 X2		0.2930	0.0586	
155	DIL BLANK		0.1653		
156	QC=10PPB		10.2668		
157	QC=50PPB		48.6913		
158	9350-22 X20		0.1913	0.3826	
159	9350-22 X2		0.4389	0.0878	
160	9350-23 X2		0.1862	0.0372	
161	9350-24 X2		0.0801	0.0160	
162	DIL BLANK		0.1027		
163	QC=10PPB		9.7679		
164	QC=50PPB		46.8223		
165	INTA X10		0.7156	0.7156	
[illegible]	INTAB X10		0.6429	0.6429	
1[illegible]	DIL BLANK		0.0749		
168	QC=10PPB		9.9190		
169	QC=50PPB		48.0079		

ANALYTE:V 51

882

page 3507.7.

2291

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
088	D.L.	2.0801		
[illegible]	DIL BLANK	1.0842		
[illegible]	QC=10PPB	10.9433		
091	QC=50PPB	50.2929		
092	D.L.	1.4238		
094	9350-FHB X2	0.2510	0.0502	
095	9350-FHB X2+50	45.6907	90.88%	90.92496 %
096	9350-BHB X2	-0.3257	-0.0651	
097	9350-BHB X2+50	46.5581	93.77%	93.72674 %
098	9350-1 X20	1.3421	2.6842	
099	9350-1 X2	16.6747	3.3349	
100	9350-2 X5	-2.5378	-1.2689	
101	9350-2 X2	-5.2915	-1.0583	
102	9350-3 X20	1.6823	3.3646	
103	9350-3 X20DUP	2.8454	5.6908	
104	DIL BLANK	3.0623		
105	QC=10PPB	> 202.7605		
106	QC=50PPB	50.2417		
107	9350-3 X2	18.1303	3.6262	
108	9350-3 X2DUP	18.4789	3.6958	
109	9350-5 X5	-3.6626	-1.8313	
110	9350-5 X5DUP	-3.9770	-1.9885	
111	9350-5 X2	-6.6960	-1.3392	
112	9350-5 X2DUP	-7.0402	-1.4080	
113	9350-7 X20	0.9426	1.8852	
114	9350-7 X20+20	20.9776	100.18%	100.1671 %
[illegible]	9350-7 X5	3.5619	1.7809	
[illegible]	9350-7 X5+20	25.5580	109.98%	108.4717 %
117	DIL BLANK	-0.4683		
118	QC=10PPB	9.5493		
119	QC=50PPB	47.4661		
120	9350-7 X2	13.7437	2.7487	
121	9350-7 X2+20	33.7051	99.81%	99.88561 %
122	9350-9 X5	-3.9722	-1.9861	
123	9350-9 X5+20	15.9951	99.84%	99.79598 %
124	9350-9 X2	-4.7706	-0.9541	
125	9350-9 X2+20	14.1270	94.49%	92.76137 %
126	9350-11 X20	8.069E+04	%161380.0000	
127	9350-11 X2	-6.1066	-1.2213	
128	9350-12 X10	1.268E+05	%126800.0000	
129	9350-12 X5	1.411E+05	70550.0000	
130	DIL BLANK	0.6677		
131	QC=10PPB	10.0612		
132	QC=50PPB	47.4979		
133	9350-12 X2	-5.4137	-1.0827	
134	9350-13 X5	7.323E+04	36615.0000	
135	9350-13 X5DUP	9.165E+04	45825.0000	
136	9350-13 X2	-4.9959	-0.9992	
137	9350-13 X2DUP	-5.5699	-1.1140	
138	9350-15 X10	1.566E+05	%156600.0000	
139	9350-15 X10DUP	1.987E+05	%198700.0000	
140	9350-15 X2	-7.6375	-1.5275	
[illegible]	9350-15 X2DUP	-8.4202	-1.6840	
[illegible]	DIL BLANK	-2.0361		
143	QC=10PPB	8.2157		
144	QC=50PPB	46.2201		
145	9350-17 X5	5.869E+04	29345.0000	
146	9350-17 X5+20	1.467E+05	440050.00%	249.8723 %

883

147	9350-17 X2		-7.7597	-1.5519	
148	9350-17 X2+20		11.9075	98.34%	97.28111 %
[illegible]	9350-19 X5		1.099E+05	54950.0000	
[illegible]	9350-19 X5+20		1.615E+05	258000.00%	146.925 %
[illegible]	9350-19 X2		-8.3392	-1.6678	
152	9350-19 X2+20		10.5414	94.40%	90.40031 %
153	9350-21 X20		-4.8028	-9.6056	
154	9350-21 X2		-10.1288	-2.0258	
155	DIL BLANK		-4.0886		
156	QC=10PPB		6.0611		
157	QC=50PPB		44.0838		
158	9350-22 X20		-4.4521	-8.9042	
159	9350-22 X2		-9.9503	-1.9901	
160	9350-23 X2		-10.4132	-2.0826	
161	9350-24 X2		-8.3708	-1.6742	
162	DIL BLANK		-4.0656		
163	QC=10PPB		7.1649		
164	QC=50PPB		45.4369		
165	INTA X10		6.1008	6.1008	
166	INTAB X10		28.0779	28.0779	
167	DIL BLANK		3.9149		
168	QC=10PPB		13.6270		
169	QC=50PPB		50.8121		

ANALYTE:V 51

w/factor			PPB	PPB X DF X .1	PROTOCOL RECOVERY
088	D.L.		2.0560		
[illegible]	DIL BLANK		0.3146		
[illegible]	QC=10PPB		10.6477		
091	QC=50PPB		49.8687		
092	D.L.		1.9932		
094	9350-FHB X2		0.1984	0.0397	
095	9350-FHB X2+50		49.1321	97.87%	97.87582 %
096	9350-BHB X2		0.4745	0.0949	
097	9350-BHB X2+50		49.4295	97.91%	97.92965 %
098	9350-1 X20		2.0657	4.1314	
099	9350-1 X2	>	20.4492	0.0000	
100	9350-2 X5		-0.0876	-0.0438	
101	9350-2 X2		-0.2108	-0.0422	
102	9350-3 X20		1.7509	3.5018	
103	9350-3 X20DUP		2.1023	4.2046	
104	DIL BLANK		-0.1946		
105	QC=10PPB	>	201.5883	glitch	
106	QC=50PPB		49.1547		
107	9350-3 X2	>	58.6614	0.0000	
108	9350-3 X2DUP	>	61.4532	0.0000	
109	9350-5 X5		-0.0301	-0.0151	
110	9350-5 X5DUP		-0.2592	-0.1296	
111	9350-5 X2		-0.2918	-0.0584	
112	9350-5 X2DUP		-0.3583	-0.0717	
113	9350-7 X20		1.8209	3.6418	
114	9350-7 X20+20		22.0342	101.07%	100.9775 %
[illegible]	9350-7 X5		5.4240	2.7120	
[illegible]	9350-7 X5+20		25.1190	98.47%	98.80035 %
[illegible]	DIL BLANK		-0.3266		
118	QC=10PPB		9.7277		
119	QC=50PPB		47.9539		
120	9350-7 X2	>	53.2586	0.0000	
121	9350-7 X2+20	>	120.2594	0.00%	0 %

884

V -Iodator cont.

122	9350-9 X5	0.0926	0.0463		
123	9350-9 X5+20	19.3169	96.12%		96.13938 %
12[illegible]	9350-9 X2	0.1711	0.0342		
1[illegible]	9350-9 X2+20	18.9300	93.79%		93.84714 %
126	9350-11 X20	7088.3701	14176.7412	NO IS	
127	9350-11 X2	0.1115	0.0223	<.500	
128	9350-12 X10	8075.7627	8075.7627	NO IS	
129	9350-12 X5	1.015E+04	5075.0000		
130	DIL BLANK	-0.0345			
131	QC=10PPB	10.4266			
132	QC=50PPB	48.2302			
133	9350-12 X2	-0.2306	-0.0461	<.500	
134	9350-13 X5	6880.8438	3440.4219	NO IS	
135	9350-13 X5DUP	7561.0972	3780.5486		
136	9350-13 X2	0.1178	0.0236	<.500	
137	9350-13 X2DUP	0.4630	0.0926	<.500	
138	9350-15 X10	9173.9619	9173.9619	NO IS	
139	9350-15 X10DUP	1.374E+04	13740.0000		
140	9350-15 X2	0.0122	0.0024	<.500	
141	9350-15 X2DUP	-0.5264	-0.1053	<.500	
142	DIL BLANK	8.187E-03			
143	QC=10PPB	10.7000			
144	QC=50PPB	49.1620			
145	9350-17 X5	2481.6904	1240.8452	NO IS	
146	9350-17 X5+20	8.338E+04	404491.56%		3332.946 %
147	9350-17 X2	-0.2495	-0.0499	<.500	
148	9350-17 X2+20	19.9753	101.12%		101.1382 %
149	9350-19 X5	4870.0615	2435.0308	NO IS	
1[illegible]	9350-19 X5+20	9.313E+04	441299.69%		1904.475 %
1[illegible]	9350-19 X2	-0.2844	-0.0569	<.500	
152	9350-19 X2+20	18.6863	94.85%		94.77926 %
153	9350-21 X20	-0.1215	-0.2430		
154	9350-21 X2	-0.0645	-0.0129	<.500	
155	DIL BLANK	-0.1727			
156	QC=10PPB	9.9871			
157	QC=50PPB	48.5476			
158	9350-22 X20	-0.7193	-1.4386		
159	9350-22 X2	-0.1668	-0.0334	<.500	
160	9350-23 X2	-0.1341	-0.0268	<.500	
161	9350-24 X2	-0.3642	-0.0728	<.500	
162	DIL BLANK	-0.2951			
163	QC=10PPB	10.4073			
164	QC=50PPB	48.8021			
165	INTA X10	-0.6858	-0.6858		
166	INTAB X10	22.9820	22.9820		
167	DIL BLANK	0.5992			
168	QC=10PPB	10.3393			
169	QC=50PPB	48.9146			

ANALYTE:Cr 52

		PPB	PPB X DF X .1		PROTOCOL RECOVERY
088	D.L.	2.2202			
0[illegible]	DIL BLANK	-6.111E-03			
[illegible]	QC=10PPB	10.1598			
091	QC=50PPB	49.2550			
092	D.L.	2.0740			
094	9350-FHB X2	2.4465	0.4893		
095	9350-FHB X2+50	50.1598	95.63%		95.63994 %
096	9350-BHB X2	0.6459	0.1292		

E 2291

685

Cr cont.

page 38 of 79

2291

097	9350-BHB X2+50		49.9633	98.63%	98.65221 %
098	9350-1 X20		50.8823	101.7646 102	
0[illegible]	9350-1 X2	>	438.0973	0.0000	
1[illegible]	9350-2 X5		3.4927	1.7463	
101	9350-2 X2		8.8259	1.7652 1.77	
102	9350-3 X20		36.1893	72.3786 72.4	
103	9350-3 X20DUP		36.5938	73.1876 73.2	
104	DIL BLANK		0.0788		
105	QC=10PPB		9.9045		
106	QC=50PPB		47.8432		
107	9350-3 X2	>	424.3170	0.0000	
108	9350-3 X2DUP	>	429.1397	0.0000	
109	9350-5 X5		3.1703	1.5852	
110	9350-5 X5DUP		3.3128	1.6564	
111	9350-5 X2		8.4919	1.6984 1.70	
112	9350-5 X2DUP		8.7750	1.7550 1.76	
113	9350-7 X20		18.5039	37.0078 37.0	
114	9350-7 X20+20		37.1972	93.47%	96.60632 %
115	9350-7 X5		70.8422	35.4211	
116	9350-7 X5+20		89.3568	92.57%	98.36485 %
117	DIL BLANK		-0.1365		
118	QC=10PPB		9.8809		
119	QC=50PPB		45.8969		
120	9350-7 X2	>	281.9616	0.0000	
121	9350-7 X2+20		176.5157	882.58%	882.5785 %
122	9350-9 X5		2.8566	1.4283	
123	9350-9 X5+20		22.0471	95.95%	96.45835 %
124	9350-9 X2		7.4696	1.4939 1.49	
1[illegible]	9350-9 X2+20		26.3219	94.26%	95.82192 %
1[illegible]	9350-11 X20		6467.0063	12934.0127 No IS	
127	9350-11 X2		5.3748	1.0750 1.08	
128	9350-12 X10		1.696E+04	16960.0000 No IS	
129	9350-12 X5		3.230E+04	16150.0000	
130	DIL BLANK		-0.1884		
131	QC=10PPB		9.6504		
132	QC=50PPB		47.3187		
133	9350-12 X2		7.5065	1.5013 1.50	
134	9350-13 X5		1.380E+04	6900.0000 No IS	
135	9350-13 X5DUP		1.451E+04	7255.0000	
136	9350-13 X2		5.0173	1.0035 1.00	
137	9350-13 X2DUP		4.9864	0.9973 .997	
138	9350-15 X10		2.332E+04	23320.0000 No IS	
139	9350-15 X10DUP		2.869E+04	28690.0000	
140	9350-15 X2		7.4538	1.4908 1.49	
141	9350-15 X2DUP		7.6323	1.5265 1.53	
142	DIL BLANK		0.0178		
143	QC=10PPB		9.9458		
144	QC=50PPB		48.1232		
145	9350-17 X5		1.401E+04	7005.0000 No IS	
146	9350-17 X5+20		9.292E+04	394550.00%	662.2951 %
147	9350-17 X2		7.4780	1.4956 1.50	
148	9350-17 X2+20		26.8958	97.09%	97.88121 %
149	9350-19 X5		3.120E+04	15600.0000 No IS	
1[illegible]	9350-19 X5+20		1.082E+05	385000.00%	346.5727 %
[illegible]	9350-19 X2		7.9266	1.5853 1.59	
152	9350-19 X2+20		27.1679	96.21%	97.28323 %
153	9350-21 X20		0.0318	0.0636	
154	9350-21 X2		3.9994	0.7999 .800	
155	DIL BLANK		-0.1837	E-17	
156	QC=10PPB		9.8919		

886

Cr. cont.

page 39 of 79

2291

157	QC=50PPB	47.7347		
158	9350-22 X20	0.1273	0.2546	
[illegible]	9350-22 X2	4.8809	0.9762	.976
[illegible]	9350-23 X2	0.5492	0.1098	<.500
161	9350-24 X2	4.4343	0.8869	.887
162	DIL BLANK	-0.1534		
163	QC=10PPB	9.7462		
164	QC=50PPB	46.9692		
165	INTA X10	1.2955	1.2955	
166	INTAB X10	12.0565	12.0565	
167	DIL BLANK	0.9513		
168	QC=10PPB	111%11.1428		
169	QC=50PPB	49.3606		

ANALYTE:Ni 60

		PPB	PPB X DF X .1		PROTOCOL RECOVERY
088	D.L.	2.1842			
089	DIL BLANK	-0.0312			
090	QC=10PPB	9.9829			
091	QC=50PPB	48.9111			
092	D.L.	2.0916			
094	9350-FHB X2	1.4688	0.2938		
095	9350-FHB X2+50	49.8730	96.81%		96.89948 %
096	9350-BHB X2	0.5355	0.1071		
097	9350-BHB X2+50	51.7052	102.34%		102.3146 %
098	9350-1 X20	22.7939	45.5878	45.6	
099	9350-1 X2	189.7822	37.9564		
[illegible]	9350-2 X5	1.7516	0.8758		
[illegible]	9350-2 X2	4.2497	0.8499	.850	
102	9350-3 X20	15.2844	30.5688	30.6	
103	9350-3 X20DUP	15.4878	30.9756	31.0	
104	DIL BLANK	-7.427E-04			
105	QC=10PPB	9.6599			
106	QC=50PPB	48.7935			
107	9350-3 X2	129.5910	25.9182		
108	9350-3 X2DUP	129.4319	25.8864		
109	9350-5 X5	1.5447	0.7724		
110	9350-5 X5DUP	1.6547	0.8274		
111	9350-5 X2	4.0396	0.8079	.808	
112	9350-5 X2DUP	4.0247	0.8049	.805	
113	9350-7 X20	6.2389	12.4778		
114	9350-7 X20+20	25.3593	95.60%		96.64773 %
115	9350-7 X5	24.6951	12.3476	12.3	
116	9350-7 X5+20	44.0572	96.81%		98.57277 %
117	DIL BLANK	0.0205			
118	QC=10PPB	9.7115			
119	QC=50PPB	46.1329			
120	9350-7 X2	57.9729	11.5946		
121	9350-7 X2+20	75.1026	85.65%		96.31885 %
122	9350-9 X5	1.7049	0.8525		
123	9350-9 X5+20	20.7423	95.19%		95.56506 %
124	9350-9 X2	4.2001	0.8400	.840	
[illegible]	9350-9 X2+20	22.8771	93.39%		94.53308 %
[illegible]	9350-11 X20	2622.3433	5244.6870	NO IS	
127	9350-11 X2	5.5637	1.1127	1.11	
128	9350-12 X10	8203.6846	8203.6846	NO IS	
129	9350-12 X5	1.908E+04	9540.0000		
130	DIL BLANK	-1.225E-03	E-48		
131	QC=10PPB	9.5075			

887

Ni 60

page 40 of 79

229 i

132	QC=50PPB	47.9766		
133	9350-12 X2	5.6324	1.1265	1.13
134	9350-13 X5	6.996E+04	34980.0000	>No IS
135	9350-13 X5DUP	8.908E+04	44540.0000	
136	9350-13 X2	46.6917	9.3383	9.34
137	9350-13 X2DUP	47.4029	9.4806	9.48
138	9350-15 X10	7723.5874	7723.5874	>NO IS
139	9350-15 X10DUP	9323.9971	9323.9971	
140	9350-15 X2	3.5651	0.7130	.713
141	9350-15 X2DUP	3.5168	0.7034	.703
142	DIL BLANK	0.2100		
143	QC=10PPB	9.8931		
144	QC=50PPB	48.5307		
145	9350-17 X5	7017.3950	3508.6978	>NO IS
146	9350-17 X5+20	8.127E+04	371263.03%	1154.831 %
147	9350-17 X2	4.8360	0.9672	.967
148	9350-17 X2+20	25.9544	105.59%	104.5031 %
149	9350-19 X5	1.522E+04	7610.0000	>NO IS
150	9350-19 X5+20	9.489E+04	398350.00%	622.6378 %
151	9350-19 X2	4.8643	0.9729	.973
152	9350-19 X2+20	23.1492	91.42%	93.10216 %
153	9350-21 X20	0.2662	0.5324	
154	9350-21 X2	2.3748	0.4750	<.500
155	DIL BLANK	0.2184		
156	QC=10PPB	10.0726		
157	QC=50PPB	48.1372		
158	9350-22 X20	0.2050	0.4100	
159	9350-22 X2	1.9089	0.3818	<.500
160	9350-23 X2	0.7657	0.1531	<.500
161	9350-24 X2	2.3668	0.4734	<.500
162	DIL BLANK	0.2345		
163	QC=10PPB	10.1553		
164	QC=50PPB	47.7890		
165	INTA X10	1.6605	1.6605	
166	INTAB X10	21.4196	21.4196	
167	DIL BLANK	0.3208		
168	QC=10PPB	10.8868		
169	QC=50PPB	50.7038		

ANALYTE:Ni 62

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
088	D.L.	2.1731		
089	DIL BLANK	-3.129E-03		
090	QC=10PPB	9.8294		
091	QC=50PPB	48.6463		
092	D.L.	2.0632		
094	9350-FHB X2	1.4367	0.2873	
095	9350-FHB X2+50	49.9456	97.02%	97.1011 %
096	9350-BHB X2	0.5816	0.1163	
097	9350-BHB X2+50	51.5615	101.96%	101.9373 %
098	9350-1 X20	22.7112	45.4224	
099	9350-1 X2	190.7414	38.1483	
100	9350-2 X5	1.7269	0.8634	
101	9350-2 X2	4.4446	0.8889	
102	9350-3 X20	15.2103	30.4206	
103	9350-3 X20DUP	15.2819	30.5638	
104	DIL BLANK	0.0133		
105	QC=10PPB	9.5289		
106	QC=50PPB	48.0744		

888

107	9350-3 X2	127.4766	25.4953	
108	9350-3 X2DUP	127.7263	25.5453	
1[illegible]	9350-5 X5	1.5669	0.7835	
[illegible]	9350-5 X5DUP	1.7584	0.8792	
111	9350-5 X2	4.0823	0.8165	
112	9350-5 X2DUP	4.1348	0.8270	
113	9350-7 X20	6.2418	12.4836	
114	9350-7 X20+20	25.3187	95.38%	96.48233 %
115	9350-7 X5	23.8854	11.9427	
116	9350-7 X5+20	42.9786	95.47%	97.93371 %
117	DIL BLANK	0.0225		
118	QC=10PPB	9.5063		
119	QC=50PPB	46.3113		
120	9350-7 X2	56.5817	11.3163	
121	9350-7 X2+20	74.5927	90.05%	97.40276 %
122	9350-9 X5	1.7273	0.8637	
123	9350-9 X5+20	20.2195	92.46%	93.06035 %
124	9350-9 X2	4.3674	0.8735	
125	9350-9 X2+20	22.8389	92.36%	93.72727 %
126	9350-11 X20	3285.5935	6571.1870	
127	9350-11 X2	5.5770	1.1154	
128	9350-12 X10	8839.8848	8839.8857	
129	9350-12 X5	2.077E+04	10385.0000	
130	DIL BLANK	0.0598		
131	QC=10PPB	9.4196		
132	QC=50PPB	47.0671		
133	9350-12 X2	5.9075	1.1815	
134	9350-13 X5	7.062E+04	35310.0000	
[illegible]	9350-13 X5DUP	8.886E+04	44430.0000	
[illegible]	9350-13 X2	46.8361	9.3672	
137	9350-13 X2DUP	47.2931	9.4586	
138	9350-15 X10	8513.7197	8513.7197	
139	9350-15 X10DUP	1.085E+04	10850.0000	
140	9350-15 X2	3.6489	0.7298	
141	9350-15 X2DUP	3.6264	0.7253	
142	DIL BLANK	0.2044		
143	QC=10PPB	9.7136		
144	QC=50PPB	47.4106		
145	9350-17 X5	7437.3398	3718.6699	
146	9350-17 X5+20	7.989E+04	362263.31%	1071.294 %
147	9350-17 X2	4.7592	0.9518	
148	9350-17 X2+20	25.4541	103.47%	102.8066 %
149	9350-19 X5	1.599E+04	7995.0000	
150	9350-19 X5+20	9.253E+04	382700.00%	577.9513 %
151	9350-19 X2	4.8365	0.9673	
152	9350-19 X2+20	22.7396	89.52%	91.55718 %
153	9350-21 X20	0.3277	0.6554	
154	9350-21 X2	2.4956	0.4991	
155	DIL BLANK	0.2220		
156	QC=10PPB	9.8561		
157	QC=50PPB	47.2933		
158	9350-22 X20	0.2250	0.4500	
159	9350-22 X2	1.9677	0.3935	
1[illegible]	9350-23 X2	0.7785	0.1557	
[illegible]	9350-24 X2	2.3215	0.4643	
1[illegible]	DIL BLANK	0.2772		
163	QC=10PPB	9.8379		
164	QC=50PPB	47.3267		
165	INTA X10	4.4951	4.4951	
166	INTAB X10	24.1719	24.1719	

2291

167 DIL BLANK	0.3894	
168 QC=10PPB	10.4816	
[illegible] QC=50PPB	50.1393	

ANALYTE:Zn 66

	PPB	PPB X DF X .1		PROTOCOL RECOVERY
088 D.L.	1.9367			
089 DIL BLANK	-0.1019			
090 QC=10PPB	9.9009			
091 QC=50PPB	47.8415			
092 D.L.	1.8433			
094 9350-FHB X2	1.8014	0.3603		
095 9350-FHB X2+50	37.6667	71.73%		72.71367 %
096 9350-BHB X2	0.5673	0.1135		
097 9350-BHB X2+50	42.1551	83.18%		83.36435 %
098 9350-1 X20	77.8001	155.6002		
099 9350-1 X2	562.7311	112.5462		
100 9350-2 X5	4.4802	2.2401		
101 9350-2 X2	8.1256	1.6251	1.63	
102 9350-3 X20	74.7127	149.4254		
103 9350-3 X20DUP	76.1542	152.3084		
104 DIL BLANK	-0.0660			
105 QC=10PPB	9.4854			
106 QC=50PPB	48.2970			
107 9350-3 X2	562.0554	112.4111		
108 9350-3 X2DUP	562.7784	112.5557		
[illegible] 9350-5 X5	3.6612	1.8306		
[illegible] 9350-5 X5DUP	3.3712	1.6856		
[illegible] 9350-5 X2	7.9569	1.5914	1.59	
112 9350-5 X2DUP	7.7477	1.5495	1.55	
113 9350-7 X20	52.6922	105.3844		
114 9350-7 X20+20	70.4609	88.84%		96.93048 %
115 9350-7 X5	193.3744	96.6872		
116 9350-7 X5+20	214.6635	106.45%		100.6041 %
117 DIL BLANK	-0.1279			
118 QC=10PPB	9.6318			
119 QC=50PPB	46.3056			
120 9350-7 X2	414.6400	82.9280		
121 9350-7 X2+20	432.3017	88.31%		99.46201 %
122 9350-9 X5	2.7159	1.3580	1.36	
123 9350-9 X5+20	19.5743	84.29%		86.17004 %
124 9350-9 X2	5.4674	1.0935		
125 9350-9 X2+20	21.3205	79.27%		83.71683 %
126 9350-11 X20	1.129E+04	22580.0000	NO IS	
127 9350-11 X2	18.6567	3.7313	3.73	
128 9350-12 X10	7.518E+04	75180.0000	NO IS	
129 9350-12 X5	1.757E+05	87850.0000		
130 DIL BLANK	-0.1055			
131 QC=10PPB	9.3459			
132 QC=50PPB	47.1492			
133 9350-12 X2	48.9682	9.7936	9.79	
134 9350-13 X5	3.526E+04	17630.0000	NO IS	
[illegible] 9350-13 X5DUP	4.179E+04	20895.0000		
[illegible] 9350-13 X2	19.6299	3.9260	3.93	
137 9350-13 X2DUP	19.6709	3.9342	3.93	
138 9350-15 X10	1.508E+04	15080.0000	NO IS	
139 9350-15 X10DUP	1.954E+04	19540.0000		
140 9350-15 X2	5.2837	1.0567	1.06	
141 9350-15 X2DUP	5.1329	1.0266	1.03	

890

Zn cont.

2291

142	DIL BLANK	-0.1127			
143	QC=10PPB	9.7743			
[illegible]	QC=50PPB	48.2383			
[illegible]	9350-17 X5	5.036E+04	25180.0000	>NO IS	
146	9350-17 X5+20	1.247E+05	371700.00%		247.5189 %
147	9350-17 X2	32.6684	6.5337	6.53	
148	9350-17 X2+20	49.5634	84.48%		94.10462 %
149	9350-19 X5	6.501E+04	32505.0000	>NO IS	
150	9350-19 X5+20	1.234E+05	291950.00%		189.7586 %
151	9350-19 X2	20.4083	4.0817	4.08	
152	9350-19 X2+20	37.1022	83.47%		91.81826 %
153	9350-21 X20	1.4969	2.9938		
154	9350-21 X2	9.0058	1.8012	1.80	
155	DIL BLANK	0.3475			
156	QC=10PPB	10.2889			
157	QC=50PPB	47.8569			
158	9350-22 X20	0.7576	1.5152		
159	9350-22 X2	5.8168	1.1634	1.16	
160	9350-23 X2	3.1555	0.6311	.631	
161	9350-24 X2	1.9564	0.3913	<.500	
162	DIL BLANK	0.4384			
163	QC=10PPB	10.1321			
164	QC=50PPB	47.5696			
165	INTA X10	4.0615	4.0615		
166	INTAB X10	12.5729	12.5729		
167	DIL BLANK	0.3068			
168	QC=10PPB	10.2445			
169	QC=50PPB	48.0892			

[illegible]LYTE:As 75

		PPB	PPB X DF X .1		PROTOCOL RECOVERY
088	D.L.	1.9352			
089	DIL BLANK	0.2187			
090	QC=10PPB	10.3045			
091	QC=50PPB	48.8536			
092	D.L.	2.0097			
094	9350-FHB X2	0.1358	0.0272	>✓	
095	9350-FHB X2+50	39.6059	78.94%		78.99725 %
096	9350-BHB X2	0.0564	0.0113	>✓	
097	9350-BHB X2+50	46.1933	92.27%		92.2825 %
098	9350-1 X20	23.5122	47.0244	47.0	
099	9350-1 X2	190.3731	38.0746		
100	9350-2 X5	> 1595.1893	0.0000		
101	9350-2 X2	> -647.2548	0.0000		
102	9350-3 X20	16.8195	33.6390	33.6	
103	9350-3 X20DUP	16.7045	33.4090	33.4	
104	DIL BLANK	0.4903			
105	QC=10PPB	9.7180			
106	QC=50PPB	49.8280			
107	9350-3 X2	138.4759	27.6952		
108	9350-3 X2DUP	137.6774	27.5355		
109	9350-5 X5	> 1580.9468	0.0000		
[illegible]	9350-5 X5DUP	> 1372.8506	0.0000		
[illegible]	9350-5 X2	> -772.2483	0.0000		
112	9350-5 X2DUP	> -648.9386	0.0000		
113	9350-7 X20	9.5827	19.1654		
114	9350-7 X20+20	29.4645	99.41%		99.60044 %
115	9350-7 X5	34.6424	1[illegible]2	17.3	
116	9350-7 X5+20	55.2912	103.24%		101.1874 %

891

As cont.

page 44 of 7

2291

117	DIL BLANK	-0.0520			
118	QC=10PPB	10.0981			
[illegible]	QC=50PPB	48.8563			
[illegible]	9350-7 X2	80.2281	16.0456		
121	9350-7 X2+20	97.4855	86.29%		97.26363 %
122	9350-9 X5	> 1316.3645	0.0000		
123	9350-9 X5+20	> 1351.7523	0.00%		0 %
124	9350-9 X2	>-1220.1902	0.0000		
125	9350-9 X2+20	>-4578.7891	0.00%		0 %
126	9350-11 X20	9940.0518	19880.1035	NO IS	
127	9350-11 X2	3.1083	0.6217	.622	
128	9350-12 X10	3.874E+04	38740.0000	> NO IS	
129	9350-12 X5	3.975E+04	19875.0000		
130	DIL BLANK	-0.0329			
131	QC=10PPB	10.2180			
132	QC=50PPB	48.9967			
133	9350-12 X2	8.8559	1.7712	1.77	
134	9350-13 X5	1.318E+04	6590.0000	> NO IS	
135	9350-13 X5DUP	1.603E+04	8015.0000		
136	9350-13 X2	2.7672	0.5534	.553	
137	9350-13 X2DUP	2.7129	0.5426	.543	
138	9350-15 X10	5.496E+04	54960.0000	> NO IS	
139	9350-15 X10DUP	6.291E+04	62910.0000		
140	9350-15 X2	0.6659	0.1332	< .500	
141	9350-15 X2DUP	-0.6617	-0.1323	< .500	
142	DIL BLANK	0.1135			
143	QC=10PPB	10.4250			
144	QC=50PPB	49.2316			
[illegible]	9350-17 X5	1.128E+04	5640.0000	> NO IS	
[illegible]	9350-17 X5+20	8.764E+04	381800.00%		775.5752 %
147	9350-17 X2	3.8876	0.7775	.778	
148	9350-17 X2+20	19.9741	80.43%		83.61703 %
149	9350-19 X5	4.783E+04	23915.0000	> NO IS	
150	9350-19 X5+20	8.438E+04	182750.00%		176.3427 %
151	9350-19 X2	-4.4596	-0.8919		
152	9350-19 X2+20	14.0359	92.48%		90.31878 %
153	9350-21 X20	0.2035	0.4070		
154	9350-21 X2	-0.1225	-0.0245	< .500	
155	DIL BLANK	0.2719			
156	QC=10PPB	10.0229			
157	QC=50PPB	49.3079			
158	9350-22 X20	-0.0250	-0.0500		
159	9350-22 X2	-0.0675	-0.0135	< .500	
160	9350-23 X2	-0.1402	-0.0280	< .500	
161	9350-24 X2	-0.0671	-0.0134	< .500	
162	DIL BLANK	-0.0232			
163	QC=10PPB	10.0130			
164	QC=50PPB	49.3720			
165	INTA X10	1.3050	1.3050		
166	INTAB X10	12.4639	12.4639		
167	DIL BLANK	1.1037			
168	QC=10PPB	10.8861			
169	QC=50PPB	51.1930			

892

[illegible]LYTE:Se 78

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
088	D.L.	2.1071		
089	DIL BLANK	-2.956E-03		
090	QC=10PPB	9.6902		

Se 78 cont.

page 45 of 79

091	QC=50PPB	48.3745		
092	D.L.	1.8118		
093	9350-FHB X2	0.3709	0.0742	
[illegible]	9350-FHB X2+50	35.6534	70.57%	70.78174 %
096	9350-BHB X2	0.3129	0.0626	
097	9350-BHB X2+50	41.1646	81.70%	81.81719 %
098	9350-1 X20	156.8814	313.7628	
099	9350-1 X2	1108.7561	221.7512	
100	9350-2 X5	> 1.544E+04	0.0000	
101	9350-2 X2	> 1.462E+04	0.0000	
102	9350-3 X20	139.6889	279.3778	
103	9350-3 X20DUP	141.0033	282.0066	
104	DIL BLANK	0.1436		
105	QC=10PPB	9.8755		
106	QC=50PPB	49.1594		
107	9350-3 X2	1048.2007	209.6401	
108	9350-3 X2DUP	1047.6769	209.5354	
109	9350-5 X5	> 1.531E+04	0.0000	
110	9350-5 X5DUP	> 1.465E+04	0.0000	
111	9350-5 X2	> 1.382E+04	0.0000	
112	9350-5 X2DUP	> 1.242E+04	0.0000	
113	9350-7 X20	97.1097	194.2194	
114	9350-7 X20+20	115.3306	91.10%	98.48083 %
115	9350-7 X5	339.3164	169.6582	
116	9350-7 X5+20	369.9643	153.24%	102.9634 %
117	DIL BLANK	0.6068		
118	QC=10PPB	10.3033		
119	QC=50PPB	48.3286		
[illegible]	9350-7 X2	725.1494	145.0299	
[illegible]	9350-7 X2+20	756.0244	154.37%	101.4594 %
122	9350-9 X5	> 1.592E+04	0.0000	
123	9350-9 X5+20	> 1.608E+04	0.00%	0 %
124	9350-9 X2	> 1.349E+04	0.0000	
125	9350-9 X2+20	> 1.358E+04	0.00%	0 %
126	9350-11 X20	2.208E+05	%441600.0000 NO IS	
127	9350-11 X2	431.0090	86.2018	
128	9350-12 X10	2.505E+06	%2505000.0000 NO IS	
129	9350-12 X5	5.673E+06	%2836500.0000	
130	DIL BLANK	1.1074		
131	QC=10PPB	10.8814		
132	QC=50PPB	48.6636		
133	9350-12 X2	1698.5410	339.7082	
134	9350-13 X5	6.238E+05	%311900.0000 NO IS	
135	9350-13 X5DUP	7.744E+05	%387200.0000	
136	9350-13 X2	374.7052	74.9410	
137	9350-13 X2DUP	374.7174	74.9435	
138	9350-15 X10	5.178E+06	%5178000.0000 NO IS	
139	9350-15 X10DUP	6.273E+06	%6273000.0000	
140	9350-15 X2	2436.6824	487.3365	
141	9350-15 X2DUP	2474.5510	494.9102	
142	DIL BLANK	1.1077		
143	QC=10PPB	10.3349		
144	QC=50PPB	48.8952		
145	9350-17 X5	7.090E+05	%354500.0000 NO IS	
[illegible]	9350-17 X5+20	9.194E+05	1052000.00%	129.6719 %
147	9350-17 X2	454.4953	90.8991	
148	9350-17 X2+20	469.9173	77.11%	99.03519 %
149	9350-19 X5	8.855E+06	%4427500.0000 NO IS	
150	9350-19 X5+20	5.886E+06	%-1[illegible]54000.00%	66.47077 %
151	9350-19 X2	2815.9905	563.1981	

2291

893

Se 78 cont.

page 46 of 79

2291

152	9350-19 X2+20	2835.4138	97.12%	99.97967 %
153	9350-21 X20	1.8837	3.7674	
[illegible]	9350-21 X2	2.4470	0.4894 <.500	
[illegible]	DIL BLANK	0.7959		
156	QC=10PPB	10.5867		
157	QC=50PPB	49.3008		
158	9350-22 X20	0.7650	1.5300	
159	9350-22 X2	1.4428	0.2886 <.500	
160	9350-23 X2	1.1669	0.2334 <.500	
161	9350-24 X2	3.2995	0.6599 .660	
162	DIL BLANK	0.8890		
163	QC=10PPB	10.5946		
164	QC=50PPB	49.4454		
165	INTA X10	1.6797	1.6797	
166	INTAB X10	10.6084	10.6084	
167	DIL BLANK	0.6922		
168	QC=10PPB	10.4940		
169	QC=50PPB	49.5949		

ANALYTE:Se 82

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
088	D.L.	1.9638		
089	DIL BLANK	0.1173		
090	QC=10PPB	9.9475		
091	QC=50PPB	48.8037		
092	D.L.	1.9820		
[illegible]	9350-FHB X2	0.7461	0.1492	
[illegible]	9350-FHB X2+50	35.5872	69.68%	70.12795 %
[illegible]	9350-BHB X2	0.1908	0.0382	
097	9350-BHB X2+50	40.9971	81.61%	81.6825 %
098	9350-1 X20	158.3271	316.6542	
099	9350-1 X2	1120.6188	224.1238	
100	9350-2 X5	8395.1250	4197.5625	
101	9350-2 X2	> 3.554E+04	0.0000	
102	9350-3 X20	141.1100	282.2200	
103	9350-3 X20DUP	139.6908	279.3816	
104	DIL BLANK	0.3904		
105	QC=10PPB	10.1275		
106	QC=50PPB	48.7380		
107	9350-3 X2	1049.9614	209.9923	
108	9350-3 X2DUP	1057.4293	211.4859	
109	9350-5 X5	8386.2568	4193.1284	
110	9350-5 X5DUP	8536.6875	4268.3438	
111	9350-5 X2	> 3.371E+04	0.0000	
112	9350-5 X2DUP	> 3.442E+04	0.0000	
113	9350-7 X20	98.7913	197.5826	
114	9350-7 X20+20	116.5888	88.99%	98.1459 %
115	9350-7 X5	341.0594	170.5297	
116	9350-7 X5+20	376.3834	176.62%	104.2442 %
117	DIL BLANK	0.7026		
118	QC=10PPB	10.0072		
119	QC=50PPB	48.3486		
[illegible]	9350-7 X2	732.8506	146.5701	
[illegible]	9350-7 X2+20	761.6843	144.17%	101.1734 %
122	9350-9 X5	1.018E+04	5090.0000	
123	9350-9 X5+20	1.016E+04	-100.00%	99.60784 %
124	9350-9 X2	> 3.738E+04	0.0000	
125	9350-9 X2+20	> 3.761E+04	0.00%	0 %
126	9350-11 X20	2.234E+05	%446800.0000	

894

E 5.17

127	9350-11 X2	436.3075	87.2615	
128	9350-12 X10	2.531E+06	%2531000.0000	
[illegible]	9350-12 X5	5.824E+06	%2912000.0000	
[illegible]	DIL BLANK	0.9679		
131	QC=10PPB	10.6316		
132	QC=50PPB	49.6034		
133	9350-12 X2	1781.6375	356.3275	
134	9350-13 X5	6.372E+05	%318600.0000	
135	9350-13 X5DUP	7.896E+05	%394800.0000	
136	9350-13 X2	380.9922	76.1984	
137	9350-13 X2DUP	381.3322	76.2664	
138	9350-15 X10	5.275E+06	%5275000.0000	
139	9350-15 X10DUP	6.409E+06	%6409000.0000	
140	9350-15 X2	2605.3110	521.0622	
141	9350-15 X2DUP	2625.2188	525.0438	
142	DIL BLANK	1.2097		
143	QC=10PPB	10.8350		
144	QC=50PPB	48.5741		
145	9350-17 X5	7.179E+05	%358950.0000	
146	9350-17 X5+20	9.352E+05	1086500.00%	130.2652 %
147	9350-17 X2	461.0161	92.2032	
148	9350-17 X2+20	474.8733	69.29%	98.72295 %
149	9350-19 X5	9.234E+06	%4617000.0000	
150	9350-19 X5+20	6.092E+06	%-15710000.00%	65.97343 %
151	9350-19 X2	3020.9153	604.1830	
152	9350-19 X2+20	3045.0330	120.59%	100.1354 %
153	9350-21 X20	2.1381	4.2762	
154	9350-21 X2	4.5164	0.9033	
[illegible]	DIL BLANK	0.9101		
[illegible]	QC=10PPB	10.4044		
157	QC=50PPB	48.6393		
158	9350-22 X20	1.1800	2.3600	
159	9350-22 X2	3.0953	0.6191	
160	9350-23 X2	0.9395	0.1879	
161	9350-24 X2	3.2284	0.6457	
162	DIL BLANK	0.7752		
163	QC=10PPB	10.3608		
164	QC=50PPB	49.6823		
165	INTA X10	1.2267	1.2267	
166	INTAB X10	11.0250	11.0250	
167	DIL BLANK	0.5563		
168	QC=10PPB	10.7284		
169	QC=50PPB	49.5452		

ANALYTE:Cd 111

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
088	D.L.	0.5439		
089	DIL BLANK	-3.874E-03		
090	QC=10PPB	9.9922		
091	QC=50PPB	48.8069		
092	D.L.	0.4609		
094	9350-FHB X2	0.0111	0.0022	
[illegible]	9350-FHB X2+50	43.2500	86.48%	86.4808 %
[illegible]	9350-BHB X2	0.0299	0.0060	
097	9350-BHB X2+50	46.5390	93.02%	93.02238 % 895
098	9350-1 X20	0.5148	1.0296	
099	9350-1 X2	4.1320	0.8264	
100	9350-2 X5	0.0994	0.0497	
101	9350-2 X2	0.1617	0.0323	

102	9350-3 X20	0.3949	0.7898	
103	9350-3 X20DUP	0.3606	0.7212	
1[illegible]	DIL BLANK	-6.051E-03		
1[illegible]	QC=10PPB	9.9960		
106	QC=50PPB	49.5778		
107	9350-3 X2	3.3610	0.6722	
108	9350-3 X2DUP	3.2751	0.6550	
109	9350-5 X5	0.0480	0.0240	
110	9350-5 X5DUP	0.0416	0.0208	
111	9350-5 X2	0.1507	0.0301	
112	9350-5 X2DUP	0.1431	0.0286	
113	9350-7 X20	0.1507	0.3014	
114	9350-7 X20+20	19.8537	98.51%	98.52611 %
115	9350-7 X5	0.6173	0.3086	
116	9350-7 X5+20	19.7942	95.88%	96.00772 %
117	DIL BLANK	-8.374E-03		
118	QC=10PPB	10.0719		
119	QC=50PPB	49.0850		
120	9350-7 X2	1.4542	0.2908	
121	9350-7 X2+20	18.7827	86.64%	87.54789 %
122	9350-9 X5	0.0925	0.0463	
123	9350-9 X5+20	19.6504	97.79%	97.79967 %
124	9350-9 X2	0.2350	0.0470	
125	9350-9 X2+20	18.2301	89.98%	90.09193 %
126	9350-11 X20	280.8363	561.6726	
127	9350-11 X2	0.4895	0.0979	
128	9350-12 X10	291.6759	291.6759	
129	9350-12 X5	754.5446	377.2723	
[illegible]	DIL BLANK	-6.420E-03		
1[illegible]	QC=10PPB	9.9150		
132	QC=50PPB	49.8270		
133	9350-12 X2	0.1392	0.0278	
134	9350-13 X5	1492.2023	746.1012	
135	9350-13 X5DUP	1850.3218	925.1609	
136	9350-13 X2	0.9820	0.1964	
137	9350-13 X2DUP	0.9767	0.1953	
138	9350-15 X10	378.0253	378.0253	
139	9350-15 X10DUP	564.4404	564.4404	
140	9350-15 X2	0.1610	0.0322	
141	9350-15 X2DUP	0.1417	0.0283	
142	DIL BLANK	-3.415E-03		
143	QC=10PPB	10.1100		
144	QC=50PPB	50.0078		
145	9350-17 X5	893.4324	446.7162	
146	9350-17 X5+20	7.193E+04	355182.84%	7874.693 %
147	9350-17 X2	0.5783	0.1157	
148	9350-17 X2+20	17.9410	86.81%	87.18407 %
149	9350-19 X5	1878.3899	939.1949	
150	9350-19 X5+20	9.015E+04	441358.06%	4748.761 %
151	9350-19 X2	0.6135	0.1227	
152	9350-19 X2+20	19.6729	95.30%	95.43697 %
153	9350-21 X20	-1.095E-03	-0.0022	
154	9350-21 X2	0.0545	0.0109	
[illegible]	DIL BLANK	6.701E-03		
[illegible]	QC=10PPB	10.3384		
157	QC=50PPB	49.8404		
158	9350-22 X20	-3.376E-03	-0.0068	
159	9350-22 X2	0.0449	0.0090	
160	9350-23 X2	0.0803	0.0161	
161	9350-24 X2	5.784E-03	0.0012	

896

2291

162 DIL BLANK	-1.496E-03		
163 QC=10PPB	9.9989		
164 QC=50PPB	49.2903		
[illegible] INTA X10	1.4741	1.4741	
166 INTAB X10	6.1672	6.1672	
167 DIL BLANK	7.058E-03		
168 QC=10PPB	9.9017		
169 QC=50PPB	48.0572		

ANALYTE:Cd 111

w/factor	PPB	PPB X DF X .1	PROTOCOL RECOVERY
088 D.L.	0.5709		
089 DIL BLANK	0.0178		
090 QC=10PPB	10.0011		
091 QC=50PPB	48.7245		
092 D.L.	0.4741		
094 9350-FHB X2	-5.439E-03	-0.0011	
095 9350-FHB X2+50	42.9484	85.91%	85.90614 %
096 9350-BHB X2	0.0173	0.0035	
097 9350-BHB X2+50	46.4294	92.82%	92.82668 %
098 9350-1 X20	0.3407	0.6814	
099 9350-1 X2	2.4569	0.4914 .491	
100 9350-2 X5	0.0596	0.0298	
101 9350-2 X2	-3.226E-03	-0.0006	
102 9350-3 X20	0.2700	0.5400	
103 9350-3 X20DUP	0.2208	0.4416	
104 DIL BLANK	0.0103		
[illegible] QC=10PPB	10.0129		
[illegible] QC=50PPB	49.5057		
107 9350-3 X2	2.0487	0.4097 .410	
108 9350-3 X2DUP	2.0728	0.4146 .415	
109 9350-5 X5	-0.0327	-0.0163	
110 9350-5 X5DUP	-0.0322	-0.0161	
111 9350-5 X2	-0.0996	-0.0199	
112 9350-5 X2DUP	-0.1191	-0.0238	
113 9350-7 X20	0.0969	0.1938	
114 9350-7 X20+20	19.8119	98.58%	98.58187 %
115 9350-7 X5	0.4168	0.2084	
116 9350-7 X5+20	19.5323	95.58%	95.66779 %
117 DIL BLANK	0.0122		
118 QC=10PPB	10.0860		
119 QC=50PPB	49.0860		
120 9350-7 X2	0.8522	0.1704 <.200	
121 9350-7 X2+20	18.1638	86.56%	87.10735 %
122 9350-9 X5	0.0678	0.0339	
123 9350-9 X5+20	19.5723	97.52%	97.53088 %
124 9350-9 X2	0.1300	0.0260	
125 9350-9 X2+20	18.0863	89.78%	89.84749 %
126 9350-11 X20	23.8759	47.7518 NO IS	
127 9350-11 X2	0.0866	0.0173	
128 9350-12 X10	11.7843	11.7843 NO IS	
129 9350-12 X5	293.7816	146.8908	
130 DIL BLANK	0.0136		
[illegible] QC=10PPB	9.9114		
132 QC=50PPB	49.7678		
133 9350-12 X2	0.0171	0.0034	
134 9350-13 X5	789.3892	394.6946 NO IS	
135 9350-13 X5DUP	907.1699	453.5850	
136 9350-13 X2	0.5605	0.1121	

E 5820

897

cd w/factor cont.

page 50 of 79

2291

137	9350-13 X2DUP	0.5632	0.1126		
138	9350-15 X10	104.2262	104.2262	>NO IS	
[illegible]	9350-15 X10DUP	191.8737	191.8737		
[illegible]	9350-15 X2	0.0569	0.0114		
141	9350-15 X2DUP	0.0609	0.0122		
142	DIL BLANK	0.0159			
143	QC=10PPB	10.1107			
144	QC=50PPB	50.0082			
145	9350-17 X5	291.8267	145.9134	>NO IS	
146	9350-17 X5+20	7.075E+04	352290.88%		22688.88 %
147	9350-17 X2	0.1875	0.0375		
148	9350-17 X2+20	17.5562	86.84%		86.9657 %
149	9350-19 X5	1564.2810	782.1405	>NO IS	
150	9350-19 X5+20	9.029E+04	443628.59%		5699.115 %
151	9350-19 X2	0.5744	0.1149		
152	9350-19 X2+20	19.6605	95.43%		95.55807 %
153	9350-21 X20	-0.0236	-0.0472		
154	9350-21 X2	-0.2949	-0.0590	<.200	
155	DIL BLANK	0.0269			
156	QC=10PPB	10.3366			
157	QC=50PPB	49.8840			
158	9350-22 X20	-0.0195	-0.0390		
159	9350-22 X2	-0.2836	-0.0567	<.200	
160	9350-23 X2	0.0768	0.0154	<.200	
161	9350-24 X2	-0.0161	-0.0032	<.200	
162	DIL BLANK	0.0149			
163	QC=10PPB	10.0131			
164	QC=50PPB	49.2397			
[illegible]	INTA X10	0.0174	0.0174		
[illegible]	INTAB X10	4.7086	4.7086		
167	DIL BLANK	0.0272			
168	QC=10PPB	9.9009			
169	QC=50PPB	48.1027			

898

page 51 of 79

E NAME = 9350-¯aa ON DRIVE a: 19:34:26 Feb 18 1999 2291

QUANTITATIVE ANALYSIS: DATA SET SUMMARY

Data Set: 02-18-99-2

Data Set Description:

ANALYTE:Li 6

	Intensity	Intensity Std Dev	Conc.	Conc. Std Dev Units	Int Std
	PPB	PPB X DF X .1 (Total ug)		PROTOCOL RECOVERY	
012 D.L.	31.1879				
013 D.L.	12.5239				
020 DIL BLANK	-69.3892				
021 QC=10PPB	6.2520				
022 QC=50PPB	5.4171				
023 9350-FHB X2	-98.8132	-19.7626	-56.67%	260.483 %	
024 9350-FHB X2+50	-127.1501				
025 9350-BHB X2	-111.8322	-22.3664	80.27%	115.9543 %	
026 9350-BHB X2+50	-71.6971				
027 9350-1 X2	> 1719.7704	0.0000			
028 9350-2 X2	-108.7863	-21.7573			
029 9350-3 X2	> 710.3881	0.0000			
030 9350-3 X2DUP	> 705.6634	0.0000			
031 9350-5 X2	-99.6504	-19.9301			
032 9350-5 X2DUP	-99.1700	-19.8340			
033 DIL BLANK	-122.7464				
034 QC=10PPB	-38.2756				
035 QC=50PPB	-31.0871				
036 9350-7 X2	> 2827.9734	0.0000	0.00%	0 %	
037 9350-7 X2+20	> 2721.2253				
038 9350-9 X2	-108.7588	-21.7518	140.22%	90.93678 %	
039 9350-9 X2+20	-80.7144				
040 9350-11 X2	-66.7438	-13.3488			
041 9350-12 X2	-113.0592	-22.6118			
042 9350-13 X2	-78.0020	-15.6004			
043 9350-13 X2DUP	-61.6304	-12.3261			
044 9350-15 X2	-72.4730	-14.4946			
045 9350-15 X2DUP	-78.4564	-15.6913			
046 DIL BLANK	-96.9908				
047 QC=10PPB	-54.3321				
048 QC=50PPB	-46.4054				
049 9350-17 X2	-94.4275	-18.8855	152.34%	85.93491 %	
050 9350-17 X2+20	-63.9592				
051 9350-19 X2	-93.7281	-18.7456	-18.79%	132.2237 %	
052 9350-19 X2+20	-97.4860				
053 9350-21 X2	-69.8110	-13.9622			
054 9350-22 X2	-47.2829	-9.4566			
055 9350-23 X2	-83.4214	-16.6843			
056 9350-24 X2	-107.1224	-21.4245			
057 DIL BLANK	-110.3959				
058 QC=10PPB	-44.9100				
059 QC=50PPB	-35.5522				

Total ug = ppb x FV x d: 1 / 1000

ANALYTE:Li 7

	PPB	PPB X DF X .1	PROTOCOL RECOVERY
012 D.L.	2.2601	113%	
013 D.L.	2.1792		

899

2291

020	DIL BLANK	-1.970E-03		
[illegible]	QC=10PPB	10.2583		
[illegible]	QC=50PPB	48.9676		
023	9350-FHB X2	0.1276	0.0255	
024	9350-FHB X2+50	57.7798	115.30%	115.2654 %
025	9350-BHB X2	0.0795	0.0159	
026	9350-BHB X2+50	55.1733	110.19%	110.1714 %
027	9350-1 X2	> 2093.7896	0.0000	
028	9350-2 X2	0.9284	0.1857 <.500	
029	9350-3 X2	> 2166.9067	0.0000	
030	9350-3 X2DUP	> 2175.0276	0.0000	
031	9350-5 X2	4.5572	0.9114 .911	
032	9350-5 X2DUP	4.4955	0.8991 .899	
033	DIL BLANK	0.2331		
034	QC=10PPB	10.6506		
035	QC=50PPB	50.1506		
036	9350-7 X2	> 2100.7837	0.0000	
037	9350-7 X2+20	> 2135.8032	0.00%	0 %
038	9350-9 X2	0.8126	0.1625 <.500	
039	9350-9 X2+20	22.7069	109.47%	109.1017 %
040	9350-11 X2	2.7491	0.5498 .550	
041	9350-12 X2	0.4911	0.0982 <.500	
042	9350-13 X2	4.0452	0.8090 .809	
043	9350-13 X2DUP	4.0620	0.8124 .812	
044	9350-15 X2	0.4746	0.0949 <.500	
045	9350-15 X2DUP	0.4867	0.0973 <.500	
046	DIL BLANK	0.1679		
047	QC=10PPB	10.6407		
[illegible]	QC=50PPB	49.0386		
[illegible]	9350-17 X2	3.7815	0.7563 .756	
050	9350-17 X2+20	27.2304	117.24%	114.5024 %
051	9350-19 X2	0.3741	0.0748 <.500	
052	9350-19 X2+20	21.8071	107.17%	107.0334 %
053	9350-21 X2	0.3856	0.0771 <.500	
054	9350-22 X2	0.5774	0.1155	
055	9350-23 X2	0.1867	0.0371	
056	9350-24 X2	0.2787	0.0557	
057	DIL BLANK	0.0829		
058	QC=10PPB	10.1867		
059	QC=50PPB	48.7955		

ANALYTE:P 31

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
012	D.L.	2.7039 ~~135%~~ 135%		
013	D.L.	2.1019		
020	DIL BLANK	-0.4798		
021	QC=10PPB	9.8335		
022	QC=50PPB	50.0550		
023	9350-FHB X2	23.3323	4.6665	
024	9350-FHB X2+50	92.3397	138.01%	126.9195 %
025	9350-BHB X2	21.4107	4.2821	
026	9350-BHB X2+50	60.1787	77.64%	84.27126 %
027	9350-1 X2	> 1.943E+04	0.0000	
028	9350-2 X2	46.8736	9.3747	
[illegible]	9350-3 X2	> 2.011E+04	0.0000	
[illegible]	9350-3 X2DUP	> 2.018E+04	0.0000	
031	9350-5 X2	55.0987	11.0197	
032	9350-5 X2DUP	55.5734	11.1147	
033	DIL BLANK	-1.0419		

900

page 53 / 79

2291

034	QC=10PPB	9.1369		
	QC=50PPB	47.6259		
	9350-7 X2	5291.4761	1058.2953	
037	9350-7 X2+20	5348.2295	283.76%	100.692 %
038	9350-9 X2	40.9999	8.2000	
039	9350-9 X2+20	61.1673	100.84%	100.2744 %
040	9350-11 X2	46.8828	9.3766	
041	9350-12 X2	36.7947	7.3589	
042	9350-13 X2	52.6829	10.5366	
043	9350-13 X2DUP	54.2600	10.8520	
044	9350-15 X2	33.2117	6.6423	
045	9350-15 X2DUP	34.8775	6.9755	
046	DIL BLANK	-2.6214		
047	QC=10PPB	7.8219		
048	QC=50PPB	47.2187		
049	9350-17 X2	63.2573	12.6515	
050	9350-17 X2+20	78.3887	75.66%	94.15234 %
051	9350-19 X2	32.3616	6.4723	
052	9350-19 X2+20	52.5549	100.97%	100.3692 %
053	9350-21 X2	31.3008	6.2602	
054	9350-22 X2	25.9405	5.1881	
055	9350-23 X2	12.3383	2.4677	
056	9350-24 X2	37.9585	7.5917	
057	DIL BLANK	-0.2893		
058	QC=10PPB	7.7948		
059	QC=50PPB	44.6126		

page 52/57 79

2291

NAME = 9350-e ON DRIVE A:
"Sample Date/Time:","Thursday, February 18, 1999 18:25:54"
"Quantitative Analysis - Summary Report"
"Sample Description:"
"Solution Type:","Sample"
"Blank File:","c:\elandata\Dataset\02-19-99-3\Blank.009"
"Number of Replicates:",3
"Peak Processing Mode:","Average"
"Signal Profile Processing Mode:","Average"
"Dual Detector Mode:","Dual"
"Current Dead Time (ns):",60
"Acq. Dead Time(ns):",60
"Cumulative Autodilution Factor:",1
"Sample File:","c:\elandata\Sample\daily.sam"
"Method File:","c:\elandata\Method\ALUMINUM.mth"
"Dataset File:","c:\elandata\Dataset\02-19-99-3\D.L.=2PPB.012"
"Tuning File:","default.tun"
"Optimization File:","default.dac"
"Calibration File:"
"Calibration Type:","External Calibration"
"Summary"
"Intensities"

		INTENSITY	INTENSITY STD DEV	CONC.	CONC. STD DEV	UNITS	INT STD
ANALYTE:Al 27		PPB		Reported By tP Total ug PPB X DF X .1		PROTOCOL RECOVERY	
1	D.L.=2PPB	2.0168					
2	DIL BLANK	0.0295					
3	QC=10PPB	10.2044					
4	QC=50PPB	51.4567					
5	9350-FHB X2	25.2484		5.0497			
6	9350-FHB X2+50	74.2718		98.05%		98.70216 %	
7	9350-BHB X2	11.5757		2.3151			
8	9350-BHB X2+50	62.8358		102.52%		102.0464 %	
9	9350-2 X5	55.6575		27.8288	27.8		
10	9350-5 X5	50.6472		25.3236	25.3		
11	9350-5 X5DUP	51.1423		25.5711	25.6		
12	9350-11 X50	20.7193		103.5965	104		
13	DIL BLANK	-0.2939					
14	QC=10PPB	9.9395					
15	QC=50PPB	51.4576					
16	9350-12 X10	22.6382		22.6382	22.6		
17	9350-13 X50	18.1082		90.5410	90 rev		
18	9350-13 X50DUP	29.0312		145.1560			
19	9350-15 X10	32.8393		32.8393	32.8		
20	9350-15 X10DUP	32.2631		32.2631	32.3		
21	DIL BLANK	-0.3458					
22	QC=10PPB	9.5093					
23	QC=50PPB	51.3778					
24	9350-17 X50	21.7281		108.6405	rev		
25	9350-17 X50+20	35.9557		71.14%		86.16663 %	
26	9350-19 X5	33.9270		16.9635	17.0	TP 2/19/99	
27	9350-19 X5+20	51.7090		88.91%		95.88704 %	
28	9350-21 X20	47.1190		94.2380	94.2		
29	9350-22 X20	47.6012		95.2024	95.2		
30	DIL BLANK	-0.3119					

Total ug = ppb x FV x d.f. / 1000

902

page 55/79

QC=50PPB 50.7941

2291

903

pm

page 56 of 79

2291

NAME = 9350-F ON DRIVE A:
"Sample Date/Time:","Friday, February 19, 1999 09:45:17"
"Quantitative Analysis - Summary Report"
"Sample Description:"
"Solution Type:","Sample"
"Blank File:","C:\elandata\Dataset\02-20-99-1\Blank.005"
"Number of Replicates:",3
"Peak Processing Mode:","Average"
"Signal Profile Processing Mode:","Average"
"Dual Detector Mode:","Dual"
"Current Dead Time (ns):",60
"Acq. Dead Time(ns):",60
"Cumulative Autodilution Factor:",1
"Sample File:","c:\elandata\Sample\daily.sam"
"Method File:","c:\elandata\Method\ALUMINUM.mth"
"Dataset File:","C:\elandata\Dataset\02-20-99-1\D.L.=2PPB.008"
"Tuning File:","default.tun"
"Optimization File:","default.dac"
"Calibration File:"
"Calibration Type:","External Calibration"
"Summary"
"Intensities"

Total ug = ppb x FV x dil / 1000

		INTENSITY	INTENSITY STD DEV	CONC.	CONC. STD DEV	UNITS	INT STD

YTE:Al 27

		PPB	PPB X DF X .1 (Total ug)		PROTOCOL RECOVERY
1	D.L.=2PPB	2.0813			
2	DIL BLANK	-0.0683			
3	QC=10PPB	10.1108			
4	QC=50PPB	51.5451			
5	9350-FHB X2	20.3451	4.0690		
6	9350-FHBX2+50	71.0327	101.38%		100.9775 %
7	9350-BHBX2	11.7856	2.3571		
8	9350-BHBX2+50	64.2081	104.85%		103.9208 %
9	9350-13 X50	20.8309	104.1545	104	
10	9350-13 X50DUP	20.3475	101.7375	102	
11	9350-17 X50	20.9681	104.8405	105	
12	9350-17 X50+20	41.1465	100.89%		100.4355 %
13	DIL BLANK	-0.0905			
14	QC=10PPB	9.9710			
15	QC=50PPB	50.0431			

904

Ms

page 57 of 79

2291

NAME = 9530-H ON DRIVE A:Sample Date/Time:","Friday, February 19, 1999 11:19:48"
"Quantitative Analysis - Summary Report"
"Sample Description:"
"Solution Type:","Sample"
"Blank File:","C:\elandata\Dataset\02-20-99-1\Blank.030"
"Number of Replicates:",3
"Peak Processing Mode:","Average"
"Signal Profile Processing Mode:","Average"
"Dual Detector Mode:","Dual"
"Current Dead Time (ns):",60
"Acq. Dead Time(ns):",60
"Cumulative Autodilution Factor:",1
"Sample File:","c:\elandata\Sample\daily.sam"
"Method File:","C:\elandata\Method\CALIBRATION.mth"
"Dataset File:","C:\elandata\Dataset\02-20-99-1\D.L.=2PPB.033"
"Tuning File:","default.tun"
"Optimization File:","default.dac"
"Calibration File:"
"Calibration Type:","External Calibration"
"Summary"
"Intensities"

Total ug = ppb x FV x dil / 1000

		INTENSITY	INTENSITY STD DEV	CONC.	CONC. STD DEV	UNITS	INT STD

ANALYTE:As 75

		PPB		PPB X DF X .1 (Total ug)		PROTOCOL RECOVERY
1	D.L.=2PPB	2.1064				
2	DIL BLANK	0.4392				
3	QC=10PPB	10.0047				
4	QC=50PPB	49.4235				
5	9350-FHB X2	-0.5271		-0.1054		
6	9350-FHBX2+50	41.9579	83.9%	~~84.97%~~		84.80987 %
7	9350-BHBX2	-0.5858		-0.1172		
8	9350-BHBX2+50	48.0124	96.0%	~~97.20%~~		97.16317 %
9	9350-2 X2	-1.9174		-0.3835	<.500	
10	9350-5 X2	-1.3490		-0.2698		
11	9350-5 X2DUP	-1.0004		-0.2001		
12	9350-19 X2	-0.5355		-0.1071		
13	9350-19 X2+20	20.2802		104.08%		104.1907 %
14	DIL BLANK	1.5444				
15	QC=10PPB	11.4262	114%			
16	QC=50PPB	52.1980				
17	9350-2 X5	-0.6652		-0.3326		
18	DIL BLANK	1.5384				
19	QC=10PPB	11.5504	116%			
20	QC=50PPB	51.6243				

ANALYTE:As 75

Factor #1

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
1	D.L.=2PPB	2.1674		
2	DIL BLANK	0.1680		
3	QC=10PPB	9.8026		
4	QC=50PPB	48.9640		
5	9350-FHB X2	0.2076	0.0415	
6	9350-FHBX2+50	43.3618	86.31%	86.36501 %

905

As 75
Factor #1

page 58 of 79

2291

8	9350-BHBX2+50	49.2766	98.10%	98.10408 %
[illegible]	9350-2 X2	46.9950	9.3990	
[illegible]	9350-5 X2	57.8969	11.5794	
11	9350-5 X2DUP	90.5103	18.1021	
12	9350-19 X2	3.8128	0.7626	
13	9350-19 X2+20	31.7992	139.93%	133.5383 %
14	DIL BLANK	0.5721		
15	QC=10PPB	10.4943		
16	QC=50PPB	50.8748		
17	9350-2 X5	-462.1033	-231.0517	
18	DIL BLANK	0.7187		
19	QC=10PPB	10.5034		
20	QC=50PPB	50.3904		

ANALYTE:As 75
Factor #2

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
1	D.L.=2PPB	2.1875		
2	DIL BLANK	0.0386		
3	QC=10PPB	9.7754		
4	QC=50PPB	49.1162		
5	9350-FHB X2	-0.0175	-0.0035	
6	9350-FHBX2+50	43.2892	86.61%	86.60871 %
7	9350-BHBX2	-0.0135	-0.0027	
8	9350-BHBX2+50	49.4207	98.87%	98.8681 %
9	9350-2 X2	-319.8802	-63.9760	
[illegible]	9350-5 X2	-317.5819	-63.5164	
[illegible]	9350-5 X2DUP	-405.2332	-81.0466	
12	9350-19 X2	-57.6515	-11.5303	
13	9350-19 X2+20	-34.5340	115.59%	91.72012 %
14	DIL BLANK	0.3764		
15	QC=10PPB	10.3142		
16	QC=50PPB	50.8525		
17	9350-2 X5	-629.5840	-314.7920	
18	DIL BLANK	0.4040		
19	QC=10PPB	10.3323		
20	QC=50PPB	50.6646		

906

page 59 of 79

FILE NAME = 9350-i ON DRIVE a:

12:43:28 Feb 19 1999

TP

QUANTITATIVE ANALYSIS: DATA SET SUMMARY

Data Set: 02-19-99-1

Data Set Description:

229 1

	Intensity	Intensity Std Dev	Conc.	Conc. Std Dev	Units	Int Std

ANALYTE:P 31

	PPB	PPB X DF X .1 (Total ug)	PROTOCOL RECOVERY
040 D.L.=4PPB	4.3416		
041 DIL BLANK	-0.2948		
042 QC=10PPB	9.5633		
043 QC=50PPB	53.4361		
044 9350-FHB X4	13.9554	5.5822	
045 9350-FHB X4+25	50.0650	144.44%	128.5188 %
046 9350-BHB X4	14.3129	5.7252	
047 9350-BHB X4+25	34.3687	80.22%	87.42346 %
048 9350-1 X100	341.1088	3411.0879	
049 9350-2 X10	15.3773	15.3773 15.4	
050 9350-3 X100	326.9267	3269.2671	
051 9350-3 X100DUP	319.4592	3194.5920	
052 DIL BLANK	-1.0644		
053 QC=10PPB	9.9305		
054 QC=50PPB	50.8662		
055 DIL BLANK	1.0636		
[illegible] 9350-5 X10	15.9024	15.9024 15.9	
[illegible] 9350-5 X10DUP	14.4863	14.4863 14.5	
058 9350-7 X100	16.2154	162.1540 162	
059 9350-7 X100+20	33.6637	87.24%	92.9541 %
060 9350-9 X5	21.4406	10.7203 10.7	
061 9350-9 X5+20	40.3903	94.75%	97.46553 %
062 9350-11 X10	13.5263	13.5263 13.5	
063 9350-12 X5	17.6490	8.8245 8.82	
064 9350-13 X10	17.1687	17.1687 17.2	
065 9350-13 X10DUP	15.7820	15.7820 15.8	
066 DIL BLANK	2.0202		
067 QC=10PPB	10.0881		
068 QC=50PPB	52.3799		
069 9350-15 X5	22.7137	11.3568 11.4	
070 9350-15 X5DUP	19.0055	9.5027 9.50	
071 9350-17 X10	9.3184	9.3184 9.32	
072 9350-17 X10+20	27.1376	89.10%	92.56167 %
073 9350-19 X5	9.5232	4.7616 4.76	
074 9350-19 X5+20	28.6736	95.75%	97.12226 %
075 9350-21 X5	15.5886	7.7943 7.79	
076 9350-22 X5	13.5929	6.7965 6.80	
077 9350-23 X2	17.0860	3.4172 3.42	
078 9350-24 X5	20.3854	10.1927 10.2	
079 DIL BLANK	1.9443		
080 QC=10PPB	10.9058		
[illegible] QC=50PPB	51.0517		
[illegible] 9350-1 X1000	34.9200	3492.0000 3490	
083 9350-3 X1000	32.8565	3285.6501 3290	
084 9350-3 X1000DUP	34.1421	3414.2102 3410	
085 DIL BLANK	1.7318		
086 QC=10PPB	9.1250		
087 QC=50PPB	49.5799		

Total ug = ppb x FV x d.1 / 1000

907

mm

page 79

2291

NAME = 9350-J ON DRIVE A Sample Date/Time:","Friday, February 19, 1999 12:27:46"
"Quantitative Analysis - Summary Report"
"Sample Description:"
"Solution Type:","Sample"
"Blank File:","C:\elandata\Dataset\02-20-99-1\Blank.053"
"Number of Replicates:",3
"Peak Processing Mode:","Average"
"Signal Profile Processing Mode:","Average"
"Dual Detector Mode:","Dual"
"Current Dead Time (ns):",60
"Acq. Dead Time(ns):",60
"Cumulative Autodilution Factor:",1
"Sample File:","c:\elandata\Sample\daily.sam"
"Method File:","C:\elandata\Method\afile.mth"
"Dataset File:","C:\elandata\Dataset\02-20-99-1\D.L.=2PPB.056"
"Tuning File:","default.tun"
"Optimization File:","default.dac"
"Calibration File:"
"Calibration Type:","External Calibration"
"Summary"
"Intensities"

Total ug = ppbx FVxdi / 1000

		INTENSITY	INTENSITY STD DEV	CONC.	CONC. STD DEV	INT UNITS	INT STD

ANALYTE:V 51

Total ug

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
1	D.L.=2PPB	2.1443		
2	DIL BLANK	1.6211		
3	QC=10PPB	12.3613		
4	QC=50PPB	52.0944		
5	9350-FHB X2	-1.6141	-0.3228	
6	9350-FHBX2+50	46.0397	95.31%	95.15106 %
7	9350-BHBX2	-3.4662	-0.6932	
8	9350-BHBX2+50	46.4734	99.88%	99.8702 %
9	9350-1 X2	19.2346	3.8469	
10	9350-3 X2	22.0588	4.4118	
11	9350-3 X2DUP	21.8440	4.3688	
12	9350-7 X2	16.6505	3.3301	
13	9350-7 X2+20	37.9140	106.32%	103.4474 %
14	DIL BLANK	0.6444		
15	QC=10PPB	10.3570		
16	QC=50PPB	49.7859		

ANALYTE:V 51

Factor #1

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
1	D.L.=2PPB	2.0441		
2	DIL BLANK	-0.3058		
	QC=10PPB	10.4326		
	QC=50PPB	49.8352		
	9350-FHB X2	-0.2271	-0.0454	
6	9350-FHBX2+50	50.9838	102.42%	102.4328 %
7	9350-BHBX2	-0.0493	-0.0099	
8	9350-BHBX2+50	51.3005	102.70%	102.7023 %
9	9350-1 X2	-3.1077	-0.6215	
10	9350-3 X2	4.1509	0.8302	

E-69

908

V51 Factor #1

page 61 of 79

	9350-7 X2	18.3006	3.6601	3.66	
	9350-7 X2+20	38.7742	102.37%		101.2365 %
14	DIL BLANK	-0.5478			
15	QC=10PPB	9.1420			
16	QC=50PPB	48.5484			

2291

ANALYTE:V 51

Factor #2

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
1	D.L.=2PPB	2.0332		
2	DIL BLANK	-0.4831		
3	QC=10PPB	10.2850		
4	QC=50PPB	49.6677		
5	9350-FHB X2	-0.1757	-0.0351	
6	9350-FHBX2+50	51.3388	103.03%	103.0397 %
7	9350-BHBX2	0.2183	0.0437	
8	9350-BHBX2+50	51.6975	102.96%	102.9455 %
9	9350-1 X2	-19.2560	-3.8512	
10	9350-3 X2	-7.0950	-1.4190	
11	9350-3 X2DUP	-6.8008	-1.3602	
12	9350-7 X2	12.3231	2.4646	
13	9350-7 X2+20	32.7327	102.05%	101.2672 %
14	DIL BLANK	-0.6727		
15	QC=10PPB	9.0179		
16	QC=50PPB	48.4463		

909

*Seq# 104,105,106,110 have NO I.S.

page 62 of 79

229 1

NAME = 9350-K ON DRIVE A: 14:08:47 Feb 19 1999

QUANTITATIVE ANALYSIS: DATA SET SUMMARY

Data Set: 02-19-99-1

Data Set Description:

	Intensity	Intensity Std Dev	Conc.	Conc. Std Dev	Units	Int Std

ANALYTE:Li 6

Total ug

	PPB	PPB X DF X .1	PROTOCOL RECOVERY
091 D.L.	-37.9030		
092 DIL BLANK	135.5266		
093 QC=10PPB	9.8375		
094 QC=50PPB	21.8167		
095 D.L.	28.9385		
096 9350-FHB X2	81.5111	16.3022	
097 9350-FHB X2+50	92.4408	21.86%	70.29125 %
098 9350-BHB X2	131.8031	26.3606	
099 9350-BHB X2+50	110.2300	-43.15%	60.63153 %
100 9350-1 X100	82.1640	821.6401	
101 9350-3 X100	100.5253	1005.2531	
102 9350-3 X100DUP	95.3474	953.4741	
103 9350-7 X100	97.5996	975.9960	
104 9350-7 X100+20	-1804.6735	-9511.37%	-1534.591 %
9350-9 X2000	-1804.9609	%-360992.1875	
9350-9 X2000+20	-1805.2109	-1.25%	101.1345 %
107 9350-7 X100	157.0307	1570.3070	
108 9350-7 X100+20	113.4959	-217.67%	64.11086 %
109 9350-9 X2000	219.9507	43990.1406	
110 9350-9 X2000+20	-1534.8481	-8773.99%	-639.6514 %
111 9350-9 X2000	83.3525	16670.5000	
112 9350-9 X2000+20	87.6178	21.33%	84.77569 %
113 DIL BLANK	231.4166		
114 QC=10PPB	87.1192		
115 QC=50PPB	118.7466		
116 9350-3 X100	88.8492	888.4920	
117 9350-3 X100DUP	207.6424	2076.4241	
118 DIL BLANK	135.5111		
119 QC=10PPB	109.9686		
120 QC=50PPB	48.1180		

Total ug = ppb x F V x dil / 1000

ANALYTE:Li 7

	PPB	PPB X DF X .1	PROTOCOL RECOVERY
091 D.L.	2.2062		
092 DIL BLANK	-0.0517		
093 QC=10PPB	9.3428		
094 QC=50PPB	45.0628		
095 D.L.	1.9553		
096 9350-FHB X2	-0.1220	-0.0244	
9350-FHB X2+50	51.7818	103.81%	103.8169 %
9350-BHB X2	-0.0499	-0.0100	
099 9350-BHB X2+50	50.8031	101.71%	101.7077 %
100 9350-1 X100	38.5844	385.8440 386	
101 9350-3 X100	47.5633	475.6330 Rerun	
102 9350-3 X100DUP	23.5833	235.8330	
103 9350-7 X100	19.3588	193.5880 ~~190~~ rev	

910

page 63 of 79

2291

105	9350-9 X2000	130.0148	26002.9590	
[illegible]	9350-9 X2000+20	134.6643	23.25%	89.76734 %
[illegible]	9350-7 X100	24.2695	242.6950 243.	
108	9350-7 X100+20	43.8076	97.69%	98.95661 %
109	9350-9 X2000	-0.0362	-7.2400	
110	9350-9 X2000+20	67.0071	335.22%	335.643 %
111	9350-9 X2000	-0.0401	-8.0200	
112	9350-9 X2000+20	19.2039	96.22%	96.21241 %
113	DIL BLANK	-0.0523		
114	QC=10PPB	9.4883		
115	QC=50PPB	46.3453		
116	9350-3 X100	48.4648	484.6480 485.	
117	9350-3 X100DUP	47.3656	473.6560 474	
118	DIL BLANK	-0.1212		
119	QC=10PPB	9.3834		
120	QC=50PPB	45.7712		

ANALYTE:Se 78

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
091	D.L.	2.0690		
092	DIL BLANK	-0.2996		
093	QC=10PPB	9.8549		
094	QC=50PPB	47.4042		
095	D.L.	1.9202		
096	9350-FHB X2	0.4928	0.0986	
[illegible]	9350-FHB X2+50	36.2064	71.43%	71.70607 %
[illegible]	9350-BHB X2	0.3502	0.0700	
099	9350-BHB X2+50	40.8146	80.93%	81.06145 %
100	9350-1 X100	33.6279	336.2790	
101	9350-3 X100	29.2773	292.7730	
102	9350-3 X100DUP	20.2424	202.4240	
103	9350-7 X100	51.4994	514.9940	
104	9350-7 X100+20	1325.2836	6368.92%	1853.559 %
105	9350-9 X2000	1354.0873	%270817.4688	
106	9350-9 X2000+20	1209.0110	-725.38%	87.98647 %
107	9350-7 X100	20.6997	206.9970	
108	9350-7 X100+20	39.7972	95.49%	97.78254 %
109	9350-9 X2000	29.2815	5856.3003	
110	9350-9 X2000+20	494.5729	2326.46%	1003.567 %
111	9350-9 X2000	30.8007	6160.1401 6160.	
112	9350-9 X2000+20	52.1240	106.62%	102.6049 %
113	DIL BLANK	-0.1226		
114	QC=10PPB	9.7568		
115	QC=50PPB	48.3457		
116	9350-3 X100	29.8025	298.0250	
117	9350-3 X100DUP	29.0295	290.2950	
118	DIL BLANK	-0.1288		
119	QC=10PPB	10.0722		
120	QC=50PPB	48.3602		

ANALYTE:Se 82

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
091	D.L.	1.9684		
092	DIL BLANK	-0.2093		
093	QC=10PPB	10.0555		
094	QC=50PPB	47.6219		
095	D.L.	2.0123		

911

page 64 of 79

229 I

[illegible]	9350-FHB X2+50	35.9217	71.71%	71.7474 %
[illegible]	9350-BHB X2	-0.1855	-0.0371	
[illegible]	9350-BHB X2+50	40.7125	81.80%	81.72822 %
100	9350-1 X100	34.0485	340.4850	
101	9350-3 X100	29.2460	292.4600	
102	9350-3 X100DUP	19.8657	198.6570	
103	9350-7 X100	51.4634	514.6340	
104	9350-7 X100+20	1.260E+04	62742.68%	17631.4 %
105	9350-9 X2000	1.328E+04	%2656000.0000	
106	9350-9 X2000+20	1.323E+04	-250.00%	99.47369 %
107	9350-7 X100	20.4233	204.2330	
108	9350-7 X100+20	40.3352	99.56%	99.78206 %
109	9350-9 X2000	29.2976	5859.5200	
110	9350-9 X2000+20	4600.1167	22854.09%	9331.319 %
111	9350-9 X2000	30.7097	6141.9399	
112	9350-9 X2000+20	52.3190	108.05%	103.1736 %
113	DIL BLANK	-0.1949		
114	QC=10PPB	9.8835		
115	QC=50PPB	48.4157		
116	9350-3 X100	30.1961	301.9610	
117	9350-3 X100DUP	29.1121	291.1210	
118	DIL BLANK	-0.1944		
119	QC=10PPB	10.0144		
120	QC=50PPB	47.8289		

912

NAME = 9350-M ON DRIVE A:
"Sample Date/Time:","Friday, February 19, 1999 17:00:30"
"Quantitative Analysis - Summary Report"
"Sample Description:"
"Solution Type:","Sample"
"Blank File:","C:\elandata\Dataset\02-20-99-1\Blank.120"
"Number of Replicates:",3
"Peak Processing Mode:","Average"
"Signal Profile Processing Mode:","Average"
"Dual Detector Mode:","Dual"
"Current Dead Time (ns):",60
"Acq. Dead Time(ns):",60
"Cumulative Autodilution Factor:",1
"Sample File:","c:\elandata\Sample\daily.sam"
"Method File:","C:\elandata\Method\dds.mth"
"Dataset File:","C:\elandata\Dataset\02-20-99-1\D.L.=2PPB.123"
"Tuning File:","default.tun"
"Optimization File:","default.dac"
"Calibration File:"
"Calibration Type:","External Calibration"
"Summary"
"Intensities"

Total ug = $\frac{\text{ppb} \times \text{FV} \times \text{dil}}{1000}$

ANALYTE:As 75

		INTENSITY	INTENSITY STD DEV	CONC.	CONC. STD DEV	UNITS	INT STD
1	D.L.=2PPB	1.7206	86.0%				
2	DIL BLANK	0.2419					
3	QC=10PPB	9.9128					
4	QC=50PPB	49.6750					
5	9350-BHB X2	-1.3998		-0.2800			
6	9350-BHBX2+50	43.2878	86.6%	89.38%			89.06918 %
7	9350-9 X2	-2.2022		-0.4404	<.500		
8	9350-9 X2+20	18.3256	91.6%	102.64%			102.9655 %
9	9350-9 X5	-0.7824		-0.3912			
10	9350-9 X5+20	18.8850		98.34%			98.26929 %
11	DIL BLANK	0.6355					
12	QC=10PPB	10.9481					
13	QC=50PPB	50.9065					

Total ug

ANALYTE:As 75

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
1	D.L.=2PPB	2.0514		
2	DIL BLANK	0.1308		
3	QC=10PPB	9.9260		
4	QC=50PPB	49.6056		
5	9350-BHB X2	-0.1883	-0.0377	
6	9350-BHBX2+50	45.1536	90.68%	90.64858 %
	9350-9 X2	32.4766	6.4953	
	9350-9 X2+20	42.9888	52.56%	81.91994 %
9	9350-9 X5	1.6203	0.8101	
10	9350-9 X5+20	24.9799	116.80%	115.5391 %
11	DIL BLANK	0.1415		
12	QC=10PPB	10.5259		
13	QC=50PPB	50.6374		

page labeled 7

ANALYTE:As 75

2291

		PPB	PPB X DF X .1	PROTOCOL RECOVERY
1	D.L.=2PPB	2.1708		
2	DIL BLANK	-0.0061		
3	QC=10PPB	9.8916		
4	QC=50PPB	49.6109		
5	9350-BHB X2	-0.1285	-0.0257	
6	9350-BHBX2+50	45.3481	90.95%	90.92989 %
7	9350-9 X2	-502.8260	-100.5652	
8	9350-9 X2+20	-519.9312	-85.53%	107.685 %
9	9350-9 X5	-212.3797	-106.1899	
10	9350-9 X5+20	-152.7841	297.98%	79.41798 %
11	DIL BLANK	-0.0722		
12	QC=10PPB	10.2481		
13	QC=50PPB	50.4905		

914

A.A. SUMMARY REPORT

CLIENT: TRIGON
P.O #: AM7909
ANALYST: JH/KEN SMITH JH
DATE: 02/12/99

ELEMENT: Ca

X	
	WT. STDS
	CONC STDS
.100	INST LIMIT(ABS ug/mL
4	SPK LEVEL(ug/mL)
1.00	MAX ALIQUOT(mL)
TOTAL ug	UNITS OF ANSWER

229 1'

X ug IN EACH STD SOLUTION	Y STD ABS	0 X^2	0 X*Y	0 Y^2	AVG (X)	AVG (Y)
0.00	0	0	0	0	2.3333333	2.363333333
2.00	2.09	4	4.18	4.3681	SXX	SXY
5.00	5	25	25	25	12.666667	12.63666667
		0	0	0	B1	Bo
		0	0	0	.99763158	.0355263158
		0	0	0		
		0	0	0	X=(AVG Y-B1)/Bo	
		0	0	0		
7	7.09	29	29.18	29.3681		

SAMPLE I.D.	Y SAMP ABS	ug PER ALIQUOT	Ml ALIQUOT	F.V. X DILUTION	RESULTS TOTAL ug	< AMT OR % SPK REC	
[illegible]-001	2.40	2.3701	1	111	263		
[illegible]-002	.340	.3052	1	111	33.9		
9350-003	2.30	2.2698	1	111	252		
9350-004-#3DUP	2.30	2.2698	1	111	252		
9350-005	.340	.3052	1	111	33.9		
9350-006-#5DUP	.340	.3052	1	111	33.9		
9350-007	1.10	1.0670	1	222	237		
9350-008-#7SPK	2.90	2.8713	1	222	637	90.2	2
9350-009	.270	.2350	1	111	26.1		
9350-010-#9SPK	3.95	3.9238	1	111	436	92.2	4
9350-011	.600	.5658	1	111	62.8		
9350-012	.365	.3303	1	111	36.7		
9350-013	.780	.7462	1	111	82.8		
9350-014-#13DUP	.775	.7412	1	111	82.3		
9350-015	.380	.3453	1	111	38.3		
9350-016-#15DUP	.380	.3453	1	111	38.3		
9350-017	.870	.8365	1	111	92.8		
9350-018-#17SPK	4.70	4.6755	1	111	519	96.0	4
9350-019	.385	.3503	1	111	38.9		
9350-020-#19SPK	4.44	4.4149	1	111	490	102	4
9350-021	.340	.3052	1	111	33.9		
9350-022	.340	.3052	1	111	33.9		
9350-023	.260	.2250	1	111	25.0		
9350-024	.240	.2050	1	111	22.8		
9350-FHBLK	.071	.0356	1	111	<	11.1	
9350-FHBLK-SPK	1.11	1.0770	1	111	120	94.5	1.1
[illegible]-BHBLK	.090	.0546	1	111	<	11.1	
[illegible]-BHBLK-SPK	1.15	1.1171	1	111	124	96.4	1.1

915

page 68 of 79

229 1

					RESULTS ug/mL
=5.00 ug/mL	5.01	4.9863	1	1	4.99
2.00=2.00 ug/mL	2.10	2.0694	1	1	2.07
2.00=2.00 ug/mL	2.10	2.0694	1	1	2.07
DL=.100 ug/mL	.133	.0977	1	1	.098
DL=.100 ug/mL	.137	.1017	1	1	.102
DL=.100 ug/mL	.137	.1017	1	1	.102
DL=.100 ug/mL	.129	.0937	1	1	.094
DL=.100 ug/mL	.141	.1057	1	1	.106
DL=.100 ug/mL	.132	.0967	1	1	.097
QC=1.00 ug/mL	1.07	1.0369	1	1	1.04
QC=1.00 ug/mL	1.08	1.0470	1	1	1.05
QC=1.00 ug/mL	1.06	1.0269	1	1	1.03

916

page 69 of 79

2291

A.A. SUMMARY REPORT

CLIENT: TRIGON
P.O #: AM7909
ANALYST: JH/KEN SMITH JH
DATE: 02/11/99 ELEMENT: Fe

X	WT. STDS CONC STDS
.100	INST LIMIT(ABS ug/mL
1.1	SPK LEVEL(ug/mL)
1.00	MAX ALIQUOT(mL)
TOTAL ug	UNITS OF ANSWER

X ug IN EACH STD SOLUTION	Y STD ABS	0 X^2	0 X*Y	0 Y^2	AVG (X)	AVG (Y)
0.00	0	0	0	0	2.3333333	2.35
2.00	2.05	4	4.1	4.2025	SXX	SXY
5.00	5	25	25	25	12.666667	12.65
		0	0	0	B1	Bo
		0	0	0	.99868421	.0197368421
		0	0	0		
		0	0	0	X=(AVG Y-B1)/Bo	
		0	0	0		
7	7.05	29	29.1	29.2025		

^ SAMPLE I.D.	Y SAMP ABS	ug PER ALIQUOT	Ml ALIQUOT	F.V. X DILUTION	RESULTS TOTAL ug	< AMT OR % SPK REC	
[illegible]-001	4.15	4.1357	1	100	414		
[illegible]-002	.210	.1905	1	100	19.1		
9350-003	1.80	1.7826	1	100	178		
9350-004-#3DUP	1.80	1.7826	1	100	178		
9350-005	.230	.2105	1	100	21.1		
9350-006-#5DUP	.230	.2105	1	100	21.1		
9350-007	1.35	1.3320	1	100	133		
9350-008-#7SPK	3.55	3.5349	1	100	353	110	2
9350-009	.099	.0794	1	100	<	10.0	
9350-010-#9SPK	2.35	2.3333	1	100	233	113	2
9350-011	.250	.2306	1	100	23.1		
9350-012	.150	.1304	1	100	13.0		
9350-013	.235	.2155	1	100	21.6		
9350-014-#13DUP	.230	.2105	1	100	21.1		
9350-015	.170	.1505	1	100	15.0		
9350-016-#15DUP	.170	.1505	1	100	15.0		
9350-017	.330	.3107	1	100	31.1		
9350-018-#17SPK	2.60	2.5837	1	100	258	114	2
9350-019	.270	.2506	1	100	25.1		
9350-020-#19SPK	2.55	2.5336	1	100	253	114	2
9350-021	.125	.1054	1	100	10.5		
9350-022	.130	.1104	1	100	11.0		
9350-023	.060	.0403	1	100	<	10.0	
9350-024	.050	.0303	1	100	<	10.0	
9350-FHBLK	.020	.0003	1	100	<	10.0	
9350-FHBLK-SPK	1.20	1.1818	1	100	118	107	1.1
[illegible]-BHBLK	.020	.0003	1	100	<	10.0	
[illegible]0-BHBLK-SPK	1.20	1.1818	1	100	118	107	1.1

917

					RESULTS ug/mL
[illegible]=2.00 ug/mL	2.05	2.0329	1	1	2.03
2.00=2.00 ug/mL	2.06	2.0430	1	1	2.04
2.00=2.00 ug/mL	2.00	1.9829	1	1	1.98
DL=.100 ug/mL	.112	.0924	1	1	.092
DL=.100 ug/mL	.113	.0934	1	1	.093
DL=.100 ug/mL	.113	.0934	1	1	.093
DL=.100 ug/mL	.112	.0924	1	1	.092
DL=.100 ug/mL	.113	.0934	1	1	.093
QC=1.00 ug/mL	1.10	1.0817	1	1	1.08
QC=1.00 ug/mL	1.09	1.0717	1	1	1.07
QC=1.00 ug/mL	1.10	1.0817	1	1	1.08
QC=1.00 ug/mL	1.10	1.0817	1	1	1.08

page 71 of 79

2291

A.A. SUMMARY REPORT

CLIENT: TRIGON
P.O #: AM7909
ANALYST: JH/KEN SMITH JH
DATE: 02/11/99

ELEMENT: K

X	WT STDS
CONC STDS	
.050	INST LIMIT(ABS ug/mL
1	SPK LEVEL(ug/mL)
1.00	MAX ALIQUOT(mL)
TOTAL ug	UNITS OF ANSWER

X ug IN EACH STD SOLUTION	Y STD ABS	X^2	X*Y	Y^2	AVG (X)	AVG (Y)
		0	0	0		
0.00	0	0	0	0	1	.985
1.00	.955	1	.955	.912025	SXX	SXY
2.00	2	4	4	4	2	2
		0	0	0	B1	Bo
		0	0	0	1	-.015
		0	0	0		
		0	0	0	X=(AVG Y-B1)/Bo	
		0	0	0		
3	2.96	5	4.955	4.912025		

SAMPLE I.D.	Y SAMP ABS	ug PER ALIQUOT	Ml ALIQUOT	F.V. X DILUTION	RESULTS TOTAL ug	< AMT OR % SPK REC	
9350-001	1.35	1.3650	1	200	273		
9350-002	.220	.2350	1	100	23.5		
9350-003	1.50	1.5150	1	200	303		
9350-004-#3DUP	1.50	1.5150	1	200	303		
9350-005	.275	.2900	1	100	29.0		
9350-006-#5DUP	.275	.2900	1	100	29.0		
9350-007	1.30	1.3150	1	100	132		
9350-008-#7SPK	1.70	1.7150	1	100	172	100	.4
9350-009	.170	.1850	1	100	18.5		
9350-010-#9SPK	.570	.5850	1	100	58.5	100	.4
9350-011	.345	.3600	1	100	36.0		
9350-012	.220	.2350	1	100	23.5		
9350-013	.345	.3600	1	100	36.0		
9350-014-#13DUP	.340	.3550	1	100	35.5		
9350-015	.205	.2200	1	100	22.0		
9350-016-#15DUP	.205	.2200	1	100	22.0		
9350-017	.365	.3800	1	100	38.0		
9350-018-#17SPK	.740	.7550	1	100	75.5	93.8	.4
9350-019	.225	.2400	1	100	24.0		
9350-020-#19SPK	.640	.6550	1	100	65.5	104	.4
9350-021	.245	.2600	1	100	26.0		
9350-022	.240	.2550	1	100	25.5		
9350-023	.060	.0750	1	100	7.50		
9350-024	.100	.1150	1	100	11.5		
9350-FHBLK	.043	.0580	1	100	5.80		
9350-BHBLK	.045	.0600	1	100	6.00		
9350-LBLK	.002	.0170	1	100	<	5.00	.4
9350-LBLK-SPK	.391	.4060	1	100	40.6	97.3	.4

919

					RESULTS ug/mL
=1.00 ug/mL	.955	.9700	1	1	.970
1.00=1.00 ug/mL	.950	.9650	1	1	.965
1.00=1.00 ug/mL	.960	.9750	1	1	.975
DL=.050 ug/mL	.049	.0640	1	1	.064
DL=.050 ug/mL	.045	.0600	1	1	.060
DL=.050 ug/mL	.050	.0650	1	1	.065
QC=.500 ug/mL	.488	.5030	1	1	.503
QC=.500 ug/mL	.500	.5150	1	1	.515
QC=.500 ug/mL	.500	.5150	1	1	.515

A.A. SUMMARY REPORT

C[redacted]NT: TRIGON
P.O #: AM7909
ANALYST: JH/KEN SMITH JH
DATE: 02/12/99 ELEMENT: Mg

X	
	WT. STDS
	CONC STDS
.050	INST LIMIT(ABS ug/mL
.25	SPK LEVEL(ug/mL)
1.00	MAX ALIQUOT(mL)
TOTAL ug	UNITS OF ANSWER

X ug IN EACH STD SOLUTION	Y STD ABS	0 X^2	0 X*Y	0 Y^2	AVG (X)	AVG (Y)
0.00	0	0	0	0	.25	.2506666667
.25	.252	.0625	.063	.063504	SXX	SXY
.50	.5	.25	.25	.25	.125	.125
		0	0	0	B1	Bo
		0	0	0	1	.0006666667
		0	0	0		
		0	0	0	X=(AVG Y-B1)/Bo	
		0	0	0		
.75	.752	.3125	.313	.313504		

SAMPLE I.D.	Y SAMP ABS	ug PER ALIQUOT	Ml ALIQUOT	F.V. X DILUTION	RESULTS TOTAL ug	< AMT OR % SPK REC	
[redacted]-001	.310	.3093	1	222	68.7		
[redacted]002	.065	.0643	1	111	7.14		
[redacted]-003	.270	.2693	1	222	59.8		
9350-004-#3DUP	.270	.2693	1	222	59.8		
9350-005	.065	.0643	1	111	7.14		
9350-006-#5DUP	.065	.0643	1	111	7.14		
9350-007	.220	.2193	1	222	48.7		
9350-008-#7SPK	.445	.4443	1	222	98.6	90.0	.25
9350-009	.045	.0443	1	111	<	5.55	
9350-010-#9SPK	.290	.2893	1	111	32.1	98.0	.25
9350-011	.110	.1093	1	111	12.1		
9350-012	.040	.0393	1	111	<	5.55	
9350-013	.100	.0993	1	111	11.0		
9350-014-#13DUP	.100	.0993	1	111	11.0		
9350-015	.060	.0593	1	111	6.59		
9350-016-#15DUP	.055	.0543	1	111	6.03		
9350-017	.165	.1643	1	111	18.2		
9350-018-#17SPK	.400	.3993	1	111	44.3	94.0	.25
9350-019	.045	.0443	1	111	<	5.55	
9350-020-#19SPK	.295	.2943	1	111	32.7	100	.25
9350-021	.070	.0693	1	111	7.70		
9350-022	.065	.0643	1	111	7.14		
9350-023	.020	.0193	1	111	<	5.55	
9350-024	.040	.0393	1	111	<	5.55	
9350-FHBLK	.009	.0083	1	111	<	5.55	
9350-FHBLK-SPK	.200	.1993	1	111	22.1	109	.176
[redacted]BHBLK	.025	.0243	1	111	<	5.55	
[redacted]BHBLK-SPK	.210	.2093	1	111	23.2	105	.176

					RESULTS ug/mL
[illegible]200 ug/mL	.190	.1893	1	1	.189
QC=.200 ug/mL	.190	.1893	1	1	.189
QC=.200 ug/mL	.196	.1953	1	1	.195
QC=.200 ug/mL	.195	.1943	1	1	.194
QC=.200 ug/mL	.190	.1893	1	1	.189
.250=.250 ug/mL	.252	.2513	1	1	.251
DL=.050 ug/mL	.052	.0513	1	1	.051
DL=.050 ug/mL	.050	.0493	1	1	.049
DL=.050 ug/mL	.052	.0513	1	1	.051
DL=.050 ug/mL	.053	.0523	1	1	.052
DL=.050 ug/mL	.054	.0533	1	1	.053

page 75 of 79

2291

A.A. SUMMARY REPORT

CLIENT: TRIGON
P.O #: AM7909
ANALYST: JH/KEN SMITH JH
DATE: 02/13/99 ELEMENT: Na

X	
	WT. STDS
	CONC STDS
.050	INST LIMIT(ABS ug/mL
.25	SPK LEVEL(ug/mL)
1.00	MAX ALIQUOT(mL)
ug/L	UNITS OF ANSWER

X ug IN EACH STD SOLUTION	Y STD ABS	0 X^2	0 X*Y	0 Y^2	AVG (X)	AVG (Y)
0.00	0	0	0	0	.5	.5033333333
.50	.51	.25	.255	.2601	SXX	SXY
1.00	1	1	1	1	.5	.5
		0	0	0	B1	Bo
		0	0	0	1	.0033333333
		0	0	0		
		0	0	0	X=(AVG Y-B1)/Bo	
		0	0	0		
1.5	1.51	1.25	1.255	1.2601		

SAMPLE I.D.	Y SAMP ABS	ug PER ALIQUOT	Ml ALIQUOT	F.V. X DILUTION	RESULTS ug/L	< AMT OR % SPK REC	
[illegible]-001	.805	.8017	1	2000	1603		
[illegible]-002	.280	.2767	1	1000	277		
9350-003	.925	.9217	1	2000	1843		
9350-004-#3DUP	.930	.9267	1	2000	1853		
9350-005	.300	.2967	1	1000	297		
9350-006-#5DUP	.295	.2917	1	1000	292		
9350-007	.575	.5717	1	2000	1143		
9350-008-#7SPK	.820	.8167	1	2000	1633	98.0	.25
9350-009	.260	.2567	1	1000	257		
9350-010-#9SPK	.520	.5167	1	1000	517	104	.25
9350-011	.265	.2617	1	1000	262		
9350-012	.290	.2867	1	1000	287		
9350-013	.325	.3217	1	1000	322		
9350-014-#13DUP	.320	.3167	1	1000	317		
9350-015	.340	.3367	1	1000	337		
9350-016-#15DUP	.335	.3317	1	1000	332		
9350-017	.280	.2767	1	1000	277		
9350-018-#17SPK	.525	.5217	1	1000	522	98.0	.25
9350-019	.270	.2667	1	1000	267		
9350-020-#19SPK	.525	.5217	1	1000	522	102	.25
9350-021	.485	.4817	1	100	48.2		
9350-022	.470	.4667	1	100	46.7		
9350-023	.300	.2967	1	500	148		
9350-024	.411	.4077	1	500	204		
9350-FHBLK	.090	.0867	1	200	17.3		
9350-BHBLK	.080	.0767	1	200	15.3		
[illegible]-LBLK	.007	.0037	1	10	<	.500	
[illegible]-LBLK-SPK	.254	.2507	1	10	2.51	98.8	.25

923

page 76 of 79

2291

					RESULTS ug/mL
=.500 ug/mL	.511	.5077	1	1	.508
.500=.500 ug/mL	.518	.5147	1	1	.515
.500=.500 ug/mL	.516	.5127	1	1	.513
.500=.500 ug/mL	.517	.5137	1	1	.514
.500=.500 ug/mL	.490	.4867	1	1	.487
.500=.500 ug/mL	.514	.5107	1	1	.511
1.00=1.00 ug/mL	.995	.9917	1	1	.992
1.00=1.00 ug/mL	.995	.9917	1	1	.992
DL=.050 ug/mL	.058	.0547	1	1	.055
DL=.050 ug/mL	.055	.0517	1	1	.052
DL=.050 ug/mL	.058	.0547	1	1	.055
DL=.050 ug/mL	.058	.0547	1	1	.055
QC=.500 ug/mL	.520	.5167	1	1	.517
QC=.500 ug/mL	.521	.5177	1	1	.518

2291

A.A. SUMMARY REPORT

CLIENT: TRIGON
P.O #: AM7909
ANALYST: JH/KEN SMITH JH
DATE: 02/11/99

ELEMENT: Si

X	WT. STDS
	CONC STDS
1.000	INST LIMIT(ABS ug/mL
1	SPK LEVEL(ug/mL)
1.00	MAX ALIQUOT(mL)
TOTAL ug	UNITS OF ANSWER

X ug IN EACH STD SOLUTION	Y STD ABS	0 X^2	0 X*Y	0 Y^2	AVG (X)	AVG (Y)
0.00	0	0	0	0	20	20
10.00	10	100	100	100	SXX	SXY
50.00	50	2500	2500	2500	1400	1400
		0	0	0	B1	Bo
		0	0	0	1	0
		0	0	0		
		0	0	0	X=(AVG Y-B1)/Bo	
		0	0	0		
60	60	2600	2600	2600		

SAMPLE I.D.	Y SAMP ABS	ug PER ALIQUOT	Ml ALIQUOT	F.V. X DILUTION	RESULTS TOTAL ug	< AMT OR % SPK REC	
[illegible]-002	1.20	1.2000	1	100	120		
[illegible]-005	2.90	2.9000	1	100	290		
9350-006-#5DUP	2.80	2.8000	1	100	280		
9350-009	1.00	1.0000	1	100	100		
9350-010-#9SPK	5.10	5.1000	1	100	510	103	4
9350-012	1.80	1.8000	1	100	180		
9350-015	2.10	2.1000	1	100	210		
9350-016-#15DUP	1.90	1.9000	1	100	190		
9350-019	1.30	1.3000	1	100	130		
9350-020-#19SPK	5.30	5.3000	1	100	530	100	4
9350-024	1.40	1.4000	1	100	140		
9350-BHBLK	.700	.1000	1	100	<	100	
9350-BHBLK-SPK	1.10	1.1000	1	100	110	110	1

					RESULTS ug/mL
10.0=10.0 ug/mL	9.99	9.9900	1	1	9.99
5.00=5.00 ug/mL	4.80	4.8000	1	1	4.80
5.00=5.00 ug/mL	5.00	5.0000	1	1	5.00
DL=1.00 ug/mL	1.00	1.0000	1	1	1.00
DL=1.00 ug/mL	.900	.9000	1	1	.900
DL=1.00 ug/mL	1.10	1.1000	1	1	1.10
DL=1.00 ug/mL	.900	.9000	1	1	.900
DL=1.00 ug/mL	.900	.9000	1	1	.900

OXFORD LABORATORY INC.

WET LAB NARRATIVE SUMMARY OLI #:99W9350
REPORT DATE: 02-15-99

CLIENT: TRIGON
PROJECT #: 046-98-158
SAMPLE ARRIVAL DATE:01-25-99 CHAIN OF CUSTODY: YES
SAMPLE ARRIVAL CONDITION/COMMENT: SHIPPED via: PRIORITY TRANSPORT
NO PROBLEMS NOTED

OBSERVED DISCREPANCY/COMMENT: NONE

INSTRUMENTATION USED:
CLASS A GLASSWARE
PRECISION SCIENTIFIC OVEN
METTLER FOUR-PLACE BALANCE
HOTPLATE

SAMPLE ANALYSIS:

SAMPLE #	REQUEST	METHOD
01-03,05,07		
09,11-13,15		
17,19,21-24	SULFATE, AS SULFUR	STD METHODS (18TH ED.) 4500D

QUALITY CONTROL: A 226 PPM QC SAMPLE WAS CARRIED THROUGH THE THE RECOVERY RANGE OF 90-110 PERCENT WAS MET. A LABORATORY BLANK WAS ALSO PERFORMED, WITH NO WEIGHT GAIN OBSERVED.

SPIKE REQUIREMENTS: SPIKE RECOVERY OF 90-110 PERCENT HAS BEEN MET WITH THE FOLLOWING EXCEPTION; SAMPLE MATRIX PROHIBITS SPIKING

FOR DUPLICATES: RELATIVE PERCENT DIFFERENCE OF + OR - 10 PERCENT WERE MET WITH THE FOLLOWING EXCEPTIONS: SAMPLE MATRIX PROHIBITS DUPLICATION

ADDITIONAL COMMENTS:
THE FINAL VOLUMES USED IN CALCULATIONS WERE 100 mL

CALCULATIONS FOR TOTAL uG REPORTED:

$$\frac{\text{WEIGHT GAIN (g)} * 0.1374 * 100 * 10000 * FV}{\text{ALIQUOT USED (mL)}} = \text{TOTAL uG S}$$

VBJ

page 79 of 79

229 F

SULFATE, AS S

GRAVIMETRIC

ANALYST: BILL JEFFERSON
DATE: 2/13-15/99
TIME: 200-300
CLIENT: TRIGON

0 BLANK IN GRAMS
S DOING (SO4-S HZSO4-SO2)
.1374 GRAVIMETRIC FACTOR
.001 MIN WT GAIN

SAMPLE I.D.	SAM SIZE ML or G.	TARE	FINAL WT	< WT. GAIN	ERR PPM S	X TOTAL VOLUME	= TOTAL uG S
9350-1	40.0000	24.2934	24.2965	.0031	10.65	100.00	1070
9350-2	40.0000	22.9475	23.0132	.0657	225.68	100.00	22600
9350-3	40.0000	24.4292	24.4332	.0040	13.74	100.00	1370
9350-5	40.0000	22.8887	22.9465	.0578	198.54	100.00	19900
9350-7	40.0000	22.9679	22.9708	.0029	9.96	100.00	996
9350-9	40.0000	23.5097	23.6023	.0926	318.08	100.00	31800
9350-11	40.0000	20.2662	20.2670	<	3.44	100.00	< 344
9350-12	40.0000	23.8498	23.8630	.0132	45.34	100.00	4530
9350-13	40.0000	22.1443	22.1448	<	3.44	100.00	< 344
9350-15	40.0000	21.5499	21.5666	.0167	57.36	100.00	5740
9350-17	40.0000	24.7745	24.7755	.0010	3.44	100.00	344
9350-19	40.0000	22.2551	22.2808	.0257	88.28	100.00	8830
9350-21	40.0000	21.7642	21.7642	<	3.44	100.00	< 344
9350-22	40.0000	22.9210	22.9220	.0010	3.44	100.00	344
9350-23	40.0000	23.7698	23.7699	<	3.44	100.00	< 344
9350-24	40.0000	24.9921	24.9921	<	3.44	100.00	< 344
226 PPM OC	20.0000	22.8902	22.9230	.0328	225.34		
BLK	100.0000	24.2111	24.2111	<	1.37		

927

Trigon Engineering Consultants, Inc. *Chain of Custody* Sampler's Signature Paul Mankin

Company: EnVitCo	Laboratory: ~~[illegible]~~ Oxford Labs.	No. of Containers: M5 29 28 Total	Sampling Methods: 5/29
City, State: Anderson, SC	Project No. 046-98-158	M29 22 Total	
Contact: Ken Bob Hewlett	Purchase Order No. AM7909		

Sample Description	Sample ID	Date	Time	Sample Disposition and Remarks
Melter Run 1 Filter # Q147	8158-08	1-20-99	1000-1102	Each sample consists of one
Run 2 Filter # Q148	8158-09		1150-1252	petri dish with filter, two
Run 3 Filter # Q152	8158-10		1402-1505	250 ml amber bottles and one
Stack Run 1 Filter # Q149	8158-11		1000-1100	1000 ml amber bottle.
Run 2 Filter # Q150	8158-12		1150-1250	one amber bottle contains the
Run 3 Filter # Q151	8158-13		1402-1502	acetone rinse of front half, the
Field Blank Filter # Q153	8158-14a		1220	other 250 ml amber bottle contains
Filter Q154	8158-14b		1220	the 0.1 N nitric acid rinse
Oxford Labs: Note acetone	fraction			from the front half. The 1000 ml
has been analyzed for particulate				amber bottle containing the
matter - reconstituted with	0.1 N HNO_3			back half fraction. Each
and added to front half	nitric rinse.			bottle is labeled according
No. of containers = 22 for Oxford				to designation in Method 29.

Relinquished By:	Date/Time	Received By:	Date/Time
Paul Mankin	01/25/99 0800		/
Relinquished By:	Date/Time	Received By:	Date/Time
	/		/
Received for Laboratory By:	Date/Time	Analyze for the Following Compounds: Al, As, Ba, Ca, Cd, Cr, Fe, K, Li, Mg, Mo, Na, Ni, P, Pb, S, Se, Si, V and Zn	
	/		

2291

928

Trigon Engineering Consultants, Inc. *Chain of Custody* **Sampler's Signature** _____

Company: ENVITCO City, State: Anderson, SC Contact: ~~Rob~~ Bob Hewlett	Laboratory: Trigon AQL Project No. 046-98-158 Purchase Order No. NA	No. of Containers: 7 ea 80% IPA 7 ea 3% H_2O_2	Sampling Methods: 8

Sample Description	Sample ID	Date	Time	Sample Disposition and Remarks
Melter Run 1	8158-01	01/19/99	1254-1358	Each sample consists of
Run 2	8158-02	01/19/99	1442-1555	two bottles: 1-250 ml
Run 3	8158-03	01/19/99	1620-1727	HDPE bottle - 80% IPA for
Run 4	8158-04	01/19/99	1750-1853	determination of H_2SO_4 including
Run 5	8158-05	01/19/99	1912-2014	SO_3 and 1-1,000 ml HDPE
Run 6	8158-06	01/19/99	2028-2130	bottle - 3% H_2O_2 (w/ DI Rinse)
Field Blank	8158-07	01/19/99	1955	for determination of SO_2 -

Relinquished By:	Date/Time	Received By:	Date/Time
	/		/
Relinquished By:	**Date/Time**	**Received By:**	**Date/Time**
	/		/
Received for Laboratory By:	**Date/Time**	**Analyze for the Following Compounds:** Sulfuric Acid Mist and Sulfur Dioxide per Method 8	
	/		
	/		

CALIBRATION DATA

930

TRIGON

QUALITY ASSURANCE AND EQUIPMENT CALIBRATION PROCEDURES

General. Each item of field or laboratory test equipment purchased or fabricated by Trigon Engineering Consultants is assigned a unique, permanent identification number. New items for which calibration is required are calibrated before initial field use. Equipment whose calibration status may change with use or with time is inspected in the field before testing begins, and again upon return from each field use. When an item of equipment is found to be out of calibration, it is adjusted and recalibrated or retired from service. All equipment is periodically recalibrated in full, regardless of the outcome of these regular inspections.

Calibrations are conducted in accordance with United States Environmental Protection Agency (US EPA) specifications. Trigon follows the calibration procedures outlined in EPA Reference Methods found in the Code of Federal Regulations (Volume 40, Part 60) and those recommended in the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA/600/R-94/038c). When the Reference Methods do not detail procedures, Trigon uses methods such as those prescribed by the American Society for Testing and Materials (ASTM).

Data obtained during calibrations are recorded on standardized forms, which are verified for completeness and accuracy by the Quality Assurance Manager. Data reduction and subsequent calculations are performed using Trigon's Air Quality Data System. Calibration calculations are performed by an environmental scientist, independently audited by the Project Manager, and reviewed by the Quality Assurance Manager for verification of data. Copies of calibration data are included in each test or project report.

Inspection and Maintenance. An effective preventative maintenance program is necessary to ensure equipment performance quality prior to, during, and following every test. Each item of equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned, and recalibrated when necessary.

Each item of equipment transported to the field for a test project is inspected again prior to being packed. Trigon performs these quality assurance checks prior to departure for the project site to detect equipment problems which may occur during periods of storage. Trigon transports adequate back-up equipment to each project so as to avoid any unforeseen circumstances.

Calibration. Source sampling equipment that require calibration include nozzles, pitot tubes, thermometers, flow meters, dry gas meters, and barometers. The following sections detail the calibration procedures followed by Trigon for each item.

931

TRIGON

Nozzles. Each probe nozzle is uniquely and permanently identified at the time of purchase or fabrication, and it is calibrated before initial field use and prior to each test. The inside diameter of the nozzle is measured to the nearest 0.001 inch using a precision jeweled micrometer. Three measurements are made using different diameters each time. If the difference between the high and the low measurements do not exceed 0.004 inch, the average of the three measurements is used. If the difference exceeds this amount, or when the nozzle becomes nicked, dented, or corroded, the nozzle is reshaped, sharpened, and recalibrated. Regardless of usage, all nozzles are inspected and recalibrated on a yearly basis.

Pitot Tubes. All Trigon Type S pitot tubes have been constructed and calibrated in strict accordance with EPA Reference Method 2, Calibration Procedures 2 and 2a. Trigon Type S pitot tubes C_p coefficients have been determined according Calibration Procedure 2a.. Trigon standard pitot tubes have been assigned a C_p coefficient of 0.99 according to Calibration Procedure 2. Each pitot tube is visually inspected prior to any field use. If the inspection indicates damage, it is recalibrated. Regardless of usage, all pitot tubes are inspected and recalibrated on a yearly basis.

Dry Gas Meter and Orifice. Each metering system receives a full calibration at the time of purchase and annually, thereafter. Post-test calibrations are performed after each source test. If the calibration factor, γ (gamma), deviates by less than five percent from the initial value, the test data are acceptable. If γ deviates by more than five percent, the meter is recalibrated and the meter coefficient (initial or recalibrated) that yields the lowest sample volume for the test runs is used. Standard practice at Trigon is to recalibrate the dry gas meter anytime γ is found to be outside the range of $0.98 \leq \gamma \leq 1.02$.

Barometer. Each field barometer is calibrated to agree within $\pm$ 0.1 inches Hg of a reference mercury barometer. The barometric pressure is corrected for pressure and temperature. Prior to and following each field test the field barometer is verified.

Thermometers. Each new thermometer, pyrometer and thermocouple purchased or fabricated by Trigon is calibrated in strict accordance with US EPA Protocol. Calibration tolerance limits are as follow:

Impinger Temperature Gauge	±1°C or 2°F
Dry Gas Meter Temperature Gauge	±3°C or 5.4°F
Stack Thermocouples	±1.5% of absolute temperature

All thermometers and thermocouples are inspected and calibrated prior to and following each field test. Regardless of usage, all thermometers and thermocouples are inspected and recalibrated on a yearly basis.

Laboratory Equipment. Trigon Engineering Consultants has a written quality assurance document that covers calibration and maintenance of laboratory equipment. This includes calibration of each analytical balance against Class S weights. Calibration of thermometers, barometers, and wet test meters are traceable to NIST. A copy of our quality assurance document may be obtained by written request.

PRETEST - POSTEST CALIBRATION DATA FORM

Client ENVITCO City/State CLEMSON, SC 2291

Pretest Date 01-15-99 JPK Calibrator JPK Postest Date 02-01-99 Calibrator JPK

Reference Thermometer 100.022 Reference Barometer 600.003

	Pretest		Postest	
	Temperature, °F	Ref. Temp., °F	Temperature, °F	Ref. Temp., °F
Omega Red Team DB/WB #100.025	62/62	62	58/58	58
Omega Green Team DB/WB #100.031				
Omega Blue Team DB/WB #100.017				
Omega Gold Team DB/WB #100.032	63/62	62	59/58	58
Omega Grev Team DB/WB #100.033				
Omega CEM DB/WB #100.026				
Drv Gas Meter Inlet/Outlet #300.035				
Drv Gas Meter Inlet/Outlet #300.045	62/62	62	58/58	58
Drv Gas Meter Inlet/Outlet #300.067				
Drv Gas Meter Inlet/Outlet #300.100				
Drv Gas Meter Inlet/Outlet #300.200	61/62	62	57/58	58
Drv Gas Meter Inlet/Outlet #300.214				
Drv Gas Meter Inlet/Outlet #300.241				
Drv Gas Meter Inlet/Outlet #300.248				
Drv Gas Meter Inlet/Outlet #300.				
Drv Gas Meter Inlet/Outlet #300.				
Umbilical Adaptor # 3 #300.032	61	62	58	58
Umbilical Adaptor # 1 #300.030	61	62	58	58
Umbilical Adaptor # 4 #300.042	61	62	58	58
Umbilical Adaptor # 10 #300.355	62	62	58	58
Umbilical Adaptor # #300.				
Umbilical Adaptor # #300.				
Probe #200.				
Probe #200.				
Probe #200.066	61	62	58	58
Probe #200.049	62	62	58	58
Probe #200.036	61	62	58	58
Probe #200.037	61	62	58	58
Pitot #200.039				
Pitot #200.				
	Field Baro., in. Hg	Ref. Baro., in. Hg	Field Baro., in. Hg	Ref. Baro., in. Hg
Barometer Red Team #600.001				
Barometer Green Team #600.014				
Barometer Blue Team #600.010				
Barometer Gold Team #600.021(D)				
Barometer CEM #600.020(D)	29.21	29.21	29.15	29.140

Were all postest calibrations within the specified EPA Quality Assurance criteria? ☐ Yes ☐ No

933

TRIGON

ISOKINETIC CONTROL CONSOLE CALIBRATION FORM

Console Number:	300.045	Calibrator:	PRJ
Calibration Date:	12/10/98	Dry Gas Meter Number:	009421
Expiration Date:	12/10/99	Barometric Pressure, in. Hg:	29.476

Console	*Gas Volume*		*Meter Temperatures*				*Time*	*Console*	
Orifice Setting ΔH in. H_2O	Wet Test Meter V_w ft^3	Dry Gas Meter V_d ft^3	Wet Test Meter t_w °F	Dry Gas Meter Inlet t_{di} °F	Dry Gas Meter Outlet t_{do} °F	DGM Avg. t_d °F	θ Minutes	DGM Factor γ	Orifice Meter $\Delta H_@$ in. H_2O
0.50	5	5.06	67.7	79.0	73.0	76.0	12.63	1.002	1.783
1.00	5	5.08	67.7	83.0	77.0	80.0	9.03	1.005	1.809
1.50	10	10.20	67.7	86.0	79.0	82.5	14.85	1.004	1.826
2.00	10	10.22	68.1	88.0	81.0	84.5	12.95	1.004	1.848
3.00	10	10.23	68.2	91.0	83.0	87.0	10.66	1.005	1.870
4.00	10	10.23	68.2	93.0	84.0	88.5	9.26	1.005	1.876
							Average	**1.00**	**1.84**

	γ	$\Delta H_@$
Tolerances:	1.00	1.84
	$\pm$ 0.02	$\pm$ 0.15

γ and $\Delta H_@$ are calculated as follows:

$$\gamma = \frac{V_w * P_b \bullet (t_d + 460)}{V_d \bullet (P_b + \Delta H/13.6) * (t_w + 460)} = 1.00$$

$$\Delta H_@ = \frac{0.0317 * \Delta H}{P_b \bullet (t_d + 460)} * \left(\frac{(t_w + 460) * \theta}{V_w}\right)^2 = 1.84$$

934

TRIGON

ISOKINETIC CONSOLE CALIBRATION DATA SHEET

2291

Client:	EnVit Co	**City, State/Location:**	Clemson SC, M5/29	**EHS Div. Project No:**	046-98-158
Date:	02/02/99	**Baro. Press., in. Hg:**	29.14	**Calibrator Initials:**	JPK
Console #:	300.045	**Dry Gas Meter No.:**	009421	**Wet Test Meter No.:**	600.002

Initial Settings, Volumes and Temperatures								Time	
Isokinetic Console						Wet Test Meter			
Orifice	Dry Gas Meter Vacuum, Volume and Temperature					Meter	Meter	*θ*	*Yi*
Meter, Δ H	Vacuum	Volume	Inlet	Outlet	Average	Volume	Temp.	minutes	
in. H2O	In. Hg	(Vd) ft^3	°F	°F	(td) °F	(Vw) ft^3	(tw) °F		
2.76	5.5	10.10	92.5	82.0	87.3	10.0	71.5	11.13	1.012
2.76	5.5	10.35	97.0	87.5	92.3	10.0	71.6	11.15	0.997
2.76	5.5	10.25	97.0	88.0	92.5	10.0	71.5	11.14	1.007

$\gamma =$ 1.01

Example Calculation:

$$\frac{Vw\ Pb\ (td + 460)}{Vd\ (Pb + (\Delta H/13.6))(tw + 460)}$$

Where:

Vw = Gas volume of wet test meter, cubic feet
Vd = Gas volume of dry gas meter, cubic feet
tw = Temperature of wet test meter, degrees Fahrenheit
td = Average temperature of dry gas meter, degrees Fahrenheit
ΔH = Pressure differential across orifice meter, inches water
γ_i = Ratio of accuracy of wet test meter to dry gas meter for each replicate
γ = Average ratio of accuracy of wet test meter to dry gas meter for all replicates;
tolerance = pretest $\gamma \pm 0.05\ \gamma$
Pb = Barometric pressure, inches mercury
θ = Time of calibration run, minutes

g:\046\excel\metercal\metercal.xls
Revised 02/13/98

935

TRIGON

ISOKINETIC CONSOLE CALIBRATION DATA SHEET

2291

Client:	EnVit Co	**City, State/Location:**	Clemson SC, M8	**EHS Div. Project No:**	046-98-158
Date:	02/02/99	**Baro. Press., in. Hg:**	29.14	**Calibrator Initials:**	JPK
Console #:	300.045	**Dry Gas Meter No.:**	009421	**Wet Test Meter No.:**	600.002

Initial Settings, Volumes and Temperatures								Time	
Isokinetic Console						Wet Test Meter			
Orifice	Dry Gas Meter Vacuum, Volume and Temperature					Meter	Meter	*θ*	*Yi*
Meter, Δ H	Vacuum	Volume	Inlet	Outlet	Average	Volume	Temp.	minutes	
in. H2O	In. Hg	(Vd) ft^3	°F	°F	(td) °F	(Vw) ft^3	(tw) °F		
2.24	12.0	10.01	85.0	75.5	80.3	10.0	71.5	12.20	1.010
2.24	12.0	10.02	88.5	78.0	83.3	10.0	71.5	12.24	1.014
2.24	12.0	10.04	90.5	80.0	85.3	10.0	71.5	12.22	1.016

$\gamma =$ 1.01

Example Calculation:

$$\frac{Vw\ Pb\ (td + 460)}{Vd\ (Pb + (\Delta H/13.6))(tw + 460)}$$

Where:

Vw = Gas volume of wet test meter, cubic feet
Vd = Gas volume of dry gas meter, cubic feet
tw = Temperature of wet test meter, degrees Fahrenheit
td = Average temperature of dry gas meter, degrees Fahrenheit
ΔH = Pressure differential across orifice meter, inches water
γ_i = Ratio of accuracy of wet test meter to dry gas meter for each replicate
γ = Average ratio of accuracy of wet test meter to dry gas meter for all replicates;
tolerance = pretest $\gamma \pm 0.05\ \gamma$
Pb = Barometric pressure, inches mercury
θ = Time of calibration run, minutes

g:\046\excel\metercal\metercal.xls
Revised 02/13/98

936

TRIGON

ISOKINETIC CONTROL CONSOLE CALIBRATION FORM

2291

Console Number:	300.200	Calibrator:	PRJ
Calibration Date:	03/11/98	Dry Gas Meter Number:	1523437
Expiration Date:	03/11/99	Barometric Pressure, in. Hg:	29.410

Console	*Gas Volume*		*Meter Temperatures*				*Time*	*Console*	
Orifice Setting ΔH in. H_2O	Wet Test Meter V_w ft^3	Dry Gas Meter V_d ft^3	Wet Test Meter t_w °F	Dry Gas Meter Inlet t_{di} °F	Dry Gas Meter Outlet t_{do} °F	DGM Avg. t_d °F	θ Minutes	DGM Factor γ	Orifice Meter $\Delta H_@$ in. H_2O
0.50	5	5.12	74.0	88.0	81.0	84.5	12.41	0.995	1.739
1.00	5	5.14	73.7	92.0	82.0	87.0	9.06	0.995	1.843
1.50	10	10.27	74.0	94.0	82.0	88.0	14.95	0.996	1.880
2.00	10	10.29	74.2	97.0	83.5	90.3	13.31	0.996	1.981
3.00	10	10.29	73.8	98.5	83.5	91.0	10.85	0.996	1.969
4.00	10	10.30	74.2	101.5	84.5	93.0	9.33	0.995	1.937
							Average	**1.00**	**1.89**

	γ	$\Delta H_@$
Tolerances:	1.00	1.84
	± 0.02	± 0.15

γ and $\Delta H_@$ are calculated as follows:

$$\gamma = \frac{V_w * P_b * (t_d + 460)}{V_d * (P_b + \Delta H/13.6) * (t_w + 460)} = 1.00$$

$$\Delta H_@ = \frac{0.0317 * \Delta H}{P_b * (t_d + 460)} * \left(\frac{(t_w + 460) * \theta}{V_w}\right)^2 = 1.89$$

937

TRIGON

ISOKINETIC CONSOLE CALIBRATION DATA SHEET

2291

Client:	EnVitCo	**City, State/Location:**	Clemson,SC/ESP Stack	**EHS Div. Project No:**	046-98-158
Date:	02/03/99	**Baro. Press., in. Hg:**	28.13	**Calibrator Initials:**	RES
Console #:	300.200	**Dry Gas Meter No.:**	1523437	**Wet Test Meter No.:**	600.002

Initial Settings, Volumes and Temperatures								Time	Yi
Isokinetic Console						Wet Test Meter			
Orifice	Dry Gas Meter Vacuum, Volume and Temperature					Meter	Meter	θ	
Meter, Δ H in. H2O	Vacuum In. Hg	Volume (Vd) ft³	Inlet °F	Outlet °F	Average (td) °F	Volume (Vw) ft³	Temp. (tw) °F	minutes	
1.72	2.0	9.83	82.0	72.0	77.0	10.0	71.6	13.91	1.023
1.72	2.0	9.89	87.0	74.5	80.8	10.0	72.0	13.90	1.023
1.72	2.0	9.92	90.0	77.5	83.8	10.0	72.0	13.95	1.026

$\gamma =$ 1.02

Example Calculation:

$$\frac{Vw\ Pb\ (td + 460)}{Vd\ (Pb + (\Delta H/13.6))(tw + 460)}$$

Where:

Vw = Gas volume of wet test meter, cubic feet
Vd = Gas volume of dry gas meter, cubic feet
tw = Temperature of wet test meter, degrees Fahrenheit
td = Average temperature of dry gas meter, degrees Fahrenheit
ΔH = Pressure differential across orifice meter, inches water
γ_i = Ratio of accuracy of wet test meter to dry gas meter for each replicate
γ = Average ratio of accuracy of wet test meter to dry gas meter for all replicates;
tolerance = pretest $\gamma \pm 0.05\ \gamma$
Pb = Barometric pressure, inches mercury
θ = Time of calibration run, minutes

g:\046\excel\metercal\metercal.xls
Revised 02/13/98

938

TRIGON

TYPE "S" PITOT TUBE CALIBRATION FORM

2291

Date: 01/04/99
Calibrator: JPM

Specifications:
A.) Pitot tube assembly must be level.
B.) If pitot tube is damaged explain under comments section.
C.) Z = A Sin γ (<0.125) and W = A Sin θ (<0.03125)
D.) α <10° and β <5°

Pitot Tubes Attached to Probes

I.D.	Length	α1°	α2°	β1°	β2°	γ°	θ°	A, in.	Z, in.	W, in.	PA, in.	PB, in.	Dt, in.
200.020	2'	2.0	1.0	1.0	2.0	1.0	0.0	1.062	0.019	0.00000	0.531	0.531	0.374
200.021	2'	1.0	2.0	1.0	0.0	2.0	1.0	1.044	0.036	0.01822	0.522	0.522	0.375
200.036	2'	1.0	0.0	1.0	0.0	1.0	0.0	0.988	0.017	0.00000	0.494	0.494	0.374
200.037	2'	1.0	0.0	1.0	2.0	1.0	0.0	0.968	0.017	0.00000	0.484	0.484	0.373
200.063	2'	0.0	1.0	0.0	0.0	1.0	1.0	0.937	0.016	0.01635	0.469	0.468	0.374
200.064	2'	0.0	1.0	1.0	1.0	0.0	1.0	0.933	0.000	0.01628	0.467	0.466	0.378
200.004	3'	0.0	0.0	1.0	1.0	0.0	0.0	0.938	0.000	0.00000	0.469	0.469	0.374
200.005	3'	1.0	0.0	1.0	2.0	2.0	1.0	0.946	0.033	0.01651	0.473	0.473	0.375
200.006	3'	2.0	1.0	0.0	1.0	0.0	0.0	0.935	0.000	0.00000	0.468	0.467	0.377
200.015	3'	0.0	0.0	3.0	4.0	3.0	1.0	0.938	0.049	0.01637	0.469	0.469	0.376
200.016	3'	0.0	0.0	0.0	1.0	0.0	0.0	0.940	0.000	0.00000	0.470	0.470	0.376
200.017	3'	0.0	0.0	0.0	0.0	0.0	0.0	0.938	0.000	0.00000	0.469	0.469	0.375
200.066	3'	0.0	0.0	0.0	1.0	0.0	0.0	0.944	0.000	0.00000	0.472	0.472	0.375
200.297	3'	0.0	0.0	0.0	0.0	0.0	0.0	0.944	0.000	0.00000	0.472	0.472	0.376
200.007	5'	0.0	0.0	0.0	0.0	1.0	1.0	0.945	0.016	0.01649	0.473	0.472	0.374
200.008	5'	0.0	0.0	1.0	1.0	2.0	0.0	0.948	0.033	0.00000	0.474	0.474	0.374
200.009	5'	0.0	0.0	0.0	0.0	1.0	0.0	0.935	0.016	0.00000	0.468	0.467	0.377
200.022	5'	0.0	0.0	3.0	3.0	2.0	0.0	0.944	0.033	0.00000	0.472	0.472	0.373
200.027	5'	0.0	0.0	1.0	1.0	1.0	0.0	0.941	0.016	0.00000	0.471	0.470	0.375
200.034	5'	0.0	1.0	0.0	0.0	0.0	1.0	0.933	0.000	0.01628	0.467	0.466	0.376
200.056	5'	0.0	0.0	0.0	0.0	0.0	1.0	0.940	0.000	0.01641	0.470	0.470	0.374
200.061	5'	0.0	0.0	0.0	1.0	1.0	0.0	0.596	0.010	0.00000	0.298	0.298	0.251
200.024	6'	0.0	0.0	1.0	0.0	1.0	1.0	0.569	0.010	0.00993	0.285	0.284	0.252
200.010	7'	0.0	0.0	0.0	0.0	2.0	1.0	0.938	0.033	0.01637	0.469	0.469	0.373
200.011	7'	0.0	0.0	0.0	0.0	1.0	0.0	0.938	0.016	0.00000	0.469	0.469	0.374
200.012	7'	0.0	0.0	0.0	0.0	0.0	0.0	0.944	0.000	0.00000	0.472	0.472	0.375
200.039	7'	0.0	0.0	0.0	0.0	0.0	0.0	0.943	0.000	0.00000	0.472	0.471	0.375
200.040	7'	0.0	0.0	0.0	1.0	1.0	1.0	0.940	0.016	0.01641	0.470	0.470	0.371
200.059	7'	0.0	1.0	1.0	1.0	0.0	1.0	0.598	0.000	0.01044	0.299	0.299	0.253
200.060	7'	0.0	0.0	0.0	1.0	1.0	0.0	0.604	0.011	0.00000	0.302	0.302	0.251
200.041	8'	0.0	0.0	0.0	1.0	1.0	1.0	0.931	0.016	0.01625	0.466	0.465	0.376
200.045	8'	0.0	1.0	1.0	2.0	2.0	1.0	0.937	0.033	0.01635	0.469	0.468	0.375
200.013	10'	2.0	2.0	2.0	3.0	1.0	1.0	0.937	0.016	0.01635	0.469	0.468	0.374
200.014	10'	2.0	2.0	1.0	1.0	1.0	1.0	0.955	0.017	0.01667	0.478	0.477	0.375
200.050	12'	0.0	0.0	0.0	0.0	0.0	0.0	0.964	0.000	0.00000	0.482	0.482	0.375
200.051	12'	0.0	0.0	0.0	0.0	0.0	1.5	0.917	0.000	0.02400	0.459	0.458	0.376
200.052	12'	3.0	2.0	1.0	1.0	0.0	1.0	0.907	0.000	0.01583	0.454	0.453	0.376
200.053	12'	0.0	0.0	0.0	1.0	1.0	0.0	0.961	0.017	0.00000	0.481	0.480	0.376

Comments: Pitot Tubes Required Only Minor Maintenance & Reconditioning
200.066 & 200.297 = Inconel Probes
200.024 = Water Cooled Probe

939

TRIGON

TYPE "S" PITOT TUBE CALIBRATION FORM

2291

Date: 01/04/99
Calibrator: JPM

Specifications:
A.) Pitot tube assembly must be level.
B.) If pitot tube is damaged explain under comments section.
C.) Z = A Sin γ (<0.125) and W = A Sin θ (<0.03125)
D.) α <10° and β <5°

Individual Pitot Tubes

I.D. Length	α1°	α2°	β1°	β2°	γ°	θ°	A, in.	Z, in.	W, in.	PA, in.	PB, in.	Dt, in.
200.057 1.5'	0.0	0.0	1.0	0.0	0.0	1.0	0.629	0.000	0.01098	0.315	0.314	0.246
200.062 1.5'	1.0	1.0	0.0	0.0	0.0	0.0	0.655	0.000	0.00000	0.328	0.327	0.250
200.019 2'	2.0	1.0	0.0	0.0	0.0	1.0	0.943	0.000	0.01646	0.472	0.471	0.378
200.058 30"	0.0	0.0	2.0	2.0	2.0	0.0	0.916	0.032	0.00000	0.458	0.458	0.377
200.049 3'	0.0	0.0	0.0	0.0	0.0	1.0	0.939	0.000	0.01639	0.470	0.469	0.373
200.028 3'	4.0	5.0	1.0	3.0	1.0	1.5	0.923	0.016	0.02416	0.462	0.461	0.377
200.025 5'	0.0	0.0	0.0	0.5	0.5	0.0	0.818	0.007	0.00000	0.409	0.409	0.377
200.067 5'	1.0	1.0	1.0	0.0	1.0	1.0	0.943	0.016	0.01646	0.472	0.471	0.375
200.044 6'	0.0	0.0	1.0	1.0	1.0	0.0	0.923	0.016	0.00000	0.462	0.461	0.376
200.038 7'	1.0	0.0	0.0	0.0	0.0	0.0	0.879	0.000	0.00000	0.440	0.439	0.376
200.030 7'	2.0	5.0	1.0	2.0	0.0	0.0	0.937	0.000	0.00000	0.469	0.468	0.375
200.055 7'	1.0	1.0	0.0	1.0	1.0	1.0	0.848	0.015	0.01480	0.424	0.424	0.378
200.031 10'	1.0	2.0	2.0	1.0	2.0	1.0	0.942	0.033	0.01644	0.471	0.471	0.376
300.164 And	3.0	3.0	1.0	1.0	1.0	1.0	1.111	0.019	0.01939	0.556	0.555	0.376

Comments: Pitot Tubes Required Only Minor Maintenance
300.164 And = Anderson Probe Extension
200.062 Alc = 4075TF Probe

940

TRIGON

Probe Type S Pitot Tube Calibration Sheet

2291

Date: 01/04/99 Standard Pitot Tube No: 200.065 Barometric Press., in. Hg: 29.32

Calibrator: TRP $C_{p(std)}$: 0.99 Ambient Temperature °F: 64

Pitot Tube	Velocity Head, Inches of Water						Calibration Coefficients	
ID No./Side	Run 1 Δp_{std}	Run 2 Δp_{std}	Run 3 Δp_{std}	Run 1 Δp_S	Run 2 Δp_S	Run 3 Δp_S	$C_{p(S)}$ Side A/B	Avg. Dev. σ
200.020/A	0.31	0.31	0.31	0.42	0.42	0.42	0.85	0.001
200.020/B	0.31	0.31	0.30	0.42	0.42	0.41	0.85	0.002
200.021/A	0.31	0.32	0.31	0.42	0.43	0.42	0.85	0.002
200.021/B	0.33	0.32	0.33	0.45	0.44	0.45	0.85	0.003
200.036/A	0.31	0.31	0.31	0.41	0.41	0.40	0.86	0.005
200.036/B	0.31	0.32	0.32	0.41	0.42	0.42	0.86	0.003
200.037/A	0.32	0.32	0.32	0.43	0.43	0.43	0.85	0.004
200.037/B	0.32	0.32	0.32	0.42	0.42	0.42	0.86	0.004
200.063/A	0.31	0.31	0.30	0.42	0.42	0.41	0.85	0.002
200.063/B	0.28	0.30	0.29	0.39	0.41	0.40	0.84	0.004
200.064/A	0.30	0.31	0.31	0.40	0.41	0.41	0.86	0.002
200.064/B	0.30	0.30	0.31	0.40	0.40	0.41	0.86	0.002
200.004/A	0.32	0.32	0.32	0.44	0.43	0.43	0.85	0.005
200.004/B	0.32	0.33	0.32	0.43	0.44	0.43	0.86	0.005
200.005/A	0.33	0.33	0.33	0.44	0.44	0.44	0.86	0.003
200.005/B	0.32	0.32	0.32	0.43	0.43	0.43	0.85	0.004
200.006/A	0.33	0.33	0.33	0.44	0.44	0.44	0.86	0.003
200.006/B	0.33	0.33	0.33	0.44	0.44	0.43	0.86	0.004
200.015/A	0.32	0.32	0.32	0.43	0.43	0.44	0.85	0.005
200.015/B	0.32	0.32	0.32	0.43	0.43	0.43	0.85	0.004
200.016/A	0.33	0.33	0.34	0.44	0.44	0.45	0.86	0.002
200.016/B	0.33	0.33	0.33	0.44	0.44	0.44	0.86	0.003
200.017/A	0.33	0.33	0.32	0.45	0.45	0.44	0.85	0.003
200.017/B	0.32	0.32	0.32	0.43	0.43	0.43	0.85	0.004
200.066/A	0.31	0.31	0.31	0.41	0.41	0.41	0.86	0.001
200.066/B	0.31	0.31	0.31	0.41	0.41	0.41	0.86	0.001
200.297/A	0.30	0.30	0.30	0.40	0.40	0.40	0.86	0.003
200.297/B	0.32	0.31	0.32	0.42	0.41	0.42	0.86	0.003
200.007/A	0.32	0.32	0.32	0.42	0.42	0.42	0.86	0.004
200.007/B	0.33	0.33	0.33	0.43	0.43	0.43	0.87	0.003
200.008/A	0.33	0.34	0.33	0.47	0.48	0.47	0.83	0.001
200.008/B	0.32	0.32	0.32	0.45	0.45	0.45	0.84	0.005
200.009/A	0.32	0.32	0.31	0.42	0.42	0.41	0.86	0.003
200.009/B	0.32	0.32	0.32	0.42	0.42	0.42	0.86	0.004
200.022/A	0.33	0.31	0.31	0.43	0.41	0.41	0.86	0.003
200.022/B	0.32	0.33	0.32	0.43	0.44	0.43	0.86	0.005
200.027/A	0.33	0.33	0.32	0.47	0.47	0.46	0.83	0.001
200.027/B	0.33	0.33	0.33	0.46	0.46	0.46	0.84	0.001

Example Calculations:

$C_{p(S)} = C_{p(std)} ((\Delta p_{std})/(\Delta p_S))^{0.5}$ Deviation = $C_{p(S)} - C_{p(A \text{ or } B)}$ must be ≤ 0.01

941

TRIGON

Individual Type S Pitot Tube Calibration Sheet

2291

Date: 01/04/99 Standard Pitot Tube No: 200.065 Barometric Press., in. Hg: 29.32

Calibrator: TRP $C_{p(std)}$: 0.99 Ambient Temperature °F: 64

Pitot Tube	Velocity Head, Inches of Water						Calibration Coefficients	
ID No./Side	Run 1 Δp_{std}	Run 2 Δp_{std}	Run 3 Δp_{std}	Run 1 Δp_S	Run 2 Δp_S	Run 3 Δp_S	$C_{p(S)}$ Side A/B	Avg. Dev. σ
200.057/A	0.30	0.30	0.29	0.41	0.41	0.40	0.85	0.004
200.057/B	0.29	0.30	0.30	0.40	0.41	0.41	0.85	0.004
200.062/A	0.30	0.29	0.31	0.40	0.39	0.41	0.86	0.003
200.062/B	0.31	0.31	0.29	0.41	0.41	0.39	0.86	0.003
200.019/A	0.31	0.30	0.31	0.42	0.41	0.42	0.85	0.002
200.019/B	0.32	0.32	0.32	0.43	0.43	0.43	0.85	0.004
200.058/A	0.32	0.32	0.33	0.44	0.44	0.45	0.85	0.005
200.058/B	0.32	0.32	0.32	0.43	0.44	0.44	0.85	0.005
200.049/A	0.30	0.31	0.30	0.41	0.42	0.41	0.85	0.002
200.049/B	0.29	0.29	0.29	0.40	0.41	0.41	0.84	0.006
200.028/A	0.30	0.30	0.30	0.43	0.43	0.43	0.83	0.003
200.028/B	0.31	0.30	0.30	0.43	0.42	0.42	0.84	0.002
200.025/A	0.32	0.32	0.32	0.44	0.44	0.44	0.84	0.004
200.025/B	0.32	0.32	0.32	0.44	0.44	0.44	0.84	0.004
200.067/A	0.33	0.33	0.33	0.45	0.45	0.45	0.85	0.002
200.067/B	0.33	0.33	0.33	0.45	0.45	0.45	0.85	0.002
200.044/A	0.30	0.31	0.31	0.43	0.44	0.44	0.83	0.002
200.044/B	0.31	0.31	0.31	0.43	0.43	0.43	0.84	0.001
200.038/A	0.30	0.30	0.30	0.43	0.43	0.43	0.83	0.003
200.038/B	0.32	0.32	0.32	0.44	0.44	0.44	0.84	0.004
200.030/A	0.31	0.31	0.31	0.44	0.44	0.45	0.83	0.003
200.030/B	0.32	0.31	0.31	0.45	0.45	0.45	0.83	0.007
200.055/A	0.29	0.29	0.30	0.40	0.40	0.41	0.84	0.004
200.055/B	0.30	0.31	0.31	0.41	0.42	0.42	0.85	0.002
200.031/A	0.31	0.31	0.31	0.44	0.44	0.44	0.83	0.001
200.031/B	0.31	0.30	0.30	0.44	0.43	0.43	0.83	0.002
300.164/A	0.30	0.30	0.29	0.40	0.40	0.39	0.86	0.004
300.164/B	0.30	0.31	0.30	0.40	0.41	0.40	0.86	0.002

Example Calculations:

$C_{p(S)} = C_{p(std)} ((\Delta p_{std})/(\Delta p_S))$^0.5 Deviation = $C_{p(S)} - \bar{C}_{p(A \text{ or } B)}$ must be ≤ 0.01

942

TRIGON

TEMPERATURE SENSOR CALIBRATION FORM
THERMOCOUPLES

2291

Tolerance: +/- 1.5% of Absolute Temperature

Date: 01/04/99
Ambient Temperature, Deg. F: 73
Calibrated By: NRK

Barometric Pressure, In. Hg: 29.51
Reference Thermometer Serial No 2890
Reference Thermometer Serial No 2775

Thermocouple ID No.	Reference Point	Source	Reference Thermometer Temperature Degrees F	Thermocouple Potentiometer Temperature Degrees F	Temperature Difference Calculation Percent, %
DGM Inlet					
300.035	1	Water Bath	34	34	0.00
	2	Water Bath	74	74	0.00
	3	Water Bath	118	118	0.00
DGM Outlet					
300.035	1	Water Bath	34	34	0.00
	2	Water Bath	74	74	0.00
	3	Water Bath	118	118	0.00
DGM Inlet					
300.045	1	Water Bath	36	36	0.00
	2	Water Bath	74	74	0.00
	3	Water Bath	114	114	0.00
DGM Outlet					
300.045	1	Water Bath	36	36	0.00
	2	Water Bath	74	74	0.00
	3	Water Bath	115	115	0.00
DGM Inlet					
300.067	1	Water Bath	35	35	0.00
	2	Water Bath	74	74	0.00
	3	Water Bath	114	114	0.00
DGM Outlet					
300.067	1	Water Bath	35	35	0.00
	2	Water Bath	74	73	0.19
	3	Water Bath	114	114	0.00
DGM Inlet					
300.100	1	Water Bath	34	34	0.00
	2	Water Bath	73	73	0.00
	3	Water Bath	117	117	0.00
DGM Outlet					
300.100	1	Water Bath	34	35	-0.20
	2	Water Bath	73	73	0.00
	3	Water Bath	117	117	0.00

Source = Type of calibration system used.

Temperature Difference Calculation:

$$\frac{(\text{Ref. Temp. Deg. F} + 460) - (\text{Test Temp. Deg. F} - 460)}{\text{Ref. Temp. Deg. F} + 460} \times 100 = <1.5\%$$

943

TRIGON

TEMPERATURE SENSOR CALIBRATION FORM
THERMOCOUPLES

2291

Tolerance: +/- 1.5% of Absolute Temperature

Date: 01/04/99
Ambient Temperature, Deg. F: 73
Calibrated By: NRK

Barometric Pressure, In. Hg: 29.51
Reference Thermometer Serial No 2890
Reference Thermometer Serial No 2775

Thermocouple ID No.	Reference Point	Source	Reference Thermometer Temperature Degrees F	Thermocouple Potentiometer Temperature Degrees F	Temperature Difference Calculation Percent, %
DGM Inlet					
300.200	1	Water Bath	34	34	0.00
	2	Water Bath	74	74	0.00
	3	Water Bath	118	118	0.00
DGM Outlet					
300.200	1	Water Bath	34	34	0.00
	2	Water Bath	74	74	0.00
	3	Water Bath	118	118	0.00
DGM Inlet					
300.214	1	Water Bath	34	34	0.00
	2	Water Bath	73	73	0.00
	3	Water Bath	117	117	0.00
DGM Outlet					
300.214	1	Water Bath	34	34	0.00
	2	Water Bath	73	73	0.00
	3	Water Bath	117	117	0.00
DGM Inlet					
300.241	1	Water Bath	34	34	0.00
	2	Water Bath	74	74	0.00
	3	Water Bath	119	119	0.00
DGM Outlet					
300.241	1	Water Bath	34	34	0.00
	2	Water Bath	74	74	0.00
	3	Water Bath	119	119	0.00
DGM Inlet					
300.248	1	Water Bath	36	36	0.00
	2	Water Bath	74	74	0.00
	3	Water Bath	115	115	0.00
DGM Outlet					
300.248	1	Water Bath	36	36	0.00
	2	Water Bath	74	74	0.00
	3	Water Bath	115	115	0.00

Source = Type of calibration system used.

Temperature Difference Calculation:

$$\frac{(\text{Ref. Temp. Deg. F} + 460) - (\text{Test Temp. Deg. F} + 460)}{\text{Ref. Temp. Deg. F} + 460} \times 100 = <1.5\%$$

944

TRIGON

TEMPERATURE SENSOR CALIBRATION FORM
THERMOCOUPLES

Tolerance: +/- 1.5% of Absolute Temperature

Date: 01/04/99
Ambient Temperature, Deg. F: 73
Calibrated By: NRK

Barometric Pressure, In. Hg: 29.51
Reference Thermometer Serial No 2890
Reference Thermometer Serial No 2775

Thermocouple ID No.	Reference Point	Source	Reference Thermometer Temperature Degrees F	Thermocouple Potentiometer Temperature Degrees F	Temperature Difference Calculation Percent, %
Umbilical Adaptor #1					
300.030	1	Water Bath	33	34	-0.20
	2	Water Bath	46	46	0.00
	3	Water Bath	77	76	0.19
Umbilical Adaptor #2					
300.031	1	Water Bath	33	33	0.00
	2	Water Bath	42	41	0.20
	3	Water Bath	77	77	0.00
Umbilical Adaptor #3					
300.032	1	Water Bath	34	34	0.00
	2	Water Bath	40	39	0.20
	3	Water Bath	76	76	0.00
Umbilical Adaptor #4					
300.042	1	Water Bath	34	34	0.00
	2	Water Bath	39	39	0.00
	3	Water Bath	76	75	0.19
Umbilical Adaptor #5					
300.043	1	Water Bath	34	34	0.00
	2	Water Bath	40	40	0.00
	3	Water Bath	76	76	0.00
Umbilical Adaptor #6					
300.044	1	Water Bath	33	33	0.00
	2	Water Bath	41	41	0.00
	3	Water Bath	75	75	0.00
Umbilical Adaptor #7					
300.134	1	Water Bath	33	33	0.00
	2	Water Bath	41	41	0.00
	3	Water Bath	75	75	0.00
Umbilical Adaptor #8					
300.135	1	Water Bath	33	33	0.00
	2	Water Bath	42	42	0.00
	3	Water Bath	75	75	0.00

Source = Type of calibration system used.

Temperature Difference Calculation:

$$\frac{(\text{Ref. Temp. Deg. F} + 460) - (\text{Test Temp. Deg. F} + 460)}{\text{Ref. Temp. Deg. F} + 460} \times 100 = <1.5\%$$

945

TRIGON

TEMPERATURE SENSOR CALIBRATION FORM
THERMOCOUPLES

2291

Tolerance: +/- 1.5% of Absolute Temperature

Date: 01/04/99
Ambient Temperature, Deg. F: 73
Calibrated By: NRK

Barometric Pressure, In. Hg: 29.51
Reference Thermometer Serial No 2890
Reference Thermometer Serial No 2775

Thermocouple ID No.	Reference Point	Source	Reference Thermometer Temperature Degrees F	Thermocouple Potentiometer Temperature Degrees F	Temperature Difference Calculation Percent, %
Umbilical Adaptor #9					
300.207	1	Water Bath	34	34	0.00
	2	Water Bath	42	42	0.00
	3	Water Bath	74	74	0.00
Umbilical Adaptor #10					
300.208	1	Water Bath	34	34	0.00
	2	Water Bath	43	43	0.00
	3	Water Bath	74	74	0.00
Umbilical Adaptor #11					
300.216	1	Water Bath	34	34	0.00
	2	Water Bath	43	43	0.00
	3	Water Bath	74	74	0.00
Umbilical Adaptor #12					
300.217	1	Water Bath	33	33	0.00
	2	Water Bath	43	43	0.00
	3	Water Bath	74	74	0.00
Umbilical Adaptor #13					
300.264	1	Water Bath	33	33	0.00
	2	Water Bath	44	44	0.00
	3	Water Bath	74	74	0.00
Umbilical Adaptor Frame Train					
300.295	1	Water Bath	33	33	0.00
	2	Water Bath	45	45	0.00
	3	Water Bath	73	73	0.00
Umbilical Adaptor Frame Train					
300.296	1	Water Bath	33	33	0.00
	2	Water Bath	45	45	0.00
	3	Water Bath	74	74	0.00

Source = Type of calibration system used.

Temperature Difference Calculation:

$$\frac{(\text{Ref. Temp. Deg. F} + 460) - (\text{Test Temp. Deg. F} + 460)}{\text{Ref. Temp. Deg. F} + 460} \times 100 = <1.5\%$$

946

TRIGON

TEMPERATURE SENSOR CALIBRATION FORM
THERMOCOUPLES

229 1'

Tolerance: +/- 1.5% of Absolute Temperature

Date: 01/04/99
Ambient Temperature, Deg. F: 73
Calibrated By: NRK

Barometric Pressure, In. Hg: 29.51
Reference Thermometer Serial No 2890
Reference Thermometer Serial No 2775

Thermocouple ID No.	Reference Point	Source	Reference Thermometer Temperature Degrees F	Thermocouple Potentiometer Temperature Degrees F	Temperature Difference Calculation Percent, %
2' Pitot Tube					
200.019	1	Water Bath	62	61	0.19
	2	Water Bath	183	184	-0.16
	3	Oil Bath	377	376	0.12
30" Pitot Tube					
200.058	1	Water Bath	62	61	0.19
	2	Water Bath	183	183	0.00
	3	Oil Bath	377	376	0.12
3' Pitot Tube					
200.049	1	Water Bath	60	60	0.00
	2	Water Bath	204	204	0.00
	3	Oil Bath	384	384	0.00
3' Pitot Tube					
200.028	1	Water Bath	60	60	0.00
	2	Water Bath	208	209	-0.15
	3	Oil Bath	384	384	0.00
5' Pitot Tube Inconel					
200.025	1	Water Bath	64	64	0.00
	2	Water Bath	210	210	0.00
	3	Oil Bath	337	338	-0.13
	4	Muffle Furnace	521	522	-0.10
	5	Muffle Furnace	823	823	0.00
	6	Muffle Furnace	1100	1101	-0.06
5' Pitot Tube					
200.067	1	Water Bath	64	64	0.00
	2	Water Bath	210	210	0.00
	3	Oil Bath	352	352	0.00
6' Pitot Tube					
200.044	1	Water Bath	61	61	0.00
	2	Water Bath	208	208	0.00
	3	Oil Bath	381	381	0.00

Source = Type of calibration system used.

Temperature Difference Calculation:

$$\frac{(\text{Ref. Temp. Deg. F} + 460) - (\text{Test Temp. Deg. F} + 460)}{\text{Ref. Temp. Deg. F} + 460} \times 100 = <1.5\%$$

G47

TRIGON

TEMPERATURE SENSOR CALIBRATION FORM
THERMOCOUPLES

2291

Tolerance: +/- 1.5% of Absolute Temperature

Date: 01/04/99
Ambient Temperature, Deg. F: 73
Calibrated By: NRK

Barometric Pressure, In. Hg: 29.51
Reference Thermometer Serial No 2890
Reference Thermometer Serial No 2775

Thermocouple ID No.	Reference Point	Source	Reference Thermometer Temperature Degrees F	Thermocouple Potentiometer Temperature Degrees F	Temperature Difference Calculation Percent, %
2' Probe (1)					
200.020	1	Water Bath	62	62	0.00
	2	Water Bath	194	193	0.15
	3	Oil Bath	374	374	0.00
2' Probe (2)					
200.021	1	Water Bath	62	61	0.19
	2	Water Bath	194	193	0.15
	3	Oil Bath	374	373	0.12
2' Probe (3)					
200.036	1	Water Bath	62	62	0.00
	2	Water Bath	199	200	-0.15
	3	Oil Bath	375	374	0.12
2' Probe (4)					
200.037	1	Water Bath	62	62	0.00
	2	Water Bath	199	200	-0.15
	3	Oil Bath	375	374	0.12
2' Probe (5)					
200.063	1	Water Bath	62	62	0.00
	2	Water Bath	195	194	0.15
	3	Oil Bath	370	369	0.12
2' Probe (6)					
200.064	1	Water Bath	62	62	0.00
	2	Water Bath	195	194	0.15
	3	Oil Bath	370	370	0.00

Source = Type of calibration system used.

Temperature Difference Calculation:

$$\frac{(\text{Ref. Temp. Deg. F} + 460) - (\text{Test Temp. Deg. F} + 460)}{\text{Ref. Temp. Deg. F} + 460} \times 100 = <1.5\%$$

948

TRIGON

TEMPERATURE SENSOR CALIBRATION FORM 2291

THERMOCOUPLES

Tolerance: +/- 1.5% of Absolute Temperature

Date: 01/04/99
Ambient Temperature, Deg. F: 73
Calibrated By: NRK

Barometric Pressure, In. Hg: 29.51
Reference Thermometer Serial No 2890
Reference Thermometer Serial No 2775

Thermocouple ID No.	Reference Point	Source	Reference Thermometer Temperature Degrees F	Thermocouple Potentiometer Temperature Degrees F	Temperature Difference Calculation Percent, %
2' Probe (1)					
200.020	1	Water Bath	62	62	0.00
	2	Water Bath	194	193	0.15
	3	Oil Bath	374	374	0.00
2' Probe (2)					
200.021	1	Water Bath	62	61	0.19
	2	Water Bath	194	193	0.15
	3	Oil Bath	374	373	0.12
2' Probe (3)					
200.036	1	Water Bath	62	62	0.00
	2	Water Bath	199	200	-0.15
	3	Oil Bath	375	374	0.12
2' Probe (4)					
200.037	1	Water Bath	62	62	0.00
	2	Water Bath	199	200	-0.15
	3	Oil Bath	375	374	0.12
2' Probe (5)					
200.063	1	Water Bath	62	62	0.00
	2	Water Bath	195	194	0.15
	3	Oil Bath	370	369	0.12
2' Probe (6)					
200.064	1	Water Bath	62	62	0.00
	2	Water Bath	195	194	0.15
	3	Oil Bath	370	370	0.00

Source = Type of calibration system used.

Temperature Difference Calculation:

$$\frac{(\text{Ref. Temp. Deg. F} + 460) - (\text{Test Temp. Deg. F} + 460)}{\text{Ref. Temp. Deg. F} + 460} \times 100 = <1.5\%$$

949

TRIGON

TEMPERATURE SENSOR CALIBRATION FORM

2291

THERMOCOUPLES

Tolerance: +/- 1.5% of Absolute Temperature

Date: 01/04/99
Ambient Temperature, Deg. F: 73
Calibrated By: NRK

Barometric Pressure, In. Hg: 29.51
Reference Thermometer Serial No 2890
Reference Thermometer Serial No 2775

Thermocouple ID No.	Reference Point	Source	Reference Thermometer Temperature Degrees F	Thermocouple Potentiometer Temperature Degrees F	Temperature Difference Calculation Percent, %
3' Probe (1)					
200.004	1	Water Bath	59	59	0.00
	2	Water Bath	204	204	0.00
	3	Oil Bath	380	380	0.00
3' Probe (2)					
200.005	1	Water Bath	59	59	0.00
	2	Water Bath	206	205	0.15
	3	Oil Bath	381	381	0.00
3' Probe (3)					
200.006	1	Water Bath	59	59	0.00
	2	Water Bath	206	207	-0.15
	3	Oil Bath	384	384	0.00
3' Probe (4)					
200.015	1	Water Bath	59	60	-0.19
	2	Water Bath	206	205	0.15
	3	Oil Bath	385	385	0.00
3' Probe (5)					
200.016	1	Water Bath	59	59	0.00
	2	Water Bath	204	205	-0.15
	3	Oil Bath	385	383	0.24
3' Probe (6)					
200.017	1	Water Bath	59	59	0.00
	2	Water Bath	206	205	0.15
	3	Oil Bath	382	383	-0.12
3' Probe (Inc.)					
200.066	1	Muffle Furnace	472	472	0.00
	2	Muffle Furnace	750	751	-0.08
	3	Muffle Furnace	1104	1105	-0.06
3' Probe (Inc.)					
200.297	1	Muffle Furnace	470	470	0.00
	2	Muffle Furnace	743	745	-0.17
	3	Muffle Furnace	1100	1101	-0.06

Source = Type of calibration system used.

Temperature Difference Calculation:

$$\frac{(\text{Ref. Temp. Deg. F} + 460) - (\text{Test Temp. Deg. F} + 460)}{\text{Ref. Temp. Deg. F} + 460} \times 100 = <1.5\%$$

950

TRIGON

229 1

453

NATIONAL WEATHER SERVICE TYPE MERCURIAL BAROMETERS

Usable up to 900 metres (3,000 feet)

The National Weather Service type barometer is PRINCO's highest grade mercurial barometer. It is used by weather services and airports the world over. The glass tube has a uniform inside diameter of 7 mm for constant capillary depression throughout the length of the scale. Scales are set at the factory by comparison with a barometer certified by the National Bureau of Standards, and read the local pressure without the necessity of correcting for capillary depression. The vernier can be smoothly and precisely set by means of a rack and pinion drive, controlled by a knurled adjusting knob. White plastic backgrounds on the mounting panel facilitate observation of the Fortin type cistern and mercury column. The vernier has a sighting edge, front and rear, to avoid parallax. A suspension bracket and an adjustable ring clamp for the cistern hold the barometer firmly in the vertical position on the mounting panel. A dual scale Celsius/Fahrenheit thermometer with a −25 to 50°C/−10 to 120°F range indicates the proper temperature to be used for temperature corrections. An instruction booklet with information for understanding and proper use of the barometer is supplied with each instrument. Complete correction tables for temperature and gravity are included.

This barometer is accurate to ±0.3 mb, 0.2 mm, or 0.01 inch of mercury when carefully set and read, and after temperature and gravity corrections have been applied. For greatest accuracy a Certificate of Calibration may be obtained and the correction contained therein also applied. Each National Weather Service barometer has a serial number.

The rugged construction of the National Weather Service type barometer is such that it can be shipped safely by United Parcel Service or express. The kidskin bag, in the Fortin type reservoir, dampens mercury column oscillations during shipment. The lower part of the glass tube is narrowed down to minimize mercury weight, and is protected by foam cushions, thus offering added resistance to damage during shipment. The cistern may be opened in the field for cleaning of the cistern glass and cistern mercury. The barometer contains approximately 680 grams (1.5 pounds) of mercury total. It is shipped completely assembled, filled with mercury and ready to use. Mounting panel dimensions are 19 x 76 x 1072 mm (3/4 x 3 x 42 inches). The shipping weight is 5 kg (11 pounds) and box dimensions are 235 x 250 x 1197 mm (9 x 10 x 47 inches).

Catalog Number	Scales
→ 453	inch and millimetre
453BI	inch and millibar
453MB	millibar and millimetre

CALIBRATION AND TEST
WET TEST METER

DATE: 10-23-97

METER TYPE: AL-20

METER SERIAL NUM. : 11098

TEST ON FIVE FOOT BELL PROVER # 3735

OIL TEMP. 75.5 deg.

AIR TEMP. 75 deg.

METER TEMP. 75.5 deg.

TEST FLOW RATE	PERCENT OF PROOF
120 cfh	100.0 %
90 cfh	100.0 %
11 cfh	99.9 %
18 cfh	100.0 %

TEST BY: HOWARD RAYFIELD

952

No. F107

CERTIFICATE OF ACCURACY

AMERICAN METER COMPANY

THIS IS TO CERTIFY *that the* 5 cft *Bell Prover No.* 3785 *manufactured by the American Meter Company has been calibrated with either an immersion type cubic foot bottle or with a portable cubic foot standard and was found to be correct within 0.15%. The calibrating standard that was used has been certified and sealed by the National Bureau of Standards at Washington, D.C.*

In accordance with the procedure outlined in National Bureau of Standards Handbook 117 1975, the prover was tested for leaks and adjusted so that the variation in pressure of the air within the bell did not exceed 1/10 inch water column when the bell descended its entire travel.

Air was used in the calibrating operation and the temperature of the air, sealant in the prover and sealant in the standard held constant.

Temperature of air 74.0 °F

Temperature of Sealant 74.5 °F

By Michael J. Wiesing
Engineer

AMERICAN METER COMPANY

Date June 10, 1993

229 1

953

©3OLS 17

EVER READY THERMOMETER CO., INC.
228 LACKAWANNA AVENUE
WEST PATTERSON, NJ 07424
(973) 812-7474

2291

REPORT OF CALIBRATION

LIQUID-IN-GLASS-THERMOMETER

CALIBRATED BY EVER READY THERMOMETER CO. FOR:
TRIGON ENGINEERING

MARKED: ERTCO CAT 1002-3FC S/N-2890
RANGE: +30 TO +124 DEGREES F IN 0.2 DEGREE GRADUATIONS.

THERMOMETER READING	CORRECTION (ITS-90)**
32.00 F	0.00 F
40.00	-0.06
60.00	-0.06
100.00	0.00
120.00	-0.06

** ALL TEMPERATURES IN THIS REPORT ARE BASED ON THE INTERNATIONAL TEMPERATURE SCALE OF 1990 (ITS-90) PUBLISHED IN THE METROLGIA 27, NO. 1, 3/10/90.

THIS THERMOMETER WAS CALIBRATED AGAINST A STANDARD CALIBRATED AT THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST) FORMERLY THE NATIONAL BUREAU OF STANDARDS (NBS) IN ACCORDANCE WITH ASTM METHOD E 77, AND NBS MONOGRAPH 174.

FOR A DISCUSSION OF ACCURACIES ATTAINABLE WITH SUCH THERMOMETERS SEE NBS MONOGRAPH 250-23.

IF NO SIGN IS GIVEN ON THE CORRECTION, THE TRUE TEMPERATURE IS HIGHER THAN THE INDICATED TEMPERATURE; IF THE SIGN GIVEN IS NEGATIVE, THE TRUE TEMPERATURE IS LOWER THAN THE INDICATED TEMPERATURE. TO USE THE CORRECTIONS PROPERLY, REFERENCE SHOULD BE MADE TO THE NOTES GIVEN BELOW.

THE THERMOMETER WAS TESTED IN A LARGE, CLOSED-TOP, ELECTRICALLY HEATED, LIQUID BATH, BEING "IMMERSED" 76MM. THE TEMPERATURE OF THE ROOM WAS ABOUT 25 DEGREES C (77 DEGREES F). IF THE THERMOMETER IS USED UNDER CONDITIONS WHICH WOULD CAUSE THE AVERAGE TEMPERATURE OF THE EMERGENT LIQUID COLUMN TO DIFFER MARKEDLY FROM THAT PREVAILING IN THE TEST, APPRECIABLE DIFFERENCES IN THE INDICATIONS OF THE THERMOMETER WOULD RESULT.

CONTINUED

TEST NUMBER: 159395
DATE: 06/09/98
STANDARD SERIAL NO. 128239
NIST IDENTIFICATION NO. 88024

REPORT OF CALIBRATION

2291

LIQUID-IN-GLASS-THERMOMETER

THE TABULATED CORRECTIONS APPLY PROVIDED THE ICE-POINT READING, TAKEN AFTER EXPOSURE FOR NOT LESS THAN 3 DAYS TO A TEMPERATURE OF ABOUT 20 DEGREES C (70 DEGREES F) IS 32.00 DEGREES F. IF THE ICE-POINT READING IS FOUND TO BE HIGHER (OR LOWER) THAN STATED, ALL OTHER READINGS WILL BE HIGHER (OR LOWER) TO THE SAME EXTENT. IF THE THERMOMETER IS USED AT A GIVEN TEMPERATURE SHORTLY AFTER BEING HEATED TO A HIGHER TEMPERATURE. AN ERROR OF 0.01 DEGREES OR LESS, FOR EACH 10 DEGREE DIFFERENCE BETWEEN THE TWO TEMPERATURES, MAY BE INTRODUCED. THE TABULATED CORRECTIONS APPLY IF THE THERMOMETER IS USED IN THE UPRIGHT POSITION; IF USED IN A HORIZONTAL POSITION, THE INDICATIONS MAY BE A FEW HUNDREDTHS OF A DEGREE HIGHER.

TEST NUMBER: 159395
DATE: 06/09/98
STANDARD SERIAL NO. 128239
NIST IDENTIFICATION NO. 88024

Charles Tang-Nian
QUALITY CONTROL MANAGER

955

Ever Ready Thermometer Co., Inc.
228 Lackawanna Avenue
West Paterson, NJ 07424
973-812-7474 FAX 973-812-7475 http://www.ertco.com

2291

Thermometer Calibration Report

This is to certify that the instrument described below has been examined and tested in our calibration laboratory using accuracately controlled constant temperature equipment; using NIST calibrated primary reference thermometers, in accordance with our ISO/EC Guide 25 Calibration Procedure 01, which is based in part on ASTM E-77-92, "Standard Test Method For Calibration And Verification Of Liquid In Glass Thermometers" and NIST Special Publication 250-23, "Liquid In Glass Thermometer Calibration Services". This calibration meets the requirements of ISO/EC Guide 25, ANSI/NCSL Z540-1-1994, the ISO 9000/QS 9000 Series OF Quality Standards, and MIL STD 45662A (ISO 10012-1).

Customer Information

TRIGON ENGINEERING CONSULTANTS
6200 HARRIS TECHNOLOGY BLVD.
CHARLOTTE, NC 28269-

Attention:

Purchase Order:

Instrument Description

Serial Number:	2775	Inscription:	ERTCO	Date Completed:	11/11/1998	Immersion:	76 mm
Product Number:	612-3FC	Scale Range:	0 TO 300 F	Scale Divisions:	2 F		

Results of Physical Examination

The instrument has been examined under a microscope for strains in the glass, if any, were judged to be minimal and of no detriment to the functionality of the instrument.

The capillary of this thermometer has been examined under magnification and no foreign material, moisture, or other evidence of contamination were discovered. No discernible capillary irregularities were noted.

It has been determined that the instrument is in good working order and is therefore suitable for calibration.

Calibration Results

Test Temperature	Reading Of This Instrument	Correction	Emergent Column Temperature	Standard Uncertainty
32.0 F	32.6 F	-0.6 F	NA	.02
100.0 F	101.6 F	-1.6 F	NA	.08
200.0 F	201.4 F	-1.4 F	NA	.08
300.0 F	301.0 F	-1.0 F	NA	.14

The above readings were made under magnification and resolved to the nearest 0.01 F. The uncertainties of our calibration system are as follows: From -121 to -49F, +/- .24F; From -40 to <32F, +/-.12F; At 32F, +/- .02F; From >32F to 212F, +/- .08F; From >212 to 392F, +/- .14F; From >392 to 572F, +/- .26F; From >572 to 752F, +/- .8F. The estimated uncertainties quoted above were determined in accordance with the guidelines given in NIST Publication IR 5341 and take into account the type of thermometer tested, the precision with which its reading can be resolved, and the degree of confidence one can have in its indications under similar conditions of usage.

For further discussion of accuracies attainable with such thermometers, see NIST Special Publication 250-23 and NIST Publication IR 5341.

Laboratory Environmental Conditions: Temperature 23C +/- 2C (73F +/- 2F). Relative Humidity - Between 30% and 60%. All temperatures in this report are based on the International Temperature Scale of 1990 (ITS-90).

**IMPORTANT NOTE: The readings and corrections noted above apply for the condition of immersion indicated provided that the ice point reading, taken after exposure for not fewer than three days to a temperature of about 22 Degrees Celcius (73F), is 0.00C (32F). If the ice point reading is found to be higher (or lower) than stated, all other readings will be higher (lower) by the same amount.

The calibration performed and documented by this report of test is a full scale calibration and no limitations of use are imposed on this instrument.

956

Traceability Information

The NIST Primary Reference Thermometers and Transfer Standards used in this test are given below:

Test Point: 32: F NIST Reference Thermometer Standard 128239 Transfer Standard Serial # 172

Test Point: 100: F NIST Reference Thermometer Standard 128239 Transfer Standard Serial # 172

Test Point: 200: F NIST Reference Thermometer Standard 128239 Transfer Standard Serial # 174

Test Point: 300: F NIST Reference Thermometer Standard 48511 Transfer Standard Serial # 174

2291

This Calibration is directly traceable to NIST.

If additional information regarding this calibration is required, please contact this laboratory.

Clifton Thomas
Qaulity Control Manager

Batch Number: 160753

957

Method 4 Moisture - Balance Calibrations

Balance Calibration CT600
Serial Number #09641
Zero: OK Span: 300g, 600g
Calibrated By: PRJ
Calibration Date: 05/25/98
Expiration Date: 05/25/99

Balance Calibration CT600
Serial Number #2402
Zero: OK Span: 300g, 600g
Calibrated By: PRJ
Calibration Date: 12/03/98
Expiration Date: 12/03/99

Balance Calibration CT600
Serial Number #13587
Zero: OK Span: 300g, 600g
Calibrated By: PRJ
Calibration Date: 09/17/98
Expiration Date: 09/17/99

Balance Calibration CT600
Serial Number #01081
Zero: OK Span: 300g, 600g
Calibrated By: PRJ
Calibration Date: 02/24/98
Expiration Date: 02/24/99

Balance Calibration
Serial Number #04-000519297H
Zero: OK Span: 500g
Calibrated By: PRJ
Calibration Date: 12/04/98
Expiration Date: 12/04/99

958

TRIGON

James A. Graham
Commissioner

North Carolina
Department of Agriculture
Standards Division

2291

N. David Smith
Director

CERTIFICATE OF TRACEABILITY
AND
REPORT OF CALIBRATION

The standard(s) described on the following page have been compared to standards of the State of North Carolina and have been found to have values as listed. Traceability to the National Institute of Standards and Technology, NIST (formerly The National Bureau of Standards, NBS) is via the NIST test number listed on the report.

Adjustments of precision laboratory standards are not recommended. Therefore, no adjustments have been made to these standards and certification to any tolerance classification is neither stated nor implied. The user(s) of these standards should examine the deviation from nominal value and the associated uncertainty to ascertain if these standards meet their precision requirements.

The uncertainty is an expression of the overall uncertainty using three standard deviations as the limit of random errors of measurement plus the uncertainty of the State Standard used in comparison.

The primary testing methodology used is the Double Substitution Method, NIST Handbook 145, *Handbook for the Quality Assurance of Metrological Measurements*, SOP number 4. Three double substitution weighings are averaged to arrive at the listed value.

959

Post Office Box 27647, Raleigh North Carolina 27611 - (919) 733-3313 - FAX (919) 715-0524

An Equal Opportunity Affirmative Action Employer

2291

James A. Graham
Commissioner

North Carolina
Department of Agriculture
and Consumer Services
Standards Division

N. David Smith
Director

NC Standards Laboratory Report of Test

Submitted by:	Trigon Engineering Consultants, Incorporated 6200 Harris Technology Boulevard Charlotte, NC 28269	**Date of Test:**	December 3, 1998
		Test Number:	NC1098W089
		P.O. Number:	AM7861
		Page Number:	1 of 3

General Description:	One (1) Set of Weights
Set Serial Number:	C.A. No. - 6640
Manufacturer:	100 g = Troemner, 50 g thru 100 mg = Ohaus
Density/Material:	100 g = 7.84 g/cc (stainless steel) 50 g - 200 mg. = 8.027 g/cc (stainless steel) 100 mg = 2.713 g/cc (aluminum)

Item(s) Tested:

# of Items	Nominal	Description	Tolerance	Serial Number(s)
1	100 g	weight	ASTM Class 4	none
1	50 g	weight	ASTM Class 4	none
1	30 g	weight	ASTM Class 4	none
1	20 g	weight	ASTM Class 4	none
1	10 g	weight	ASTM Class 4	none
1	5 g	weight	ASTM Class 4	none
1	3 g	weight	ASTM Class 4	none
1	2 g	weight	ASTM Class 4	none
1	1 g	weight	ASTM Class 4	none
1	500 mg	weight	ASTM Class 4	none
2	200 mg	weights	ASTM Class 4	plain, one dot

This document cannot be reproduced except in full, without the written approval of the N.C. Standards Laboratory.

Post Office Box 27647 Raleigh, North Carolina, 27611 • (919) 733-3313 FAX (919) 715-0524
An Equal Opportunity Affirmative Action Employer

960

229 T sartorius

BALANCE CERTIFICATE of CALIBRATION

CUSTOMER: Trigon
6200 Harris Tech. Blvd
Charlotte, NC 28269

CERTIFICATE #: S20- 32385
DATE OF CALIBRATION: 2-2-99
NEXT CALIBRATION DUE: 2-2000

DEPT.:

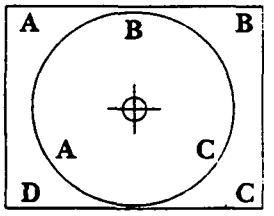
ENVIRONMENTAL CONDITIONS: VERY GOOD | GOOD | FAIR | POOR

MAKE: Mettler MODEL: AJ100 SERIAL #: M131656

THIS CERTIFIES THAT THE ABOVE BALANCE HAS BEEN CALIBRATED USING THE ORIGINAL EQUIPMENT MANUFACTURER CALIBRATION PROCEDURES WITH WEIGHTS TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST).

Sartorius Weight set ID#: 19333
Calibrated to Class: One
Date weight set calibrated: 9-3-98
Date weight set due: 3-3-2000
N.I.S.T. Test number: 882/254480

CORNER LOAD ERROR



FRONT

WEIGHT USED: 50 g TOLERANCE: ±.2mg

STATUS \ REF.POINTS	A	B	C	D*	IN TOLERANCE Y	IN TOLERANCE N
BEFORE ADJ.	+.1mg	-.2mg	+.1mg	*	✓	
AFTER ADJ.	-.1mg	-.1mg	0	*	✓	

*Not applicable to circular pans

LINEARITY CHECK: RANGE 1: 110.0001g TOLERANCE: ±.2mg RANGE 2: TOLERANCE:

RANGE 3: TOLERANCE:

Nominal Value	Before Adjustment	IN TOLERANCE Y	IN TOLERANCE N	After Adjustment	IN TOLERANCE Y	IN TOLERANCE N
20 g	20.0035		✓	20.0000	✓	
50 g	50.0082		✓	50.0001	✓	
70 g	70.0115		✓	70.0002	✓	
100 g	100.0157		✓	100.0000	✓	

COMMENTS:

Kurt Thompson 2-2-99
Sartorius Service Representative Date

131 Heartland Blvd.
Edgewood, New York 11717
(800) 645-3108
(516) 254-4249
Fax: (516) 254-4252

THIS CERTIFICATE OF CALIBRATION SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF THE SARTORIUS CORPORATION.

961

REF: S20D0195

NC Standards Laboratory Report of Test

Submitted by:	Trigon Engineering Consultants, Incorporated 6200 Harris Technology Boulevard Charlotte, NC 28269	**Date of Test:**	December 3, 1998
		Test Number:	NC1098W089
		P.O. Number:	AM7861
		Page Number:	2 of 3

Item(s) Tested:

# of Items	Nominal	Description	Tolerance	Serial Number(s)
1	100 mg	weight	ASTM Class 4	none

Traceability: The items described above have been compared with the standards of the State of North Carolina, and at the time of test were found to be within the reported tolerance. They are traceable to the National Institute of Standards and Technology (NIST) via the test number shown above. All tests were performed at the North Carolina Standards Laboratory, 4040 District Drive, Raleigh, NC 27607. This report does not in any way imply product endorsement by any N.C. or U.S. Government agency.

Environmental conditions of the laboratory: Temperature: 22°C ± 2°C Relative Humidity: 30% - 55%

Uncertainty Statement: The uncertainty of the measurements as calculated according to NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results" with a coverage factor of k=2 (approximately a 95% confidence level), does not exceed 25% of the applicable tolerance for the items listed above.

Condition of Item(s) Upon Receipt:

Good	artifacts display some wear or other degradation

Standards Used: (identified by a "✓") **Balances Used:** (identified by a "✓")

Description	NIST Test Number	Cal Date	Cal Due	All Balances Used for Comparisons Only - No Calibration Required.
☐ 50lb - 1µlb, 30kg - 2kg OSS (Set#86A)	523/236653	2/86	*	☑ Sartorius S4 (sn 10302221)
☐ 4oz - 1/32oz (Set#87A)	523/239265	6/87	*	☑ Mettler Umt5/6 (sn N40614)
☐ 1kg ., 1kg ..OSS (Set#86A)	822/253521	8/96	8/1998	☑ Mettler AT106 (sn 113150849)
☐ 1kg .., 1kg ... (Set #95A)	822/253521	8/96	8/2000	☐ Mettler AT1005 (sn 1115133492)
☑ 500g-200g, 100g pl, 50g-1mg (Set #95A)	822/253521-94	2/95	*	☐ Sartorius C500 (sn 36070006)
☐ 500g-1mg OSS Set #86A	822/253521	7/96	*	☐ Sartorius 2086 (sn 3506003)
☐ 100g., 100g.., 100g... (Set #95A)	822/253521	7/96	*	☐ Sartorius 1681 (sn 35100010)
☐ 10g., 1g pl, 100mg., 10mg. (Set #95A)	822/253521	7/96	*	☐ Mettler PK60mc (sn D94348)
☐ Other				☐ Other

This document cannot be reproduced except in full, without the written approval of the N.C. Standards Laboratory.

NC Standards Laboratory Report of Test

Submitted by:	Trigon Engineering Consultants, Incorporated 6200 Harris Technology Boulevard Charlotte, NC 28269	**Date of Test:**	December 3, 1998
		Test Number:	NC1098W089
		P.O. Number:	AM7861
		Page Number:	3 of 3

* The calibration dates listed indicate NIST calibration dates only. These standards are monitored as part of the laboratory measurement control program and are returned for NIST calibration if problems are detected. As indicated, the 1 kg standards are the only standards that are routinely returned to NIST for calibration.

Test Method Used: **(identified by a "✓")**

NIST Handbook 145, "Handbook for the Quality Assurance of Metrological Measurements"-
☐ SOP No. 8, Modified Substitution Weighing
☑ SOP No. 4, Double Substitution Weighing (☑ Single Double Sub ☐ Averaged Multiple Double Subs)

*Any deviations from or additions to the SOP have been reviewed and approved for use by laboratory management. These deviations are documented and filed in the laboratory files.

Glen Davenport — Metrologist — 12/22/98 Date

Sharon Denning — Reviewed By — 12-22-98 Date

Laboratory Manager: L.F. Eason Laboratory Quality Manager: Sharon Denning
Metrologists: Glen Davenport, Reginald Kennion, Tal Anderson

Original Certificate has the NCDA Seal Embossed Above

This document cannot be reproduced except in full, without the written approval of the N.C. Standards Laboratory.

2291

Company Name: Trigon Engineering Consultants, Inc.
Set Serial Number: AM7861
Tolerance: ASTM Class 4

Test #: NC1098W08
Date: December 3, 1998
Page 1 **Of** 1

Serial #	Nominal Mass	Full Tolerance	Standard Correction	Balance Reading		Approximate Error	
				Before Adjustment	After Adjustment	As Found	As Left
none	100 g	2.0 mg	*	*	*	0.174 mg	0.174 mg
none	50 g	1.2 mg	*	*	*	0.530 mg	0.530 mg
none	30 g	0.90 mg	*	*	*	0.425 mg	0.425 mg
none	20 g	0.70 mg	*	*	*	0.219 mg	0.219 mg
none	10 g	0.50 mg	*	*	*	0.199 mg	0.199 mg
none	5 g	0.36 mg	*	*	*	0.1985 mg	0.1985 mg
none	3 g	0.30 mg	*	*	*	-0.0559 mg	-0.0559 mg
none	2 g	0.26 mg	*	*	*	-0.0523 mg	-0.0523 mg
none	1 g	0.20 mg	*	*	*	0.0221 mg	0.0221 mg
none	500 mg	0.16 mg	*	*	*	-0.0935 mg	-0.0935 mg
plain	200 mg	0.12 mg	*	*	*	-0.0060 mg	-0.0060 mg
one dot	200 mg	0.12 mg	*	*	*	-0.0439 mg	-0.0439 mg
none	100 mg	0.10 mg	*	*	*	0.0036 mg	0.0036 mg

*NA: Measurements performed using NIST Handbook 145, SOP No. 4. Air buoyancy corrections applied.

The uncertainty of the above mass values does not exceed 25% of the applicable tolerance for the weights listed. The "As Found" value for the weights reflects the condition of the weights as they were delivered for test. This condition does not necessarily represent the "As Used" condition of the weights if they have been cleaned, painted, or damaged in shipment.

Metrologist

F:\USERS\DAVEGL\TFLAG8.WPD
Form No.: NC96MR5 Rev Dt.: 2/97 Rev No.: 1

964

2291

James A. Graham
Commissioner

North Carolina
Department of Agriculture
and Consumer Services
Standards Division

N. David Smith
Director

NC Standards Laboratory Report of Calibration

Submitted by:	Trigon Engineering Consultants, Incorporated 6200 Harris Technology Boulevard Charlotte, NC 28269	**Date of Test:** **Test Number:** **P.O. Number:** **Page Number:**	August 20, 1998 NC0698C149 AM7763 1 of 3

General Description:	One (1) Set of Weights
Set Serial Number:	4563
Manufacturer:	Troemner
Density/Material:	100 g - 1 g = 7.84 g/cc (stainless steel) 500 mg, 100 mg = 8.0 g/cc (stainless steel)

Item(s) Tested:

Nominal	Serial Number	Mass Corrections [a]		Expanded Uncertainty
		Mass in Vacuum Correction	Conventional Mass vs 8.0 g/cm^3	
100 g	none	0.100 mg	-0.206 mg	0.046 mg
50 g	none	-0.005 mg	-0.158 mg	0.045 mg
20 g	plain	0.365 mg	0.304 mg	0.025 mg
20 g	one dot	0.153 mg	0.092 mg	0.025 mg
10 g	none	0.056 mg	0.026 mg	0.013 mg
5 g	none	0.210 mg	0.195 mg	0.012 mg
2 g	plain	0.1037 mg	0.0976 mg	0.0046 mg
2 g	one dot	0.0826 mg	0.0765 mg	0.0046 mg
1 g	none	0.0864 mg	0.0834 mg	0.0036 mg
500 mg	none	0.0022 mg	0.0022 mg	0.0061 mg

This document cannot be reproduced except in full, without the written approval of the N.C. Standards Laboratory.

Post Office Box 27647 Raleigh, North Carolina, 27611 • (919) 733-3313 FAX (919) 715-0524
An Equal Opportunity Affirmative Action Employer

965

NC Standards Laboratory Report of Calibration

Submitted by:	Trigon Engineering Consultants, Incorporated 6200 Harris Technology Boulevard Charlotte, NC 28269	**Date of Test:** **Test Number:** **P.O. Number:** **Page Number:**	August 20, 1998 NC0698C149 AM7763 2 of 3

Item(s) Tested:

Nominal	Serial Number	Mass Corrections [a]		Expanded Uncertainty
		Mass in Vacuum Correction	Conventional Mass vs 8.0 g/cm³	
100 mg	none	0.0017 mg	0.0017 mg	0.0015 mg

a: *The Mass in Vacuum Correction (formerly referred to as the true mass correction) is the mass of the weight in a vacuum and should not be used unless calibrations are being made in a vacuum. Use the conventional mass vs 8.0 g/cm³ (formerly referred to as the apparent mass vs 8.0 g/cm³) for all tests performed in air.*

Traceability: The items described above have been compared with the standards of the State of North Carolina, and at the time of test were found to have the mass values listed above. No adjustments were made and no tolerances were evaluated. They are traceable to the National Institute of Standards and Technology (NIST) via the test number shown above. All tests were performed at the North Carolina Standards Laboratory, 4040 District Drive, Raleigh, NC 27607. This report does not in any way imply product endorsement by any N.C. or U.S. Government agency.

Environmental conditions of the laboratory: Temperature: 22°C ± 2°C Relative Humidity: 30% - 55%

Uncertainty Statement: Mass uncertainties were calculated according to NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results." The uncertainty reported is two (2) times the root sum square of the type A and B uncertainties. Type A uncertainties evaluated include balance standard deviations and mass standard uncertainties. Type B uncertainties estimated include air buoyancy and material density uncertainties, and mass standard surveillance discrepancies. The expanded uncertainty represents a coverage factor of k=2 (approximately a 95% confidence level).

Condition of Item(s) Upon Receipt:

Good	artifacts display some wear or other degradation

This document cannot be reproduced except in full, without the written approval of the N.C. Standards Laboratory.

NC Standards Laboratory Report of Calibration

Submitted by: Trigon Engineering Consultants, Incorporated 6200 Harris Technology Boulevard Charlotte, NC 28269	**Date of Test:** August 20, 1998 **Test Number:** NC0698C149 **P.O. Number:** AM7763 **Page Number:** 3 of 3

Standards Used: (identified by a "✓")

Description	NIST Test Number	Cal Date	Cal Due
☐ 50lb - 1µlb, 30kg - 2kg OSS (Set#86A)	523/236653	2/86	*
☐ 4oz - 1/32oz (Set#87A)	523/239265	6/87	*
☐ 1kg ., 1kg ..OSS (Set#86A)	822/253521	8/96	8/1998
☐ 1kg .., 1kg ... (Set #95A)	822/253521	8/96	8/2000
☑ 500g-200g, 100g pl, 50g-1mg (Set #95A)	822/253521-94	2/95	*
☐ 500g-1mg OSS Set #86A	822/253521	7/96	*
☐ 100g., 100g.., 100g... (Set #95A)	822/253521	7/96	*
☐ 10g., 1g pl, 100mg., 10mg. (Set #95A)	822/253521	7/96	*
☐ Other			

Balances Used: (identified by a "✓")

All Balances Used for Comparisons Only - No Calibration Required.
☑ Sartorius S4 (sn 10302221)
☑ Mettler Umt5/6 (sn N40614)
☑ Mettler AT106 (sn 113150849)
☐ Mettler AT1005 (sn 1115133492)
☐ Sartorius C500 (sn 36070006)
☐ Sartorius 2086 (sn 3506003)
☐ Sartorius 1681 (sn 35100010)
☐ Mettler PK60mc (sn D94348)
☐ Other

*The calibration dates listed indicate NIST calibration dates only. These standards are monitored as part of the laboratory measurement control program and are returned for NIST calibration if problems are detected. As indicated, the 1 kg standards are the only standards that are routinely returned to NIST for calibration.

Test Method Used: (identified by a "✓")

NIST Handbook 145, "Handbook for the Quality Assurance of Metrological Measurements"-
☐ SOP No. 8, Modified Substitution Weighing
☑ SOP No. 4, Double Substitution Weighing (☐ Single Double Sub ☑ Averaged Multiple Double Subs)

*Any deviations from or additions to the SOP have been reviewed and approved for use by laboratory management. These deviations are documented and filed in the laboratory files.

Glen Davenport — Metrologist — 8/26/98 — Date

RA-Eason — Reviewed By — 8-26-98 — Date

Laboratory Manager: L.F. Eason Laboratory Quality Manager: Sharon Denning
Metrologists: Glen Davenport, Reginald Kennion, Tal Anderson

Original Certificate has the NCDA Seal Embossed Above

This document cannot be reproduced except in full, without the written approval of the N.C. Standards Laboratory.

WHATMAN 934-AH GLASS MICROFIBRE FILTERS

THE FILTER OF CHOICE FOR SUSPENDED SOLIDS ANALYSIS

2291

Make 934-AH your choice too — request a sample now!

If you're not already using the accepted standard for water quality testing, here's an opportunity to evaluate samples of Whatman 934-AH.

Whatman grade 934-AH is a smooth-surfaced, high retention glass microfibre filter intended for routine filtrations and water quality testing. These filters are produced entirely from the highest grade of borosilicate glass microfibres, are binder free and will withstand temperatures over 500°C.

Whatman glass microfibre filters offer a special combination of advantages, providing high filtration speed with retention of extremely fine particulates.

So if you're not using Whatman 934-AH, here's an opportunity to start. Just write on your letterhead, specifying the diameter you require and mail to:

Whatman Inc.
9 Bridewell Place
Clifton, New Jersey 07014

For technical inquires on
Whatman Grade 934-AH
CALL TOLL FREE: (800) 922-0361
in New Jersey call (201) 773-5800

WHATMAN 934-AH

Availability: Circles — 100 per Box

CATALOG NUMBER	DIAMETER (CM)	PRICE/BOX
1827-021	2.1	$ 6.60
1827-024	2.4	7.30
1827-032	3.2	8.70
1827-037	3.7	9.45
1827-042	4.25	10.50
1827-055	5.5	13.85
1827-070	7.0	17.30
1827-090	9.0	22.85
1827-110	11.0	32.25
1827-125	12.5	39.60
1827-150	15.0	51.85

TECHNICAL CHARACTERISTICS

Weight (gsm)	64
Thickness (mm)	0.33
Retention (μm)	1.5
[1]Filtration Speed (sec/100 ml)	47
DOP Penetration (0.3μm Particle)	0.02%
Minimum Dry Tensil (g/1.5cm width)	300
Minimum Wet Burst (psi)	0.20
Surface	Smooth

[1]Herzberg test at 10 cm hydrostatic head.

Whatman

968

Whatman Inc.
9 Bridewell Place, Clifton, New Jersey 07014 Telephone 201-773-5800 Telex 133426

A Whatman International Company

DWYER INSTRUMENTS, INC.

1505 COBB INDUSTRIAL DRIVE
MARIETTA, GEORGIA 30066

2291

September 10, 1990

Attention: Tony Blanton

Referenece : Purchase Order No. ED1022

CALIBRATION CERTIFICATION

This is to certify that the flowmeters, Catalog Nos. RMA-21 and RMA-25 have been built and tested to conform to an accuracy of ± 4% of full scale as specified in Dwyer's published data.

DWYER INSTRUMENTS, INC.

James H. Milton /BB

JHM/bb

Enc: Page 9, Bulletin F-41

969

SOUTHEASTERN SALES OFFICE • PHONE 404-427-9406 • FAX 404-427-7985

2291

An OMEGA Technologies Company

Certificate of Calibration

for

TRIGON ENGINEERING CONSULTANTS

Cust PO#: AM6802 Model#: HHF615
Report#: 505967094 Serial#: 12770

CAL-3

OMEGA Engineering, Inc. certifies that the above listed instrumentation has been calibrated to meet or exceed the published specifications. This calibration was performed by using instrumentation and standards that are traceable to the U.S. National Institute of Standards and Technology, and is in compliance with MIL-STD-45662A.

Readings Observed In: FPM

STANDARD		AS RECEIVED	FINAL CAL
6000	5000	5100	5000
└	1000	1050	1000
1250	1000	1100	1000
└	250	249	247
300	250	245	250
└	50	45	48
Temp	75F	75F	75F
└	200F	200F	200F

NIST Traceable No(s): 836 TN 251822

Test Conditions: Temp 23C +/-2C, Rel Hum 35% +/-20%

Certified By _____ Date: 06/05/95
Instrumentation Lab Supervisor

OMEGA Engineering, Inc., One Omega Drive, Box 4047, Stamford, CT 06907
Telephone: **(203) 359-1660** • FAX: **(203) 359-7811**

970

Disk: Forms FN: CertCal
WCS-0594

MANUFACTURER'S CALIBRATION CERTIFICATE

2291

The following record shows the accuracy of your digital flowmeter at tested flow rates compared to NIST calibrated standard TN 250561 TELEDYNE HEM-1A #1481. certified 09/08/92.

CALIBRATION DATE: [illegible] PRESSURE (mb): [illegible]
INTERNAL UNIT #: [illegible] SERIAL #: 006023 TEMPERATURE (C): [illegible]
REL. HUMIDITY (%): [illegible]

CALIBRATION FLOW (ml/min)	% ERROR
50.77	[illegible]
502.71	[illegible]
2989.84	-0.14

CALIBRATED BY: LVL PROCEDURE: ATP-M651
CAL. INTERVAL: 2 YEARS

Humonics, Inc. 11315 Sunrise Gold Dr. #1, Rancho Cordova, CA 95742

MANUFACTURER'S CALIBRATION CERTIFICATE

The following record shows the accuracy of your digital flowmeter at tested flow rates compared to NIST calibrated standard TN 250561 TELEDYNE HEM-1A #1481. certified 09/08/92.

CALIBRATION DATE: 05/23/96 PRESSURE (mb): 1025
INTERNAL UNIT #: 21466 SERIAL #: 006021 TEMPERATURE (C): 25
REL. HUMIDITY (%): 35

CALIBRATION FLOW (ml/min)	% ERROR
50.77	-1.64
502.71	0.92
2989.84	1.64

CALIBRATED BY: LVL PROCEDURE: ATP-M651
CAL. INTERVAL: 2 YEARS

Humonics, Inc. 11315 Sunrise Gold Dr. #1, Rancho Cordova, CA 95742

MANUFACTURER'S CALIBRATION CERTIFICATE

The following record shows the accuracy of your digital flowmeter at tested flow rates compared to NIST calibrated standard TN 250561 TELEDYNE HEM-1A #1481. certified 09/08/92.

CALIBRATION DATE: 05/23/96
INTERNAL UNIT #: 21467 SERIAL #: 006022

PRESSURE (mb): 1025
TEMPERATURE (C): 25
REL. HUMIDITY (%): 35

CALIBRATION FLOW (ml/min)	% ERROR
50.77	-1.72
502.71	0.36
2989.84	1.09

CALIBRATED BY: LvL

PROCEDURE: ATP-M651
CAL. INTERVAL: 2 YEARS

Humonics. Inc. 11315 Sunrise Gold Cir. "I". Rancho Cordova. CA 95742

SENSIDYNE, INC. 2291

CALIBRATION CERTIFICATE

CELL S/N: 10280-S DATE: 01 - 16 - 1998

This is to certify that the above referenced Gilibrator Flow Cell was calibrated using film flowmeter MCS-102-A, which has been calibrated by instruments directly traceable to the National Institute of Standards and Technology. NIST Report 8361604.

Results:

	REFERENCE MCS-102-A cc/min	S/N 10280-S cc/min	RELATIVE DIFF. cc/min	PERCENT DIFF.
	2021	2023	2	0.1
	2021	2024	3	0.15
	2017	2015	-2	-0.1
	2021	2024	3	0.15
	2021	2024	3	0.15
	2027	2025	-2	-0.1
	2021	2023	2	0.1
	2027	2024	-3	-0.15
	2019	2020	1	0.05
	2023	2021	-2	-0.1
MAX			3	0.15
MEAN	2021.8	2022.3		

CALIBRATED BY Rafael Torres Sensidyne 205 DATE: 01 - 16 - 1998

CODE 000

973

229 F

MODUS Instruments, Inc.

10 Bearfoot Road • Northborough, Massachusetts 01532
Telephone: 508-393-8991

CALIBRATION CERTIFICATE

Company Name: Trigon Engineering Consultants
6200 Harris Technology Boulevard
Charlotte, NC 28269

Model #: MA2-002I Serial #: 9D60106

Calibration Date: December 16, 1997

This instrument has been calibrated with measurement standards whose accuracy is traceable to the National Institute of Standards and Technology test numbers:

Pressure : Mass 822/249620
Piston & Cylinder : E2828

Instrument A is used for pressure ranges below 0.5 inches of water (125 Pascals)
Instrument B is used for pressure ranges below 5.0 inches of water (1250 Pascals)

Calibration Instrument: Heise Pressure Indicator Model PPM-1
Calibration Standard ID # : QAID 1324

	Instrument A	Instrument B
Certification ID # :	41420-35618	41421-35621
Pressure Range :	0 - 0.50000" H_2O	0 - 5.0000" H_2O
Serial # :	41420	41421
Accuracy:	0.07%	0.06%
Last Calibrated:	7/14/97	7/14/97
Calibration Due Date:	7/14/98	7/14/98

All standards used in this calibration are maintained in accordance with the latest revisions of MIL-STD-45662 and ISO-10012

By :

Title : QA Manager
Date : December 16, 1997

MODUS INSTRUMENTS, INC
10 BEARFOOT ROAD
NORTHBORO , MA 01532

229

PRESSURE CALIBRATION

Pressure Transmitter and Manometer

Model No: MA2-002I **Serial No:** 9D60106

Applied Pressure Units in "H20	Output Units in "H20	Theoretical Output Units in "H20
.200	.200	.200
.160	.160	.160
.120	.120	.120
.080	.080	.080
.040	.040	.040
0	0	0
- .040	- .040	- .040
- .080	- .079	- .080
- .120	- .119	- .120
- .160	- .159	- .160
- .200	- .199	- .200

Environmental Conditions: Temperature = 24.0°C ±2 Degrees C
Humidity = 0 - 60%

Notes :

Calibration By : Ruth L. Szmyt Date : 12-16-97

95

NETECH®

CERTIFICATE OF CALIBRATION

This is to Certify that the instrument listed below has been calibrated against NETECH Corporation's standards which are traceable to the NATIONAL INSTITUTE OF STANDARDS (formerly NBS) and that the instrument performs within NETECH Corporation's Specifications.

NAME OF INSTRUMENT Digimano 2000

MODEL/VERSION 50psi

SERIAL NO. 11456

DATE OF CALIBRATION 4/14/98

CALIBRATION DUE 4/14/99

W. I

For NETECH Corporation

976

TRIGON

Certificate of Calibration

1000004892

2291

Instrument Identification

Trigon Engineering Consult.
208880

Ref# : 279212
SO#: 2814

Instrument Id: **4777**

Noun: Pressure Vacuum Meter
Mfr: Netech
Accuracy: ± 0.1% F.S. ± 1LSD

Model: 220-50PSI
Serial #: 11456

Certification Information

Reason For Service: Calibration
Type Of Calibration: Normal
As Found Condition: In Tolerance
As Left Condition: Left As Found
Procedure: NA17 20MP-117L : Precision Pressure Standard
Remarks: Local gravity : 980.087cm/sec2

Technician: Jozef Sedlacek
Cal Date: 25 SEP 98
Cal Due: 25 SEP 99
Temperature: 21.0 °C
Humidity: 48.0 %

The instrument(s) listed on this certification have been calibrated against standards traceable to the National Institute of Standards and Technology (NIST), derived from ratio type measurements, or compared to nationally or internationally recognized consensus standards.

A calibration uncertainty ratio of 4:1 was maintained unless otherwise stated.

Davis Instruments quality system complies with applicable requirements of ANSI/NCSL Z540-1-1994 and ISO 9002:1994(E)

All results contained within this certification relate only to item(s) calibrated. This certificate shall not be reproduced except in full and with the written consent of Davis Instruments.

Approved By: _____

Calibration Standards

NIST Traceable #	Instrument ID#	Description	Model	Calibration Date	Date Due
1000000068	01-0065	Deadweight Mass Set, Air	6-001	26 JAN 1998	26 JAN 1999
1000003261	01-0062	Deadweight Tester, Air	6-201-0001	26 JAN 1998	26 JAN 1999

977

Davis Instruments • 4701 Mount Hope Drive • Baltimore, Maryland 21215 • Phone: 410.358.3900 • Fax: 410.358.0252

CERTIFICATE OF CALIBRATION

Certified ISO 9002

2291

E.I.L. INSTRUMENTS, INC. (36)
9201 H SOUTHERN PINE BOULEVARD
CHARLOTTE, NC 28273
7045296290 FAX: 7045296390

TRIGON ENGINEERING CONSULTANTS
1920 STARITA ROAD SUITE J
CHARLOTTE, NC 28206
7045981049 FAX:

OWNER: TRIGON ENGINEERING CONSUL
MANUFACTURER: BECKMAN
MODEL NUMBER: RMS225
DESCRIPTION:
SERIAL NUMBER: 10618047
ASSET NUMBER:

EIL NUMBER: E180569
SERVICE ORDER: 1116087
PO NUMBER: AM7370
PROCEDURE: 36-1596
DEPARTMENT:

Calibration performed in accordance with:
MIL-STD 45662A

Reports accompanying Certificate of Calibration:

Date of Calibration: 01/15/97 **Temp:** 70
Due Date: 01/15/98 **RH:** 42 **BP:**

As Received Condition:
X In Tolerance
___ Out of Tolerance
___ As Found Reading Taken After Repair & Before Adjustment

John E Galanski
Certifying Technician

Calibration Equipment Used

E006283-ROT/320, 12/12/96
E006282-ROT/350, 12/12/96
E006993-DAT/4308, 09/05/96

NIST Traceability

LN/4210 STD RESISTOR, NIST #811/256171, 11/01/95
GUL/9152/4 VOLTAGE STD, NIST #811/253226-94, 02/02/94

Calibration traceable to the National Institute of Standards and Technology (NIST) has been accomplished on the instrument listed above by comparison with standards maintained by EIL Instruments. The accuracy and stability of all standards maintained by EIL Instruments are traceable to national standards maintained by NIST in Gaithersburg, Maryland and Boulder, Colorado. This certificate relates only to the equipment listed and shall not be reproduced except in full, without the written approval of EIL Instruments. All calibrations have been performed using standards having an accuracy of four times or better than the instrument listed above. Uncertainties of measurements for this calibration are based upon 95% confidence limits. (SER940)

978

Electronic Controls Design Inc.
4287-A S.E. International Way
Milwaukie OR 97222-8825
U.S.A.
(503) 659-6100 (800) 323-4548
FAX: (503) 659-4422

SINCE 1964

CERT. NO. 4565

229 F

CERTIFICATE OF NIST TRACEABILITY

CUSTOMER COLE-PARMER

PART # E28-0050-00 MODEL # MODEL 50 SERIAL # 9701-3609

Method Of Calibration

This product was calibrated by applying a stable voltage, from a precision dc calibration source, through an ice-point reference device.

Standards Used

MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	DESCRIPTION
ANALOGIC	AN3200	1316670A	CALIBRATOR, DC V/A
OMEGA	TRC3	60304	ICE POINT CELL

CALIBRATION DATE: January 30, 1997 CALIBRATION DATE DUE: June 30, 1997

Electronic Controls Design, Inc. certifies that the equipment noted heron has been compared to the standards listed above in accordance with the referenced method of calibration, and has been found to be within tolerance. The standards used to establish the basis for this calibration are certified as being traceable to the National Institute of Standards and Technology.

CALIBRATION TECH B. Witherspoon

A32-0001-00
F - 50

979

Electronic Controls Design Inc.
4287-A S.E. International Way
Milwaukie, Oregon U.S.A. 97222-8825
(503) 659-6100 (800) 323-4548
FAX: (503) 659-4422

SINCE 1964

2291

DECLARATION OF CONFORMITY

Model Number MODEL 50 **Serial Number** 9701-3609

The above product is in conformity with the following standards or other normative documents:

* Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio frequency equipment:
  EN55011:1992

* Electromagnetic compatibility generic immunity standard
  Part 1: Residential, commercial and light industry
  EN50082-1:1992

* Safety requirements for electrical equipment for measurement, control, and laboratory use
  Part 1: General requirements
  EN61010-1:1990, and Amendment 1:1992

following the provisions of the following European Directives:

* Electromagnetic Compatibility Directive
  89/336/EEC

* Low-voltage Directive
  73/23/EEC

PAUL SALMON
Paul Salmon

Date January 30, 1997

A35-0200-17 Rev A

980

Electronic Controls Design Inc.
4287-A S.E. International Way
Milwaukie OR 97222-8825
U.S.A.
(503) 659-6100 (800) 323-4548
FAX: (503) 659-4422

SINCE 1964

2291

CERT. NO. 4565

CERTIFICATE OF NIST TRACEABILITY

CUSTOMER COLE-PARMER

PART # E28-0050-00 MODEL # MODEL 50 SERIAL # 9701-3609

Method Of Calibration

This product was calibrated by applying a stable voltage, from a precision dc calibration source, through an ice-point reference device.

Standards Used

MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	DESCRIPTION
ANALOGIC	AN3200	1316670A	CALIBRATOR, DC V/A
OMEGA	TRC3	60304	ICE POINT CELL

CALIBRATION DATE: January 30, 1997 CALIBRATION DATE DUE: June 30, 1997

Electronic Controls Design, Inc. certifies that the equipment noted heron has been compared to the standards listed above in accordance with the referenced method of calibration, and has been found to be within tolerance. The standards used to establish the basis for this calibration are certified as being traceable to the National Institute of Standards and Technology.

CALIBRATION TECH B. Witherspoon

A32-0001-00

981

Electronic Controls Design Inc.
4287-A S.E. International Way
Milwaukie, Oregon U.S.A. 97222-8825
(503) 659-6100 (800) 323-4548
FAX: (503) 659-4422

SINCE 1964

2291

DECLARATION OF CONFORMITY

Model Number MODEL 50 **Serial Number** 9701-3609

The above product is in conformity with the following standards or other normative documents:

- Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio frequency equipment:
  EN55011:1992

- Electromagnetic compatibility generic immunity standard
  Part 1: Residential, commercial and light industry
  EN50082-1:1992

- Safety requirements for electrical equipment for measurement, control, and laboratory use
  Part 1: General requirements
  EN61010-1:1990, and Amendment 1:1992

following the provisions of the following European Directives:

- Electromagnetic Compatibility Directive
  89/336/EEC

- Low-voltage Directive
  73/23/EEC

PAUL SALMON
Paul Salmon

Date January 30, 1997

A35-0200-17 Rev A

982

RATA CLASS

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1750 EAST CLUB BLVD,DURHAM,NC 27704 Phone: 919-220-0803 Fax: 919-220-0808

2291

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM,NC 27704

P.O. No.: AM7840
Project No.: 12-30834-002

Customer

TRIGON ENGINEERING

6200 HARRIS TECH BLVD
CHARLOTTE NC 28269

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997.

Cylinder Number: AAL17249 **Certification Date:** 10/13/98 **Exp. Date:** 10/13/2001
Cylinder Pressure*:** 2000 PSIG

COMPONENT	CERTIFIED CONCENTRATION		ANALYTICAL ACCURACY**	TRACEABILITY
CARBON DIOXIDE	10.13	%	+/- 1%	NIST
OXYGEN	12.65	%	+/- 1%	NIST
NITROGEN		BALANCE		

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes. Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 18000	4/12/00	ALM047531	17.95 %	CARBON DIOXIDE
NTRM 2659	1/02/01	ALM031720	20.72 %	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
VARIAN GC/3400/0160-CO2	10/12/98	GC / TCD
VARIAN GC/3400/0160-CO2	09/29/98	GC / TCD

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

CARBON DIOXIDE

First Triad Analysis			Second Triad Analysis	Calibration Curve	
Date: 10/12/98	Response Unit: %			Concentration = A + Bx + Cx2 + Dx3 + Ex4	
Z1 = 0.0000	R1 = 12434.	T1 = 70218.		r = 0.999990	18000
R2 = 12444.	Z2 = 0.0000	T2 = 70212.		Constants:	A = 0.000000
Z3 = 0.0000	T3 = 70234.	R3 = 12454.		B = 1.000000	C = 0.000000
Avg. Concentration:	10.13	%		D = 0.000000	E = 0.000000

OXYGEN

First Triad Analysis			Second Triad Analysis	Calibration Curve	
Date: 10/13/98	Response Unit: %			Concentration = A + Bx + Cx2 + Dx3 + Ex4	
Z1 = 0.0000	R1 = 53074.	T1 = 32386.		r = 0.999990	2659
R2 = 53109.	Z2 = 0.0000	T2 = 32380.		Constants:	A = 0.000000
Z3 = 0.0000	T3 = 32453.	R3 = 53114.		B = 1.000000	C = 0.000000
Avg. Concentration:	12.65	%		D = 0.000000	E = 0.000000

Special Notes:

APPROVED BY: B.M. BECTON

SUPERVISOR: B. TYSON

983

Scott Specialty Gases

1750 EAST CLUB BLVD,DURHAM,NC 27704 Phone: 919-220-0803 Fax: 919-220-0808

2291

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
TRIGON ENGINEERING

6200 HARRIS TECH BLVD

CHARLOTTE,NC 28269

Assay Laboratory

SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM,NC 27704

Project No.: 12-26718-003
P.O. No.: AM7687

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1993.

Cylinder Number: ALM004556 **Certification Date:** 1/14/98 **Exp. Date:** 1/14/2001
Cylinder Pressure*:** 2015 PSIG

COMPONENT	CERTIFIED CONCENTRATION		ANALYTICAL ACCURACY**
CARBON DIOXIDE	18.37	%	+/- 1% NIST TRACEABLE
OXYGEN	22.4	%	+/- 1% NIST TRACEABLE
NITROGEN		BALANCE	

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes. Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 18000	4/12/01	ALM047775	17.95 PCT	CARBON DIOXIDE
NTRM 2659	1/02/01	ALM031720	20.72 %	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	LAST DATE CALIBRATED	ANALYTICAL PRINCIPLE
VARIAN GC/3400/0160-CO2	12/22/97	GC / TCD
VARIAN/3400/16804-O2	01/13/98	GC / TCD

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis **Second Triad Analysis** **Calibration Curve**

CARBON DIOXIDE

Date: 01/13/98	Response Unit: AREA	
Z1 = 0.0000	R1 = 124078	T1 = 127112
R2 = 124227	Z2 = 0.0000	T2 = 127160
Z3 = 0.0000	T3 = 127138	R3 = 124293
Avg. Concentration:	18.37	%

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 0.99999
Constants: A = 0.00
B = 1.00 C = 0.00
D = 0.00 E = 0.00

OXYGEN

Date: 01/14/98	Response Unit: AREA	
Z1 = 0.0000	R1 = 527512	T1 = 570179
R2 = 527204	Z2 = 0.0000	T2 = 567746
Z3 = 0.0000	T3 = 570360	R3 = 526579
Avg. Concentration:	22.40	%

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 0.99999
Constants: A = 0.00
B = 1.00 C = 0.00
D = 0.00 E = 0.00

Special Notes:

984

ANALYST: B.M. Becton
B.M. BECTON

Scott Specialty Gases

1750 EAST CLUB BLVD,DURHAM,NC 27704 Phone: 919-220-0803 Fax: 919-220-0808

2291

CERTIFICATE OF ANALYSIS: Interference-Free™ EPA Protocol Gas

Customer
SCOTT SPECIALTY GASES
RECERTIFICATION TRIGON
1750 EAST CLUB ROAD

DURHAM,NC 27704

Assay Laboratory
SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM,NC 27704

Project No.: 12-30017-001
P.O. No.: RECERT TRIGON

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1993.

Cylinder Number: ALM041244 **Certification Date:** 8/10/98 **Exp. Date:** 8/10/2000
Cylinder Pressure*:** 990 PSIG

COMPONENT	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY**
SULFUR DIOXIDE *	47.19 PPM	+/- 1% NIST Traceable
NITROGEN	BALANCE	

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes. Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

This Protocol has been certified using corrected NIST SO2 standard values, per EPA guidance dated 7/24/96 and will not correlate with uncorrected Protocols.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM1694	10/28/98	ALM057408	96.20 PPM	SO2/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	LAST DATE CALIBRATED	ANALYTICAL PRINCIPLE
FTIR System/8220/AAB9400252	07/20/98	Scott Enhanced FTIR

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

SULFUR DIOXIDE *

First Triad Analysis

Date: 07/31/98	Response Unit: PPM	
Z1 = 0.0379	R1 = 96.069	T1 = 47.124
R2 = 96.187	Z2 = 0.1111	T2 = 47.243
Z3 = 0.0647	T3 = 47.301	R3 = 96.345
Avg. Concentration:	47.22	PPM

Second Triad Analysis

Date: 08/10/98	Response Unit: PPM	
Z1 = 0.0200	R1 = 96.155	T1 = 47.145
R2 = 96.197	Z2 = 0.0988	T2 = 47.166
Z3 = 0.0552	T3 = 47.188	R3 = 96.248
Avg. Concentration:	47.17	PPM

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = 0.999990	
Constants:	A = 0.000000
B = 1.000000	C = 0.000000
D = 0.000000	E = 0.000000

Special Notes:

ANALYST: B.M. Becton
B.M. Becton

985

Scott Specialty Gases

2291

1750 EAST CLUB BLVD,DURHAM,NC 27704 Phone: 919-220-0803 Fax: 919-220-0808

CERTIFICATE OF ANALYSIS: Interference-Free™ EPA Protocol Gas

Customer
TRIGON ENGINEERING

6200 HARRIS TECH BLVD

CHARLOTTE,NC 28269

Assay Laboratory

SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM,NC 27704

Project No.: 12-30834-004
P.O. No.: AM7840

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1993.

Cylinder Number: ALM000903 **Certification Date:** 11/04/98 **Exp. Date:** 11/04/2000
Cylinder Pressure*:** 1772 PSIG

COMPONENT	CERTIFIED CONCENTRATION		ANALYTICAL ACCURACY**
SULFUR DIOXIDE *	87.17	PPM	+/- 1% NIST Traceable
NITROGEN		BALANCE	

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes. Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

* This Protocol has been certified using corrected NIST SO2 standard values, per EPA guidance dated 7/24/96 and will not correlate with uncorrected Protocols.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM1661	10/02/02	ALM060356	488.5 PPM	SO2/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	LAST DATE CALIBRATED	ANALYTICAL PRINCIPLE
FTIR System/8220/AAB9400252	10/23/98	Scott Enhanced FTIR

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis

SULFUR DIOXIDE *

Date: 10/28/98	Response Unit: PPM	
Z1 = -0.215	R1 = 96.111	T1 = 86.537
R2 = 96.345	Z2 = 0.0383	T2 = 86.985
Z3 = -0.115	T3 = 87.096	R3 = 96.144
Avg. Concentration:	86.87	PPM

Second Triad Analysis

Date: 11/04/98	Response Unit: PPM	
Z1 = 0.3167	R1 = 487.89	T1 = 87.390
R2 = 488.64	Z2 = 1.3198	T2 = 87.601
Z3 = 0.5772	T3 = 87.411	R3 = 488.96
Avg. Concentration:	87.47	PPM

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = 0.999990	
Constants:	A = 0.000000
B = 1.000000	C = 0.000000
D = 0.000000	E = 0.000000

Special Notes:

ANALYST: B.M. Becton
B.M. Becton

G86

RATA CLASS **2291**

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1750 EAST CLUB BLVD,DURHAM,NC 27704 Phone: 919-220-0803 Fax: 919-220-0808

CERTIFICATE OF ACCURACY: Interference Free™ EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM,NC 27704

P.O. No.: C.C.-ROBERT BIVENS
Project No.: 12-31691-001

Customer

TRIGON ENGINEERING

6200 HARRIS TECH BLVD
CHARLOTTE NC 28269

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997.

Cylinder Number: ALM009653 **Certification Date:** 12/15/98 **Exp. Date:** 12/15/2000

Cylinder Pressure*:** 1924 PSIG

COMPONENT	CERTIFIED CONCENTRATION		ANALYTICAL ACCURACY**	TRACEABILITY
SO2	450.3	PPM	+/- 1%	NIST
N2		BALANCE		

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes. Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM1661	10/02/02	ALM060356	488.5 PPM	SO2/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR System/8220/AAB9400252	11/20/98	Scott Enhanced FTIR

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

SO2

First Triad Analysis

Date: 12/08/98	Response Unit: PPM	
Z1 = 0.3839	R1 = 488.60	T1 = 450.23
R2 = 488.52	Z2 = 1.0957	T2 = 450.74
Z3 = 0.6669	T3 = 450.91	R3 = 488.37
Avg. Concentration:	450.6	PPM

Second Triad Analysis

Date: 12/15/98	Response Unit: PPM	
Z1 = 0.2412	R1 = 487.99	T1 = 450.19
R2 = 489.08	Z2 = 0.4460	T2 = 450.30
Z3 = 1.3907	T3 = 449.78	R3 = 488.43
Avg. Concentration:	450.1	PPM

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = 0.999990	
Constants:	A = 0.000000
B = 1.000000	C = 0.000000
D = 0.000000	E = 0.000000

Special Notes:

APPROVED BY: B. M. Becton
B.M. Becton

F - 58

987

2291

Scott Specialty Gases

1750 EAST CLUB BLVD,DURHAM,NC 27704 Phone: 919-220-0803 Fax: 919-220-0808

CERTIFICATE OF ANALYSIS: Interference-Free™ EPA Protocol Gas

Customer
TRIGON ENGINEERING

6200 HARRIS TECH BLVD

CHARLOTTE,NC 28269

Assay Laboratory

SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM,NC 27704

Project No.: 12-26735-001
P.O. No.: W/A

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1993.

Cylinder Number: AAL19194 **Certification Date:** 2/12/98 **Exp. Date:** 2/12/2001
Cylinder Pressure*:** 1052 PSIG

COMPONENT	CERTIFIED CONCENTRATION		ANALYTICAL ACCURACY**
SULFUR DIOXIDE *	970.2	PPM	+/- 1% NIST Traceable
NITROGEN		BALANCE	

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes. Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

This Protocol has been certified using corrected NIST SO2 standard values, per EPA guidance dated 7/24/96 and will not correlate with uncorrected Protocols.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRMR1662	5/09/98	ALM057950	967.0 PPM	SO2/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	LAST DATE CALIBRATED	ANALYTICAL PRINCIPLE
FTIR System/8220/AAB9400252	01/29/98	Scott Enhanced FTIR

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

SULFUR DIOXIDE *

First Triad Analysis

Date: 02/05/98	Response Unit: PPM	
Z1 = 0.0727	R1 = 967.05	T1 = 969.08
R2 = 966.69	Z2 = 1.4564	T2 = 969.63
Z3 = 1.7100	T3 = 970.88	R3 = 967.26
Avg. Concentration:	969.9	PPM

Second Triad Analysis

Date: 02/12/98	Response Unit: PPM	
Z1 = -1.309	R1 = 966.19	T1 = 971.44
R2 = 967.05	Z2 = 0.3652	T2 = 971.02
Z3 = 0.2809	T3 = 969.40	R3 = 967.76
Avg. Concentration:	970.6	PPM

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = 0.999990	
Constants:	A = 0.000000
B = 1.000000	C = 0.000000
D = 0.000000	E = 0.000000

Special Notes:

ANALYST: B.M. Becton
B.M. Becton

988

2291

Scott Specialty Gases

Shipped From: 1750 EAST CLUB BLVD
DURHAM NC 27704
Phone: 919-220-0803 Fax: 919-220-0808

CERTIFICATE OF ANALYSIS

TRIGON ENGINEERING

6200 HARRIS TECH BLVD

CHARLOTTE NC 28269

PROJECT #: 12-27859-001
PO#: AM7724
ITEM #: 12022914 CAL
DATE: 3/18/98

CYLINDER #: ALM021781
FILL PRESSURE: 1160 PSIG

ANALYTICAL ACCURACY: +-1%
PRODUCT EXPIRATION: 3/18/2000

BLEND TYPE : RECERTIFICATION OF CYLINDER

COMPONENT	REQUESTED GAS CONC MOLES		ANALYSIS (MOLES)	
NITRIC OXIDE	49.35	PPM	50.06	PPM
NITROGEN - OXYGEN FREE		BALANCE		BALANCE
OXIDES OF NITROGEN			50.18	PPM

ANALYTICAL METHOD: 1

ANALYST: B.M. Becton
B.M. Becton

F-60

989

RATA CLASS 2291

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1750 EAST CLUB BLVD,DURHAM,NC 27704 Phone: 919-220-0803 Fax: 919-220-0808

CERTIFICATE OF ACCURACY: Interference Free™ EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM,NC 27704

P.O. No.: C.C.-ROBERT BIVENS
Project No.: 12-31691-002

Customer

TRIGON ENGINEERING

6200 HARRIS TECH BLVD
CHARLOTTE NC 28269

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; *Procedure #G1; September, 1997.*

Cylinder Number: ALM001056 **Certification Date:** 12/14/98 **Exp. Date:** 12/14/2000
Cylinder Pressure*:** 1912 PSIG

COMPONENT	CERTIFIED CONCENTRATION		ANALYTICAL ACCURACY**	TRACEABILITY
NO	97.28	PPM	+/- 1%	NIST
NITROGEN - OXYGEN FREE		BALANCE		
NOX	97.79	PPM		Reference Value Only

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes. *Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.*

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM1685	7/10/01	ALM048455	247.5 PPM	NO/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR System/8220/AAB9400252	11/20/98	Scott Enhanced FTIR

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

NO

First Triad Analysis

Date: 12/07/98	Response Unit: PPM	
Z1 = 0.1384	R1 = 246.76	T1 = 97.099
R2 = 247.36	Z2 = 0.1621	T2 = 97.401
Z3 = 0.1866	T3 = 97.703	R3 = 248.37
Avg. Concentration:	97.40	PPM

Second Triad Analysis

Date: 12/14/98	Response Unit: PPM	
Z1 = -0.001	R1 = 247.38	T1 = 97.051
R2 = 247.41	Z2 = 0.1727	T2 = 97.175
Z3 = 0.2517	T3 = 97.251	R3 = 247.71
Avg. Concentration:	97.16	PPM

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 0.999990

Constants:	A = 0.000000
B = 1.000000	C = 0.000000
D = 0.000000	E = 0.000000

Special Notes:

APPROVED BY: B.M. Becton
B.M. Becton

990

Scott Specialty Gases

2291

500 WEAVER PARK RD.LONGMONT,CO 80501 Phone: 303-442-4700 Fax: 303-772-7673

CERTIFICATE OF ANALYSIS: Interference-Free™ Multi-Component EPA Protocol Gas

Customer
TRIGON ENGINEERING
TOM WYNN
6200 HARRIS TECH BLVD

CHARLOTTE,NC 28269

Assay Laboratory

SCOTT SPECIALTY GASES
500 WEAVER PARK RD
LONGMONT,CO 80501

Project No.: 08-37237-001
P.O. No.: AM7593

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1993.

Cylinder Number: ALM051381 **Certification Date:** 6/16/97 **Exp. Date:** 6/16/1999
Cylinder Pressure*:** 1876 PSIG

COMPONENT	CERTIFIED CONCENTRATION		ANALYTICAL ACCURACY**
NITRIC OXIDE	556	PPM	+/- 1% NIST Traceable
OXIDES OF NITROGEN	556	PPM	Reference Value
NITROGEN - OXYGEN FREE		BALANCE	

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes. Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM1686	7/11/97	ALM048648	504.0 PPM	NO/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	LAST DATE CALIBRATED	ANALYTICAL PRINCIPLE
FTIR System/8220/AAB9400251	05/22/97	Scott Enhanced FTIR

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

NITRIC OXIDE

First Triad Analysis

Date: 06/06/97	Response Unit: PPM	
Z1 = 0.0258	R1 = 503.69	T1 = 556.56
R2 = 504.13	Z2 = 0.1420	T2 = 556.73
Z3 = 0.2957	T3 = 556.29	R3 = 504.18
Avg. Concentration:	556.5	PPM

Second Triad Analysis

Date: 06/16/97	Response Unit: PPM	
Z1 = 0.0317	R1 = 504.00	T1 = 555.01
R2 = 503.88	Z2 = 0.1732	T2 = 554.89
Z3 = 0.3284	T3 = 554.41	R3 = 504.12
Avg. Concentration:	554.8	PPM

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = 0.999990	
Constants:	A = 0.000000
B = 1.000000	C = 0.000000
D = 0.000000	E = 0.000000

Special Notes:

ANALYST: Devon VonFeldt
Devon VonFeldt

991

RATA CLASS

2291

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1750 EAST CLUB BLVD,DURHAM,NC 27704 Phone: 919-220-0803 Fax: 919-220-0808

CERTIFICATE OF ACCURACY: Interference Free™ EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM,NC 27704

P.O. No.: AM7745
Project No.: 12-28486-001

Customer

TRIGON ENGINEERING

6200 HARRIS TECH BLVD
CHARLOTTE NC 28269

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997.

Cylinder Number: ALM036781 **Certification Date:** 5/01/98 **Exp. Date:** 5/01/2000

Cylinder Pressure*:** 1904 PSIG

COMPONENT	CERTIFIED CONCENTRATION		ANALYTICAL ACCURACY**	TRACEABILITY
NITRIC OXIDE	896.3	PPM	+/- 1%	NIST
NITROGEN - OXYGEN FREE		BALANCE		
NOX	904.5	PPM		Reference Value Only

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes.

Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM1687	7/12/98	ALM058421	1002. PPM	NO/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR System/8220/AAB9400252	04/23/98	Scott Enhanced FTIR

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis

NITRIC OXIDE

Date: 04/24/98	Response Unit: PPM	
Z1 = 0.0381	R1 = 1004.0	T1 = 898.38
R2 = 1002.3	Z2 = 0.1439	T2 = 896.56
Z3 = 0.5070	T3 = 898.08	R3 = 999.66
Avg. Concentration:	897.7	PPM

Second Triad Analysis

Date: 05/01/98	Response Unit: PPM	
Z1 = 0.0543	R1 = 1001.7	T1 = 894.22
R2 = 1001.6	Z2 = 0.2381	T2 = 895.05
Z3 = 0.2363	T3 = 895.27	R3 = 1002.6
Avg. Concentration:	894.8	PPM

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = 0.999990	
Constants:	A = 0.000000
B = 1.000000	C = 0.000000
D = 0.000000	E = 0.000000

Special Notes:

APPROVED BY: B.M. Becton
B.M. Becton

SUPERVISOR: Margaret Hensler
M. HENSLER

992

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC
27713
(919)544-3772

CERTIFICATE OF ANALYSIS * EPA PROTOCOL MIXTURES

REFERENCE #:	88-48507	CYLINDER #:	LL605	CYL. PRESSURE:	2000 PSIG	P.O. #:	1019356
EXP. DATE:	7/23/99	LAST ANALYSIS DATE:	7/23/96	CUSTOMER:	NATIONAL WELDERS CHARLOTTE,NC		

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1 THIS STANDARD SHOULD NOT BE USED WHEN ITS GAS PRESSURE IS BELOW 1.0 MEGAPASCALS (150 PSIG).

COMPONENT: PROPANE

STANDARD

SRM #: 1667B
CYL. #: CLM 5293
CONC: 47.3 PPM

INSTRUMENT: ROSEMOUNT THC
MODEL #: 400A
SERIAL #: 2000335
LAST CAL.: 7/6/96

MEAN CONC.: 31.0 PPM +/- 0.25 PPM

REPLICATE CONC.

DATE: 7/23/96
31.0 PPM
31.0 PPM
31.1 PPM

BALANCE GAS: NITROGEN

REPLICATE DATA						REPLICATE DATA	REPLICATE DATA
DATE: 7/23/96							
Z	0	R	90.2	C	59.1		
R	90.1	Z	0	C	59.1		
Z	0	C	59.3	R	90.2		

Z= ZERO C=CANDIDATE R=REFERENCE

ANALYST: Mark Hill APPROVED BY: Tracy A. Silvers

THIS REPORT STATED ACCURATELY THE RESULTS OF THE INVESTIGATION MADE UPON THE MATERIAL SUBMITTED TO THE ANALYTICAL LABORATORY EVERY EFFORT HAS BEEN MADE TO DETERMINE OBJECTIVELY THE INFORMATION REQUESTED, HOWEVER, IN CONNECTION WITH THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE ASSAYED AT NATIONAL SPECIALTY GASES, 630 UNITED DRIVE, DURHAM, NC 27713. (919)544-3772

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC
27713
(919)544-3772

CERTIFICATE OF ANALYSIS * EPA PROTOCOL MIXTURES

REFERENCE #:	88-48230	CYLINDER #.	LL 16848	CYL. PRESSURE:	2000 PSIG	P.O. #:	1003208
EXP. DATE:	7/5/99	LAST ANALYSIS DATE:	7/5/96	CUSTOMER:	NATIONAL WELDERS CHARLOTTE, N.C.		

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1997,G-1 THIS STANDARD SHOULD NOT BE USED WHEN ITS GAS PRESSURE IS BELOW 1.0 MEGAPASCALS (150 PSIG).

COMPONENT:	PROPANE
STANDARD	
SRM #:	2643A
CYL. #:	SX 20245
CONC:	99.1 PPM
INSTRUMENT:	ROSEMOUNT THC
MODEL #:	400A
SERIAL #:	2000335
LAST CAL.:	6/17/96

MEAN CONC.: 50.5 PPM +/- 0.40 PPM

REPLICATE CONC.

DATE:	7/5/96
50.5	PPM
50.5	PPM
50.5	PPM

BALANCE GAS: NITROGEN

REPLICATE DATA						REPLICATE DATA	REPLICATE DATA
DATE:	7/5/96						
Z	0	R	99.1	C	50.5		
R	99.1	Z	0	C	50.5		
Z	0	C	50.5	R	99.1		

Z= ZERO C=CANDIDATE R=REFERENCE

ANALYST: G B Moore APPROVED BY: Richard Sykes

THIS REPORT STATES ACCURATELY THE RESULTS OF THE INVESTIGATION MADE UPON THE MATERIAL SUBMITTED TO THE ANALYTICAL LABORATORY. EVERY EFFORT HAS BEEN MADE TO DEFINE OBJECTIVELY THE INFORMATION REQUESTED; HOWEVER, IN CONNECTION WITH THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE.

ASSAYED AT: NATIONAL SPECIALTY GASES, 630 UNITED DRIVE, DURHAM, NC 27713 (919)544-3772

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC
27713
(919)544-3772

CERTIFICATE OF ANALYSIS * EPA PROTOCOL MIXTURES

REFERENCE #:	88-56452	CYLINDER #:	LL676	CYL. PRESSURE:	2000 PSIG	P.O. #:	1652652
EXP. DATE:	2/23/01	LAST ANALYSIS DATE:	2/23/98	CUSTOMER:	CHARLOTTE, N.C.		

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1997:G-1 THIS STANDARD SHOULD NOT BE USED WHEN ITS GAS PRESSURE IS BELOW 1.0 MEGAPASCALS (150 PSIG).

COMPONENT: PROPANE

STANDARD

SRM #: 1668B

CYL. #: CAL 11036

CONC: 98.8 PPM

INSTRUMENT: ROSEMOUNT THC

MODEL #: 400A

SERIAL #: 2000335

LAST CAL.: 2/17/98

MEAN CONC.: 85.6 PPM +/- 0.68 PPM

REPLICATE CONC.

DATE: 2/23/98

85.6 PPM

85.6 PPM

85.6 PPM

BALANCE GAS: NITROGEN

REPLICATE DATA						REPLICATE DATA	REPLICATE DATA
DATE: 2/23/98							
Z:	0	R	98.8	C	85.6		
R:	98.8	Z	0	C	85.6		
Z:	0	C	85.6	R	98.8		

Z= ZERO C=CANDIDATE R=REFERENCE

ANALYST: Kirsty Daniels APPROVED BY: Richard Sykes

THIS REPORT STATED ACCURATELY THE RESULTS OF THE INVESTIGATION MADE UPON THE MATERIAL SUBMITTED TO THE ANALYTICAL LABORATORY. EVERY EFFORT HAS BEEN MADE TO DETERMINE OBJECTIVELY THE INFORMATION REQUESTED; HOWEVER, IN CONNECTION WITH THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTADLISHED CHARGE FOR THE SERVICE

ASSAYED AT: NATIONAL SPECIALTY GASES, 630 UNITED DRIVE, DURHAM, NC 27713. (919)544-3772

SECTION 9

RESERVED

APPENDIX B

Demonstration Surrogate Glass – S0-B5B-2

Table B.1 S0 Surrogate Batch Sheet for Glass S0-D5B-2

Table B.2 S0-D5B-2 Glass Crucible Melt Batch Sheet

Table B.3 Oxide Totals for Glass Batch S0-D5B-2

Table B.4 Glass Composition S0-D5B-2

Table B.5 FDF-Supplied S1 Surrogate Batch Composition

Table B.6 FDF-Supplied S2 Surrogate Batch Composition

EnVitCo, Inc.
A COGEMA Group Company

2291

Table B.1
S0 Surrogate Batch Sheet for Glass S0-D5B-2

S0-D Surrogate – Adjusted from original Contract recipe with respect to:

1. Fumed SiO_2 increased 20% at expense of coarse silica
2. Content of Magnesium Phosphate reduced to 62 wt.% of original amount

Target Batch Wt. (g) 3000

Soluble Components		Dry wt%	LOD wt%	Chem H_2O wt%	Wt for 100 dry	Target Wt	Target Wt x 2	+2x Wt	-2x Wt	Actual 2x Wt	
Na_2HAsO_4-$7H_2O$	0.17	0.17	38.43	40.385	0.29	7.82	15.63	15.79	15.48		
Na_2CrO_4	0.27	0.27	0.69		0.27	7.45	14.90	15.05	14.75		
Na_2SeO_3	0.1	0.10	0.06		0.10	2.74	5.48	5.54	5.43		
$NaNO_3$	1.03	1.04	0.09		1.04	28.26	56.51	57.08	55.95		
V_2O_5	0.09	0.09	0.11		0.09	2.47	4.94	4.99	4.89		
Water											
Insoluble Components		**Dry wt%**	**LOD wt%**	**Chem H_2O wt%**	**Wt for 100 dry**	**Target Wt**	**+Wt**	**-Wt**	**Actual Wt Batch 1**	**Actual Wt Batch 2**	
$BaSO_4$	8.18	8.25	0.05		8.26	224.31	226.55	222.07			
Fe_2O_3	2.52	2.54	0.09		2.54	69.13	69.82	68.44			
$Mg_3(PO4)2$-$5H_2O$	1.457	1.47	1.37	25.502	1.97	53.60	54.14	53.07			
NiO	0.43	0.43	0.04		0.43	11.79	11.91	11.67			
PbO	5.67	5.72	0.01		5.72	155.42	156.97	153.87			
$PbCO_3$	6.6	6.66	0.32		6.68	181.48	183.29	179.66			
$PbSO_4$	2.65	2.67	0.03		2.67	72.65	73.38	71.93			
Coarse SiO_2	18.096	18.26	0.02		18.26	496.08	501.04	491.12			
Fine SiO_2	18.9	19.07	0.06		19.08	518.33	523.51	513.14			
Fumed SiO_2	10.944	11.04	2.12		11.28	306.45	309.52	303.39			
ZnO	0.01	0.01	0.1		0.01	0.27	0.28	0.27			
Tributyl Phosphate	0.92	0.93			0.93	25.22	25.47	24.96			
Kerosene	0.92	0.93			0.93	25.22	25.47	24.96			
Diatomaceous Earth	1.83	1.85	5.25		1.95	52.94	53.47	52.41			
Feldspar	18.32	18.49	0.07		18.50	502.47	507.50	497.45			
Surrogate total	99.107	100.00			101.02	2744.1					
BentoGrout	8.618	8.70	7.7		9.4211	255.91	258.47	253.35			
Surrogate+BentoGrout	107.73	108.70			110.44	3000					

998

EnVitCo, Inc.
A COGEMA Group Company

2291

Table B.2
S0-D5B-2 Glass Crucible Melt Batch Sheet

Batch Sheet for S0-D5B-2-S1, 2, 3, 4 Crucible Melts

83.9 wt. % Waste Loading, Total Alkali 9.49 wt.%, Oxide from Additives 17.02 wt.%

Sugar added at from 0.1 to 0.4% wt.% C*

Date Batched: _____

Dry Surrogate Weight: 400 gm

At ___ %H_2O, weigh out _____ gm. of wetted surrogate

	Wt-100	Target			
Component	**Dry Sur**	**Wt**	**+ Wt**	**- Wt**	**Actual Wt**
Surrogate	110.44	400.00	404.00	396.00	
Additive 1	13.98	50.63	51.13	50.12	
Additive 2	6.21	22.50	22.73	22.28	
Additive 3	13.81	50.00	50.50	49.50	
Additive 4	6.83	24.75	25.00	24.50	
Additive 5	1.95	7.06	7.13	6.99	
Totals	153.22	554.94			
		Sugar	+ Wt	- Wt	
-S1 (0.1% C*)	0.31	1.11	1.12	1.10	
-S2 (0.2% C*)	0.61	2.22	2.24	2.20	
-S3 (0.3% C*)	0.92	3.33	3.36	3.30	
-S4 (0.4% C*)	1.23	4.44	4.49	4.40	

* C equiv. based on oxide wt.

999

EnVitCo, Inc.
A COGEMA Group Company

2291

Table B.3
Oxide Totals for Glass Batch S0-D5B-2

Compound	LOI wt%	Tot Ox wt	Oxide	Mol Wt	Oxide wt
Na_2HAsO_4	42.73	0.16	Na_2O	62	0.06
			As_2O_5	229.84	0.11
$BaSO_4$	0.94	8.18	BaO	153.34	5.37
			SO_3	80.06	2.81
Na_2CrO_4	0.85	0.27	Na_2O	62	0.10
			CrO_3	100	0.17
Fe_2O_3	0.18	2.54	Fe_2O_3	159.6	2.54
$Mg_3(PO_4)_2$	23.42	1.51	MgO	40.3	0.70
			P_2O_5	141.94	0.82
$NaNO_3$	63.5	0.38	Na_2O	62	0.38
NiO	0.13	0.43	NiO	74.71	0.43
PbO	0.32	5.70	PbO	223.2	5.70
$PbCO_3$	17.02	5.54	PbO	223.2	4.63
$PbSO_4$	3.78	2.57	PbO	223.2	1.89
			SO_3	80.06	0.68
Na_2SeO_3	-3.55	0.10	Na_2O	62	0.04
			SeO_2	110.96	0.07
Coarse SiO_2	0.08	18.25	SiO_2	60.08	18.25
Fine SiO_2	0.16	19.05	SiO_2	60.08	19.05
Fumed SiO_2	2.68	10.98	SiO_2	60.08	10.98
V_2O_5	0.19	0.09	V_2O_5	181.88	0.09
ZnO	0.27	0.01	ZnO	81.37	0.01
$(C_4H_9)_3PO_4$	73.37	0.25	P_2O_5	141.94	0.25
Kerosene	100	0.00			0.00
Diatomaceous Earth	8.23	1.79	SiO_2 %	90	1.61
Feldspar	0.16	18.47	Na_2O %	6.98	1.29
			K_2O %	4.37	0.81
			Al_2O_3 %	18.87	3.48
			SiO_2 %	68.1	12.58
			CaO %	1.37	0.25
BentoGrout	13.18	8.18	SiO_2 %	65.4	5.35
			Al_2O_3 %	15.8	1.29
			MgO %	6.3	0.52
			Fe_2O_3 %	3.6	0.29
			Na_2O %	3.4	0.28
			CaO %	1.8	0.15
			K_2O %	0.8	0.07
Surrogate+BentoGrout Total Oxide wt					**103.08**
Additive 1	XXX	7.9967	Add.1 Oxide		7.9967
Additive 2	XXX	3.6337	Add.2 Oxide		3.6337
Additive 3	XXX	5.5834	Add.3 Oxide		5.5834
Additive 4	XXX	6.8336	Add.4 Oxide		6.8336
Additive 5	XXX	1.9447	Add.5 Oxide		1.9447
Oxide Total Wt					**129.08**

1000

EnVitCo, Inc.
A COGEMA Group Company

229 1

Table B.4
Measured/Predicted Glass Composition – Demonstration Glass S0-D5B-2

Oxide	Predicted *	Measured **	Method
(wt. %)	(wt.%)	(wt.%)	
R_2O	9.49	9.08	ICP
As_2O_3	0.08	Not measured	
BaO	4.16	4.21	ICP
Cr_2O_3	0.10	Not measured	
Fe_2O_3	2.20	Not measured	
MgO	0.94	0.72	ICP
NiO	0.34	0.34	ICP
P_20_5	0.82	0.86	ICP
PbO	9.48	9.56	ICP
SO_3	2.70*	0.35	LECO
SeO_2	0.05	Not measured	
SiO_2	52.55	58.2	ICP
V_20_5	0.07	Not measured	
From other Additives	17.02		

* - does not compensate for volatility losses or losses due to reaction with sugar
** - from Sample XGLS-S0-T-0232 submitted to Corning December 6, 1998.

EnVitCo, Inc.
A COGEMA Group Company

2291

Table B.5
FDF-Supplied S1 Surrogate Batch Composition

Component, Actual	Dry wt	LOD wt%	Chem H2O wt%	Surrog. Mix wt
BaSO4	10.33	0.00		10.33
Na2CrO4	0.06	30.80		0.08
Fe2O3	2.66	0.20		2.67
MgO	0.57	0.40		0.57
MgCO3	0.28	4.10		0.29
Mg3(PO4)2-5H2O	0.96	8.80	25.50	1.29
NaNO3	0.50	0.10		0.50
NiO	0.46	1.00		0.46
PbO	5.00	0.00		5.00
PbCO3	4.17	0.00		4.17
PbSO4	6.23	1.10		6.30
Na2SeO3	0.13	2.40		0.13
Coarse SiO2	22.13	0.02		22.13
Fine SiO2	16.13	1.00		16.29
Fumed SiO2	12.13	0.60		12.20
V2O5	0.09	0.00		0.09
ZnO	0.01	0.10		0.01
Diatomaceous Earth	1.47	0.10		1.47
Feldspar	16.25	0.10		16.27
Surrogate total	99.54			100.25
BentoGrout	8.66	7.70		9.38
Surrogate+BentoGrout	108.20			109.63

Water added: _____

Water+Surrogate+BentoGrout: _____

% Water in wet surrogate mix: _____

EnVitCo, Inc.
A COGEMA Group Company

2291

Table B.6
FDF-Supplied S2 Surrogate Batch Composition

Component, Actual	Dry wt	LOD wt%	Chem H2O wt%	Surrog. Mix wt
Al2O3	0.80	2.20		0.815
Na2HAsO4-7H2O	0.13	39.30	40.38	0.215
BaSO4	6.80	0.00		6.800
CaCO3	1.91	0.40		1.920
Na2CrO4	0.04	30.80		0.055
Fe2O3	6.22	0.20		6.230
KNO3	0.36	0.10		0.356
Mg3(PO4)2-5H2O	0.38	8.80	25.50	0.510
NaNO3	0.71	0.10		0.715
NiO	0.37	1.00		0.370
PbO	3.57	0.00		3.570
PbCO3	0.46	0.00		0.455
PbSO4	3.99	1.10		4.030
Na2SeO3	0.10	2.40		0.100
Coarse SiO2	27.02	0.20		27.075
Fine SiO2	13.91	1.00		14.055
Fumed SiO2	13.40	0.60		13.485
V2O5	0.09	0.00		0.085
ZnO	0.01	0.10		0.015
Tributyl Phosphate	0.92			0.915
Kerosene	0.92			0.915
Diatomaceous Earth	4.43	0.10		4.430
Feldspar	13.27	0.10		13.285
Surrogate total	99.78			100.40
BentoGrout	8.68	7.70		9.40
Surrogate+BentoGrout	108.46			109.80

Water added: _____

Water+Surrogate+BentoGrout: _____

% Water in wet surrogate mix: _____

EnVitCo, Inc.
A COGEMA Group Company

2291

SECTION 11

RESERVED

1004

EnVitCo, Inc.
A COGEMA Group Company

2291

SECTION 12

LABORATORY LOG NOTEBOOK JJ

1005

2291

LABORATORY NOTEBOOK

ENVITCO, INC.
FDF POPT

Notebook No.: JJ

Assigned to: _____

Date: _____

Use Nalge Cat. No. 6301-2000 to reorder.

Copyright 1973, 1993 Nalge Company, Rochester, N.Y.

A Subsidiary of Sybron Corporation

Printed in U.S.A.

1006

Rev. 1993

Printed on recycled paper.

PRINTED WITH SOY INK

~~1/17/99~~ 1/18/99 2291

0945 – Quick Insp in Level
Drain Sfc 1108 → 1105
Drain In-Glass – 1248 – leave

0950 – Feed up to P=32 – 0.68-0.70 l/min

1000 Drain Rate = 0.3
Video Camera record initiated. Seventy-two hour testing begun!

We are now on the Clock! Good Luck, Team!

KRW

New Drum (Drum #20) started for the 72-hour test. RRW

10:15 Switch feed to Salt Drain Pot
10:30 Switch feed to Glass Drain Pot

In-Glass Main tank = 1175 top range
[redacted]

1040 Drain Rate = 0.34 [redacted] to 15.1 kW

1049 Changed feed position to Viewport (VP). RRW
Drain Rate = 0.32 kg/min

Continued on Page

Read and Understood By

1007

Signed Date Signed Date

1/18/99

2291

1054 [redacted] reduced [redacted] flow

1055 Reduced power to Zones 1 & 2:

[redacted]

[redacted] Glass Center T= 1176°C

[redacted]

[redacted]

1115 Change feed to pump 1, Salt Drain

1120 In-Gls Mn tank - 1174 - OK
Drain In-Glass - 1241 - Low
Incr. Sfc Bars to 1113
[redacted] up +0.1 kW [redacted]
Drain Rate 0.30 kg/min
Reduce [redacted] (-0.3 kW)

1140 Drain Rate = 0.32
Reduce [redacted] (-0.6 kW)

[redacted] down 0.2 - 1176

1200 Drain rate at 0.3 Kg/m, Turned
[redacted] down to [redacted] (-0.5 Kw)

1220 Changed feed position to viewport

Continued on Page

Read and Understood By

1008

Signed | Date | Signed | Date

1235 Add 0.2 kW to 21/2 [redacted] 2291

1245 Drain Rate = 0.244 kg/min

Change feed nozzle to Salt Drain

1255 - Mn Tank In-Glass = 1173
Reduce 21/2 T by -0.1 kW
Drain In-Glass = 1243
Incr 23 by +0.2 kW

Drop [redacted] 0.1 kW

10 - Incr Plenum P = 17 → 19
Incr 21/2 Bottom - +0.1 kW
[redacted]

1320 - Mn Tank In-Glass = 1172 (falling)
Incr 21/2 B[redacted] +0.1 kW
left ([redacted])

1330 Drain Rate = 0.24 Also opened dil. valve on melter right
1345 Drain Rate = 0.24 27 - down 0.1 kW
1400 Mn Tank In-Glass = 1172 -
Can put in more power - +0.1 kW
1405 Drain 0.25 - reduce [redacted] more
[redacted]

Continued on Page

Read and Understood By

1009

Signed Date Signed Date

1/18/99

[redacted]10 – feed position moved to Salt Drain Area

1414 – increased zone 1 & 2 bottom by 0.1 KW ea

Drain Rate 0.24 kg/min
[redacted] – down [redacted]

1426 Feed Rate down to 37% kgH
1440 Drain 0.23 kg/min
— [redacted] down [redacted] —
Moved Feed to GD. kgH
1500 Drain Rate 0.22
[redacted] – down [redacted] – [redacted]

[redacted]05 [redacted] back up to 13.0 kW kgH
1510 Changed feed to VP kgH
1533 Slurry Recirc. T = 29.2°C kgH
1540 Changed Feed to SD kgH
1610 Changed Feed to GD kgH
1615 [redacted] down to [redacted] kgH
1630 Changed feed to VP kgH
1640 Drain Rate = 0.19 kg/min JPatten
1705 Changed Feed to SD kgH
1705 Increased [redacted] to [redacted] by KW H
1716 [redacted] Z3 temp = 1226 Z3 up .5 kW to [redacted]
1720 Drain Rate = 0.19 kg/min JPatten
[redacted]25 Feed Rate back up to 38% output kgH

Continued on Page

Read and Understood By

1010

Signed | Date | Signed | Date

1/18/99

1730 Changed Feed to GD KJH

1738 Drain [redacted] T = 1233 KJH

2291

1740 Drain Rate = 0.20 kg/min KJH

1744 Low N_2 Pressure alarm on Tank 1, checking cylinder room, switched to TANK 2. KJH

1800 Changed Feed to VP KJH

Transferred SURR #008B to TANK 3

1805 Drain Rate = 0.17 kg/min [redacted] up to [redacted] KJH

1810 Feed Rate down to 37% KJH

1815 Sealed up slidegate at backend of OG Trailer to help keep Inlet T upper D. Pooke of McGill. Furnace pressure down 0.01 to -0.04 and duct pressure down to -4.30 KJH

1822 Drain Rate = 0.22 kg/min [redacted] back to [redacted] KJH

1830 Changed feed to SD KJH

1900 Changed feed to GD KJH

Also adjusted Dil. Air Valve over melter to get -0.05" in melter

1905 Drain Rate = 0.23 kg/min [redacted] down to [redacted] KJH

Level = -0.16 Tank T = 1177 Drain [redacted] = 1265°C

1910 Noted first major salt flow in Tank. KJH

1930 Changed feed to VP KJH Drain Rate = 0.22 kg/min [redacted] down to [redacted] T = 1264 KJH

2000 Changed feed to SD KJH

2005 [redacted] down to [redacted] KJH

2035 Changed feed to GD KJH Drain Rate = 0.20 kg/min

2050 Feed not melting as rapidly Tank T = 1171

Feed Rate down to 35% KJH

Continued on Page

Read and Understood By

1011

Signed Date Signed Date

2102 Changed Feed to VP KJH Drain = .23 kg/min
2107 [redacted] KJH GD [redacted] 125% 2291
[redacted] up to [redacted] KJH
2110 Feed Low Flow Alarm - Backflushed line and feed restarted
2115 Feed Only covering ~½ melter. Increased feed to 36%.
2135 Changed Feed to SD KJH
2141 Drain Rate = 0.19 kg/min JPatten
2145 Completed Transfer of Batch 008A INTO THE MIX TANK KJH
2146 [redacted] up 0.3 [redacted] KJH
2158 [redacted] down to [redacted] KJH
2200 Changed feed to GD KJH Feed Rate up to 37%.
2203 Slurry Temp = 28.6°C
2213 Drain Rate = 0.236 kg/min.
2215 Feed Rate back down to 36%.
2230 Changed Feed to VP KJH
2250 Drain Rate = 0.16 kg/min JPatten
2305 Changed Feed to SD KJH
2310 [redacted] up to [redacted] Drain Rate = 0.17 kg/min
2332 Changed Feed to (Glass Drain) KJH
2350 DAS offline for a few minutes to replace broken mouse KJH
2400 Changed Feed to VP KJH
1/19/99
0022 Lights-Out Check of melter [redacted] KJH
0032 Changed feed to SD (salt drain). RAW
0047 Drain Rate = 0.19 kg/min. RAW
0058 Changed feed to GD (Glass Drain). RAW
0103 Drain Rate = 0.18 kg/min. RAW

Continued on Page

Read and Understood By

1012

Signed Date Signed Date

1/[redacted]/99 2291

[redacted]34 Changed to feed position VP (viewport). RAW

0157 Changed to feed position SD (salt drain). RAW

0205 Glass Drain Rate = 0.17 kg/min. Increased [redacted] to [redacted] RAW

0211 Batch (Surrogate) #008A Complete! RAW

0220 Glass drain rate = 0.18 kg/min. MOW

0230 Changed to feed position GD (Glass drain). MOW

0244 Glass drain rate = 0.189 kg/min. MOW

0254 Changed feed position VP (View port). MOW
Glass Temp. in main tank center = 1173°C. MOW

0331 Changed to feed position SD (salt drain). RAW

[redacted]42 Glass Drain Rate = 0.28 Kg/min. [redacted] RAW

0357 Changed to feed position GD (glass drain).
Glass Drain Rate = 0.22 Kg/min. RAW

0435 Changed feed position to VP (viewport) RAW

0441 Glass Drain Rate = 0.154 kg/min. Glass level = -0.16".
Increased [redacted] to [redacted] RAW
[redacted] RAW

0452 Transferred Surrogate #007 from Storage Tank #4 to Mix Tank. Rinse water addition: ~65 Kg. RAW

0458 Changed to feed position SD (salt drain). RAW

0520 Glass Drain Rate = 0.23 kg/min. RAW

Continued on Page

Read and Understood By

1013

Signed Date Signed Date

1/19/99

2291

0533 Changed feed position to GD (Glass Drain).
Feed flow rate = 0.75 Lpm (37% output). RAW

0549 Cleared salt drain orifice.
Glass Drain Rate = 0.23 Kg/min. [redacted]

0557 Changed feed position to VP (viewport). RAW
0611 Low N_2 Pressure Alarm. Switched to Tank #1. RAW
Glass Drain Rate = 0.22 Kg/min. RAW
0616 Changed feed position to SD (salt drain). RAW
0620 Opened salt drain [redacted] No salt draining ~~occur~~ RAW. [redacted]
Glass Level = -0.10" ~~Lp~~ RAW.
0635 Changed to feed position GD (Glass Drain). RAW
0650 Glass Drain Rate = 0.17 Kg/min [redacted] RAW
0653 Changed to feed position VP (viewport). RAW
0703 Glass Drain Rate = 0.18 Kg/min. RAW
0710 Changed feed position to SD (salt drain). RAW
0727 Changed feed position to GD (glass drain). RAW
0740 Glass Drain Rate = 0.217 Kg/min. RAW
0754 Changed feed position to VP (viewport). RAW
0800 Glass Drain Rate = 0.22 Kg/min. RAW
0825 Changed feed position to SD (salt drain). RAW

Continued on Page

Read and Understood By

1014

Signed | Date | Signed | Date

1/19/99 2291

[redacted]3 Changed feed position to GD (glass drain). RAW

0855 Glass Drain Rate = 0.15 kg/min. [redacted] RAW

0900 Changed feed position to viewport (VP). RAW

0915 Glass Drain Rate = 0.15 kg/min. Increased [redacted] to [redacted]. RAW

0935 Changed feed position to salt drain (SD). RAW

0947 Temperature drop in the main tank coincided with a molten salt evolution similar to Sunday morning. Increased 2 SB/2B [redacted] RAW

0952 Glass Center Temp. dropped from 1165°C to 1142°C. RAW

[redacted] Glass Center temperature reached its lowest point of 1117°C before beginning to rise. Molten salt was present in and the entire melt surface with little indication of pooling.

1020 Changed feed position to glass drain (GD). Sparging with water appeared to retard salt presence. After feed position change & nozzle flush, the salt presence dropped appreciably and appeared to slow to previous manageable levels. RAW

Continued on Page

Read and Understood By

1015

Signed Date Signed Date

1/19/99 2291

1030 Glass Center temp. has risen to 1135°C

[redacted]

Offgas Sampling: Trigon Engineering
Continuous Emissions Monitors
1st Run: 8:30 - 10:00 am — Replaced Filters
2nd Run: 11:00 am

Method 25A (VOCs) - Continuous since 8:30 am. RAW

1100 Began transfer of Batch #007 to the Feed Tank from the Mix Tank. Initial transfer samples of feed taken: (3) Enviro, (3) archive. RAW
- Initial Transfer: 1911.9 - 84.6 = 1827.3 kg Batch 007
- Additional Water to Mixtank: 119.2 - 84.6 = 34.6 kg (as Rinse)

1215 Pump #1 began to labor. Adjusted back pressure to 6 psi. Pump operation steadied. RAW

1200 Switched feed position to salt drain (SD). RAW

1244 Switched feed position to glass drain (GD). RAW

Continued on Page

Read and Understood By

1016

Signed Date Signed Date

1-19-99 2291

300 changed to VP KJH

1305 [redacted] down [redacted] to [redacted] Glass Dr. Rate = 0.23 KJH

1335 Changed Feed to SD KJH

1400 [redacted] down [redacted] to [redacted] T = 1271 KJH

1405 changed Feed to GD KJH

1430 Changed Feed to VP KJH DRAIN RATE = 0.21 kg/min Level = 0.20

1438 Reset OG Computer for modem connection

1510 Changed Feed to SD KJH DRAIN RATE = 0.23 kg/min Level = 0.34

Z3 [redacted] = 1247 [redacted] back up to [redacted]

1530 Feed nearly covering entire melt surface - Feed down to 35%

1535 changed Feed to GD KJH

1558 Changed Feed to VP KJH

02 [redacted] down [redacted] as drain rate = 0.27 [redacted] KJH

No SALT FLOWS FOR 2-3 hrs.

1611 SALT FLOW OF GOOD AMOUNT PRESENT FROM VP area and lasted only 2-3 minutes. KJH

1630 Changed Feed position to SD KJH

1635 Drain Rate = 0.24 kg/min Level = +0.11 Z3 [redacted] = 1247

[redacted] KJH

1700 Changed Feed to GD KJH

1702 ~~Z3~~ [redacted] LOW N_2 Alarm - Changed to tank 2 and went Low so changing both 1 & 2 #2 is on cylinder and will connect Dewar.

1705 N_2 Restored KJH We are running on #1 with #2 as backup

1730 large salt flow noted on center of melter, only small ones noted since 1611 hrs KJH lasted 2-3 minutes

Continued on Page

Read and Understood By

10M

Signed Date Signed Date

2291

1735 Changed feed position to VP KJH

** McGill has tightened the inleakage to the EP and furnace P + Duct P has gone more negative. Closing Damper to re-establish -0.05 → -0.09" in melter, currently Melter = -0.15 Duct -7.00 This also caused a drop in Plenum T = 741

1739 Damper at 8% OPEN, Melter P = -0.10 to -0.07
Duct Flow = 5000 afpm Plenum T = 741
Duct Pressure = -5.50 These vary a little as OG Samplers open and close ports for sampling trains. KJH

1745 Drain Rate = 0.19 kg/min JPH
[redacted] up to [redacted] KJH

1758 Changed Feed to SD KJH

1820 [redacted] up to [redacted] KJH Drain Rate still .20 kg/min

1830 Changed Feed to GD KJH

1835 Large Salt flow for 1-2 minutes from under SD feed position KJH

1900 Drain rate = 0.23 CLK

1905 Changed Feed to VP KJH

1930 Changed Feed to SD KJH

1946 Drain rate = .24 CLK

1945 Level = 0.34, [redacted] T = 1272 (up 20°C in ~45 min)
visual check - level OK - looks like a little foam.
[redacted] down to [redacted] (-.6 kw) KJH

1950 Drain Rate = .24 kg/min

2000 Changed feed to GD KJH

Continued on Page

Read and Understood By

1018

Signed Date Signed Date

2291

2030 Changed feed to SD Level = +0.31

23[redacted] T = 1252 [redacted] back to [redacted]

Drain Rate = 0.25 [redacted] down [redacted] KJH

2100 Drain Rate = 0.26 JP

2100 Changed feed to VP KJH

2102 Slurry Recirc Flow almost stopped when taking 2100 feed sample, adjusted back-pressure valve and flow restored with backpressure ~6 psi. KJH

2130 Changed feed to GD

— When going to flush line 2 noticed no air pressure for solenoids (building at 40 psi) also pulsair are down.

2140 Drain Rate = 0.31 kg/min J Potter

— Compressor doors closed, they were opened and compr. restarted. The high outlet temp was on momentarily. KJH

2200 Drain Rate = 0.306 kg/min. DCR

Moved feed to SD KJH

2207 large salt flow from GD location lasted ~1 min then second flow from near same location lasted ~2 min. melt had been very quiet since last flow @ 1835

2222 salt flow, not as big as 2207, but of good size @ SD

2230 Changed feed to VP Drain Rate 0.27 kg/min

* Compressor over temp tripped @ ~2215 hrs. Restarted and restricted outlet air flow to keep compressor cooled down. This results in ~80 psi in building which is enough. KJH

Continued on Page

Read and Understood By

Signed Date Signed Date

1-19-99 2291

2240 Transferred Remainder + wash waters of batch #007 = 86 kg into Feed Tank. KJH

2300 Drain Rate = 0.30 kg/min Jpatter

2300 Changed feed Position to Glass Drain (GD)

2305 Noted wild fluctuations in feed rate. Inspected Recirc pumps and lost pump #1 Changed to pump 2 and adjusted back pressure to ~7 psi. TP is replacing pump #1 with a backup. KJH

2330 Changed feed to SD. Feed rate has stabilized. KJH

2339 Drain Rate: 0.29 kg/min JPatter

2355 Changed feed to VP KJH

1/20/99

0022 Installed Pump into Pump #1 (Diaphragm Pump). Switched from Pump #2 to Pump #1 at the Feed Tank. Pump #2 is

0029 Switched feed position to Salt Drain (SD). [illegible]

0038 Glass Drain Rate = 0.21 kg/min.

0057 Switched feed position to Glass Drain (GD). [illegible]

Continued on Page

Read and Understood By

1020

Signed Date Signed Date

~~1-19-99~~ 1-20-99 **2291**

.00 Glass Drain Rate = 0.20 kg/min. Glass Level = +0.27

0115 Process Conditions:

Glass Center T = 1154 [redacted]

[redacted] [redacted]

Plenum Temp = 873 [redacted]

Plenum Setpoint = 19 [redacted]

Glass Level = 0.21 [redacted]

Feed Flow Rate = 0.72 [redacted]

Feed Flow Setpoint = ~~0.72~~ 35% [redacted]

0127 Changed feed position to VP (Viewport).

35 Salt expulsion occurred at the glass drain cold cap, near the wall. Expulsion resembled a lava flow and lasted for two minutes (stopped at 0137). Overall, the salt expulsion was mild.

0146 Glass Drain Rate = 0.15 kg/min. Glass Level = +0.20

Increased [redacted]

0152 Melt surface began to breathe and then stopped as another salt expulsion erupted at the viewport.

Batch coverage @ ~ 1/3 of melt surface.

Continued on Page

Read and Understood By

1021

Signed Date Signed Date

~~1-19-99~~ 1-20-99 2291

0154 Changed feed position to SD (Salt Drain). RAW

0214 Glass Drain Rate = 0.145 Kg/min. Glass Level = +0.42" RAW

0224 Backflushed the feed take-off nozzle. RAW

0225 Glass Drain Rate = 0.173 Kg/min. Glass Level = +0.44" RAW

0235 Changed feed position to GD (Glass drain) RAW

0240 Filled seal pot reservoir on Pump #2 [redacted] and repressurized the system. Water filled to ¼" above the bottom of the blue marking tape. RAW

0245 Salt expulsion began again at the glass drain feed location (present feed location). Glass Center T = 1159°C. RAW

0246 Salt expulsion ceased. RAW

0248 Glass Drain Rate = 0.19 Kg/min. RAW

0255 Changed feed position to VP (viewpot). RAW

Continued on Page

Read and Understood By

1022

Signed Date Signed Date

~~1-19~~ 1-20-99 2291

0300 Filled seal pot reservoir on Pump #1 [redacted] and repressurized the system. RAW

0320 Mina salt expulsion at viewport feed position. No melt breathing before salt expulsion observed. RAW

0325 Glass Drain Rate = 0.18 Kg/min. Glass Level = +0.26" Increased [redacted] RAW

0327 Changed feed position to salt drain (SD). RAW Mina salt expulsion occurred at the viewport feed position immediately after flushing the slurry feed nozzle with water. RAW

0352 Changed feed position to GD (Glass Drain)

0411 Salt expulsion occurred at glass drain feed point. Subsided after 20 seconds. RAW

0416 Salt expulsion occurred at glass drain feed point. Subsided after a minute 17 seconds RAW

Continued on Page

Read and Understood By

1023

Signed Date Signed Date

1-20-99 2291

0420 Salt venting has become much more prevalent over the last 5 minutes with salt expulsions occurring every 1 minute for 30-40 seconds. RAW

0423 Changed feed position to salt drain (SD). RAW

0439 Salt expulsion occured at salt drain feed. Lasted for 1 min. 48 seconds. MOW

0454 Changed feed position to glass drain (GD). RAW

0515 Glass Drain Rate = 0.19 kg/min. Glass Level = +0.49 kg/min RAW
Increased [redacted] RAW

0518 Changed feed position to viewport (VP). RAW

0542 Changed feed position to salt drain (SD) RAW

0603 Low Melter Feed Alarm sounded. Backflushed the feed take-off nozzle (3) times. Feed resumed after 30 seconds. Normal conditions. RAW

0612 Changed feed position to glass drain (GD). RAW

Continued on Page

Read and Understood By

1024

Signed Date Signed Date

1-20-99 2291

0628 - Glass Drain Rate = 0.25 Kg/min. Glass Level = +0.42". RAW

0615 - Strong SO_2 odor. Checked offgas draft at melter level, mezzanine level, and EP stack. All points exhibiting strong draft.
Hypothesis: Since the Tuigan CEM at the stack remained fairly constant for SO_2 (6.6 ppm SO_2), perhaps the building ventilation system swept SO_2 from the stack into the HVAC system. All other systems were normal and operational during the odor presence.

0641 Voluminous salt expulsion at the glass drain feed point immediately following the change from the glass drain to the viewport feed. Salt venting lasted for 45-50 seconds. RAW

Changed feed position to viewport. RAW

0657 Salt venting again; viewport location for ~15 seconds. RAW

0712 Changed feed position to SD (Salt Drain).

Continued on Page

Read and Understood By

1025

Signed Date Signed Date

20-99 2291

0733 Changed to feed position GD (glass drain). RAW

0747 Glass drain rate .21 kg/min. MOW

0812 Chaned to feed position SP (Salt Drain. MOW

0830 Changed to feed position view port LT

0855 Changed feed position to GD (Glass Drain). RAW
Drain Rate = 0.28 Kg/min. RAW

0942 Glass Drain Rate = 0.31 kg/min. Glass Level = +0.49"
Decreased [redacted] RAW

0930 Changed feed position to SD (salt drain). RAW

0952 Glass Drain Rate = 0.28 Kg/min. Glass Level = +0.54 in
Changed feed position to VP (viewport). RAW

1015 Glass Drain Rate = 0.33 Kg/min Turned [redacted]
down. [redacted]

1030 Changed feed position to Glass drain LT

1112 Changed feed position to Salt drain LT

Continued on Page

Read and Understood By

1026

Signed Date Signed Date

20-99 2291

200 Drain Rate = 0.33 [redacted] down [redacted] KJH

1200 Changed feed position to view port

1224 Large Salt flow lasted only 30 sec. KJH

1230 Changed feed to GD KJH

1257 Changed feed position to SD. flow

1300 [redacted] up to [redacted] as drain rate = 0.23 kg/min KJH

1322 [redacted] up to [redacted] KJH

1320 changed feed to VP KJH

1332 DRAIN RATE = 0.21 kg/min KJH

1333 Low Feed Flow Alarm — Backflushed and feed rate restored, recirc pump operating OK KJH

05 Changed feed to SD KJH

1410 [redacted] down to [redacted] as drain rate = 0.32 kg/min KJH

1420 Drain Rate = 0.31 kg/min

1430 changed feed to GD KJH

1445 Drain Rate = 0.23 kg/min [redacted] up to [redacted] KJH

1453 Large salt flow from under GD lasted 30 sec and then small amount of "spitting" then stopped

1500 Changed feed to VP KJH Drain = 0.24 kg/min

1530 changed feed to SD KJH Drain = 0.27 kg/min

1533 TRICON has packed up all 3rd level equipment and closed sample ports. Melter P = -0.10 Flow = 5500 cfm. KJH

1600 changed feed to GD KJH

1600 Drain Rate = 0.274 Kg/min. DCR

Continued on Page

Read and Understood By

1027

Signed Date Signed Date

20-99 **2291**

0824 Finished Transferr of 914.0 kg of Batch 8A from Storage #2 to MIX. KJH

1630 Changed feed to VP KJH

1638 Drain Rate = 0.217 kg/min DCR

1639 [redacted] up [redacted] to [redacted] KJH

1700 Changed feed to SD KJH

1730 Changed feed to ~~GD~~ VP KJH

1742 Drain Rate = 0.25 kg/min KJH

1745 Completed Glass former Addition and transfer of the remainder of Batch 8A. = 958.6 kg including the rinse water of ~20 kg. for a total surrogate batch of 1872.6 kg + additives = 2,174.5 kg melter feed. KJH

1800 Changed feed to GD KJH

1830 Changed feed to SD KJH - also closed dil air valve 1/2 above G. Drain

1830 Drain Rate = 0.328 kg/min. DCR

1900 Changed feed to VP KJH

1901 Level = +0.44 Z3 [redacted] T = 1281 appears to be foam with drain rate also up. [redacted] down to [redacted] [redacted] down to [redacted] Drain Rate = 0.34 KJH

1924 Drain Rate = 0.33 kg/min CLR

1925 [redacted] down to [redacted] [redacted] T = 1276 Level = +0.12 KJH

1930 Completed partial transfer of Batch 008A = 952 kg leaving 1222 kg of 008A in MIX TANK. KJH

1932 Changed feed to SD KJH

Continued on Page

Read and Understood By

1028

Signed Date Signed Date

229 I'

[illegible] Drain Rate = 0.329 kg/min DCR

954 Drain Rate = 0.30 kg/min KGH

2000 Changed feed to GD. KGH

2030 Changed feed to SD KGH Drain Rate = 0.286 kg/min

2045 [redacted] back up to [redacted] [redacted] up to [redacted]

[redacted] T = 1260 Level = -0.03

2046 ~30 sec salt flows from SD position and then a small one from the GD position.

2055 Changed feed to VP KGH

2133 Changed feed to SD KGH

2140 large salt flow for ~45 sec Drain Rate = 0.30 kg/min

2142 [redacted] down to [redacted] KGH

2155 large salt flow

[illegible]200 Changed feed to VP Drain Rate = 0.24 kg/min

2232 Changed feed to GD Drain Rate = 0.19 kg/min KGH

2245 Changed feed to SD KGH

2310 Changed feed to VP KGH

2312 Feed Rate down to 35% as new batch not melting quite as fast. KGH - could be higher solids?

2316 Tank T has dropped 9° in last 15 minutes to 1148°

2320 Tank T is rebounding w/o change in settings - now 1150

2325 Changed feed to GD Tank T = 1153

2330 Feed Rate down to 34% KGH Tank T = 1156 Drain = 0.27 kg/m

2340 Changed feed to SD KGH

1/29 2400 Drain Rate = 0.256 kg/min DCR

0013 Changed feed to VP. now

Continued on Page

Read and Understood By

Signed Date Signed Date

2291

1-31-99

1244 Changed to feed position 60. RAW

1250 Glass Drain Rate = 0.34 kg/min. RAW

1

1253 Salt venting appears much more fluid (less air pockets and froth). Salt venting is also brighter in color (more yellow versus the previous gray). RAW

1257 Glass Drain Rate = 0.31 kg/min.

0113 Changed feed position to 50. RAW

0115 Glass Center T dropped to 1144°C. Coincided with batch coverage reaching the center of the main tank. RAW

.22 Glass Center T back to 1150°C with no adjustments. RAW

0147 Changed feed position to VP. RAW

0224 Changed feed position to 50. RAW

0231 Low Melter Feed alarm sounded. Backflushed the feed takeoff nozzle. Flow resumed immediately. RAW

0238 Glass drain rate = .28 kg/min RAW

0257 Batch incorporation is improving. Increased feed flow rate to 0.71 Lpm (35% output). Glass Level = -0.08". RAW

Continued on Page

Read and Understood By

1030

Signed | Date | Signed | Date

L[redacted]-99

L 2291

54 Glass Drain Rate = 0.31 kg/min.

0255 Melter feed flow rate began to fluctuate between 0.52 Lpm and 0.74 Lpm. Increased back pressure slightly (to 7psi) to improve/steady pump performance. RAW

0301 Changed feed position to 6D. RAW

0322 [redacted]

Glass drain rate is a little fast. [redacted] RAW

0310 Salt venting (typically gray/frothy type) occurred for ~15 seconds at the salt drain feed location. RAW

0313 Salt venting occurred at 2 points for ~~0.45~~ 43 seconds before ceasing. RAW

0318 Salt venting (aggressive) occurred at the glass drain feed point for 1 minute 20 seconds. RAW

0325 Changed feed position to ~~5D~~ VP. RAW

0332 Glass Drain Rate = 0.27 kg/min. RAW

0352 Glass Drain Rate = 0.18 kg/min. [redacted]

0353 Changed feed position to 5D. RAW

Continued on Page

Read and Understood By

1031

Signed | Date | Signed | Date

2291

[redacted]-99

0404 Glass drain rate = 0.16 kg/min. Increased power in [redacted] to [redacted] RDW

0417 Changed to feed position GD. RDW

0432 Salt venting occurred at glass drain feed point for 12 seconds. RDW

0449 Changed feed position to UP. MOW

0508 Changed feed position to SD. RDW

0540 Changed feed position to GD. RDW

[redacted]

605 Changed feed position to VP. RDW

0635 Changed feed position to SD. MOW

0636 Transferred Drum #24 (full); began draining into Drum #25. RDW

0645 Glass Drain Rate = 0.15 kg/min. Increased [redacted]

0709 Changed feed position to GD. MOW

0720 Low Melter Feed Alarm sounded. Backflushed feed take-off nozzle, flow resumed immediately. Diaphragm Pump #1 began to labor; adjusted backpressure valve for steady flow. RDW

Continued on Page

Read and Understood By

1032

Signed Date Signed Date

1-[illegible]99 2291

235 Glass Drain Rate = 0.31 Kg/min. RAW [redacted] RAW

0747 Changed to feed position SD. RAW

Glass Drain Rate = 0.29 Kg/min. RAW

0804 Glass Drain Rate = 0.28 Kg/min. RAW

0817 Changed feed position to VP. MCW

0837 Mix Tank Pre-Transfer Wt.: 1179 Kg
Feed Tank Pre-Transfer Wt: 858 Kg
Transfer Water: 19.6 Kg

Mix Tank Post Transfer Wt: 58.6 Kg
Feed Tank Post Transfer Wt: 1997 Kg

} Batch #008A Transfer from Mix Tank to Feed Tank RAW

0 8 Glass Drain Rate: 0.27 Kg/min.

0905 Changed feed position to GP. RAW

0938 Changed feed position to SD. LT

0948:40 The back pressure valve on the slurry recirculation valve failed. Lee Terry unwapped the slurry feed takeoff nozzle to the redundant recirculation loop. Once installed, the diaphragm recirculation pump was restarted and feeding recommenced. Total Downtime: 3 minutes, 12 seconds RAW

Continued on Page

Read and Understood By

1033

Signed Date Signed Date

1-99 2291

1000 Successful Completion of the 72-Hour POPT Demonstration!!!

Total Downtime: 3 minutes, 12 seconds

Congratulation, TEAM! Great Job!

Rob Wilson
Principal Investigator

1100 Changed feed position to GD. LT

1115 Drum rate low increased [redacted] to [redacted]

1130 Changed feed position to SD. LT

Continued on Page

Read and Understood By

Signed Date Signed Date

EnVitCo, Inc.
A COGEMA Group Company

2291

SECTION 13

WEEKLY TELECONFERENCE CALL REPORTS

1035

97702 CT DMB TCR 19980609 1040 0 N
Keywords: weekly conference call, minutes, conference call

EnVitCo

TELEPHONE CALL REPORT

2291

To..... SAS, IMW, DHD, KJH, RCC
From..... DMB/RAW
Info..... RJN, RHI, E. Nicaise, G. LeClerc
Customer. Fluor Daniel Fernald
Location... Fernald, OH
Job No..... 97702
Subject POPT Weekly Phone Conference Call – Week 1

Date..... June 9, 1998
Time..... 9:00
Talked with See Below
Company.. FDF
Phone No.. 513 648 4816

Party contacted us

Action or follow-up necessary

Action: M. Morse to advise Envitco of new formulation ASAP.
Action: Envitco to determine 'drop dead' date for finalizing the surrogate formulation.
Action: M. Morse to investigate and advise Envitco.
Action: FDF will advise labs for September samples.
Action: Mary Morse will send a copy of the RFP Amendment 004 to Envitco

Message

The first weekly conference call was held with FDF. Attendees for FDF:

Jeff Stone	Dennis Nixon	David Jacobowski (M. Morse backup)
John Roberts	Bill Hensley	Bill Limerick (CTR for another team)
John Smets	Mary Morse (CTR)	

Representing Envitco: DMB and RAW

Highlights:

FDF is still adjusting the surrogate formulation to increase the leaching characteristics of the raw surrogate. The problem is associated with the lead leaching characteristics. The changes are affecting the amount and type of lead compounds in the surrogate. This may or may not be an issue. Envitco advised that they would evaluate. Final surrogate formulation should be available on Friday, June12. Action: M. Morse to advise Envitco of new formulation ASAP. Action: Envitco to determine 'drop dead' date for finalizing the surrogate formulation.

FDF noted that they were having difficulties attaining lead carbonate due to quantity and lead-time. Mary Morse would contact Rod Gimple and determine what the actual problems were. Envitco had noted problems with other lead compounds, but not lead carbonate. Action: M. Morse to investigate and advise Envitco.

[illegible] questioned interim dates for sample analysis so that they could advise their contract labs. RAW [illegible]sed that surrogate preparation was scheduled for 9/14-10/9. Action: FDF will advise labs for September samples.

1036

RAW requested clarification on Amendment 4, which was not received by Envitco. Hensley advised that Amendment 4 was for the cement-based processes and dealt with dewatering and secondary waste. Hensley was advised that Envitco was conducting the contract review and noted that Amendment 4 was not covered. Action: Mary Morse will send a copy of the amendment to Envitco.

FDF stated/advised that Envitco should flush the demonstration melter with surrogate prior to initiation of the 72 hour demonstration run. FDF emphasized they do not want "transition" glass as the first run samples. Envitco acknowledged that the 72-hour run would be conducted at 'steady state' conditions.

NOTE: During discussions DMB mentioned that Rod Gimple may wish to call Envitco and discuss the problems that they had noted in getting the lead compounds. Hensley reminded FDF and Envitco that all communications were through Mary Morse or Bill Hensley. Likewise, all Envitco personnel should be routing communications through DMB or RAW until other approved lines can be established. All Envitco communications will be with Hensley and Morse.

97702 PR RAW TCR 19980616 0930 0 N
Key Words: FDF, POPT, Weekly Conference Call

EnVitCo

TELEPHONE CALL REPORT

To..... **DHD, KJH, IMW, SAS, RCC**
From..... RAW/DMB
Info ..... GBS/RJN, RHI, E. Nicaise, G. LeClerc
Customer. Fluor Daniel Fernald
Location... Cincinnati, OH
Job No..... **97702**
Subject **POPT Weekly Phone Conference Call – Week 2**

Date..... June 16, 1998
Time..... 9:00 am
Talked with See Below
Company .. FDF
Phone No.. (513) 648-4800

I placed the call

Action or follow-up necessary

Action: M. Morse to provide an historical information packet on previous Silos 1 & 2 treatment studies to Envitco.

Message

The second weekly conference call was held with FDF.

Attendees for FDF were:

Bill Hensley (CR)	Rod Gimple	Jeff Stone
Mary Morse (CTR)	David Jacobowski	John Smets
John Roberts	Phil Limerick	

Representing Envitco: DMB and RAW

The meeting was opened by discussing the action items. Two (2) of the four (4) identified action items are complete: 1.) transmittal of Amendment 004 to Envitco, and 2.) transmittal of raw material vendor information from FDF to Envitco. FDF confirmed the finalization of the surrogate formulations for the POPT would be delayed two (2) to three (3) weeks.

Based on FDF's delay for submittal of the final surrogate formulations, Envitco anticipates a two (2) to (3) three week delay in the performance of the POPT and a potential five (5) week delay because of the holiday season. Envitco explained that FDF's delay displaces procurement of raw materials and delays the beginning of the demonstration surrogate glass formulation. Consequently, the period of performance of the EV-101 72-hour demonstration will fall during the Christmas and New Year's holiday season. Envitco would delay the demonstration until after the holiday season if this scenario occurs.

FDF responded (John Smets) by saying the demonstration surrogate may be finalized as early as next week. A bracketing study of approximately 15 compositions is currently undergoing validation. When asked if FDF will release the demonstration surrogate next week, the reply was the surrogate formulations will be released when complete. FDF would not commit to releasing the demonstration surrogate formulation any earlier than their documented two (2) to three (3) week delay. Note: FDF is

1038

assuming that, if we receive the demonstration surrogate formulation by next week, our schedule will not be impacted. Envitco has not agreed or committed to this assumption.

FDF is providing an historical information packet to all the POPT participants. The packet of information includes summaries of campaign runs on the vitrification pilot plant and results from both the Vitreous State Laboratory and PNL on their respective waste and glass formulation studies. DMB asked if this packet included information not available through the Public Environmental Information Center at Fernald. FDF replied that all work performed at Fernald is released to the public when complete. DMB asked if unpublished or incomplete reports were available. FDF replied that no unpublished or incomplete reports existed. The packet will be shipped by this Thursday (June 18) or Friday (June 19). Action: M. Morse to provide historical information packet to Envitco.

FDF confirmed that the Biweekly Status Meetings identified in the Work Plan Outline are not necessary. Weekly reports and weekly teleconferences will suffice. KJH: Remove section 12.3 – Biweekly Status Meetings from Envitco's annotated work plan outline.

RAW/DMB/lrp

98703 PR DMB TCR 19980623 0930 0 N
Key Words: FDF, POPT, Weekly Conference Call

EnVitCo

TELEPHONE CALL REPORT

2291

To ..... DHD, KJH, IMW, SAS, RCC
From ..... RAW/DMB
Info ..... GBS/RJN, RHI, E. Nicaise, G. LeClerc
Customer. Fluor Daniel Fernald
Location... Cincinnati, OH
Job No..... 97702
Subject POPT Weekly Phone Conference Call – Week 3

Date ..... June 23, 1998
Time..... 9:00 am
Talked with See Below
Company .. FDF
Phone No.. (513) 648-4800

I placed the call

Action or follow-up necessary

Action: M. Morse to provide formal direction on the selection of Pb compounds for the surrogate manufacturing. This information is to be supplied to Envitco by 6/26/98.

Action: M. Morse to forward a copy of a recent R. Gimple paper on VITPP Lessons Learned. The paper was written for July conference in Florida; Envitco to receive early release.

Action: M. Morse to contact DMB or RAW to review Submittal Form required for submittal of Envitco deliverables to FDF. (This activity was completed shortly after the Conference Call.)

Message

The third weekly conference call was held with FDF.

Attendees for FDF were:

Mary Morse (CTR)	Rod Gimple	Rod Houston (?)
David Jacobowski	Jeff Stone (late arrival)	
John Roberts	Phil Limerick	

Representing Envitco: DMB and RAW

The meeting was opened by discussing the Open Issues.

Schedule: Envitco restated that the schedule for the POPT would be impacted if Envitco did not receive official guidance on the surrogate formulation by June 26. Rod Gimple indicated that FDF had gotten positive results from the TCLP testing, but would not complete physical characterization for two weeks. FDF will review status of the testing, and has stated that, contingent on FDF-engineering approval, they will make an official transmittal of the surrogate composition by 6/26.

Surrogate: FDF explained that testing was indicating that the surrogate formulation was going to change. The unofficial change is a substitution of the PbCO3 with PbO. The 'estimated' lead composite was presented as 5% PbCO3, 2% PbSO3, 4% PbO. The PbO is anticipated to be better delivery than the PbCO3.

1040

E 2291

Document Submittal Form: Envitco conducted a walk through on the Submittal form shortly after the conference call. This issue is complete; M. Morse will send additional info on document family. DMB/RAW will apply the info as required.

Conference Call: DMB will initiate the conference call on 6/30. Phone: 513 648 4800.

Slurry Feed Pipe: M. Morse advised that they were still having difficulties getting the samples of the slurry feed pipes to the contractors. No new info.

New Issues: Rod Gimple questioned whether Envitco intended to offer one or two melters for the production facility. DMB explained that Envitco was capable of supplying one melter for the entire requirement, but that availability, processing strategy, waste availability, and other factors would need to be assessed to determined the melter size and quantity. FDF is trying to get the jump on their planning, and was assuming that at least two melters would be required due to scaling considerations. DMB explained this was not the case, but no decisions would be made until later in the project.

New Issues: DMB questioned how Envitco could get better access/understanding of the lessons learned from the VITPP. Gimple advised that he had written a summary paper of "Lessons Learned"; this will be sent to Envitco.

RAW/DMB/lrp

EnVitCo

TELEPHONE CALL REPORT

2291

To..... **RAW, DHD, KJH, IMW, SAS, RCC**
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, G. LeClerc

Date..... June 30, 1998
Time..... 0900
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 4**

I placed the call

Action or follow-up necessary

Action: M. Morse to provide formal response to Envitco's request to reduce the minimum number of batches from 10 to 5. This change has been approved in principle.

Action: M. Morse/J. Smets to develop formal design basis document addressing all of the basic design data questions of Envitco (re. 98703 PR DMB FAX 19980629 1435 0 N).

Action: FDF continues review on Work Plan/QA Plan. Currently on schedule.

Action: M. Morse to provide clarification on the type of feldspar required for the surrogate formulation.

Action: Envitco will utilize Document Submittal Forms for future weekly report submittals.

Message

The fourth weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse (CTR)	David Jacobowski	Jeff Stone
John Smets	Phil Limerick	John Hiestand (correct spelling)
Dennis Nixon	Rod Gimpel (also correct spelling)	

M. Morse opened by clarifying the shipping address for the section of pipe from the VITPP. I advised that it should be sent to the 3400 Executive Parkway address, attention RAW.

M. Morse asked that Envitco use the document submittal form for future weekly reports. This was overlooked by DMB, and will be applied on future submittals.

Discussion moved directly into the two requests submitted by Envitco regarding batching (98703 CT DMB FAX 19980629 1000 0 N) and Basic Data Requirements (98703 PR DMB FAX 19980629 1435 0 N).

FDF has agreed that Envitco can use 5 batches, but no less than 5. They desire to have some 'indication' of the robustness of the process to handle waste variation, and this is expected through natural process variation. DMB discussed with Smets that the objectives conflict, as Envitco wants to

1042

reduce variation to ease the material balance, and FDF wants variation to demonstrate robustness. FDF agreed that the contract had no provisions to demonstrate process variation, so a minimum of 5 batches was confirmed. Envitco should examine if there is any way to assist FDF with the 'robustness' argument.

M. Morse confirmed that the 5 batch approach would be applied to the 72 hour demo. It was also asked how many batches would be used in startup; this was estimated at 5 batches or three days (which is approximately equivalent to three tank volumes to steady state).

Regarding the basis data requirements:

a) a study is underway on the vitrified product storage container. Data should be available in about 1 week.
b) site permit data is available, though the requirements are driven by radon control and the decontamination required for a carbon bed radon capture system. The offgases must be scrubbed of NOx and SOx to allow carbon bed technology. Data should be available in 1-2 weeks.
c) wastewater allowances have been determined. Available 1-2 weeks.
d) secondary waste will be defined based on Envitco mass balance. Some data exists
e) product WAC will be NTS requirements which is primarily TCLP and dispersible fines. On-site lag storage may change this. Envitco needs to confirm that both requirements are addressed in FDF's guidance.
f) (not on list) FDF will provide a formal waste profile including any rad inventories.

FDF will address all of the questions in a single, design basis document that will be provided to all of the testing facilities. Smets would not commit to a schedule on delivery, but seemed to feel that the compiled document could be available in two weeks.

Rod Gimpel questioned the size of the melter again. DMB advised that the scaling was not the issue, but the operating strategy (availability of waste, uptime/availability, etc.) and overall economics would dictate the size. DMB offered assistance if necessary to provide access to some large scale melters if necessary. Smets intervened and commented that he had seen 200 MTD melters, and advised that this issue was closed twice before. End of discussion.

DMB advised that Envitco needed clarification on the type of feldspar required for the surrogate. Gimpel stated that it was high sodium, and may be albite. M. Morse agreed to formally identify the type of feldspar and advise.

DMB advised that Envitco had not closed Action Item 2 (Surrogate Schedule Impacts) and was in the process of reviewing the changes before any formal acceptance/closure. No schedule impact is anticipated, but further review would confirm.

Morse confirmed that Hensley's fax was not working, and she would forward the three communications (weekly report, basic data, and batching memos) to Hensley. Hensley is on distribution for all received docs.

C:\My Documents\MAIN\ENVITCO\ENVITCO\98703 FERNALD POPT\envitco-POPT week 2 conference call minutes.doc

98703 PR RAW TCR 19980707 1045 0 N
Key words: weekly conference call, minutes, week 5

EnVitCo

TELEPHONE CALL REPORT

2291

To..... **SAS,IMW,DHD,KJH,RCC**
From..... RAW/DMB
Info..... GBS/RJN,RHI,G.Chevrier, E.Nicaise,G.LeClerc
Customer. Fluor Daniel Fernald
Location... Fernald, OH
Job No..... **98703**
Subject **POPT Weekly Phone Conference Call – Week 5**

Date..... July 7, 1998
Time..... 9:00 am
Talked with See Below
Company.. FDF
Phone No.. (513) 648-4800

I placed the call

Action or follow-up necessary

Action: Envitco to acknowledge and submit acceptance of Contract Modification 01 – Demonstration Surrogate Formulation by Wednesday, July 8, 1998.
Action: M. Morse / B. Hensley (FDF) to submit Contract Modification 02 – Minimum Demonstration Batches (5) to Envitco by end of the week.
Action: FDF to prepare formal design basis for the preliminary conceptual design of the full-scale facility by next week.
Action: M. Morse to provide any available information on the chemical and physical characteristics of the raw materials used to develop the POPT surrogates.
Action: FDF to supply revised Silo 1 and Silo 2 surrogate formulations July 31, 1998.
Action: Envitco to assess schedule impact from Silo 1 and Silo 2 surrogate formulation delay.
Action: FDF to ship slurry feed pipe section by the end of the week.

Message

Attendees for the fifth weekly teleconference were:

FDF:	Mary Morse (CTR)	John Roberts	Jeff Stone (late)
	Bill Hensley	Phil Limerick	David Jacobowski
	Dennis Nixon (late)		

Envitco: DMB and RAW

Highlights:

FDF requested to know when Contract Modification 01 – Demonstration Surrogate Formulation would be acknowledged by Envitco. After confirming lead oxide was not more expensive or on a longer delivery date than lead carbonate, Envitco agreed to sign and submit Contract Modification 01 by Wednesday, July 8, 1998.

1044

229 1

Envitco's request to reduce the number of demonstration surrogate batches from ten [10] to five [5] will be addressed in Contract Modification 02. Bill Hensley will draft the contract modification and submit to Envitco later this week.

FDF is in the process of developing a formal design basis for the conceptual design of the full-scale treatment facility. John Smets (FDF) is on vacation, but has delegated the task to his second-in-command. The design basis will be available to all four (4) POPT contractors sometime next week.

Envitco's request for additional information on the physical properties of the surrogate chemicals was discussed. FDF is not aware of any physical data for the chemicals used in the surrogate development. The chemicals used for the surrogate development were purchased in bulk quantities for the Vitrification Pilot Plant (VITPP). The original vendor is no longer in business. However, FDF agreed to conduct a search and provide any available information on the surrogate chemicals to Envitco.

FDF advised Envitco of a new completion date for the Silo 1 and Silo 2 surrogate formulations. The revised formulations will not be available until July 31st. Envitco is to assess the schedule impact of the delay.

Action Items 2, 6, 7, 11 and 12 are in process (see Weekly Report – Week 5: 98703 CT DMB FAX 0698 1515 0 N). The slurry feed pipe section has been sampled and should be shipped to Envitco the end of the week. Rod Gimpel's technical paper on the lessons learned from the VITPP is still undergoing review by the legal department.

Action Items 13 and 14 are closed. Bill Hensley confirmed that his fax line is not operational and may not be for some time. M. Morse will continue to forward all correspondence from Envitco to Bill Hensley.

Discussion Items:

Guidelines for indoor radon concentration were requested by Envitco. This information is necessary to support the conceptual preliminary design of the full-scale treatment facility. (The radon exposure limit for the operator is a key design parameter for the facility and the treatment of HVAC intakes.) This is not an issue if the HVAC system is not a part of the facility design scope. To confirm, DMB asked if the HVAC system for the facility was within the design scope. M. Morse stated she believes the HVAC system is within the design scope, but John Smets and the engineering group must confirm this statement.

FDF is operating under the assumption that the building HVAC never sees radon. This is due to the process operating under a constant negative pressure. DMB advised FDF that SGN takes the conservative approach when designing hazardous, radioactive and mixed-waste treatment facilities. It is SGN's standard philosophy to design for upset conditions (both foreseen and unforeseen, as possible) to assure safe working conditions.

FDF is also assuming that the Contractor will utilize the existing 500 scfm radon control system to capture radon from the treatment process. Any additional capacity required for radon control is the

1045

2291

design responsibility of the Contractor. The design and cost of any additional radon control should be included in the conceptual preliminary design of the full-scale treatment facility.

M. Morse will forward these discussion items to the FDF engineering group developing the formal design basis document.

98703 PR RAW TCR 19980714 1145 0 N
Key words: weekly conference call, minutes, week 6

EnVitCo

TELEPHONE CALL REPORT

2291

To ..... **SAS,IMW,DHD,KJH,RCC**
From..... RAW/DMB
Info ..... GBS/RJN,RHI,G.Chevrier, E.Nicaise,G.LeClerc
Customer. Fluor Daniel Fernald
Location... Fernald, OH
Job No..... **98703**
Subject **POPT Weekly Phone Conference Call – Week 6**

Date..... July 14, 1998
Time..... 9:00 am
Talked with See Below
Company .. FDF
Phone No.. (513) 648-4800

I placed the call

Action or follow-up necessary

Action: FDF to ship matrix of glass samples and supporting documentation to Envitco.

Message

Attendees for the sixth weekly teleconference were:

FDF:	Mary Morse (CTR)	John Roberts	Jeff Stone
	John Smets	Phil Limerick (late)	
	Rod Gimpel		

Envitco: DMB, KJH and RAW

Highlights:

Bill Hensley (FDF) has not received the signed originals of Contract Modification No. 1. Envitco shipped the signed originals via UPS overnight to the 7400 Willey Road address on Wednesday, July 8, 1998. M. Morse / B. Hensley will confirm receipt. (A trace of UPS shipment indicated the package was shipped to Georgia. The shipping error (by UPS, not Envitco/TECO) has been corrected, and the package will be delivered to Fernald tomorrow morning. Bill Hensley has been notified of the delay. **NOTE: Bill Hensley has requested that all mail correspondence be shipped to Post Office Box 538704, Cincinnati, OH 45253-8704. Overnight shipments by FedEx or UPS should continue to be directed to the 7400 Willey Road address.**)

Envitco confirmed that Contract Modification No.2 was received. The signed originals will be returned to FDF today.

Rod Gimpel (FDF) indicated that a matrix of approximately 80 - 100 glass melts exists. The glass formulations ranged from borosilicate to lithium-based, and are arranged in a display matrix for visual determination of "successful" glasses. Formal documentation for each of the glasses is not compiled, but data exists in laboratory notebooks. The available documentation will be compiled and shipped with the glass matrix to Envitco for review.

1047

2291

Envitco informed FDF that receipt of the revised Silo 1 & Silo 2 surrogate formulations on July 31st will not impact the POPT schedule unless the formulation revisions include new components. John Smets would not guarantee that the revised formulations would not introduce new compounds, but committed to informing Envitco of any compound additions ASAP. Smets agreed that the issue was closed, and the responsibility for any schedule slippage due to procurement of new compounds was FDF's. FDF also confirmed the revised surrogate formulations were on schedule for a July 31st delivery.

Shipment of the slurry feed pipe section has been delayed. The sections (in 24-36 inch lengths) must be transferred to shipping containers capable of handling the pipe length. The anticipated delay is another week.

The FDF formal design basis for the conceptual design of the full-scale treatment facility was discussed. John Smets (FDF) has not been updated on the status, but is assuming that the design basis will be issued by the end of the week. If the design basis is delayed, FDF will notify Envitco promptly.

Action Items 2, 11, 17 and 18 are closed. The remaining open action items are in process.

Discussion Items:

Review of the Draft POPT Work Plan and Draft POPT QA Plan is on schedule. M Morse is currently compiling comments. FDF will provide comments on July 23rd in electronic format.

John Roberts (FDF) advised that the other vendors were having problems obtaining magnesium carbonate in a non-hydroxide form. Envitco, mistakenly, responded that we had located a vendor who met the 95% purity requirements. [After review, RAW realized that magnesium carbonate had not been quoted yet, and that the primary vendor could only supply the carbonate-hydroxide mix. RAW informed M. Morse of the error during a follow-up call, and advised FDF that Envitco had not located a vendor for 95% pure magnesium carbonate.]

\lrp

1048

98703 PR DMB IOC 19980721 1522 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT

2291

To..... RAW, DHD, KJH, IMW, SAS, RCC
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, G. LeClerc

Date..... July 21, 1998
Time..... 0900
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 7**

I placed the call

Action or follow-up necessary

Action: IMW contact M. Morse to determine what her requirements are for the promotional video tape information.

Action: RAW evaluate procurement of bench scale quantities of the MgCO3 to determine if there are any short term delivery problems.

Action: DMB to obtain Chain of Custody forms from CETL, and following review, will forward to M. Morse.

Message

The fourth weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse (CTR)	David Yachtman (DOE)	Richard Mauer (Proj. Manager)
John Roberts	Phil Limerick	
Dennis Nixon	Rod Gimpel	

Attendees for Envitco: RAW and DMB

M. Morse requested that if Envitco had any promotional videotapes that could be used by FDF to generate a public video on the POPT program. DMB advised that IMW would contact her and forward the necessary information.

M. Morse confirmed with RAW that Envitco would provide an estimated 'percent completed' on a monthly basis. Envitco will provide that guidance in the weekly report beginning the week of July 27.

M. Morse confirmed to RAW that the comments from FDF on the Work and QA Plans would be submitted to Envitco on disc, and not via email. FDF is on schedule to have those comments to Envitco on July 23 as planned.

2291

Morse advised that the slurry feed pipe section would ship by the end of the week.

Discussion of Action Items

#6-Slurry feed pipe—will ship by the end of the week (July 24) as noted above.

#12- Design Basis: FDF will complete the design basis document by the end of the week (July 24); though it was unclear if this was a completion or a shipping schedule.

#16-Silo 1 and 2 surrogates—revised compositions will be available by July 31.

#19-Glass Samples and Matrix: FDF will be shipping (Fed Ex) the glass samples and related documentation to Envitco today, July 21. (Note: The offer by FDF to send these samples to Envitco is not totally understood, though is a welcomed gesture. Envitco originally assumed that they would be available for viewing at the site, but FDF offered to send them to Envitco's offices.)

Discussion of Issues

FDF questioned Envitco's success at locating the MgCO3. After some discussion, it was realized that Envitco needed less material than originally requested due to the schedule for the bench and pilot work. Envitco will reassess the amount of material necessary for the bench work, and determine if there is any problem with obtaining the smaller quantity. FDF advised that Mallinkcroft have 75 lbs of material available, and if necessary, could provide the bench scale quantities. RAW will review delivery and advise.

M. Morse requested a copy of Envitco's Chain of Custody form. They are in the process of updating their planning, and needed to determine how Envitco's form would integrate into their document control system. DMB advised that we can supply the form, but it may be changing in the near future. DMB will get forms from CETL and review and forward as appropriate.

C:\My Documents\MAIN\ENVITCO\ENVITCO\98703 FERNALD POPT\envitco-POPT week 7 conference call minutes.doc

1050

98703 PR DMB IOC 19980728 1013 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT

7/30/98 RAW

2291

To..... **RAW, DHD, KJH, IMW, SAS, RCC**
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, G. LeClerc

Date..... July 28, 1998
Time..... 0900
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 8**

I placed the call

Action or follow-up necessary

Action: RAW to confer with Morse to determine schedule and format for addressing Envitco questions on the Work and QA Plan comments.

Action: Envitco to report Project Completion Status every third week.

Action: DMB to obtain Chain of Custody forms from CETL, and following review, will forward to M. Morse. Completed by RAW 7/27/98!

Message

The fourth weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse (CTR)	David Yachtman (DOE)	John Roberts
Phil Limerick	David Jacobowski	Rod Hiestand

Attendees for Envitco: RAW, KJH and DMB

Issues

M. Morse opened by stating that the Design Basis addressing Envitco's questions of June 30 was nearly complete and had been distributed for review. Morse believes it will be completed this week, though no commitments were made.

The videotapes from IMW were received.

Chain of Custody forms were received by FDF. John Roberts stated that they were acceptable, but it was unclear if this was a comment on their content/format, or acknowledgment of receipt of a legible copy.

Morse stated that Envitco would receive their contract modification for the Silo 1 and Silo 2 surrogate formulations by July 31.

Customer : FDF
Subject : Weekly Meeting Minutes
Job No. 98703

2291

Activities

Morse stated that FDF would provide clarification on the isomeric purity requirements for the sodium orthoarsenate and magnesium orthophosphate. This would be submitted to Envitco as a memo, and no contract modification would be required. (NOTE: This is indicative that no other companies questioned the isomer issue, and that FDF was not concerned about its impact.)

Morse acknowledged the status report on percent completion on the project, and requested that future reports be submitted on the third week of the month to coincide with their variance reporting. Envitco agreed.

New Issues

Wilson requested an opportunity to ask questions regarding the FDF comments on the Work and Test Plans. Morse stated that she would determine who that group was, and would contact Wilson later in the day to set a time.

Wilson stated that there were still difficulties in getting the 95% purity $MgCO_3$. Concern was expressed that other participants may not have 95% purity, since Mallinckrodt did not carry the product as stated by FDF. Due to difficulties and the amount of effort required by Envitco on this issue, FDF will provide material from their inventory for Envitco (estimated 5 kg required). FDF will query the other demonstration vendors and confirm that the material obtained by them is actually 95% pure).

Bennert expressed concerns on the continued delay in the design basis. Morse expressed that she had made it a priority, and that she expected it to be completed by the end of the week.

C:\My Documents\MAIN\ENVITCO\ENVITCO\98703 FERNALD POPT\envitco-POPT week 8 conference call minutes.doc

98703 PR DMB IOC 19980728 1013 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT

2291

To..... **RAW, DHD, KJH, IMW, SAS, RCC**
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, G. LeClerc

Date..... August 11, 1998
Time..... 0900
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 10**

Envitco originated the call

Action or follow-up necessary

Action: Morse to investigate availability of emissions inventory data for offgas design basis.

Action: Morse to investigate Dietrich's request for material balance files.

Action: Morse to continue to push on Modification 3; Silo 1 and Silo 2 surrogates.

Action: DMB to compile comments and questions on design basis

Message

The fourth weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse (CTR) John Roberts
Phil Limerick Ron Dietrich

Attendees for Envitco: RAW, KJH and DMB

Issues

FDF acknowledged that the Draft B Work Plan had been received, both in hard copy and electronic (email).

Contract Modification 3 will be reissued (prior version withdrawn due to problems in specifications). Anticipate reissuance on Friday, August 14. Changes will include the Silo 1 and Silo 2 (S1 and S2) surrogate formulations, as well as the target value for the in-situ density. Per Morse, no other changes were made other than narrative or text changes.

Draft B Work Plan comments will be completed by FDF by Friday, August 21. FDF will send a copy via next day mail for delivery on Monday, and will also send a copy of comments via email. FDF's internal schedule includes completion of the comments by August 14, and compiling and reporting by August 21.

1053

2291

Activities

Envitco is continuing their work on the QA Plan comments, which will complete August 12 for delivery to FDF on August 13.

FDF will continue their review on the Work Plan resolutions.

Envitco is continuing work on reviewing/commenting on the design basis document, and will provide FDF with those comments and questions by August 17.

New Issues

KJH advised FDF that the design basis was clearly incomplete as related to the emissions inventories allowable for the vitrification process. Morse acknowledged that it existed, and said that she would try to determine if it could be distributed to the POPT demonstration groups.

Note: Later calls between RAW and Morse indicated that some of the reviewers (Martin, others) were not FDF employees. Envitco is reviewing their options on this, and will discuss with Morse and/or Hensley.

Note: Later calls between RAW and Morse indicated that Dietrich had requested electronic copies of the material balance which is summarized in the Draft B Work Plan. Dietrich is responsible for the feasibility studies, though his need for the material balance at this stage is unclear. RAW advised Morse that the material balance was not included in the Work Plan since it was considered proprietary, and questioned if Dietrich's request should be routed through Morse or Hensley (regardless of justification). Morse agreed to intervene. No action will be taken by Envitco.

C:\My Documents\MAIN\ENVITCO\ENVITCO\98703 FERNALD POPT\envitco-POPT week 8 conferenc
e call minutes.doc

98703 PR DMB IOC 19980818 1700 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT

2291

To..... **RAW, DHD, KJH, IMW, SAS, RCC**
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, G. LeClerc

Date..... August 18, 1998
Time..... 0900
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 11**

Envitco originated the call

Action or follow-up necessary

Action: DMB to provide comments on Design Basis to FDF by August 19

Action: DMB to provide comments on Contract Modification No. 3 by August 21.

Action: Morse to provide guidance on distribution of submittals.

Action: Morse to forward comments on Work Plan to Envitco via email August 21.

Action: Morse to provide revision on in-situ density methods.

Action: Morse to advise on comments on Interface Design from Envitco.

Message

The eleventh weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse	John Roberts	Rod Gimpel
David Jacobowski	John Smets	

Attendees for Envitco: RAW, KJH and DMB

Issues

Envitco has supplied their review and comments of the in-situ density procedure to FDF. The revised procedure as provided by University of Cincinnati was incomplete; Envitco document 98703 PR DMB IOC 19980814 0849 0 Y was transmitted to M. Morse to document discrepancies. Morse advised that FDF would 'resolve quickly'.

Comments on the Interface Design Basis had been received (98703 PR DMB FAX 19980629 1435 0 N) and was being copied and distributed. No feedback on when they would be addressed.

1055

2291

Brief discussion of the amount of effort Envitco was expending on review of procedures and contract modifications to correct errors or insufficient data from FDF. The statement was acknowledged by FDF. No immediate resolution, but FDF is aware of Envitco's position and appreciates their effort to date.

Envitco acknowledged receipt of additional information provided by FDF on radon emissions. This did not address the original request for additional guidance on other offgas emissions, including any data on volatile metals, or other regulated elements. The design basis was considered incomplete with respect to heavy metals.

Activities

Envitco is continuing to work on preparations for the demonstration, including the procurement of materials for the bench scale development.

Envitco completed submittal of the Draft B QA Plan, which was submitted August 13. FDF has two weeks to reply.

Envitco will begin addressing comments on the Draft B Work Plan, which will be received by email on August 21.

New Issues

FDF will require that all official submittals (weekly reports, Work/QA Plans, etc.) will be submitted directly to EDC group. It will be acceptable to send via fax. There will be official guidance through a contract modification.

Envitco was asked to provide percent completion. DMB will supply by August 19.

Envitco advised that they would submit comments on Contract Modification No. 3 by Friday, August 21 or earlier.

C:\My Documents\MAIN\ENVITCO\ENVITCO\98703 FERNALD POPT\envitco-POPT week 11 conference call minutes.doc

98703 PR DMB IOC 19980825 1000 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT

2291

To..... **RAW, DHD, KJH, IMW, SAS, RCC**
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, G. LeClerc

Date..... August 25, 1998
Time..... 0900
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 12**

Envitco originated the call

Action or follow-up necessary

Action: Envitco to develop response to Draft B Work Plan comments for submittal August 31.

Action: DMB to provide confidentiality agreement to FDF by August 27.

Action: Morse to provide response to Contract Modification 3 by August 28.

Action: Morse to provide response to Design Basis by August 28.

Action: Morse to provide revision on in-situ density methods by August 28.

Action: Morse to review Contract Mod #3 to determine if clarification on pH determination could be incorporated before scheduled delivery on August 28.

Message

The twelfth weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse	John Roberts	Rod Gimpel	Jeff Stone
David Jacobowski	John Smets	Phil Limerick	

Attendees for Envitco: RAW, KJH and DMB

Issues

FDF received the comments on the Contract Modification #3 and response is in draft. Anticipate response by Friday, August 28. No indication of position of FDF.

1057

2291

RAW requested guidance from FDF on resolution of Draft B questions that are tied to changes in the outstanding Contract Modification #3. FDF advised that these changes would need to be finalized in the Work Plan, and that these changes may occur following the submittal of the Draft B Comment responses.

FDF questioned when the Confidentiality Agreement would be available. DMB advised that it was in review, and anticipated it by Thursday, August 27.

FDF advised the Bob Bromm is addressing the Interface Design Basis document, and should have it completed by Friday, August 28.

FDF advised that their response to the FDF comments on Modification #3 should be available by Friday, August 28.

FDF advised that the In-Situ Density method had been reviewed with UC and the John Roberts was spearheading revision/completion of the method. This should be to Envitco by Friday, August 28.

FDF advised that submittals should be faxed (weekly reports) and sent to FDF ECDC at the following address:

Mail submittals to:
Fluor Daniel Fernald
P.O. Box 538704
Cincinnati, OH 45253-8704
Attention: ECDC, MS 52-7

Fax submittals to:
Melissa Crews at 513 648 3648

Mail/ship samples to:
Fluor Daniel Fernald
7400 Willey Road
Hamilton, OH 45013-9402
Attention: John Roberts
Bldg. 15, Room S43

Project Status (Completion Report) was submitted and received by FDF.

Activities

Envitco is continuing to work on responses for Draft B Work Plan comments.

Envitco will participate in conference call with Larry Sexton at 10:30 (RAW, KJH, DHD, J. Osborne) to discuss Draft B QA Plan. Sexton has issues that may be addressable through conference call.

1058

2291

New Issues

Envitco questioned the pH determination method that should be applied to the surrogate. FDF advised that the pH determination was done as part of the acid/base determination where a small amount of the solid is equilibrated in water. This was the point where the pH was determined. Envitco requested that this be clarified and written into the Contract Mod. 3.

C:\My Documents\MAIN\ENVITCO\ENVITCO\98703 FERNALD POPT\envitco-POPT week 11 conference call minutes.doc

98703 PR DMB IOC 19980901 1000 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT

2291

To..... **RAW, DHD, KJH, IMW, SAS, RCC**
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, G. LeClerc

Date..... September 1, 1998
Time..... 0900
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 13**

Envitco originated the call

Action or follow-up necessary

Action: Envitco to respond to revised in-situ density methodology; respond in conference call Sept. 3 at 9:00.

Action: Envitco/FDF to conduct conference call to discuss definition of 'steady state'; Sept. 3 at 9:00.

Action: Envitco/FDF to conduct conference call to discuss Contract Mod. #3, Sept. 3, at 9:00

Action: Morse to provide Response to Final Draft of Work Plan by September 15,1998.

Action: Morse/Hensley to revise Contract Mod #3 to clarify pH determination methodology. Completion based on resolution of Envitco Mod #3 issues.

Action: Envitco to submit Final QA Plan to FDF on September 3.

Message

The thirteenth weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse
David Jacobowski
John Roberts
Kevin Deitrich
Rod Gimpel

Attendees for Envitco: RAW, KJH and DMB

Issues

Envitco confirmed that the work plan was shipped on August 31, and FDF was awaiting reciept.

Envitco confirmed that they were reviewing the Contract Mod #3, and that the issues needed to be discussed in a conference call. FDF agreed to a call on September 3, which will include Morse, Smets, and Hensley.

1060

2291

Envitco advised that the 'steady state' definition from the Work Plan was not acceptable as written and requested additional discussion. This will be added to the call on September 3.

Envitco advised that they had received the in-situ density method, and preliminary comments were good. A response from Envitco would be available by September 3.

FDF questioned if Envitco still intended to begin the surrogate validation work by September 15. Envitco advised that the schedule still held under the assumption that FDF cleared the Work Plan by that date. FDF advised that they would complete the Work Plan review by that date.

FDF questioned when the Certification of Analysis data would be available to FDF for approval. RAW confirmed that the data would be available by Friday, September 4. Later internal discussions pushed this to Wednesday, September 2 in an effort to confirm FDF's approval of the COA approval strategy.

FDF responded to an open issue on the pH determination methodology. Per M. Morse, this will be resolved in the final release of Modification #3. (Note: situation here is unclear, as Mod #3 has been officially released, though not accepted by Envitco).

The group briefly discussed the conference call on the Design Interface Basis Document. FDF questioned if this had 'tied up the loose ends'. Envitco thanked FDF for the assistance and support, as the meeting was very successful.

K. Deitrich has requested that Envitco provide advanced indication of the water useage (cooling capacity) that is required for the Envitco process. DMB responded that Envitco did not wish to release that information at this time, as it was very preliminary and subject to significant change. After further consideration, DMB considered the possibility of providing guidance based on the energy balance conducted for the TWRS program. This was discussed internally, though FDF is not expecting a response. (NOTE: There are advantages to providing advanced data to FDF if it is available, as this will further assist them in their validation efforts, and will avoid significant discrepancies between the FDF design and the Envitco design.)

Activities

Envitco is continuing to work on responses for Draft B QA Plan comments; submittal to FDF on September 3.

New Issues

Clarification of Steady State Requirements (as noted above).

Discussion and closure of Contract Mod. #3 (as noted above).

98703 PR RAW IOC 19980914 1455 0 Q
KW: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT

2291

To..... **DMB, DHD, KJH, IMW, SAS, RCC**
From..... RAW
Info..... GBS/RJN, RHI, E. Nicaise, G. LeClerc
Customer. Fluor Daniel Fernald
Location... Cincinnati, OH
Job No..... **98703**
Subject **POPT Weekly Conference Call – Week ~~15~~ 14**

Date..... September 14, 1998
Time..... 0900
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. (513) 648-4800

I placed the call

Action or follow-up necessary

Action: FDF to revise in-situ density procedure to standardize equipment fabrication specifications (ring size to 2 and 3/8 inches).

Action: FDF to fax Ohio Administrative Code web address to Envitco.

Action: FDF to provide SEG container design of a previous full-scale vitrification process.

Action: FDF to issue Revision 1 of the Interface Design Basis by Friday, September 18, 1998. The revision will address the organic loading of the Radon Control System and the revised disposal container dose rate limits for the Nevada Test Site.

Message

The fourteenth (14th) weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse	John Roberts	Phil Limerick
Dave Jacoboski	Rod Gimpel	Jeff Stone

Attendees for Envitco: DMB, KJH and RAW

Issues:

FDF updated the addressing of information requests on the Interface Design Basis. A revised Interface Design Basis is expected by Friday, September 18, 1998. Within the revision, FDF will address the organic loading limits of the Radon Control System. The disposal container dose rate limit for the Nevada Test Site will also be revised.

FDF is mailing (today) the SEG container design for the previously designed full-scale vitrification facility.

1062

2291

FDF will transmit via fax the web page address of the Ohio Administrative Code so Envitco may download OAC 3745-31-05(A).

FDF had not yet reviewed DMB's transmittal (98703 CT DMB FAX 19980909 1211 0 Y) of Envitco's concerns surrounding the fabrication specifications of the in-situ density equipment. Envitco stressed that the equipment had already been fabricated. FDF suggested standardizing the ring assembly diameter to 2 and 3/8 inches. FDF is to issue a revised in-situ density procedure ASAP.

FDF has planned a witnessing visit of September 22 and 23 (at CETL) to coincide with the initiation of the Surrogate Mix Validation and Treatment Recipe Development activities. Tentative attendees for FDF include Mary Morse, Dave Jacoboski, John Roberts, and Larry Sexton. Areas of inquiry include:

- Viewing the laboratory for the Treatment Recipe Development,
- Procedures,
- Quality Assurance activities,
- Review of the POPT training matrix,
- Surrogate preparation, and
- Viewing the EV-101 melter (Envitco explained that this would not be possible.)

FDF confirmed receipt of the surrogate chemical Certificates of Analysis.

FDF confirmed a target approval date of Tuesday, September 15, 1998 for the Final Work Plan and Thursday, September 17, 1998 for the Final POPT QA Plan.

RAW/lrp

98703 PR DMB IOC 19980901 1000 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT

2291

To..... **RAW, DHD, KJH, IMW, SAS, RCC**
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, G. LeClerc

Date..... September 29, 1998
Time..... 0900
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 17**

Envitco originated the call

Action or follow-up necessary

Action: FDF to change contract to reflect Design Basis CO2 concentration in offgas.

Action: Envitco to conduct in-situ density by graduated cylinder compaction method. No contract terms established, though this may address in-situ density issues.

Action: Morse to address Envitco's request for relief on the sieve analysis

Action: Morse to address (written response) Envitco's request for acceptance of NiO.

Message

The seventeenth weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse	John Roberts	Rod Gimpel
David Jacobowski	Jeff Stone	

Attendees for Envitco: DMB, KJH and DHD

Issues

NOTE: DMB spoke with Morse off-line to get her comments on their visit of September 22-23. Morse said that the results and impression from the meeting were overall 'very good'. She stated that "FDF was very comfortable with the approach to the recipe development, and the qualifications of the personnel supporting the work". Other concerns were discussed (schedule, melter availability, etc.), which Envitco will continue to address. She is very confident in Envitco, and the attention to technical detail that has been displayed. The efforts of Envitco and TECO (in particular DHD, KJH, and RAW) continue to be noticed by FDF, and are clearly appreciated (even though much of our attention to detail has been related for contract and FDF technical problems!). Thanks to all for the continuing effort, and the extra effort to get us past the 'authorization to proceed' phase.

1064

2291

FDF acknowledged that there are still multiple problems with the in-situ density. They have also acknowledged that the changes to accommodate plasticity have a direct effect on in-situ density, and visa versa. There is currently no contractual resolution to the in-situ density. Envitco stated that they cannot adjust for density after plasticity has been met.

FDF advised that they are looking into the simple 'compacted waste in graduated cylinder' methodology again. FDF asked if we could conduct this test on the existing waste. DMB agreed that the test could be done, but we would not put any time into the test until plasticity was finalized. FDF agreed.

Envitco had advised FDF that the NiO had about 5%-retained material on the 105-micron screen. DMB had requested that FDF accept this material. Rod Gimpel felt it was acceptable, and Morse gave a verbal acceptance, though a formal, written acceptance of the deviation must have Smets agreement. Morse would pursue; Envitco is proceeding with other work under the assumption that the material will be accepted.

DMB had requested relief on the dry sieve analysis included in Mod 3. Dry sieving is not possible, and therefore should be eliminated from the contract mod. FDF asked if we could wet sieve; this was refused due to cost and effort expended. FDF understands the problem, and has put this issue on hold pending additional internal discussions.

FDF advised that the Design Basis data for organics is still in review, and should be completed this week (10/2).

Morse was appreciative of the photos provided to FDF by Envitco for presentation in the FRESH meeting, which is scheduled for Monday, October 5. IMW—is this one we should attend?

Morse advised that FDF management is concerned with the melter schedule. As such, they have offered to provide any assistance possible to ensure that the melter is completed on time. Envitco is considering if anything can be done by FDF to assist.

FDF will request another visit to Clemson during the startup phase of the demonstration. This should be expected in late November, pending the actual startup schedule.

Activities

Glass formulation and surrogate validation work continues at CETL. The surrogate validation is delayed due to not meeting the plasticity requirements of the contract. New silica ratios are being blended, and will be tested and dried on 09/30. A sample should be available for shipment on 10/01.

Glass formulation work is proceeding. Changes to the test program include the melting of 30% wetted batch to improve on the amount of glass that can be produced in a single crucible (a 3-4 times increase per crucible). No foaming has been observed to date, though a significant salt layer is being produced.

2291

New Issues

Morse acknowledged that the discrepancy between the contract and the design basis for CO2 content was an error in the contract. The contract reflects a max of 0.5% CO2 (which is an error), and the Design Basis presents 10%, which will appear in the next contract modification.

DMB contacted Morse on 09/30 to advise that the surrogate validation samples would not be ready until at least Thursday, due to the 12 hour LOD test that must be performed at completion of the plasticity limit procedure. Assuming that one of the three samples currently in process meets the plasticity limit, Envitco will submit their samples on 10/01.

FDF has advised Envitco that Vortec is purchasing the PbCO3 from Noah Chemicals. Envitco is pursing.

C:\My Documents\MAIN\ENVITCO\ENVITCO\98703 FERNALD POPT\envitco-POPT week 13 conference call minutes.doc

98703 PR DMB IOC 19981008 1000 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT

2291

To..... **RAW, DHD, KJH, IMW, SAS, RCC**
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, G. LeClerc

Date..... October 6, 1998
Time..... 0900
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 18**

Envitco originated the call

Action or follow-up necessary

Action: DMB to correct physical testing schedule statements in Section 5 of Week 17 report.

Action: DMB to clarify deviation request statements in Section 2 of Week 17 report.

Action: Roberts/Morse to provide results of surrogate validation testing to Envitco by COB 10/7 (complete).

Action: Morse to address Envitco's concerns related to the change in the UTS standards with W. Hensley.

Action: Morse to evaluate compression strength methodologies to determine if a simplified test can be identified as an alternative to C-39 and/or C-109.

Action: Morse/Roberts to continue investigation of the TCLP data for lead leaching in order to determine the reason for the discrepancy.

Message

The eighteenth weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse
David Jacobowski
John Roberts
Jeff Stone
Kelley Glenn (acting recorder)

Attendees for Envitco: DMB, RAW, and KJH

Issues

1067

2291

M. Morse pointed out two areas of the Week 17 report that she felt required revision. This included clarifying the exemption granted by FDF on the dry sieve analysis requirements, and the schedule for validation of the surrogate.

Morse advised that FDF was having problems with the TCLP results for samples as provided by Envitco and Vortec (all of the validation samples received to date). Both Envitco and Vortec were getting 269 mg/l Pb leaching, versus 560-850 mg/l contract specifications. FDF is investigating. DMB advised that they were proceeding at 'their' risk, and that if FDF responds to the TCLP results with negative results, then the schedule will be impacted very significantly. Morse acknowledged.

Morse advised that FDF had completed most of the surrogate validation tests on the October 3 samples. Plasticity, TCLP, and density were complete, with favorable results on all but TCLP. Roberts was to complete all testing and report by COB 10/7.

Morse commented on the Public Meeting held on Monday, October 5, stating that the photos from Envitco were very well received. DMB confirmed that there were no other vendors present. Morse advised that another meeting was scheduled for 10/13, which was the quarterly meeting of the citizen groups. This may be the meeting for Envitco to attend. Morse advised that more info was available on their home page.

tivities

Envitco advised that they had submitted surrogate samples to Texidyne for validation of the surrogate, as well as for TCLP testing of the glasses. These samples were for screening, and were not routed through an approved laboratory. Morse acknowledged this approach, and approved. DMB asked if the data would be accepted by FDF if Texidyne had sufficient quality standards, to which FDF provided a reluctant 'maybe'.

New Issues

DMB advised that Envitco was reviewing the contract revision, and had some issues with the new compression test method specified (ASTM C-109). Morse responded that the new test and geometry was for the grout technology vendors, and its impact on glass was not considered. Envitco advised that they had already taken exception to the original method (ASTM C-39) and opted for C-773 as defined in the proposal 'Exceptions and Clarifications'. Morse acknowledged that the compressibility was really not an issue for glass, though they must maintain some consistency. DMB emphasized that for glass, and compression testing was very expensive. Morse agreed to investigate further to see if there was a means of reducing the requirements, or making a general acceptance of the C-773 method for both glass vendors. (There was no indication that FDF was in disagreement with Envitco's proposal to use C-773).

orse advised that the Public Meeting had generated requests for a meeting/forum to be held following the demonstrations to discuss the results, data, issues and concerns. DMB questioned if this would be after reporting (March/April), or earlier. FDF seems to feel this will be earlier, immediately following the test. There are merits to both schedules; Envitco should consider the best and try to influence the schedule.

2291

The Weekly Meeting for 10/27 will be held at 8:00 rather than 9:00.

DMB advised that cursory review of Contract Mod #4 raised questions about the change in the UTS leaching standards. Some standards were tightened, the effect of which cannot be judged until several glasses have been made. Therefore, Envitco would be hesitant to accept this change. Morse understood and advised that they would discuss with W. Hensley.

C:\My Documents\MAIN\ENVITCO\ENVITCO\98703 FERNALD POPT\envitco-POPT week 18 conference call minutes.doc

EnVitCo, Inc.
A COGEMA Group Company

TELEPHONE CALL REPORT

98703 PR RAW TCR 19981022 1404 0 Q

Key Words: POPT, Project Meeting, Meeting Minutes

To ..... **DMB, DHD, KJH, IMW, SAS**	Date ..... October 13, 1998
From ..... RAW	Time 09:00
Info ..... GBS/RJN, RHI, E. Nicaise	Talked with See Below
Customer. Fluor Daniel Fernald	Company .. Fluor Daniel Fernald
Location ... Fernald, OH	Phone No.. 513 648 4800
Job No **98703**	
Subject ... **POPT Weekly Conference Call – Week 19**	

2291

Envitco originated the call

Action or follow-up necessary

RAW: Forward WJT IOC on the silo residues radiological characterization to FDF (M. Morse).

Envitco: Assess schedule impact if new demonstration formulation is issued on October 30th.

Message

The nineteenth weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse	Dave Jacoboski	Phil Limerick
Kevin Dietrich	Kelly Glenn	

Attendees for Envitco: DMB, DHD, RAW

Issues

The path forward for the validation of the leaching characteristics of the Demonstration Surrogate was discussed. FDF is manufacturing their own surrogate and performing a TCLP time study on the Pb leaching characteristics. FDF will use the surrogate materials from the University of Cincinnati (the original manufacturer of the silo waste surrogates) to conduct the TCLP time study.

FDF will not validate the surrogate within the contract-stipulated seven [7] business days, but will have a path forward by October 16, 1998. The path forward options include:

1. Continue using the current formulation and accept the Pb leaching differences between contractors,
2. Change the surrogate formulation (only the ratio of Pb compounds; the total quantity of Pb, on a mole basis, will remain the same).

FDF inquired as to the schedule impact of the path forward options. Envitco would not commit to a schedule impact without a definitive path forward. If the path forward is to continue using the current formulation, there is no schedule impact. If a revised surrogate formulation is issued (tentatively October 30th), FDF would require a re-validation of the new surrogate prior to

2291

proceeding with the demonstration run. Envitco is to assess the schedule impact of this path forward.

Activities

FDF is responding to the Interface Design Basis comments submitted by Envitco/SGN today. Envitco is to forward the internal memo on radiological issues from FDF's Silo Residues Characterization document to M. Morse (FDF).

The physical characteristics of the Demonstration Surrogate (S0) have been approved by FDF. The approval does not include the Pb leaching criteria by TCLP (discussed earlier).

Other Issues

The silo waste rheology study by Florida International University was due (to FDF) last week, but was not received. FDF's contact at FIU is out of the office until Thursday (10/15/98). FDF will forward the document to Envitco once the document is received and approved for release.

EnVitCo, Inc.
A COGEMA Group Company

TELEPHONE CALL REPORT

98703 PR RAW TCR 19981023 1123 0 Q
Key Words: POPT, Project Meeting, Meeting Minutes

2291

To ..... **DMB, DHD, KJH, IMW, SAS**
From ..... RAW
Info ..... GBS/RJN, RHI, E. Nicaise
Customer. Fluor Daniel Fernald
Location... Fernald, OH
Job No **98703**
Subject ... **POPT Weekly Conference Call – Week 20**

Date..... October 20, 1998
Time 09:00
Talked with See Below
Company .. Fluor Daniel Fernald
Phone No.. (513) 648-4800

Envitco originated the call.

Action or follow-up necessary

FDF (Morse)/Envitco (RAW): Schedule supplementary conference call on radiological design basis.

Message

The twentieth weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse Dave Jacoboski Phil Limerick
Rod Gimpel

Attendees for Envitco: DMB, RAW

Issues

FDF has completed their internal surrogate testing. The TCLP time study for Pb leaching did not indicate a time-dependence. FDF believes the current Pb ratios in the surrogate formulation provide the correct Pb leaching characteristics.

At FDF's request, all POPT subcontractors have submitted twenty [20] gram samples of the Pb compounds used for the surrogate development. FDF believes the Pb compounds from different vendors impact the Pb leaching. With the subcontractor-supplied samples, FDF is attempting to determine the correct Pb ratio for the demonstration surrogate.

FDF will likely specify the Pb compound suppliers that each POPT subcontractor must use for the demonstration surrogate as the path forward. In the event that FDF mandates a specific vendor, FDF will assume the cost of the compound substitution.

Envitco's fax to FDF (William Hensley) outlining Envitco's concerns to Contract Modification No. 4 (Universal Treatment Standards) has been received. M. Morse is to meet with Dennis Nixon (OU4 Operations Manager) today to discuss our concerns. Formal response will be submitted by FDF.

FDF has not received the silo waste rheology report from Florida International University. Once received and approved for release, the document will be forwarded to Envitco.

2291

In response to Envitco's request for clarification on the radiological data provided in the Interface Design Basis, FDF has requested a supplementary conference call for Thursday, October 22, 1998. M. Morse and RAW will coordinate the conference call schedule.

Melter Status

The status of the EV-101 re-assembly was discussed. The EV-101 was on-site Monday, October 19, 1998 and site prep was completed. Melter re-assembly will continue over the next three weeks. An inspection of the refractory for the EV-101 was performed on Monday, October 19, 1998 and is on-schedule for delivery to CETL. An inspection of the EV-101 power supply was delayed until Thursday, October 22, but was not expected to impact the scheduled completion of the melter.

2291

EnVitCo, Inc.
A COGEMA Group Company

TELEPHONE CALL REPORT

98703 PR RAW TCR 19981027 1123 0 Q
Key Words: POPT, Project Meeting, Meeting Minutes

To ..... **DMB, DHD, KJH, IMW, SAS**	Date ..... October 27, 1998
From ..... RAW	Time 08:00
Info ..... GBS/RJN, RHI, E. Nicaise	Talked with See Below
Customer. Fluor Daniel Fernald	Company .. Fluor Daniel Fernald
Location ... Fernald, OH	Phone No.. (513) 648-4800
Job No **98703**	
Subject ... **POPT Weekly Conference Call – Week 21**	

Envitco originated the call.

Action or follow-up necessary

FDF (Morse): Provide a formal response to the questions submitted by Envitco concerning the radiological characterization of the Interface Design Basis.

FDF (Morse): Provide a formal response on the acceptable TCLP variation of the demonstration glass.

Envitco: Develop a schedule for an FDF pre-demonstration visit and submit in the Week 22 Conference Call.

DMB/IMW: Sign and return Contract Modification No. 4 by the end of the week.

Message

The twenty-first weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse	Dave Jacoboski	Jeff Stone
Rod Gimpel	John Roberts (late)	

Attendees for Envitco: DMB, KJH, RAW

Issues

Validation of Demo Surrogate: FDF announced that a decision on the surrogate formulations would be formalized by the end of the week. The exact form and impact of the decision is unknown. Envitco should expect a formal transmittal by the end of the week.

Glass Formulation: FDF requested a copy of Envitco's demonstration glass recipe once finalized. FDF wishes to produce crucible melts with actual K-65 waste using the treatment formulations developed by the POPT subcontractors.

While discussing the second round of the crucible melts, DMB posed the question to FDF: is it necessary for Envitco to develop a glass more durable than the 50% TCLP limits to ensure the natural variability of the waste glasses meet the contract requirements? Envitco successfully

2291

developed a high waste-loading glass during the initial crucible melts which met the 50% TCLP requirements imposed by the contract, but felt additional glass development work was necessary to ensure the 50% TCLP limits were always met. Since FDF originally chose the 50% TCLP limit to provide a buffer for successfully meeting the disposal regulations, improving the glass durability beyond the 50% TCLP limits may be unnecessary to successfully fulfill the intent of the POPT. Envitco requested a formal response from FDF defining the error (+/- the 50% TCLP limits) acceptable for the demonstration glass.

Contract Modification No. 4: Envitco agreed to sign and return Contract Modification No. 4 by the end of the week.

FIU Rheology Study: FDF has received the silo waste rheology report from Florida International University. FDF expects the document to be released at the end of the week. M. Morse will forward a copy to Envitco when it becomes available.

Melter Status

The status of the EV-101 re-assembly was discussed. Refractory installation began on Monday, October 26 and will continue for the next few days. All long lead items for the EV-101 will be on-site today. Re-assembly is proceeding on-schedule.

FDF requested to visit CETL and view the melter prior to the start of the demonstration. Envitco is to evaluate the progress of the EV-101 re-assembly and submit a visit schedule during next week's weekly conference call.

EnVitCo, Inc.
A COGEMA Group Company

TELEPHONE CALL REPORT

98703 PR RAW TCR 19981104 1350 0 Q
Key Words: POPT, Project Meeting, Meeting Minutes

2291

To ..... **DMB, DHD, KJH, IMW, SAS**
From ..... RAW/lrp
Info ..... GBS/RJN, RHI, E. Nicaise
Customer. Fluor Daniel Fernald
Location... Fernald, OH
Job No **98703**
Subject ... **POPT Weekly Conference Call – Week 22**

Date ..... November 3, 1998
Time 09:00
Talked with See Below
Company .. Fluor Daniel Fernald
Phone No.. (513) 648-4800

Envitco originated the call.

Action or follow-up necessary

FDF (M. Morse):	Contact CELS and confirm analytical updating method for Quantitative Chemical analysis (oxide and elemental, normalized).
FDF (M. Morse):	Issue Contract Modification No. 5
FDF (M. Morse):	Supply FDF's protocol (CELS contract number, etc.) for submitting samples to CELS for analysis under FDF's contract.
FDF (M. Morse):	Provide direction on organic sorption procedure for demonstration-scale batches of the demonstration surrogate.
Envitco (DMB):	Notify FDF of feasibility for CETL visit the week of November 23rd.
FDF (M. Morse):	Supply formal response to Envitco radiological concerns by November 13, 1998.

Message

The twenty-second weekly conference call was held with Fluor Daniel Fernald.

Attendees for FDF:

Mary Morse	John Roberts	Dave Jacoboski
John Smets (late)	Jeff Stone (late)	Kelly Glenn

Attendees for Envitco: DMB, KJH, RAW

Issues

FIU Rheology Report: Fluor Daniel Fernald is awaiting approval from Document Control prior to releasing the rheology report to Envitco. Envitco should expect formal transmittal by the end of the week.

Contract Modification No. 5: FDF is finalizing the language and tolerances for Contract Modification No. 5. They anticipate issuing the modification today. As part of the contract modification change, Fluor Daniel Fernald is contracting with CELS (Corning Laboratory Services) to conduct quantitative chemical analysis on the surrogate samples. FDF is requesting barium and lead analysis (on an oxide basis) for each of the demo surrogate samples submitted by

2291

subcontractors. In addition to this testing, Fluor Daniel Fernald is reanalyzing the surrogate samples previously submitted by the subcontractors for total metals.

Envitco brought up the issue of properly constraining the analytical process so that Contract Modification No. 5 is valid. Envitco raised the issues of oxide basis, normalized (oxide) basis and elemental (oxide) basis. Envitco suggested that Fluor Daniel Fernald perform a total quantitative chemical analysis on an oxide basis normalized to the oxide. Envitco feels that this will provide a baseline for all the subcontractors to get consistent and relevant data. Fluor Daniel Fernald then has the opportunity to target a lead oxide content with a tolerance of + or - .5 wt. %.

Chemical Suppliers: Envitco notified Fluor Daniel Fernald that we are experiencing delays with lead carbonate and lead sulfate shipments. Spectrum, the current supplier, has identified another lead carbonate supplier and expects to meet our schedule date. However, lead sulfate delivery is unresolved. Spectrum and Envitco are working to identify alternative suppliers. Envitco expects resolution of this issue in one form or another by close of business Wednesday, November 4.

50% TCLP Limit: John Smets was asked what safety margin Envitco should apply to the 50% TCLP limit mandated in the contract. Smets' reply was that Envitco must assess our own level of risk and assign an appropriate safety margin. FDF's official response is that Envitco must meet the 50% TCLP limit . Smets did add the caveat that minor excursions above the 50% TCLP limit would be looked at within the context of the overall success of the project. However, Envitco is still contractually required to produce glasses that meet or exceed (better) the 50% TCLP limit.

Fluor Daniel Fernald is aware of the issue of TCLP variability, specifically regarding the surface area. FDF will take into account waste loading when correlated with the TCLP results, i.e. if Envitco produces a glass that has much better TCLP leachability at a lower waste loading, Fluor Daniel Fernald will adjust the waste loading up accordingly. As part of the TCLP variability discussion, Envitco indicated that we are tracking particle size versus surface area effects on the TCLP results by submitting two (2) samples – one screened, the other crushed and submitted as is.

FDF Visit to CETL: Envitco had suggested a Fluor Daniel Fernald visit to CETL the week of November 30. Due to conflicts, Fluor Daniel Fernald would like to reschedule to the week of November 23, but prior to Thanksgiving. Envitco will take this under advisement and will notify Fluor Daniel Fernald on a weeky basis as to the visiting schedule.

Radiological Analysis Response: This is an action item that is still open. Bob Vogel of Fluor Daniel Fernald has been diverted from the resolution of this task. FDF committed to a new target date of November 13, 1998 for completion of this task.

Recipe Formulations: Fluor Daniel Fernald indicated that the demonstration surrogate treatment recipe formulation (i.e. demo glass formulation) is not needed as urgently as previously requested. FDF plans to use samples from the actual demonstration runs to quantify the glass formulation in their validations. Envitco should be aware that the demonstration surrogate treatment recipe formulation may be requested at a later date. Envitco agreed to submit the final demonstration formulation when requested.

229 1

New Issues

Demo Batch Mixing: Envitco raised the issue of the proper mixing procedure for the organics adsorption. Envitco requested guidance from Fluor Daniel Fernald for a better mixing methodology than indicated in the contract. Fluor Daniel Fernald indicated that Vortec has completed their surrogate batching but was unable to describe Vortec's mixing methodology. FDF plans to contact Vortec on their mixing methods and provide direction to Envitco on the organics adsorption procedure. (Note: The issue impacts batch-mixing equipment in order to adsorb the organics on the coarse or fine silica. The choice of the silica, whether it be coarse or fine, directly impacts the size of the mixing equipment.)

Melter Re-assembly: KJH provided a status of the melter re-assembly. The melter itself is complete; work continues on erecting platforms, utility and electrical installation. The current melter re-assembly is on schedule for the December 14 start of the demonstration run.

EnVitCo, Inc.
A COGEMA Group Company

TELEPHONE CALL REPORT

98703 PR RAW TCR 19981110 1350 0 Q

Key Words: POPT, Project Meeting, Meeting Minutes

To ..... **DMB, DHD, KJH, IMW, SAS**	Date ..... November 10, 1998
From ..... RAW/lrp	Time 09:00
Info ..... GBS/RJN, RHI, E. Nicaise	Talked with See Below
Customer. Fluor Daniel Fernald	Company .. Fluor Daniel Fernald
Location ... Fernald, OH	Phone No.. (513) 648-4800
Job No **98703**	
Subject ... **POPT Weekly Conference Call – Week 23**	

Envitco originated the call.

Action or follow-up necessary

FDF (M. Morse):	Provide FIU Rheology report.
FDF (M. Morse):	Issue Contract Modification No. 5
Envitco (DMB):	Provide schedule options and impacts resulting from Contract Modification No. 5 to FDF.

Message

The twenty-third weekly conference call was held with Fluor Daniel Fernald.

Attendees for FDF:

Mary Morse	Kelly Glenn
John Smets	Jeff Stone (late)

Attendees for Envitco: DMB, RAW

Issues

Contract Modification No. 5: FDF has completed an internal study that indicates magnesium phosphate in the hydrated form is sufficiently soluble to interact with lead in the surrogate and reduce the lead leachability of the demonstration surrogate. FDF's study indicates that lowering the magnesium phosphate content increases the lead leachability. Based on these results, FDF is maintaining the current lead leachability requirement of 650 to 850 ppm for the demonstration surrogate. Using PbO as the validation criteria (previously identified as the path forward in Week 22) has been discarded.

Several activities will be adjusted or increased in Contract Modification No. 5:

1. Subcontractors will not have to resubmit the 30 wt.% moisture demonstration surrogate for validation by FDF. However, subcontractors must "prove" the demonstration surrogate meets the lead leachability requirements through documentation (laboratory notebooks and analytical results) of the magnesium content adjustment. Essentially, the subcontractors must validate the demonstration surrogate internally.
2. The subcontractors must submit four [4] surrogate samples for validation:
   - Bench-scale Silo 1 surrogate (Designated: S1)
   - Bench-scale Silo 2 surrogate (Designated: S2)

2291

- Bench-scale demonstration surrogate for the UTS treatment recipe development (Designated: DS) – Additional sample not originally stipulated in the contract.
- Pilot-scale demonstration surrogate (Designated: DS)

3. The surrogate samples for validation will be sent to two different laboratories:
   - Validation samples will be shipped to CELS – Corning Laboratory Services and FDF. FDF will contract directly with CELS for the analysis of the validation samples.

Laboratory	Bench-scale	Pilot-scale
CELS	1 liter	To Be Determined
FDF	2 liter	To Be Determined

4. FDF will witness the manufacture, both weighing and mixing, of the demonstration surrogate (pilot-scale).

FDF will issue a formal letter covering the items outlined above by Thursday, November 12, 1998. Contract Modification No. 5 is undergoing final review and is scheduled for issue this week.

Envitco deferred discussing schedule impacts resulting from Contract Modification No.5 until the modification has been formally issued.

FIU Rheology Report: Fluor Daniel Fernald has approved release of the rheology report to Envitco. FDF will FedEx the report to Envitco today.

Radiological Analysis Response: This is an action item that is still open. Bob Vogel of Fluor Daniel Fernald has been diverted from the resolution of this task. FDF committed to a new target date of November 20, 1998 for completion of this task.

98703 PR DMB IOC 19981119 1400 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT

2291

To..... **RAW, DHD, KJH, IMW, SAS, RCC**
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, G. LeClerc

Date..... November 19, 1998
Time..... 1400
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 24**

Envitco originated the call

Action or follow-up necessary

Action: Envitco to begin production of S1 and S2 surrogate samples ASAP. Samples will be produced with varied magnesium phosphate. FDF will conduct TCLP and pH testing for validation. Schedule to be determined based on available manpower, though may be conducted the week of November 30.

Action: RAW to advise M. Morse on the schedule for the Week 25 weekly meeting. FDF has conflict and has requested any time other than 9:00 and 1:00.

Action: Morse to advise on turnaround schedule for CELS validation samples and FDF validation of Envitco DS surrogate samples.

Action: Envitco to provide 5 samples of DS surrogate with varied magnesium phosphate.

Action: Envitco to send COC paperwork to John Roberts in advance of the sample shipment.

Action: FDF to conduct TCLP and pH testing of five DS surrogate samples. Response in 36-48 hours after receipt.

Action: Envitco to assess schedule impacts related to surrogate validation requirements.

Action: FDF to provide TCLP targets and ranges in follow-up contract modification, due about December 30.

Action: Envitco would send the

Message

The twenty-fourth weekly conference call was held with FDF.

Customer : FDF
Subject : Weekly Meeting Minutes
Job No. 98703

2291

Attendees for FDF:

Mary Morse
David Jacobowski
John Roberts
Rod Gimpel
Kelley Glenn (acting recorder)
Jeff Stone

Attendees for Envitco: DMB, RAW, and KJH

Issues

Envitco requested confirmation that FDF was willing to conduct the additional TCLP tests that were required by Contract Modification #5. FDF (Morse) agreed that the work would be done by FDF for all three surrogate validation studies.

Envitco expressed concerns that the acceptance criteria for S1 and S2 had not been established, and that was causing problems for Envitco on the next validation phase. FDF advised that the targets were known, but the ranges were to be established. FDF also acknowledged that they did not know what to expect of the lead leaching tendencies, and were conducting tests with Contractor lead and phosphate compounds. Envitco suggested that FDF conduct the studies on Envitco manufactured samples, thereby getting the data they required, and also validating Envitco's surrogates. FDF agreed that this would be beneficial, and the Envitco would produce S1 and S2 surrogate samples for FDF validation. 4 or 5 levels of magnesium phosphate will be tested to produce a leaching curve.

Envitco expressed concerns that the scaling of the surrogate manufacturing process from bench to demonstration scale produced potential problems. Envitco noted that the TCLP, pH, and composition accuracy were subject to change. FDF acknowledged, and stated that they were awaiting Vortec's validation samples as confirmation that the TCLP and pH would be scaleable. FDF also advised that they would validate the surrogate manufacturing process to the tolerances stated in the contract (10% for additives less than 0.5% of batch, and 1% for those greater than 0.5%) by observing the manufacturing process for conformance with contract requirements. The actual analysis may not meet the specified targets; this would be assessed and accepted based on observance of good lab practice, known analytical error, and other variables which could not be controlled at this time.

Activities

Envitco was completing the recipe development work, and was awaiting the remaining confirmation data.

Envitco was completing the melter connections, and was starting checkout this week.

New Issues

Envitco would review the schedule in light of a better understanding of the surrogate validation. A copy of the tentative schedule is attached to this memo for reference. The demonstration schedule depends solely on the ability to validate the surrogate in a timely manner.

2291

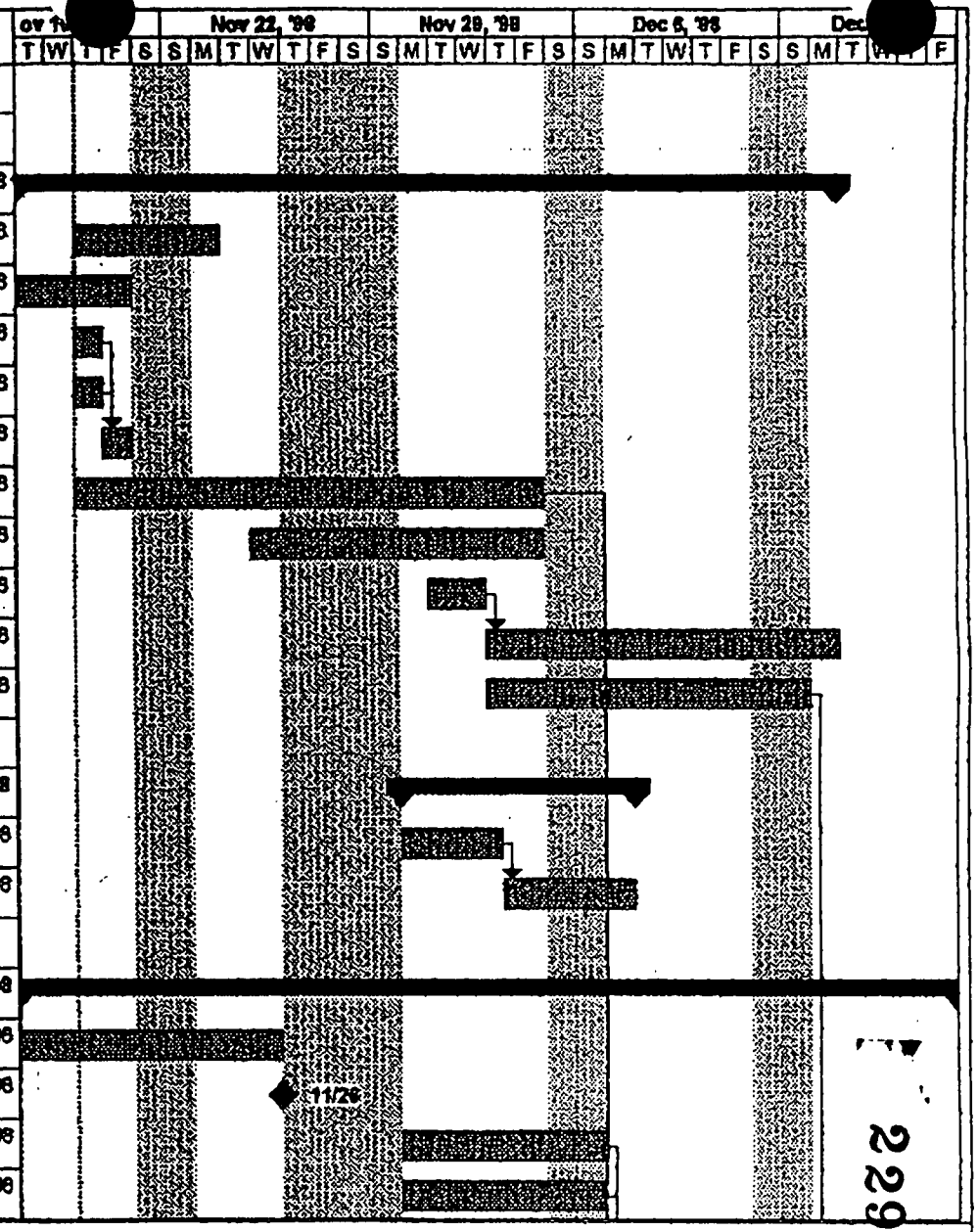
Morse has advised (11/17) that CELS has contracted at 6 working days for TCLP turnaround, but seems to be performing at 7 days. This is due to the need to concentrate the waste to greater than 50% solids per the protocol.

Morse has advised that FDF should have TCLP data by 11/20, 11/21 at the latest, based on receipt of the samples on 11/18.

FDF (Morse) has been advised that a tentative validation should be scheduled for 11/30 through 12/2. This will also serve as the observation of the melter status, which will be in heatup during this time. This should be discussed and confirmed in the Week 25 (11/24) conference call.

Envitco should begin the week of 11/30 (or earlier if possible) to produce the S1 and S2 samples.

ID	Task Name	Duration	Start	Finish
1				
2				
3	**Surrogate Manufacture**	**19d**	**Tue 11/17/98**	**Mon 12/14/98**
4	LOI/LOD of additives	3d	Thu 11/19/98	Mon 11/23/98
5	bench scale surrogate validation	4d	Tue 11/17/98	Fri 11/20/98
6	blood test	1d	Thu 11/19/98	Thu 11/19/98
7	pulmonary test	1d	Thu 11/19/98	Thu 11/19/98
8	fill test	1d	Fri 11/20/98	Fri 11/20/98
9	conversion batch mfg	10d	Thu 11/19/98	Fri 12/4/98
10	Envitco self validation of surrogate	6d	Wed 11/25/98	Fri 12/4/98
11	witness point for surrogate	2d	Tue 12/1/98	Wed 12/2/98
12	demo surrogate validation	8d	Thu 12/3/98	Mon 12/14/98
13	demonstration surrogate mfg (risk)	7d	Thu 12/3/98	Sun 12/13/98
14				
15	**S1, S2 Surrogate Validation**	**8d**	**Mon 11/30/98**	**Mon 12/7/98**
16	surrogate mfg	3.5d	Mon 11/30/98	Thu 12/3/98
17	surrogate verification (FDF)	2.5d	Thu 12/3/98	Mon 12/7/98
18				
19	**Melter Prep and Operations**	**22d**	**Tue 11/17/98**	**Fri 12/18/98**
20	melter checkout	7d	Tue 11/17/98	Wed 11/25/98
21	THANKSGIVING HOLIDAY	0d	Thu 11/26/98	Thu 11/26/98
22	melter startup/shakedown	5d	Mon 11/30/98	Sun 12/6/98
23	training (classroom to melter)	5d	Mon 11/30/98	Sun 12/6/98



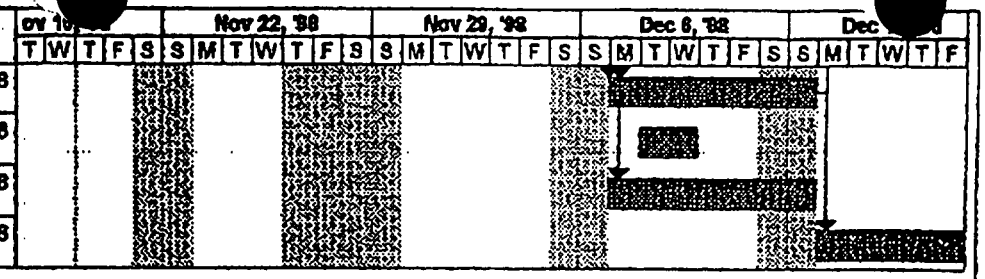
Project: Nov-Dec schedule.MPP
Date: Thu 11/19/98

Task | Progress | Milestone | Summary | Rolled Up Task | Rolled Up Milestone | Rolled Up Progress

229 1

1084

ID	Task Name	Duration	Start	Finish
24	melter conversion	5d	Mon 12/7/98	Sun 12/13/98
25	TN Level Detector calibration	2d	Tue 12/8/98	Wed 12/9/98
26	training (melter process)	5d	Mon 12/7/98	Sun 12/13/98
27	demonstration run	5d	Mon 12/14/98	Fri 12/18/98



Project: Nov-Dec schedule.MPP
Date: Thu 11/19/98

Task | Progress | Milestone | Summary | Rolled Up Task | Rolled Up Milestone | Rolled Up Progress

2291

1085

98703 PR DMB IOC 19981208 0900 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT 2291

To..... RAW, DHD, KJH, IMW, SAS, RCC
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, G. LeClerc

Date..... December 8, 1998
Time..... 0900
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 27**

Envitco originated the call

Action or follow-up necessary

Action: DMB to approve Contract Modification #5 and forward to B. Hensley.

Action: Morse to contact DMB later in the day 12/8 to determine status.

Action: Morse to advise on the outcome of the CELS TCLP analysis.

Action: Morse to investigate confidentiality agreements and try to get them signed in advance of the demonstration.

Action: Morse to provide list of personnel that will be attending the demonstration. Anticipate sending the list 12/8.

Action: Envitco to assess schedule impacts related to surrogate validation requirements.

Action: FDF to provide TCLP targets and ranges in follow-up contract modification, due about December 30.

Message

The twenty-seventh weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse
David Jacobowski
Jeff Stone
Rod Gimpel
Kelley Glenn (acting recorder)
Kevin Deitrich

Attendees for Envitco: DMB, RAW, and KJH

1086

Customer : FDF
Subject : Weekly Meeting Minutes
Job No. 98703

2291

Issues

DMB requested guidance on where to send the ECDC copy of the weekly report, since the line for Melissa Crews was no longer in service. Morse to advise.

Morse requested Envitco to complete the Contract Mod #5. DMB to follow up.

FDF has not resolved the rad inventory issue that has been open now for several months. DMB advised that the information would have been valuable several weeks ago, but will not be utilized for a few weeks based on the demonstration schedule.

Activities

Envitco was completing melter preparations. Problems with the slurry were identified when the surrogate was converted to feed through the addition of glass making additives. Material is thixotropic and is not mixing well in the feed tank. Adjustments are being made to remedy the problem.

Envitco is troubleshooting the power supply problems. This may impact schedule. FDF has been advised and will be in contact later today.

Envitco is awaiting TCLP results from Texidyne. Will advise FDF upon receipt.

New Issues

FDF is in the process of writing Contract Mod #7, which will include the S1 and S2 surrogate manufacturing by FDF.

FDF has not resolved the leaching criteria for S1 and S2. This has slipped off the list and should be entered as an issue in Week 28.

Envitco and FDF will likely begin daily conference calls to examine status up to the demonstration. FDF has been advised that recent problems with the power supply and the surrogate/feed may impact the demo schedule.

Morse and Jacobowski will arrive on Sunday, December 13. FDF and DOE reps will arrive Monday, December 14.

2291

98703 PR DMB IOC 19981215 0900 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT

To..... **RAW, DHD, KJH, IMW, SAS, RCC**
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, G. LeClerc

Date..... December 15, 1998
Time..... 0900
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 28**

Envitco originated the call

Action or follow-up necessary

Action: DMB to approve Contract Modification #6. IMW to sign and forward to B. Hensley.

Action: IMW to evaluate if FDF is covered under existing confidentiality agreements. FDF is currently assuming that they do not need to sign the recently forwarded agreements.

Action: FDF to provide information on seals, pumps and seal purge reservoirs to Envitco based on FDF experience/lessons learned.

Action: Morse to evaluate status of resolution of Issue #53 as related to design basis radiological information.

Message

The twenty-eighth weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse	Jeff Stone	Kelley Glenn (acting recorder)
David Jacobowski	Rod Gimpel	Phil Limerick

Attendees for Envitco: DMB and RAW.

Issues

Contract Modification #7 is underway, though no date is set for release. FDF is still working the details of how the S1 and S2 surrogates will be manufactured validated and provided to the subcontractors.
FDF anticipates having the surrogate to the subcontractors the week of January 18 (note: coincident with the demonstration).

1088

2291

FDF will conduct a two-step validation prior to sending the surrogate. Note: Based on comments during the meeting, there seem to be numerous logistics problems to overcome before the surrogate is release. Delays should be anticipated.

Envitco has reviewed Contract Mod. #6, and will approve. IMW should sign and forward.

FDF has still not resolved the rad inventory issue that has been open now for several months. FDF is aware, but it is not high on the priority list at this time. Envitco acknowledged though will need the information in January.

FDF acknowledged that the delays in the surrogate validation and supply (S1 and S2) would probably delay the testing and analysis. TCLP data may not be available for the Draft Report in March.

Activities

FDF inquired about the problems with the pumps. DMB explained that the pump seals were being changed to double mechanical. FDF concurred, as it was their experience with the Moyno pumps that the single mechanical seals were inadequate. FDF also advise that they had good luck with the double mechanical and a Goulds supplied seal pot. FDF will provide info if available.

FDF inquired about the samples that were submitted for re-validation. DMB advised that they had been shipped on 12/14 to CELS and FDF.

Envitco explained that they are continuing to troubleshoot peripheral systems, though the melter had operated reliably for the past 10 days, even through the other troubleshooting. FDF commented that their experience with pumps and slurry transfer indicated that slurry handling was the weak link.

FDF inquired about other modifications. DMB commented that the slurry distribution system had been modified and improved to simplify the system and allow better flushing. FDF agreed with the benefits of this approach.

DMB advised that Envitco would shut the melter down cold for the holidays. This surprised all of FDF, as they were not able to do this with the Duratek melter. This was most likely dictated by the K3 refractory used by Duratek. DMB described that Envitco could readjust the binding steel during cooling to permit this, as was done in the TVS. FDF was very interested in this approach, and seemed to feel it was a benefit of the Envitco design. More questions/inquiries expected.

New Issues

FDF is continuing to write Contract Mod #7.

Envitco is awaiting the double mechanical seals for installation in the Moyno pumps.

98703 PR DMB IOC 19981229 0900 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT 2291

To..... **RAW, DHD, KJH, IMW, SAS, RCC**
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, G. LeClerc

Date..... December 29, 1998
Time..... 0900
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 30**

Envitco originated the call

Action or follow-up necessary

Action: M. Morse to push engineering to address radiological questions (Re. open issue #53.)

Action: M. Morse to push W. Hensley for resolution of confidentiality agreements for FDF employees.

Action: FDF to complete TCLP analysis of new Batch 1 surrogate validation sample. Due to holidays and other priorities, schedule is unclear. M. Morse to pursue.

Action: M. Morse to provide additional justification to W. Hensley on Contract Mod. #7.

Action: DMB to advise M. Morse on schedule for M. Morse visit to CETL the week of January 10.

Message

The 30th weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse

Attendees for Envitco: DMB

Issues

Contract Modification #7 is technically complete. W. Hensley has requested additional justification from M. Morse as related to the cost impact. Specifically, it is the position by FDF that the delays created by the surrogate problems offset any potential adjustments that FDF could request (i.e. quid pro quo). No date is set for release.

1090

2291

FDF has still not resolved the rad inventory issues. M. Morse has a request in to engineering to resolve. No date for response.

FDF acknowledged that the delays in the surrogate validation and supply (S1 and S2) would probably delay the testing and analysis. TCLP data may not be available for the Draft Report in March.

Activities

No work has been conducted by Envitco at CETL since December 18 due to the holidays.

CELS has the new surrogate samples for validation. Results are not anticipated until January 8.

FDF validation sample TCLP results have been delayed due to other priorities, though they are anticipated by January 5.

FDF will be closed on Friday, January 1 for the New Year holiday.

New Issues

None

C:\My Documents\MAIN\ENVITCO\ENVITCO\98703 FERNALD POPT\envitco-POPT week 30 conference call minutes.doc

98703 PR DMB IOC 19991204 0900 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT

2291

To..... **RAW, DHD, KJH, IMW, SAS, RCC**
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, G. LeClerc

Date..... January 5, 1999
Time..... 0900
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 31**

Envitco originated the call

Action or follow-up necessary

Action: DHD: Review surrogate handling requirements to determine what is necessary to split, blend, and adjust the surrogate for LOD.

Action: IMW: Follow up with Hensley, Smith on confidentiality agreements for FDF personnel.

Action: FDF to complete TCLP analysis of new Batch 1 surrogate validation sample. Due to holidays and other priorities, schedule is unclear. M. Morse to pursue.

Action: M. Morse to provide additional justification to W. Hensley on Contract Mod. #7.

Action: DMB: Follow up with M. Morse on confidentiality agreements for non-FDF personnel.

Message

The 30th weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse	Kelley Glenn	Rod Gimpel
Dave Jacobowski	Jeff Stone	

Attendees for Envitco: DMB, RAW

Issues

Contract Modification #7 is still outstanding awaiting development of the financial justification. Delays have been due to personnel availability over the holidays. The justification is for the sake of DOE,

2291

and is intended to make a case for FDF's contribution of the surrogate without cost adjustment. Modification is still scheduled for release this week.

Silo 1 and 2 surrogates are to be distributed the week of January 18.

Mary Morse will be visiting CETL January 11 and 12 to view preparedness and discuss the demo. Her schedule is to arrive in Greenville at about 4:00, and depart Greenville about 4:30.

The confidentiality agreement for FDF employees has been forwarded to Brad Smith, the attorney for Procurement. Smith will communicate with IMW for resolution. Non-FDF personnel (CAT members, DOE, EPA) have a deadline to return the forms to M. Morse by January 8.

Activities

Silo 1 and 2 surrogates have been produced in three variations (A, B, and C) and submitted to the lab for testing. Final decision on formulations will be based on the results of this series.

Envitco will receive 40 kg dry of Silo 1 and Silo 2 formulations. These will be sent in 10-kg units, along with sufficient bentogrout to produce the full surrogate. Envitco should begin planning for handling, splitting and blending of this material, including considerations for LOD and other variables.

CELS has the new surrogate samples for validation. Results are not anticipated until January 8.

New Issues

None

C:\My Documents\MAIN\ENVITCO\ENVITCO\98703 FERNALD POPT\envitco-POPT week 31 conference call minutes.doc

2291
98703 PR DMB IOC 19990202 0900 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT

To..... **RAW, DHD, KJH, IMW, SAS, RCC**
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, G. LeClerc

Date..... February 2, 1999
Time..... 0900
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 35**

Envitco originated the call

Action or follow-up necessary

Action: DMB: Locate and send photos of POPT to FDF (Morse) for D. Nixon presentation to EPA.

Action: Morse/Dietrich: Send electronic copies of Design Basis, PFD's, P&ID's, and other FS design data to Envitco. Due 2/8.

Action: Morse: Push for LOD information on S1 and S2 surrogates. Required by Envitco to adjust spreadsheet and predict composition.

Action: Morse: Include PFD Symbols Library with Design Data package (this was requested 2/3, with efforts to include in 2/8 package).

Action: Morse: Supply letter acknowledging removal of compressibility testing requirements from contract (note: advised by Morse to DMB on 2/4).

Action: DMB to contact B. Bromm for clarification on the waste composition analysis.

Message

The 35th weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse Kelley Glenn Rod Gimpel
Dave Jacobowski

Attendees for Envitco: DMB, RAW

Issues

2291

Customer : FDF
Subject : Weekly Meeting Minutes
Job No. 98703

FDF (Deitrich) is targeting 2/8 for delivery of electronic version of design basis. Morse will attempt to get the symbols library included in this package. Package should also include MICROSHIELD data.

FDF has accepted the use of Compuchem for TCLP analyses. If any of the vendors do not pass the performance requirements, then CELS will be contracted by FDF to 'normalize' the results by conducting new tests on all vendors.

TCLP size reduction 'protocol' was received by Envitco, and deemed unsuitable for standardizing the size reduction process. Envitco will discuss the 'protocol' with Compuchem in an effort to avoid excessive size reduction.

LOD data is being generated and should be available by 2/5.

Envitco has been asked to supply photos of the demonstration to M. Morse for use by D. Nixon in presentation to EPA. The photos are not (currently) for use in the Fernald public meeting, which is scheduled for 2/9. Nina Ackunduz will make a presentation with photos at the public meeting in March. Envitco will attend the 2/9 meeting.

Activities

Envitco is underway with post-mortem.

Envitco is preparing samples for analysis (CELS, Compuchem, Teledyne).

Data entry is complete; data analysis has been initiated.

New Issues

Morse has been advised that there is a discrepancy between the waste compositions presented in the design basis, and the waste compositions presented in the original design basis package. In addition, the new design basis does not include organics in the waste. Morse has directed DMB to contact B. Bromm for clarification.

C:\My Documents\MAIN\ENVITCO\ENVITCO\98703 FERNALD POPT\envitco-POPT week 35 conference call minutes.doc

2291

98703 PR DMB IOC 19990209 0900 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT

To..... **RAW, DHD, KJH, IMW, SAS, RCC**
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, G. LeClerc

Date..... February 9, 1999
Time..... 0900
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 36**

Envitco originated the call

Action or follow-up necessary

Action: DMB: Contact Jeff Stone for directions and specifics on Fernald Site Status Meeting.

Action: Morse: Send revised design basis files (equipment list, design basis, Micro Shield, etc.).

Action: Morse/Gimple: Provide clarification on design basis organic carbon.

Action: Bennert/Morse: Provide clarification on balance of composition (13-14% unaccounted oxides) as presented in design basis.

Message

The 35th weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse Kelley Glenn Rod Gimpel
John Roberts

Attendees for Envitco: DMB, KJH

Issues

FDF (Morse) will review the formal Document Submittal list and revise in accordance with new interpretations and contract modifications.

Roberts advised that the S1 surrogate as provided by FDF did not have the bentogrout added prior to shipment. Envitco was to add the bentogrout in accordance with the instructions provided.

1096

2291

Customer : FDF
Subject : Weekly Meeting Minutes
Job No. 98703

Morse agreed to generate a letter providing the surrogate validation analysis as conducted and accepted by FDF. This would take some time, since Morse must formally request the info of engineering, and engineering must formally reply prior to transmitting the information to Envitco.

Gimple clarified the SOX and NOx limits provided in the design basis. Per Gimple, the values presented were developed based on the carbon bed being loaded to 1% with each constituent. The maximum emission rate is based on distributing the 1% over the three year operating period. Therefore, spikes are acceptable, as long as the integrated total for that constituent does not exceed the total over three years.

Morse advised that the organic carbon issue would be resolved by 2/10.

FDF has been requested to evaluate if the particlulate/dusting analysis is required. Morse will evaluate.

FDF was advised that the laboratory notebook used in the demonstration contains confidential information which is being edited out. FDF was asked to comment on this if a special control of the notebook is required.

FDF was requested to provide additional detail on the DeNOx design so that Envitco can determine its applicability.

Activities

Envitco is has completed the post mortem and is shipping the final samples for analysis.

Report writing has begun.

New Issues

None

C:\My Documents\MAIN\ENVITCO\ENVITCO\98703 FERNALD POPT\envitco-POPT week 36 conference call minutes.doc

2291

98703 PR DMB IOC 19990216 0900 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT

To..... **RAW, DHD, KJH, IMW, SAS, RCC**
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, S. Runge

Date..... February 16, 1999
Time..... 0900
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week ~~36~~ 37**

Envitco originated the call

Action or follow-up necessary

Action: DMB: Contact SGN and determine necessity of the clarification of the radionuclide content/assay. (Note: This is an FDF action item from10/22/98 related to a request for clarification on the radionuclide assay. Request was related to mean and standard deviation data which did not provide a proper (correct?) assay presentation.)

Action: Morse: Outstanding action items78, 79, 80, 82, 83, 84, 85, 86.

Action: Morse: Provide formal guidance on what aspects of the final report are important to the draft report submittal.

Action: Morse: Return photos to Envitco.

Message

The 37th weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse Kelley Glenn Dave Jacobowski

Attendees for Envitco: DMB, KJH, RAW

Issues

FDF (Morse) did not have an opportunity to deal with the open issues presented during the Week 36 conference call. This will be addressed by Morse by 02/18/99.

2291

Morse was asked to advise on the critical aspects of the draft report submittal. She commented that the material balance was critical to FDF, particularly as it relates to secondary waste production. DMB asked is conceptual design was critical for FDF's validation, to which she replied that this was also very important in the draft submittal.

Morse acknowledged that the request for relief on particle size was near completion. Jacobowski suggested that Envitco not conduct the test and present an engineering defense in the report. Bennert disagreed with this approach, as it is a contract deliverable, and must be approved by FDF prior to any actions. Morse agreed to pursue.

Envitco advised that the following items were critical to their path forward, and must be addressed as soon as possible:

78. SOx and water vapor limits for RCS
84. Cost estimate for RCS system expansion
85. Verification of steam availability
86. Detail on DeNox system and waste removal system in RCS

Other items, though important to Envitco are less critical than information affecting conceptual design efforts.

Activities

Envitco is focussing all efforts on conceptual design and reporting efforts.

New Issues

None

C:\My Documents\MAIN\ENVITCO\ENVITCO\98703 FERNALD POPT\envitco-POPT week 37 conference call minutes.doc

2291

98703 PR DMB IOC 19990223 0900 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT

To..... **RAW, DHD, KJH, IMW, SAS, RCC**
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, S. Runge
G. Stegal

Date..... February 23, 1999
Time..... 0900
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 38**

Envitco originated the call

Action or follow-up necessary

Action: DMB: Identify/clarify the problem metals and radionuclides that are expected in the offgas blowdown and present to FDF for discussion. Consider the presentation of the offgas blowdown rates and composition to FDF for evaluation against AWR treatment capabilities.

Action: Morse: Outstanding action items78, 79, 80, 82, 83, 84, 85,.

Action: Morse: Investigate definition of the role of AWR in the treatment of the contractors effluent.

Action: Morse: Complete review of submittal list and provide update by 02/26.

Action: Morse: Complete review of response to radionuclide questions (Item 53) and release by 02/23.

Action: Morse: Release letter on dusting/particulate matter and Envitco's exemption on testing.

Action: Morse: Complete letter on approval of S0 surrogate and submit analysis to Envitco.

Action: Roberts/Gimpel: Complete review of S1 and S2 analytical data and confirm composition.

Action: Morse: Return photos to Envitco.

Message

The 38th weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse	Kelley Glenn	Dave Jacobowski
Dennis Nixon	Rod Gimpel	John Roberts

1100

2291

Customer : FDF
Subject : Weekly Meeting Minutes
Job No. 98703

Attendees for Envitco: DMB, KJH

Issues

Morse advised that FDF had reviewed Envitco's request for relief on the wasteform dusting/particulate analysis. FDF agrees that, if a monolith is to be poured, there should not be fine particulate matter or dust formed, and therefore there is no need in conducting the test. FDF will send a letter to Envitco confirming that the dusting/particulate testing is not necessary.

Morse advised that the letter addressing the radiological questions has been drafted and should be released by COB 02/23.

Morse advised that the surrogate validation (S1 and S2) by FDF was still underway, though no problems have been noted. DMB advised that the analysis provided to Envitco (98703 GL RAW INC 19990218 1650 0 Q) indicated good results for the metals tested, but did not indicate any of the sulfate data. DMB tried to clarify that Envitco was examining all possible sources of error, and was looking for anything that could possibly affect the melting characteristics of the FDF provided S1 and S2 material. FDF (Roberts/Morse) agreed to complete their assessment of the materials using the SELS analyses.

NOTE: Gimpel advised that FDF had used urea rather than sugar, as their observations concluded that the sugar left 'residual carbon in the glass', where urea did not affect the glass. This was not observed at a crucible level, though may be true in the melter.

Morse advised that she has reviewed the submittal list with consideration for the contract modifications. The list is in revisions, and should be available by 02/26.

Morse advised that the letter closing out the S0 validation and data is in process, and should be available by 02/26.

Morse confirmed that the questions presented by Envitco on the final report (see Issues, Weekly Report 38) as follows: Item N, Safety Issues should address full scale design; Item O, Reliability should be addressed as presented in the Weekly Report, and Item Q (Implementation) and Item X (Ease of Process) will be addressed by Smets and Gimpel by 02/25.

Morse was asked to confirm FDF's position on the critical aspects of the draft report submittal. She confirmed the following items as most important to the draft submittal.

- General Arrangement Drawings
- Material Balance, including secondary waste identification (blowdown, salts, metals) and lead and sulfate (salt) treatment.
- Lessons Learned (including addressing the use of moly electrodes and other process considerations that would affect the baseline process)
- Conceptual Design Data

Morse was asked several questions related to the function of the AWR wastewater treatment in regards to the receipt and treatment of the wastewater from the vitrification process. FDF has been very casual about the ability of the AWR facility to take and treat wastewater from the vit process. The statement was made by FDF that "AWR could receive any water from vit as long as the concentration of metals and radionuclides did not exceed that present in the water used to retrieve the waste". FDF has not provided any data on the sluicing water or AWR's capability to treat that water. Therefore, Envitco does not know the AWR receiving limits. Morse understood the issue and agreed to investigate.

NOTE: FDF invited Envitco to submit estimates of the wastewater to FDF for review against the capabilities of AWR. DMB agreed to clarify for FDF which metals/radionuclides were of concern and to consider submitting the wastewater estimates.

Activities

Envitco is focussing all efforts on conceptual design and reporting efforts.

New Issues

FDF is investigating how/if to define function of AWR wastewater treatment in terms of the treatment of contractors effluent.

Envitco will identify problem areas with the blowdown from the offgas treatment for presentation to FDF in consideration of treatability through AWR.

C:\My Documents\MAIN\ENVITCO\ENVITCO\98703 FERNALD POPT\envitco-POPT week 38 conference call minutes.doc

98703 PR DMB 19990302 0900 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT

To..... **RAW, DHD, KJH, IMW, SAS, RCC**
From.... DMB
Info ..... GBS/RJN, RHI, E. Nicaise, S. Runge

Date..... March 2, 1999
Time..... 0900
Job No..... **98703**
Talked with See Below
Company .. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 39**

Envitco originated the call

Action or follow-up necessary

Action: Morse: Item 87: Investigate definition of the role of AWR in the treatment of the contractors effluent.

Action: Morse: Item 79: Complete review of submittal list and provide update by 02/26.

Action: Morse: Item 80: Complete letter on approval of S0 surrogate and submit analysis to Envitco.

Action: Roberts/Gimpel: Item 89: Complete review of S1 and S2 analytical data and confirm composition.

Action: Morse/Gimpel: Item 88: Clarify bulking factor calculations.

Action: Morse: Provide guidance/definition on report Item q. (implementation) and Item x (ease of process).

Action: DMB: Arrange for phone conference (if necessary) to discuss the difficulties with the S1 and S2 surrogates in the laboratory.

Action: DMB: Arrange for call with Morse/Gimpel on the bulking factor calculation.

Message

The 39th weekly conference call was held with FDF.

Attendees for FDF:

Mary Morse	Kelley Glenn	John Smets
Dennis Nixon	Rod Gimpel	

Attendees for Envitco: DMB, KJH

2291

Customer : FDF
Subject : Weekly Meeting Minutes
Job No. 98703

Issues

Morse advised that the following issues should be addressed this week:

a) clarification of Items q. and x. should be complete 03/02.
b) revision of submittal list should be complete 03//05
c) AWR capabilities should be complete 03/02.
d) other items should be complete soon (this week?)

DMB advised that the validation of surrogates S1 and S2 was now a moot point, as Envitco had forced the production of the glasses regardless of difficulties. Smets was advised of the situation (seemed unaware), and committed his personnel to completion of the validation, and some consideration of the problem. DMB has action item to establish phone conference.

NOTE: Envitco has not presented offgas blowdown numbers to FDF, and will provide treatment of the blowdown by reverse osmosis. This will ultimately require additional study, but will be presented as the baseline for the secondary waste treatment.

Activities

Envitco is focussing all efforts on conceptual design and reporting efforts.

New Issues

none.

C:\My Documents\MAIN\ENVITCO\ENVITCO\98703 FERNALD POPT\envitco-POPT week 39 conference call minutes.doc

98703 PR DMB IOC 19990309 0900 O N
Keywords: POPT, Project Meeting, Meeting Minutes

EnVitCo

TELEPHONE CALL REPORT

To..... **RAW, DHD, KJH, IMW, SAS, RCC**
From.... DMB
Info..... GBS/RJN, RHI, E. Nicaise, S. Runge

Date..... March 9, 1999
Time..... 0900
Job No..... **98703**
Talked with See Below
Company.. Fluor Daniel Fernald
Phone No.. 513 648 4800

Subject **POPT Weekly Conference Call – Week 40**

Envitco originated the call

Action or follow-up necessary

Action: Morse/Smets: Item 87: Investigate definition of the role of AWR in the treatment of the contractors effluent. Smets advised that this would be transmitted 03/09.

Action: Morse/Smets: Item 79: Revised submittal list has been received, but still contains confidential information requirements. Smets requested a conference call 03/09..

Action: Morse: Item 80: Complete letter on approval of S0 surrogate and submit analysis to Envitco. Smets advised that this letter is complete, and should be transmitted shortly

Action: Roberts/Gimpel/Smets: Item 89: Complete review of S1 and S2 analytical data and confirm composition. Smets requested a conference call on 03/09 to discuss.

Message

The 40th weekly conference call was held with FDF.

Attendees for FDF:

John Smets	Dave Jacobowski	(Morse out sick with flu)
Dennis Nixon	Jeff Stone	

Attendees for Envitco: DMB, RAW

Issues

DMB advised that the validation of surrogates S1 and S2 was beyond critical state, but remained concerned that the differences observed may be indication of a problem. Smets requested a conference call to discuss with Gimpel et al.

DMB advised that the document submittal list had been reviewed briefly and contained some confusing requests, as well as requirements for confidential information. Specifically, the requirements for batch sheets, glass formulations, and material balance data forces Envitco to present confidential info. Smets requested conference call to discuss.

Envitco is still awaiting the S0 validation data. Though the letter has been written, it cannot get out of FDF. No explanation given.

Activities

Envitco is focussing all efforts on conceptual design and reporting efforts.

New Issues

Stone advised that the monthly Fernald communication briefing has been cancelled. The next monthly meeting that will focus on OU4 is in September. The information planned for presentation in March will be dispersed through other meetings. FDF will advise if any of those meetings are significant and warrant Envitco's attendance.

C:\My Documents\MAIN\ENVITCO\ENVITCO\98703 FERNALD POPT\envitco-POPT week 40 conference call minutes.doc

EnVitCo, Inc.
A COGEMA Group Company

2291

SECTION 14

POPT CHAIN OF CUSTODY FORMS

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

KDF-002

001108

2291

Lab: Fluor-Daniel Fernald, 7400 Wilely Road, Rm 513, Bldg 15, HAMILTON, OH 45013-9402 Attn:	Sampler Name(s): Gary Evans	Clemson Environmental Technologies Laboratory, Attn: ROBERT WILSON - ENVITCO, 100 Technology Drive, Anderson, SC 29625, Phone: 864-646-2413 x 202, Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
SURR-SO-T-0019	10/1/98	5:00 PM	GE	Submittal C720-2248-C3-010	3 - 1 Gallon Paint Cans	3 samples ~1400g each

Relinquished by: (print) Gary D. Evans (sign) Gary D. Evans	Date/Time 10/2/98 11:00 AM	Received by: (print) (sign)	Date/Time	Delivery by: Way Bill #
Relinquished by: (print) (sign)	Date/Time	Received by: (print) (sign)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the: Clemson Environmental Technologies Laboratory, Clemson University, 100 Technology Drive, Anderson, SC 29625
(sign)	Date/Time	Received by: (print) (sign)	Date/Time	

White - return to sender; Pink - lab copy; Orange - originator's copy

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

KDF-003

001109

Lab: Fluor-Daniel Fernald Attn: Ms. Mary Morse	Sampler Name(s)	Clemson Environmental Technologies Laboratory Attn: _____ 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
SO-DDH	9/25	4:15	DHD	per FDF	1 gal. Tin Can - Double-bagged inside	Trial 30% Moisture Denon. Surrogate

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Douglas H Davis	9/25/98 4:30pm	(print)		Federal Express
(sign) Douglas H Davis		(sign)		Way Bill # 8009056046581
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

KDE-004

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

Lab: Corning Lab. Services
Corning Incorporated
Attn: Ms. Linda Adams

Sampler Name(s): Douglas H. Davis

Clemson Environmental Technologies Laboratory
Attn: _____
100 Technology Drive Phone: 864-646-2413 x _____
Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
XGLS-SO-T-0026	10/2/98	1400	DHD	GCA, HTV/Resis, Redox, Lgds/I.D.	4 Plstc 16oz bottles	Please return remaining sample
XGLS-SO-T-0027	10/2/98	1430	DHD	Redox	1 Plstc 8oz bottle	
XGLS-SO-T-0028	10/2/98	1430	DHD	Redox	1 Plstc 8oz bottle	
				All sample used for analysis		

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Douglas H. Davis	10/2/98 1430	(print) Linda L. Adams	12/5/98 1000	
(sign) Douglas H. Davis		(sign) Linda Adams		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

001110

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

Lab: TEXIDYNE Attn: JUDY	Sampler Name(s) DOUGLAS H. DAVIS ENVITCO	Clemson Environmental Technologies Laboratory Attn: _____ 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
XGLS-SO-T-0018	10/2/98		DHD	TCLP	Glass Bottle	TCLP w/ 14 metals (UTS)
XGLS-SO-T-0020	10/2/98		DHD	TCLP	"	"
XGLS-SO-T-0021	10/2/98		DHD	"	"	"
XGLS-SO-T-0023	10/2/98		DHD	"	"	"
XGLS-SO-T-0024	10/2/98		DHD	"	"	"
XGLS-SO-T-0025	10/2/98		DHD	"	"	"
SURR-SO-T-0029	10/2/98		DDC	"	"	"

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) DOUGLAS H DAVIS	10/2/98	(print)		
(sign) Douglas H Davis	1300	(sign)		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: W 1 yellow - return to sender, Pink - lab copy, Orange - originator's copy

001111

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

FOF-005

001112

Lab: TEXIDYNE

Attn:

Sampler Name(s): DOUGLAS H. DAVIS ENVITCO

Clemson Environmental Technologies Laboratory
Attn:
100 Technology Drive Phone: 864-646-2413 x
Anderson, SC 29625 Fax: 864-656-7410

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
XGLS-SO-T-0018	10/2/98		DHD	TCLP	Glass Bottle	
XGLS-SO-T-0020	10/2/98		DHD	TCLP	"	
XGLS-SO-T-0021	10/2/98		DHD	"	"	
XGLS-SO-T-0023	10/2/98		DHD	"	"	
XGLS-SO-T-0024	10/2/98		DHD	"	"	
XGLS-SO-T-0025	10/2/98		DHD	"	"	
SURR-SO-T-0028	10/2/98		DDC	"	"	

Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Delivery by:
(sign) Douglas H Davis	10/2/98 1300	(sign)		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

FDF- 006

Lab: CORNING LAB SERVICES Attn: MS. LINDA ADAMS	Sampler Name(s) D. M. BENNERT	Clemson Environmental Technologies Laboratory Attn: 100 Technology Drive Phone: 864-646-2413 x Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
XGLS-SO-T-0030	10/5/98	16:21	DMB	QCA - SEE REQ. FORM	120 ml GLASS	
XGLS-SO-T-0031	10/5/98	16:21	DMB	QCA - SEE REQ. FORM	120 ml GLASS	
SURR-SO-T-0032	10/5/98	16:21	DMB	QCA - SEE REQ. FORM	30 ml NALGENE	

VOID

VOID

Relinquished by: (print) D. BENNERT	Date/Time 10/05/98 17:00	Received by: (print)	Date/Time	Delivery by:
(sign) D. Bennert		(sign)		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: [illegible] and yellow - return to sender, Pink - lab copy, Orange - originator's copy

001113

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

FDF 007

Lab: CORNING LAB SERVICES Attn: MS. LINDA ADAMS	Sampler Name(s) D. BENNERT	Clemson Environmental Technologies Laboratory Attn: _____ 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
SALD-SO-T-0030	10/05/98	16:21	DMB	QCA - See REQ. FORM	120 ml ~~NALGENE~~ GLASS	FROM XLGS-SO-T-~~008~~ 0008
SALD-SO-T-0031	10/05/98	16:21	DMB	QCA - See REQ. FORM	120 ml ~~NALGENE~~ GLASS	FROM XLGS-SO-T-0011
SURR-SO-T-0032	10/05/98	16:21	DMB	QCA - See REQ. FORM	30 ml NALGENE	SURROGATE MIX SURR-SO-T-0022

Relinquished by: (print) D. BENNERT (sign) D Bennert	Date/Time 10/06/98 10:00	Received by: (print) (sign)	Date/Time	Delivery by: Way Bill #
Relinquished by: (print) (sign)	Date/Time	Received by: (print) (sign)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the: Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
Relinquished by: (print) (sign)	Date/Time	Received by: (print) (sign)	Date/Time	

Distribution: W[illegible] and yellow - return to sender, Pink - lab copy, Orange - originator's copy

001111

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

FDF - 008

Lab: FDF - FLUOR DANIEL FERNALD

Attn: John Roberts

Sampler Name(s): D. BENNERT

Clemson Environmental Technologies Laboratory
Attn: DAVID BENNERT - ENVITCO
100 Technology Drive Phone: 864-646-2413 x 202
Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
RAWM-SO-T-0033	12/19/98	[illegible]	DWB	TBD BY FDF	30 ml NALGENE	Pb503 sample - <133 MICRON FOR TCLP PROBLEM SOLVING
RAWM-SO-T-0034	12/19/98	15:[illegible]	DWB	TBD BY FDF	30 ml NALGENE	Pb0 - FOR TCLP PROBLEM SOLV.
RAWM-SO-T-0035	12/19/98	15:0[illegible]	DWB	TBD BY FDF	30 ml NALGENE	Pb50 - FOR TCLP PROBLEM SOLV.

Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Delivery by:
DAVID BENNERT.	12/19/98			
(sign) D. Bennert		(sign)		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

FOF - 009

Lab: FLUOR DANIEL FERNALD Attn: JOHN ROBERTS	Sampler Name(s) AMBENNETT	Clemson Environmental Technologies Laboratory Attn: ROBERT WILSON 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
RAWM-SO-T-0036	10/26	1600	AMB	TBD BY FOF	250ml NALGENE	TRIBUTYL PHOSPHATE
RAWM-SO-T-0037	10/26	1600	AMB	TBD BY FOF	250ml NALGENE	$Mg_3(PO_4)_2 - 5H_2O$

Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Delivery by:
A. BENNETT (sign)	10/26/98 16:30	(sign)		Way Bill #
Relinquished by: (print) (sign)	Date/Time	Received by: (print) (sign)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the: Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
Relinquished by: (print) (sign)	Date/Time	Received by: (print) (sign)	Date/Time	

Distribution: White - yellow - return to sender, Pink - lab copy, Orange - originator's copy

001116

2291

98-2428

FDF - 010

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

001117

Lab: TEXIDYNE Attn: JUDY	Sampler Name(s) D. DAVIS	Clemson Environmental Technologies Laboratory Attn: ROB WILSON 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
XGLS-SO-T-0042	10/26	1920	DMB/DHD	TCLP PER ANAL. REQ. FORM	250 ml NALGENE	RETURN SAMPLES AFTER EXTRACT.
XGLS-SO-T-0043	10/26	1920	DMB/DHD	"	"	"
XGLS-SO-T-0045	10/22	1400	"	"	"	"
XGLS-SO-T-0046	10/22	1400	"	"	"	"
XGLS-SO-T-0048	10/27	1100	"	"	"	"
XGLS-SO-T-0055	10/27	1130	"	"	"	"
XGLS-SO-T-0057	10/27	1300	"	"	"	"
XGLS-SO-T-0049	10/27	1000	"	"	"	"
XGLS-SO-T-0058	10/27	1300	"	"	"	"
XGLS-SO-T-0060	10/27	1345	"	"	"	"
XGLS-SO-T-0061	10/27	1345	"	"	"	"
XGLS-SO-T-0063	10/27	1400	"	"	"	"

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) D. BENNERT	10/27/98 1655	(print)		
(sign) D Bennert		(sign)		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print) J. MASTERSON	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign) Masterson	10-27-98 1655	

Distribution: White - yellow - return to sender, Pink - lab copy, Orange - originator's copy

P1 of 2

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

FAX - 011

Lab: TEXIDYNE Attn: JUDY	Sampler Name(s) D. DAVIS	Clemson Environmental Technologies Laboratory Attn: ROB WILSON 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
XGLS-SO-T-0051	10/27	1100	DHD/DMB	TCLP - Pb, Ba - PER A.R.S.	250 ml NALGENE	RETURN SAMPLES AFTER EXTRACT.
XGLS-SO-T-0052	10/27	1100	DHD/DMB	TCLP - Pb, Ba - PER A.R.S	"	"
XGLS-SO-T-0054	10/27	1130	DHD/DMB	TCLP - Pb, Ba - "	"	"
XGLS-SO-T-0064	10/27	1400	DHD/DMB	TCLP - Pb, B - "	"	"

Relinquished by: (print) D. BENNERT (sign)	Date/Time 10-27-98 1655	Received by: (print) (sign)	Date/Time	Delivery by: XXX Way Bill #
Relinquished by: (print) (sign)	Date/Time	Received by: (print) (sign)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the: Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
Relinquished by: (print) (sign)	Date/Time	Received by: (print) (sign)	Date/Time 10-27-98 1655	

Distribution: White - original yellow - return to sender, Pink - lab copy, Orange - originator's copy

001118

D2 of 2

229 11

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

012

001119

Lab: Texidyne, Inc
Attn: Judy

Sampler Name(s): D. Davis

Clemson Environmental Technologies Laboratory
Attn: Rob Wilson
100 Technology Drive Phone: 864-646-2413 x _____
Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
XGLS-SO-T-0074	10/28	1000	DHD	TCLP-Pb, Ba per ARS	8oz Nalgene	Return Samples After Extract
XGLS-SO-T-0075	10/28	1000	DHD	TCLP-Pb, Ba " "	"	"
XGLS-SO-T-0076	10/28	1040	DHD	TCLP-Pb, Ba " "	"	"
XGLS-SO-T-0077	10/28	1040	DHD	TCLP-Pb, Ba " "	"	"
XGLS-SO-T-0078	10/28	1040	DHD	TCLP-Pb, Ba " "	"	"
XGLS-SO-T0079	10/28	1040	DHD	TCLP-Pb, Ba " "	"	"

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by: Personal - by hand
(print) DH Davis	10/28/98 1500	(print)		Way Bill #
(sign) Dwight H Davis		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	
(sign)		(sign)		

Distribution: d yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

013

001130

Lab: Clemson Electron Microsc. Attn: Andu Nelson	Sampler Name(s) DH DAVIS	Clemson Environmental Technologies Laboratory Attn: _____ 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
XGLS-SO-T-0038	10/27	1600	DHD	SEM for Metals	8 oz Nalgene	[redacted]

VOID / Not Used DHDavis

Relinquished by: (print) / (sign)	Date/Time	Received by: (print) / (sign)	Date/Time	Delivery by: / Way Bill #
Relinquished by: (print) / (sign)	Date/Time	Received by: (print) / (sign)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the: Clemson Environmental Technologies Laboratory, Clemson University, 100 Technology Drive, Anderson, SC 29625
Relinquished by: (print) / (sign)	Date/Time	Received by: (print) / (sign)	Date/Time	

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

011

001121

Lab: Texidyne
Attn: Judy

Sampler Name(s): DH Davis

Clemson Environmental Technologies Laboratory
Attn: Rob Wilson
100 Technology Drive Phone: 864-646-2413 x _____
Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
XGLS-SD-T-0081	10/28	1030	DHD	TCLP Pb, Ba, Zn	8 oz Nalgene	Return Samples After Extraction
XGLS-SD-T-0083	10/29	1100	DHD	TCLP Pb, Ba, Zn	"	"
XGLS-SD-T-0085	10/29	1400	DHD	TCLP Pb, Ba, Zn	"	"
XGLS-SD-T-0087	10/29	1400	DHD	TCLP Pb, Ba, Zn	"	"
XGLS-SD-T-0090	10/29	1400	DHD	TCLP Pb, Ba, Zn	"	"
XGLS-SD-T-0093	10/29	1500	DHD	TCLP Pb, Ba, Zn	"	"

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) DH Davis Enviro	10/29/98 1900	(print)		
(sign) Douglas H Davis		(sign)		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the: Clemson Environmental Technologies Laboratory, Clemson University, 100 Technology Drive, Anderson, SC 29625
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

015

001122

Lab: Texidyne, Inc Attn: Judy	Sampler Name(s) DH Davis	Clemson Environmental Technologies Laboratory Attn: Rob Wilson 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
XGLS-SO-T-0097	7/10/30	1400	DHD	TCLP-Pb, Ba	8 oz Nalgene	
XGLS-SO-T-0098	10/30	1400	DHD	TCLP-Pb, Ba	"	

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Douglas H. Davis	10/30	(print)		
(sign) Douglas H. Davis	1400	(sign)		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White - yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

016

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

Lab: Texidyne

Attn: Judy

Sampler Name(s): DHDAVIS

Clemson Environmental Technologies Laboratory
Attn: Rob Wilson
100 Technology Drive Phone: 864-646-2413 x _____
Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
XGLS-SD-T-0122	11/5/98	1400	DHD	TCLP Pb, Ba	8 oz Nalgene	Return Samples
" " "-0126	"	"	"	"	"	"
" " "-0124	"	"	"	"	"	"
" " "-0127	"	"	"	"	"	"
" " "-0128	"	"	"	"	16 oz Nalgen	"

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) DOUGLAS DAVIS	1300 11/5/98	(print)		personal
(sign) Douglas Davis		(sign)		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the: Clemson Environmental Technologies Laboratory, Clemson University, 100 Technology Drive, Anderson, SC 29625
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	
(sign)		(sign)	11/5/98	

Distribution: White - yellow - return to sender, Pink - lab copy, Orange - originator's copy

001123

7 8-0536

229 1

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

016

Lab: Texlayne Attn: Judy	Sampler Name(s) DHDAVIS	Clemson Environmental Technologies Laboratory Attn: Rob Wilson 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
NGLS-SD-T-0122	11/5/98	1400	DHD	TCLP Pb, Ba	8 oz Nalgene	Return Samples
" " "-0126	"	"	"	"	"	"
" " "-0124	"	"	"	"	"	"
" " "-0127	"	"	"	"	"	"
" " "-0128	"	"	"	"	16 oz Nalgen	"

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) DOUGLAS DAVIS	1300	(print)		personal
(sign) Douglas H Davis	11/5/98	(sign)		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print) J. MATTERSON	Date/Time 11-5-98/1510	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White - yellow - return to sender, Pink - lab copy, Orange - originator's copy

001121

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

017

001125

Lab: Corning Labs Attn: Linda Adams	Sampler Name(s) D H Davis	Clemson Environmental Technologies Laboratory Attn: Rob Wilson 100 Technology Drive Phone: 864-646-2413 x ____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
XGLS-SD-T-0123	11/5	1700	DHD	Reducing Fe	8 oz bottle	
-0125	11/5	"	DHD			
-0129	"	"	DHD			
-0130	"	"	DHD			
-0131	"	"	DHD			

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Douglas H Davis	11/5/98 1700	(print)		Fed Ex
(sign) Douglas H Davis		(sign)		Way Bill # 800905046651
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	
(sign)		(sign)		

Distribution: W[illegible] d yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

2 of 2

1 019

CHAIN OF CUSTODY RECORD
Clemson Environmental Technologies Laboratory

Lab: Corning Labs
Attn: Linda Adams

Sampler Name(s): D. H. Davis, Steve Hueffner

Clemson Environmental Technologies Laboratory
Attn: Rob Wilson
100 Technology Drive Phone: 864-646-2413 x _____
Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
XGLS-SO-T-145	11/6	1300	SLH	Redox using iron oxide	8 oz glass bottle	
-0146		1350	SLH			
-0147		1350	SLH			
-0148		1350	SLH			
-0149		1355	SLH			
-0150		1130	SLH			

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Steve Hueffner	11/6/98 1550	(print)		Fed Ex
(sign) Steve Hueffner		(sign)		Way Bill # 8009050416662
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: 1 yellow - return to sender, Pink - lab copy, Orange - originator's copy

001126

99-2258 2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

020

001127

Lab: Texidyne Attn: Judy	Sampler Name(s) Steve Hoeffner	Clemson Environmental Technologies Laboratory Attn: Rob Wilson 100 Technology Drive Phone: 864-646-2413 x ____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
XGLS-SO-T-0100	11/10/98	1100	SZH	TCLP (Ba, Pb)	8 oz glass	Retain samples after analysis
XGLS-SO-T-0103	"	"	SZH	"	"	"
XGLS-SO-T-0104	"	1102	SZH	"	"	"
XGLS-SO-T-0107	"	1107	SZH	TCLP (Ba, Pb, [redacted])	"	"
XGLS-SO-T-0108	"	1103	SZH	"	"	"
XGLS-SO-T-0116	"	1108	SZH	"	"	"

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Steve Hoeffner	11/10/98 1345	(print) Grant Gordon	11-10-98 1345	
(sign) Steve Hoeffner		(sign) Grant Gordon		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White - yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

021

001128

Lab: Fluor Daniel Attn: Mary Morse	Sampler Name(s): Steve Hoeffner	Clemson Environmental Technologies Laboratory Attn: Rob Wilson 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
~~SURR-SO-T-0172~~	~~11/12~~	~~1600~~	~~SJH~~	~~TCLP~~	~~8 oz glass~~	
0173			SJH	TCLP		
0174			SJH	TCLP		
0175			SJH	TCLP		
0176			SJH	TCLP		
0177			SJH	TCLP		

REPLACED BY 025

Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Delivery by:
(sign)		(sign)		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291.2617

022

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

001129

Lab: Texidyne Attn: Judy	Sampler Name(s) D H Davis	Clemson Environmental Technologies Laboratory Attn: _____ 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

	Sample #	Date	Time	Initials	Analysis	Container Description	Comments
1	YGLS-SO-T-0220	11/16			TCLP	GLASS	
2	-0214						
3	-0194						
4	-0204						
5	-0203						
6	-0186						
7	-0191						
8	-0208						
9	-0205						
10	-0206						
11	-0218						
12	-0189						

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) DOUGLAS H DAVIS	11/16/98	(print)		Way Bill #
(sign) Douglas H Davis	1330	(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
Relinquished by: (print)	Date/Time	Received by: (print) Grant Gordon	Date/Time 11-16-98	
(sign)		(sign)	1330	

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

023

001130

Lab: CELS-Corning Lab Services Attn: Linda Adams	Sampler Name(s) DH Davis	Clemson Environmental Technologies Laboratory Attn: Rob Wilson 100 Technology Drive Phone: 864-646-2413 x ____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
XCLS-SO-T-0213	11/15		DHD	Gross Radioactivity Iron	40z Amber Bottle	
XCLS-SO-T-0202	11/14		"	"	"	
-0195	11/13		"	"	"	
-0196	11/13		"	"	"	
-0201	11/14		"	"	"	
-0215 (215)	11/15		"	"	"	
-0193	11/13		"	"	"	
-0200	11/14		"	"	"	
-0192	11/13		"	"	"	
-0207	11/15		"	"	"	
-0178	11/12		"	"	"	
-0199	11/14		"	"	"	

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Douglas H. Davis	11/16/98	(print)		Way Bill #
(sign) [signature]	1445	(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: [illegible]d yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

021

001131

Lab: FLUOR - DANIEL FERNALD Attn: JOHN ROBERTS	Sampler Name(s) S. HOEFFNER / D. BENNERT	Clemson Environmental Technologies Laboratory Attn: ROB WILSON 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
SUBR-S2-T-0222	11/20/98	1600	PMS	TCLP (Pb, Ba, Ca)	250ml Glass	50% OF TARGET $Mg_3(PO_4)_2$
SUBR-S2-T-~~002~~ 0221	11/20/98	1600	PMS	TCLP (Pb, Ba, Ca)	250ml Glass	100% OF TARGET $Mg_3(PO_4)_2$

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) D. BENNERT	11/20/98 1600	(print)		FED-EX
(sign)		(sign)		Way Bill # 8072371 90050
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

FDF 025

001132

Lab: FLUOR - DANIEL Attn: JOHN ROBERTS	Sampler Name(s) STEVE HOEFFNER	Clemson Environmental Technologies Laboratory Attn: ROB WILSON 100 Technology Drive Phone: 864-646-2413 x 209 Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
SUER-SO-T-0172	11/12	16:00	SJH	TCLP	8 OZ GLASS	Adjusted $Mg_3(PO_4)_2$ samples
-0173	11/12	16:00	SJH	TCLP		
-0174			SJH	TCLP		
-0175			SJH	TCLP		
-0176			SJH	TCLP		
-0177			SJH	TCLP		

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Steve Hoeffner (sign) Steve Hoeffner	11/13/98 4:00 pm	(print) DAVID BENNETT (sign)	11/12/98 4:00 pm	FED-EX Way Bill # 8072871 90049
Relinquished by: (print) DAVID BENNETT (sign)	11/17/98 4:10 pm	Received by: (print) (sign)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the: Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
Relinquished by: (print) (sign)	Date/Time	Received by: (print) (sign)	Date/Time	

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

1 FOF 027

001133

Lab: CELS Attn: LINDA ADAMS	Sampler Name(s) D. BENNERT	Clemson Environmental Technologies Laboratory Attn: ROB WILSON 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
SURR-SO-T-0224	11/27/98	1600	DWB	TCLP PER FOF	1 GALLON STEEL CAN ~ 3l	ANALYSIS PER FLUOR-DANIEL FERNALD REQUIREMENTS

TO BE PROCESSED UNDER FOF CONTRACT W/ CELS
re: CONTRACT
CONTACT D. BENNERT AT 864-646-2413 X209

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) D. BENNERT	11/27/98 1900	(print)		Way Bill #
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

229 11

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

FOF 028

Lab: FLUOR - DANIEL Attn: JOHN ROBERTS	Sampler Name(s) D. BENNERT	Clemson Environmental Technologies Laboratory Attn: ROB WILSON 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
SURR-SO-T-~~007~~	11/27/98	1600	RMB	VALIDATION OF DEMO-	2 x 1 GALLON STEEL CONTAINERS	ANALYSIS PER
0223				SCALE SURROGATE		VALIDATION REQ.
				PER CONTRACT		

Relinquished by: (print) R. BENNERT (sign)	Date/Time 11/27/98 1900	Received by: (print) (sign)	Date/Time	Delivery by: Way Bill #
Relinquished by: (print) (sign)	Date/Time	Received by: (print) (sign)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
Relinquished by: (print) (sign)	Date/Time	Received by: (print) (sign)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

028

001134

98- 2774

029

229 II

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

Lab: Texidyne
Attn: Judy

Sampler Name(s): Ginny Trebeaux

Clemson Environmental Technologies Laboratory
Attn: Rob Wilson
100 Technology Drive Phone: 864-646-2413 x _____
Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
SURR-SD-T-0225	12/1	1800	DW	TCLP	1 liter Glass Bottle	70% H_2O Demo Surrogate
~~SURR-SD-T-0226~~	~~12/1~~	~~1800~~	~~DW~~	~~"~~	~~"~~	~~70% H_2O Demo Surrogate~~
					NOT REQ'D - HELD BY D. BENNERT	

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) D. BENNERT		(print)		Personal
(sign) D. Bennert		(sign)		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
Relinquished by: (print)	Date/Time	Received by: (print) J. Masterson	Date/Time 12/3/98 1445	
(sign)		(sign) J. MASTERSON		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

001135

032

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

229 1

Lab: CELS Attn: LINDA ADAMS	Sampler Name(s): D. BENNERT	Clemson Environmental Technologies Laboratory Attn: PAR WILSON 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
SURR-SO-T-0236	12/14/98	1500	ANS	TCLP + OTHER VALIDATION PER EDF	3x 1 l POLY BOTTLES	

TO BE PROCESSED UNDER EDF CONTRACT BY CELS
PR CONTACT / CONTACT D. BENNERT / ENVITCO 864-646-2413 x209

Relinquished by: (print) D. BENNERT (sign)	Date/Time 12/14/98 -1600	Received by: (print) (sign)	Date/Time	Delivery by: 807287190103 Way Bill # FED EX
Relinquished by: (print) (sign)	Date/Time	Received by: (print) (sign)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the: Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
Relinquished by: (print) (sign)	Date/Time	Received by: (print) (sign)	Date/Time	

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

032

001136

229 L

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

033

Lab: FLUOR - DANIEL Attn: JOHN ROBERT	Sampler Name(s) D. BENNETT	Clemson Environmental Technologies Laboratory Attn: BOB WILSON 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
SRR-SO-T-0237	12/14	1600	DNB	TCLP + VALIDATION	3 x 1 l POLY	

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) D. Bennett	12/14/98 1600	(print)		8072871 90093
(sign) D. BENNETT		(sign)		Way Bill # Fed Ex
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White - yellow - return to sender, Pink - lab copy, Orange - originator's copy

033

001127

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

031

Lab: CORNING LHBS
Attn: LINDA H DAVIS

Sampler Name(s): DH DAVIS

Clemson Environmental Technologies Laboratory
Attn: Rob Wilson
100 Technology Drive Phone: 864-646-2413 x _____
Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
DGLHS-SO-T-0289	12/16	0000	DHD	Redox by Iron	Small Amber Bottle	
DGLHS-SO-T-0288	12/18	0600	DHD	Redox by Iron	Small Amber Bottle	

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) DOUGLAS H DAVIS	12/18 1400	(print)		Fed Express
(sign) Douglas H Davis		(sign)		Way Bill # 8009050 46132
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
Relinquished by:	Date/Time	Received by: (print)	Date/Time	
		(sign)		

001138

d yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

035

001139

Lab: Corning Labs Attn: Linda Adams	Sampler Name(s) DHD	Clemson Environmental Technologies Laboratory Attn: Rob Wilson 100 Technology Drive Phone: 864-646-2413 x_____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
XGLS-SO-T-0300	1/11/99	1500	DHD	QCH & Redox	16oz Nalgene	
XGLS-SO-T-0297	1/11/99	1500	DHD	QCH	4oz Amber Bottle	
XGLS-SO-T-0293	1/11/99	1500	DHD	Glass Redox Ix/Ion	4oz Amber Bottles	
XGLS-SO-T-0295	1/11/99	1500	DHD	Glass Redox Ix/Ion	4oz Amber Bottles	

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by: Fedex
(print) DH Davis (sign) Douglas H Davis	1/11/99/1500	(print) (sign)		Way Bill # 5000450416 78X7
Relinquished by: (print) (sign)	Date/Time	Received by: (print) (sign)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the: Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
Relinquished by: (print) (sign)	Date/Time	Received by: (print) (sign)	Date/Time	

Distribution: White - yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

036

001110

Lab: Corning Labs Attn: Linda Adams	Sampler Name(s) DHD	Clemson Environmental Technologies Laboratory Attn: Rob Wilson 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
GLS-SO-F-0313	1/12/99	1030	DHD	QCA, Redox	16oz Nalgene	Glass Sample
DGL-SO-T-0315	1/14/99	[illegible]	MCE	QCA, Redox	16oz Nalgene	Glass Sample
X						

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Michelle Everson	1/13/99	(print)		Fed Ex – AM next day
(sign) Michelle Everson	1200	(sign)		Way Bill # 8009050466 95
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: [illegible] yellow - return to sender, Pink - lab copy, Orange - originator's copy

036

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

037

Lab: Envitco Attn:	Sampler Name(s) Andrew James	Clemson Environmental Technologies Laboratory Attn: ROB WILSON 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
FEEDSOT 0350	1-17-99 ~~1-19-99~~ AJ	0630 ~~0600~~ AJ	AJ	LOD	1000ml narrow mouth poly	feed sample to check for solids decrease
						Feed batch 001

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Andrew James	0600	(print) Robert A. Wilson	0600	
(sign) Andrew James	1-19-99	(sign) Robert A. Wilson	1-19-99	Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White - Send yellow - return to sender, Pink - lab copy, Orange - originator's copy

001111

ENVITCO 229 1

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

Box 1

039

001142

Lab: FLUOR-Daniel Fernald Attn: John Roberts	Sampler Name(s)	Clemson Environmental Technologies Laboratory Attn: _____ 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
DGLS-SO-T-0391	Jan. 18,1999	1000	SLH	40720-2240-C4-003	1000ml HDPE wide mouth	Durability Samples
DGLS-SO-T-0397	Jan. 18,1999	1300	SLH			
DGLS-SO-T-0409	Jan 18,1999	1630	TP			
DGLS-SO-T-0416	Jan 19,1999	1910	TP			
DGLS-SO-T-0422	Jan. 18,1999	2210	TP			
DGLS-SO-T-0431	Jan. 19,1999	0100	AJ			
DGLS-SO-T-0442	Jan. 19,1999	0400	JC			
DGLS-SO-T-0450	Jan. 19,1999	0700	JC			
DGLS-SO-T-0459	Jan. 19,1999	~~1330~~ 1300 ME	ME			
DGLS-SO-T-0474	Jan 19,1999	1620	DCR			
DGLS-SO-T-0484	Jan. 19,1999	1905	DCR			
DGLS-SO-T-0470	Jan 19,1999	1330	ME			
DGLS-SO-T-0490	Jan 19,1999	2210	DCR			

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Michelle Eversen	1/23/99 1200	(print)		Way Bill #
(sign) Michelle Eversen		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

ENVITCO 2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

Box 2

039

001113

Lab: Flor Daniel Fernald Attn: John Roberts	Sampler Name(s)	Clemson Environmental Technologies Laboratory Attn: _____ 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
DGLS-SO-T-0499	1/20/99	0100	JC	40 720-2240-C4-003	1000ml HDPE wide mouth	Durability Samples
DGLS-SO-T-0505	1/20/99	0400	JC			
DGLS-SO-T-0515	1/20/99	0700	JC			
DGLS-SO-T-0524	1/20/99	1000	ME			
DGLS-SO-T-0529	1/20/99	1300	ME			
DGLS-SO-T-0542	1/20/99	1615	DCR			
DGLS-SO-T-0551	1/20/99	1910	DCR			
DGLS-SO-T-0557	1/20/99	2210	TP			
DGLS-SO-T-0569	1/21/99	0100	JC			
DGLS-SO-T-0573	1/21/99	0400	AJ			
DGLS-SO-T-0581	1/21/99	0700	JC ~~DAE~~			
DGLS-SO-T-0591	1/21/99	1000	SLH			

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Michelle Eversen (sign) Michelle Eversen	1/25/99 1100	(print) (sign)		Way Bill #
Relinquished by: (print) (sign)	Date/Time	Received by: (print) (sign)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the: Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
Relinquished by: (print) (sign)	Date/Time	Received by: (print) (sign)	Date/Time	

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

ENV291TCO

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

Box ~~3~~ 6

040

Lab: Fluor – Daniel Fernald Attn: John Roberts	Sampler Name(s)	Clemson Environmental Technologies Laboratory Attn: _____ 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
DGLS-SO-T-0393	1/18/99	1900	SLH	FDF Archive glass	1000ml HDPE wide mouth	Durability Samples
DGLS-SO-T-0411	1/18/99	1600	TP	Submittal # 40720-2240-CH-003		
DGLS-SO-T-0399	1/18/99	1300	SLH			
DGLS-SO-T-0418	1/18/99	1910	TP			
DGLS-SO-T-0424	1/18/99	2210	TP			
DGLS-SO-T-0433	1/19/99	0100	AJ			
DGLS-SO-T-0441	1/19/99	0400	JC			
DGLS-SO-T-0453	1/19/99	0700	JC			
DGLS-SO-T-0461	1/19/99	1000	ME			
DGLS-SO-T-0469	1/19/99	1330	ME			
DGLS-SO-T-0477	1/19/99	1620	DCR			
DGLS-SO-T-0487	1/19/99	1905	DCR			

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Michelle Eversen	1/25/99 1800	(print)		Way Bill #
(sign) Michelle Eversen		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

ibuti and yellow - return to sender, Pink - lab copy, Orange - originator's copy

001114

EN-2291 TCO

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

Box 6 (cont.) 041

Lab: Fluor Daniel Ferrald Attn: John Roberts	Sampler Name(s)	Clemson Environmental Technologies Laboratory Attn: _____ 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
DCLS-SO-T-0493	1/19/99	2210	DCR	FDF Active Glass ~~40720-2240-CH-003~~ Submittal # 40720-2240-CH-003	1000ml HDPE widemouth	Durability Samples

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Michelle Eversen	1/25/99 1800	(print)		Way Bill #
(sign) Michelle Eversen		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: d yellow - return to sender, Pink - lab copy, Orange - originator's copy

001145

ENVITCO 229 I

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

Box 7

042

Lab: Fluor Daniel Fernald Attn: John Roberts	Sampler Name(s)	Clemson Environmental Technologies Laboratory Attn: _____ 100 Technology Drive Phone: 864-646-2413 x _____ Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
DGLS-SO-T-0501	1/20/99	0100	JC	FDF Archive Glass	1000ml HDPE wide mouth	Durability Samples
DGLS-SO-T-0509	1/20/99	0400	AJ	Submittal 4720-2240-G1-003		
DGLS-SO-T-0513	1/20/99	0700	JC			
DGLS-SO-T-0522	1/20/99	1000	ME			
DGLS-SO-T-0531	1/20/99	1305	ME			
DGLS-SO-T-0545	1/20/99	1615	DCR			
DGLS-SO-T-0554	1/20/99	1910	DCR			
DGLS-SO-T-0560	1/20/99	2210	TP			
DGLS-SO-T-0567	1/21/99	0100	JC			
DGLS-SO-T-0575	1/21/99	0400	AJ			
DGLS-SO-T-0579	1/21/99	0700	JC			
DGLS-SO-T-0593	1/21/99	1020	SLH			

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Michelle Everson (sign) Michelle Everson	1/25/99 1100	(print) (sign)		Way Bill #
Relinquished by: (print) (sign)	Date/Time	Received by: (print) (sign)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
Relinquished by: (print) (sign)	Date/Time	Received by: (print) (sign)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625

Distribution: White - yellow - return to sender, Pink - lab copy, Orange - originator's copy

001116

EDVI 1229 CO

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

Box 3 043

Lab: FLUOR-Daniel Fernald

Attn: John Roberts

Sampler Name(s)

Clemson Environmental Technologies Laboratory
Attn: _____
100 Technology Drive Phone: 864-646-2413 x _____
Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
SURR-SO-T-0437	1/19/99	0315	AJ	Surrogate FDF Validation Samples	(3) 1000mL HDPE narrow mouth	Batch 008A
SURR-SO-T-0404	1/18/99	1345	ME		(3) 1000mL HDPE narrow mouth	Batch 008B

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Michelle Eversen	1/26/99 1200	(print)		Way Bill #
(sign) Michelle Eversen		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

001117

EPV229 TCO

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

Box 4

044

001178

Lab: FLUOR DANIEL FERNALD

Attn: John Roberts

Sampler Name(s):

Clemson Environmental Technologies Laboratory
Attn: _____
100 Technology Drive Phone: 864-646-2413 x _____
Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
SURR-50-T-0449	1/19/99	0605	JC	Surrogate EDF Validation samples	(3) 1000 ml HDPE narrow mouth	Batch 007
SURR-50-T-0351	1/17/99	0645	AJ		(1) 1000 ml HDPE narrow mouth	Batch 005

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Michelle Eversen	1/26/99 1200	(print)		
(sign) Michelle Eversen		(sign)		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

ENVITCO 2291

Box 5

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

045

Lab: FLUOR - Daniel Fernald

Attn: John Roberts

Sampler Name(s)

Clemson Environmental Technologies Laboratory
Attn: _____
100 Technology Drive Phone: 864-646-2413 x _____
Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
DGLS-SO-T-0597	1/21/99	1450	SLH	Archive Glass	1000 ml HDPE wide mouth	Durability Samples
DGLS-SO-T-0605	1/21/99	2230	DCR	Outside 72 Hour Test submittal # 40720-2210-04-03	1000 ml HDPE wide mouth	
DGLS-SO-T-0608	1/22/99	0600	JC		1000 ml HDPE wide mouth	
DGLS-SO-T-0618	1/22/99	2215	DCR		1000 ml HDPE wide mouth	
DGLS-SO-T-0623	1/23/99	0430	JC		1000 ml HDPE wide mouth	
DGLS-SO-T-0379	1/18/99	0300	AJ		(2) 1000 ml HDPE wide mouth	
DGLS-SO-T-0381	1/18/99	0300	AJ		(2) 1000 ml HDPE wide mouth	
DGLS-SO-T-0385	1/18/99	0600	JC		(2) 1000 ml HDPE wide mouth	
DGLS-SO7-0383	1/18/99	0600	JC		(1) 1000 ml HDPE wide mouth	
DGLS-SO7-0382	1/18/99	0600	JC		(1) 1000 ml HDPE wide mouth	

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Michelle Eversen	1/25/99 1600	(print)		
(sign) Michelle Eversen		(sign)		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

001179

ENVITCO 2291

Box 8

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

046

001150

Lab: FLUOR-Daniel Fernald

Attn: John Roberts

Sampler Name(s)

Clemson Environmental Technologies Laboratory
Attn: _____
100 Technology Drive Phone: 864-646-2413 x _____
Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
DGLS-SO-T-0651	1/26/99	~~1252~~ 1100	ME	Archive Glass	(1) 1000ml HDPE wide mouth	Durability Samples
DGLS-SO-T-0652	1/26/99	1100	ME	prior to 72 hour Demo Submittal # 40720-2240-S4-003		
DGLS-SO-T-0653	1/26/99	1100	ME			
DGLS-SO-T-0654	1/26/99	1100	ME			
DGLS-SO-T-0655	1/26/99	1100	ME			
DGLS-SO-T-0656	1/26/99	1100	ME			
DGLS-SO-T-0657	1/26/99	1110	ME			
DGLS-SO-T-0658	1/26/99	1120	ME			
DGLS-SO-T-0365	1/17/99	2300	DCR			

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Michelle Everson	1/26/99 1200	(print)		Way Bill #
(sign) Michelle Everson		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

047

001151

Lab: Clean Air Engineering via United McGill Corporation Attn: Dave Poole	Sampler Name(s) Dave Rohrer	Clemson Environmental Technologies Laboratory Attn: Rob Wilson 100 Technology Drive Phone: 864-646-2413 x 209 Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
OGSO-SO-T-0547	1/26/99	1730	DCR	Particle Size/Resistivity	250 ml poly bottle	Offgas solids collected in McGill ESP

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Robert A Wilson	1/25/99	(print) WADE SHOEMAKER	1-28-99	
(sign) Robert A Wilson	15:20	(sign) Wade Shoemaker	3:30 pm	Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

048

001152

Lab: CELS - Corning Lab Services Attn: Linda Adams/Connie Fiero	Sampler Name(s) Michelle Everson Tim Pruett	Clemson Environmental Technologies Laboratory Attn: Rob Wilson 100 Technology Drive Phone: 864-646-2413 x 209 Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
FEED-SO-T-0330	1/15/1999	1430	ME	QCA, GCA, LOD, LOI	1000 mL HDPE wide mouth	Feed Sample: Batch #001
FEED-SO-T-0358	1/17/1999	1530	ME	"	1000 mL HDPE wide mouth	Feed Sample: Batch #005
FEED-SO-T-0395	1/18/1999	1200	ME	"	1000 mL HDPE narrow mouth	Feed Sample: Batch #005
FEED-SO-T-~~0410~~ 0454	1/18/1999	1630	TP	"	1000 mL HDPE narrow mouth	Feed Sample: Batch #005

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Robert A. Wilson	2/5/99 15:48	(print)		Fed Ex
(sign) Robert A. Wilson		(sign)		Way Bill # 807287190130 #1 of 3
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

049

001153

Lab: CELS- Corning Lab Services Attn: Linda Adams/Connie Fiero	Sampler Name(s) Don Rohrer Michelle Everson	Clemson Environmental Technologies Laboratory Attn: Robert Wilson 100 Technology Drive Phone: 864-646-2413 x 209 Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
FEED-SO-T-0488	1/19/1999	2100	DCR	GCA, GSA, LOD, LOI	100 ml HDPE narrow mouth	Feed Sample: Batch #007
FEED-SO-T-0517	1/20/1999	0700	ME	"	"	" "
FEED-SO-T-0555	1/20/1999	[illegible]	DCR	"	"	Feed Sample: Batch #007
FEED-SO-T-0584	1/21/1999	[illegible]	ME	"	"	Initial Feed Batch 008A

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Robert A. Wilson	1/5/99	(print)		Fed Ex
(sign) Robert A. Wilson	15:54	(sign)		Way Bill # 807287190130 #2 of 3
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: [illegible] and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

050

001154

Lab: CELS - Corning Lab Services Attn: Linda Adams/Connie Fiene	Sampler Name(s) Julie Crouton Michelle Evanson Steve Hartley	Clemson Environmental Technologies Laboratory Attn: Rob L. Wilson 100 Technology Drive Phone: 864-646-2413 x 209 Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
FEED-SO-T-0606	1/22/1999	0630	JC	GCA, GSA, LCD, LCI	1000 ml HDPE narrow mouth	Batch # 006A Recirc. Line
FEED-SO-T-0611	1/22/1999	0930	HE	"	1000 ml HDPE narrow mouth	Initial Feed Batch 006B
FEED-SO-T-0638	1/23/1999	1610	SH	"	1000 ml HDPE narrow mouth	Batch #006B Recirc. Line

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Robert A. Wilson	2/5/99	(print)		Fed Ex
(sign) Robert A. Wilson	16:02	(sign)		Way Bill # 807287190130 #3 of 3
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

051

001155

Lab: Corning Lab Services - CELS Attn: Linda Adams / Connie Fiero	Sampler Name(s) Ginny Trobaugh Michelle Eversen Julie Crockton Dan Rohrer	Clemson Environmental Technologies Laboratory Attn: Rob Wilson (Envirea) 100 Technology Drive Phone: 864-646-2413 x 209 Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
DGLS-SO-T-0327	1/15/99	1100	GLT	QSA, QCA, redox, density	1000 ml HDPE wide mouth	Start of 7800 kg Processing
DGLS-SO-T-0357	1/17/99	1500	MGE	QSA, QCA, conductivity, etc.	1000 ml HDPE wide mouth	
DGLS-SO-T-0392	1/18/99	1000	MGE	See Accompanying	1000 ml HDPE wide mouth	Start of 72-hour Demo
DGLS-SO-T-0417	1/18/99	1910	DCR	Analysis Request	1000 ml HDPE wide mouth	
DGLS-SO-T-0443	1/19/99	0400	JC	Form	1000 ml HDPE wide mouth	
DGLS-SO-T-0478 (1 out)	1/19/99	1330	MF		1000 ml HDPE wide mouth	
DGLS-SO-T-0491	1/19/99	2210	DCR		1000 ml HDPE wide mouth	
DGLS-SO-T-0514	1/20/99	0700	JC		1000 ml HDPE wide mouth	
DGLS-SO-T-0543	1/20/99	1615	DCR		1000 ml HDPE wide mouth	

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Robert A. Wilson	2/10/99	(print)		Federal Express
(sign) Robert A. Wilson	1555	(sign)		Way Bill # 8009505046890
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

052

001156

Lab: CELS - Corning Lab Services Attn: Linda Adams / Connie Fiero	Sampler Name(s) Julie Croxton Steve Hoeffner Dan Rabner	Clemson Environmental Technologies Laboratory Attn: Bob Wilson (Envitco) 100 Technology Drive Phone: 864-646-2413 x 209 Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
DGLS-SO-T-0568	1/21/99	0100	JC	See Analysis	1000 ml HDPE wide mouth	
DGLS-SO-T-0592	1/21/99	1020	SH	Request Form	1000 ml HDPE wide mouth	End of 72-hr Demo
DGLS-SO-T-0636	1/23/99	1600	SH		1000 ml HDPE wide mouth	
DGLS-SO-T-0646	1/23/99	2110	DCR		1000 ml HDPE wide mouth	End of 78cu.y. Processing

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Robert A. Wilson	2/10/99	(print)		Federal Express
(sign) Robert A. Wilson	1555	(sign)		Way Bill # 8005050346890
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

229 11

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

952

001157

Lab: Teledyne Metal Working Products Attn: Dr. Steve Caldwell	Sampler Name(s) Rob Wilson	Clemson Environmental Technologies Laboratory Attn: Rob Wilson 100 Technology Drive Phone: 864-646-2413 x 209 Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
MTSC-SU-T-0661	2/11/99	1358	RAW	SEM	1 L Ziplock	[redacted] Electrode
MTSC-SU-T-0662	2/11/99	1403	RAW		1 L Ziplock	[redacted] Electrode [redacted]
MTSC-SU-T-0663	2/11/99	1408	RAW		1 L HDPE wide mouth	[redacted] Electrod
MTSC-SU-T-0665	2/11/99	1617	RAW		1 L HDPE wide mouth	Metallic Nodules
MTSC-SU-T-0668	2/11/99	1628	RAW		250 ml HDPE wide mouth	High Shine Metallic Nodule

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Robert A. Wilson	2/11/99	(print)		Federal Express
(sign) Robert A. Wilson	1918	(sign)		Way Bill # 800905046938
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: [illegible]nd yellow - return to sender, Pink - lab copy, Orange - originator's copy

229 1

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

1 054

001158

Lab: CELS - Corning Lab Services Attn: Linda Adams/Connie Fieno	Sampler Name(s) Michelle Eversen Julie Croxton Rob Wilson	Clemson Environmental Technologies Laboratory Attn: Rob Wilson 100 Technology Drive Phone: 864-646-2413 x 209 Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
OGSO-SO-T-0361	1/17/99	1600	ME	QSA, QCA	500 mL HDPE wide mouth	Pre 72-hr Demo
OGSO-SO-T-0389	1/18/99	0940	MGE	QSA, QCA	500 mL HDPE wide mouth	Start of 72-hr Demo
OGSO-SO-T-0498	1/20/99	0100	AJ	QSA, QCA	500 mL HDPE wide mouth	
OGSO-SO-T-0588	1/21/99	0935	MGE	QCA	500 mL HDPE wide mouth	End of 72-hr Demo
OGSO-SO-T-0622	1/23/99	0030	JC	QCA	500 mL HDPE wide mouth	NEAR End of 7800 Kg Processing
OGSO-SO-T-0546	1/20/99	1730	DCR	QCA	250 mL HDPE wide mouth	
SALT-SO-T-0375	1/18/99	0141	JC	QSA	1 L HDPE wide mouth	Pre 72-hr Demo
SALT-SO-T-0658	1/28/99	1525	RAW		250 mL HDPE wide mouth	Surface Sample (Post Mortem)
MISC-SO-T-0672	2/11/99	1638	RAW	SEM, XRD	500 mL HDPE wide mouth	Devitrified Material
SALT-SO-T-0673	1/23/99	1100	RAW	QSA	1 L HDPE wide mouth	Salt at end of 7800 Kg

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Robert A. Wilson	2/11/99	(print)		Federal Express
(sign) Robert A. Wilson	19:52	(sign)		Way Bill # 800905046950
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

229 11

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

055

Lab: Compuchem

Attn: Marlene Swift

Sampler Name(s)

Clemson Environmental Technologies Laboratory
Attn: Rob Wilson
100 Technology Drive Phone: 864-646-2413 x 209
Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
DGLS-SO-T-0334	1/15/99	1715	MOW	TCLP	500 mL HDPE widemouth	113.90 g
DGLS-SO-T-0364	1/17/99	2215	DCR			116.36 g
DGLS-SO-T-0394	1/18/99	1000	MGE			111.72 g
DGLS-SO-T-0419	1/18/99	1910	TP			116.70 g
DGLS-SO-T-0440	1/19/99	0400	JC			127.0 g
DGLS-SO-T-0468	1/19/99	1330	MGE			114.67 g
DGLS-SO-T-0492	1/19/99	2210	DCR			116.91 g
DGLS-SO-T-0544	1/20/99	1615	DCR			115 g
DGLS-SO-T-0566	1/21/99	0100	JC			113.33 g
DGLS-SO-T-0590	1/21/99	1020	SLH			115.75 g
DGLS-SO-T-0617	1/22/99	2215	DCR			120 g
DGLS-SO-T-0647	1/23/99	2110	DCR			114.20 g

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Robert A. Wilson	2/11/99	(print)		Federal Express
(sign) Robert A. Wilson	21:19	(sign)		Way Bill # 800905046960
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2281

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

056

Lab: Compuchem

Attn: Marlene Swift

Sampler Name(s)

Clemson Environmental Technologies Laboratory
Attn: Rob Wilson
100 Technology Drive Phone: 864-646-2413 x 209
Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
DGLS-SO-T-0512	1/20/99	0700	JC	TCLP	500 ml HDPE wide	116.49g
DGSO-SO-T-0360	1/17/99	1600	ME			129.62g
DGSO-SO-T-0497	1/20/99	0100	AT			129.17g
DGSO-SO-T-0587	1/21/99	0935	ME			115.35g

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) Robert A. Wilson	2/11/99	(print)		Federal Express
(sign) Robert A. Wilson	21:19	(sign)		Way Bill # 8009050469 60
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

99-5251

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

057

001161

Lab: Texidyne, Inc.

Attn: [illegible]

Sampler Name(s): M Wilson

Clemson Environmental Technologies Laboratory
Attn: Rob Wilson
100 Technology Drive Phone: 864-646-2413 x ____
Anderson, SC 29625 Fax: 864-656-7310

	Sample #	Date	Time	Initials	Analysis	Container Description	Comments
1	XGLS-S1-T-0638	2/16	1430	MOW	TCLP-Pb per ARS	500ml Nalgene	Return samples after extraction
2	XGLS-S1-T-0685	2/16	1430	MOW	"	"	"
3	XGLS-SO-T-0680	2/16	1430	MOW	"	"	"
4	XGLS-SO-T-0678	2/16	1430	MOW	"	"	"
5	XGLS-SO-T-0682	2/16	1430	MOW	"	"	"
6	XGLS-S1-T-0696	2/16	1430	MOW	"	"	"
7	XGLS-S1-T-0694	2/16	1430	MOW	"	"	"
8	XGLS-S1-T-0692	2/16	1430	MOW	"	"	"
9	XGLS-S1-T-0690	2/16	1430	MOW	"	"	"

Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Delivery by:
(sign)	2-16-99 1530	(sign)		Way Bill # Personal by hand
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
Relinquished by: (print)	Date/Time	Received by: (print) L. Masten Sow	Date/Time	
(sign)		(sign) [illegible]	2-16-99 1530	

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

059

001162

Lab: Texidyne, Inc.
Attn: Judy

Sampler Name(s): M. Wilson

Clemson Environmental Technologies Laboratory
Attn: Rob Wilson
100 Technology Drive Phone: 864-646-2413 x _____
Anderson, SC 29625 Fax: 864-656-7310

	Sample #	Date	Time	Initials	Analysis	Container Description	Comments
1	XGLS-S1-T-0698	2/17/99	1000	MOW	TCLP-Pb	500 ml nalgene	Return samples after extract
2	XGLS-S1-T-0700	2/17/99	1010	MOW	TCLP-Pb	"	"
3	XGLS-S2-T-0702	2/17/99	1030	MOW	TCLP-Pb	"	"
4	XGLS-S2-T-0704	2/17/99	1930	MOW	TCLP-Pb	"	"
5	XGLS-S2-T-0706	2/18/99	1000	MOW	TCLP-Pb	"	"
6	XGLS-S2-T-0708	2/18/99	1020	MOW	TCLP-Pb	"	"
7	XGLS-S2-T-0710	2/18/99	1020	MOW	TCLP-Pb	"	"
8	XGLS-S2-T-0712	2/18/99	1040	MOW	TCLP-Pb	"	"

Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Delivery by: Personal By Hand
(sign)		(sign)		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: (, and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

059

001163

Lab: Texidyne, Inc

Attn: Judy

Sampler Name(s): M. [illegible]

Clemson Environmental Technologies Laboratory
Attn: Rob Wilson
100 Technology Drive Phone: 864-646-2413 x _____
Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
XGLS-S1-T-[illegible]	2/24/[illegible]	1600	MOW	TCLP-Pb	500 ml polyprop	Refuse Sample [illegible]
XGLS-S1-T-[illegible]	2/24/[illegible]	1600	MOW	TCLP-Pb	"	"
XGLS-S1-T-0724	2/24/[illegible]	1600	MOW	TCLP-Pb	"	"
XGLS-S1-T-0726	2/24/[illegible]	1600	MOW	TCLP-Pb	"	"
XGLS-S1-T-0728	2/24/[illegible]	1600	MOW	TCLP-Pb	"	"
XGLS-S1-T-0730	2/24/[illegible]	1600	MOW	TCLP-Pb	"	"
XGLS-S1-T-0732	2/24/[illegible]	1600	MOW	TCLP-Pb	"	"

Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Delivery by: Personal Pick Up
(sign)		(sign)		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291 Not Rec'd

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

060

001164

Lab: Texidyne Inc Attn: Judy	Sampler Name(s) M. Wilson	Clemson Environmental Technologies Laboratory Attn: Rob Wilson 100 Technology Drive Phone: 864-646-2413 x Anderson, SC 29625 Fax: 864-656-7310

	Sample #	Date	Time	Initials	Analysis	Container Description	Comments
1	VGLS-S1-T-0734	2/24/99	1400	MOW	TCLP-Pb	500 ml polypro	Return Sample after extract
2	VGLS-S1-T-0736	"	1400	MOW	TCLP-Pb	"	"
3	VGLS-S1-T-0738	"	1400	MOW	TCLP-Pb	"	"
4	VGLS-S1-T-0740	"	1400	MOW	TCLP-Pb	"	"
5	VGLS-S1-T-0742	"	1400	MOW	TCLP-Pb	"	"
6	VGLS-S1-T-0744	"	1400	MOW	TCLP-Pb	"	"
7	VGLS-S1-T-0746	"	1400	MOW	TCLP-Pb	"	"

Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Delivery by: Personal by Hand
(sign)		(sign)		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

061

001165

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory

Lab: Texidyne
Attn: Judy

Sampler Name(s): Doug Davis

Clemson Environmental Technologies Laboratory
Attn: Rob Wilson
100 Technology Drive Phone: 864-646-2413 x _____
Anderson, SC 29625 Fax: 864-656-7310

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
XGLS-SI-T-0749	3/3	1600	DHD	TCLP for Pb	16 oz Halgni	
" SI-T-0751	3/3	0700	DHD	"	"	
" SI-T-0752	3/3	0700	DHD	"	"	
" SI-T-0754	3/3	1800	DHD	"	"	
" SI-T-0755	3/3	1800	DHD	"	"	
" SI-T-0757	3/3	0700	DHD	"	"	
" SI-T-0759	3/3	2200	DHD	"	"	
" SI-T-0761	3/3	2100	DHD	"	"	
" SI-T-0763	3/3	2350	DHD	"	"	
~~" SI-T~~						
" SI-T 0764	3/3	2350	DHD	"	"	

Relinquished by:	Date/Time	Received by:	Date/Time	Delivery by:
(print) D.H. Davis	3/4/99 11:30 AM	(print)		Personal - DHD
(sign) Doug H. Davis		(sign)		Way Bill #
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

2291

CHAIN OF CUSTODY RECORD

Clemson Environmental Technologies Laboratory 419-539-7297

62

001166

Lab: COMPUCHEM Attn: MARLENE SWIFT	Sampler Name(s)	Clemson Environmental Technologies Laboratory Attn: ROBERT WILSON 100 Technology Drive Phone: ~~864-646-2413~~ x _____ Anderson, SC 29625 Fax: ~~864-656-7310~~

Sample #	Date	Time	Initials	Analysis	Container Description	Comments
SUBR-SO-T-0446	03/04/99	1200	DRB	TCLP- SEL ANALYSIS	1000 ml poly	BATCH 007
-0438	3/4/99	1200	|	| REQUEST SUT	" " "	BATCH 008A
-0403	3/4/99	1200	|	|	" " "	BATCH 008B

Relinquished by: (print) D. BENNETT	Date/Time 03/04/99	Received by: (print)	Date/Time	Delivery by: FED-EX
(sign)		(sign)		Way Bill # 8072371900 32
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Note: All information concerning sample preparation, retrieval, storage, and sampling method are kept in bound log books at the:
(sign)		(sign)		
Relinquished by: (print)	Date/Time	Received by: (print)	Date/Time	Clemson Environmental Technologies Laboratory Clemson University 100 Technology Drive Anderson, SC 29625
(sign)		(sign)		

Distribution: White and yellow - return to sender, Pink - lab copy, Orange - originator's copy

EnVitCo, Inc.
A COGEMA Group Company

2291

SECTION 15

POPT SAMPLE LOG BOOK

2291

SAMPLE LOG

LABORATORY NOTEBOOK

ENVITCO, INC.

FDF POPT

Notebook No.: CC

Assigned to: Job # 98703 (RAW)

Date: August 31, 1998

Use Nalge Cat. No. 6301-2000 to reorder.

Copyright 1973, 1993 Nalge Company, Rochester, N.Y.

A Subsidiary of Sybron Corporation

Printed in U.S.A.

001168

Printed on recycled paper

PRINTED WITH SOY INK

PROJECT FDF Proof of Principle

Notebook No. CC 2291

Continued From Page

Sample Number	Sample Container	Sample Weight	Sample Type	Date	Time	Initials
T-S-001-C	Nalgene (1L)	—	Surrogate	9/1/98	—	RAW
T-S-002-C	Nalgene (500mL)	—	Surrogate	9/1/98	—	RAW
T-S-003-C	Nalgene (1L)	—	Surrogate	9/1/98	—	RAW

(NOTE: NUMBERING SYSTEM CHANGED AFTER THIS POINT. AMB)

10/21/98

AMB

Continued on Page

Read and Understood By

001169

Signed	Date	Signed	Date
[signature]	10/21/98		

1 2-Page Width Use of Notebook

SAMPLE I.D.			Notebook Reference		Requirement	SAMPLE BY
XGLS	SO	T	0001	DD-28	Melt Techn.-Glass Yield	DHD
XGLS	SO	T	0002	DD 29	Melting Technique Devel	DHD
XGLS	SO	T	0003	DD-33	" " "	DHD
XGLS	SO	T	0004	DD-35	" " "	DHD
~~SURR~~	~~SO~~	~~T~~	~~0005~~	~~DD-45/46/50~~	DHD Davis	
XGLS	SO	T	0005	DD-47	Melting Technique Devel.	DHD
XGLS	SO	T	0006	DD-p 53	Produce Glass for Testing	DHD
XGLS	SO	T	0007	DD-pg 55	" " " "	DHD
XGLS	SO	T	0008	DD-pg 56	" " " "	DHD
XGLS	SO	T	0009	DD-pg 57.	" " " "	DHD
XGLS	SO	T	0010	DD-pg 58	" " " "	DHD
XGLS	SO	T	0011	DD-pg 59	" " " "	DHD
XGLS	SO	T	0012	DD-pg 60	" " " "	DHD
XGLS	SO	T	0013	DD-pg 61	" " " "	DHD
XGLS	SO	T	0014	DD-pg 62	" " " "	DHD
XGLS	SO	T	0015	DD-pg 63	" " " "	DHD
XGLS	SO	T	0016	DD-pg 65	" " " "	DHD
SURR	SO	T	0017	DD-48	Surr. Prep. for Glass Melt.	DHD
XGLS	SO	T	0018	DD-66	TCLP sample	DHD
SURR	SO	T	0019		Surr for FDF Testing	DHD
XGLS	SO	T	0020	DD-p66	TCLP Sample	DHD
XGLS	SO	T	0021	DD-p.66	TCLP SAMPLE	DHD
SURR	SO	T	0022		Archive of SURR SOT 0019	DDE

Continued on Page

Read and Understood By

Signed 10/21/98 Date Signed Date

PROJECT

Full 2 Page Width

SAMPLE DATE	SAMPLE TIME	Approx Wt.	Notes
9/26/98		500gm	Scoping Tests for Prodctn Mcrts
9/26/98		500gm	As above - Crucible + Glass in Bag
9/27/98		500gm	" " — " " " "
9/27/98		400gm	" " — " " " "
9/29/98		~400gm	As Above - Crucible & Glass in Bag
9/30/98	10:30am	~400gm	Crucible & Glass & Salt
9/30/98	10:30am	~400gm	" " "
9/30/98	12:00noon	~400gm	" " "
9/30/98	12:00noon	~400g	" " "
9/[illegible]/98	~~1800 7:30pm~~	~400g	" " "
9/[illegible]/98	1800	~400gm	" " "
9/30/98	2000	~400gm	" " "
9/30/98	2000	~400g	" " "
9/30/98	2130	~400g	" " "
9/30/98	2130	~400g	" " "
9/31/98	1130	~800	" " "
9/29/98	10pm	150gm	25% Wetted Surrogate for MeHg on 9/30/98
10/2/98	9am	118gm	Glass No. 5 - Fines returned to main sample. SO-01-005
10/2/98	9am	5kg	30% Moisture Surrogate
10/2/98	10am	186gm	Glass No. 4 - Fines returned to main sample SO-01-004
10/2/98	1100	108gm	Glass No. 1 - Fines returned to main sample SO-01-001
10/2/98	5pm	730gm	

DAB

Continued on Page

Read and Understood By

001171

A Barnet — Signed
10/21/98 — Date
Signed
Date

SAMPLE NUMBER				Notebook Reference	Requirement	Sampled By
XGLS	SO	T	0023	DD-p 66	TCLP Sample	NHD
XGLS	SO	T	0024	DD-p 67	TCLP Sample	NHD
XGLS	SO	T	0025	DD-p 67	TCLP Sample	NHD
XGLS	SO	T	0026		Glass Characterizatn CELS	NHD
XGLS	SO	T	0027		Redox Analysis-CELS	NHD
XGLS	SO	T	0028		Redox Analysis-CELS	NHD
SURR	SO	T	0029		TCLP Sample	GDE
~~XGLS~~ ~~SALD~~	SO	T	0030		QCA of SALT RESIDUE	DMB / DHD
~~XGLS~~ ~~SALD~~	SO	T	0031		QCA of SALT RESIDUE	DMB / DHD
SURR	SO	T	0032		QCA of SURROGATE SO	DMB / GDE
→	BOTH SAMPLES 0030 AND 0031				ARE SALD (SALT DRAIN) SAMPLES	— DMB
RAWM	SO	T	0033	N/A	ANALYSIS / TESTING BY FOF ($PbCO_3$)	DMB
R[illegible]	SO	T	0034	N/A	" " " " (PbO)	DMB
RAWM	SO	T	0035	N/A	" " " " ($PbSO_4$)	DMB

COPIED TO ARCHIVE
10/21/98

Continued on Page

Read and Understood By

001172

P Burnett 10/21/98

PROJECT

Date	Sample Time	Approx. Weight	Notes
10/2/98	1200	110gm	Glass No. 2 - fines returned SO-01-002 (MS)
10/2/98	1200	110gm	Glass No. 3 from Series SO-01-003 - fines returned
10/2/98	1200	110gm	High Al_2O_3 Glass - fines returned
10/2/98	1300	1000gm	Composite of 0007, 0011, 0016a, 0016b
10/2/98	1400	15gm	Drawn from YGLS-SO-T-0012, Gls 4 + hi Oxate
10/2/98	1400	19gm	Drawn from YGLS-SO-T-0014, Gls 4 + reactnt
10/2/98	1435	150gm	This sample taken from SURR SOT 0022
10/5/98	16.21	3.6 gm	SALT FROM XGLS-SO-T-~~008~~ 0008 (PM3) SO-01-001 PM
10/5/98	16:21	5 gm	SALT FROM XGLS SO T 0011 SO-01-004 PM3
10/5/98	16:21	30gm	SURROGATE SURR-SO-T-0022
10/19/98	15:00	20.1g	$PbCO_3$ sample, sieved to < 100u (TCLP problem)
10/19/98	15:00	20.2g	PbO " - for KOC testing (TCLP problem)
10/19/98	15:00	20.4g	$PbSO_4$ " - " " " (TCLP problem)

COPIED TO ARCHIVE
10/21/98

Continued on Page

Read and Understood By

P Barnett 10/21/98
Signed Date

PROJECT

Notebook No. E 2291

Continued From Page

SAMPLE NUMBER				NOTEBOOK REFERENCE	REQUIREMENT	SAMPLED BY
RAWM	SO	T	0036	N/A	TRI-BUTYL PHOSPHATE - TEST BY FDF	DMS
RAWM	SO	T	0037	N/A	$Mg_3(PO_4)_2 - 5H_2O$ - TEST BY FDF	DMS
XGLS	SO	T	0038	DD-pg. 87	Glass Recipe Development	DH Davis
XGLS	SO	T	0039	DD-pg 88	Glass Recipe Development	DH Davis
XGLS	SO	T	0040	DD-pg 82	" " "	DH Davis
XGLS	SO	T	0041	DD-pg 83	" " "	DH Davis
XGLS	SO	T	0042	DD-pg 94	TCLP Sample - 9.5mm-50m	DH Davis
XGLS	SO	T	0043	DD-pg 94	TCLP Smple 9.5-50m+fines	DH Davis
XGLS	SO	T	0044	DD-pg 83	Metal Condenste for Analysis	DH Davis
XGLS	SO	T	0045	DD-pg 94	TCLP Sample - 9.5mm-50m	DH Davis
XGLS	SO	T	0046	DD-pg 94	TCLP Sample-9.5-50m+fines	DH Davis
X[illegible]	SO	T	0047	DD-p. 75	Glass Recipe Development	DH Davis
X[illegible]	SO	T	0048	DD-p. 91	TCLP Simple - no fines	DH Davis
XGLS	SO	T	0049	DD-p. 91	TCLP Sample - + fines	DH Davis
XGLS	SO	T	0050	DD-pg 76	Glass Recipe Development	DH Davis
XGLS	SO	T	0051	DD-pg 93	TCLP Smple - No Fines	DH Davis
XGLS	SO	T	0052	DD-pg 93	TCLP Smple - + Fines	DH Davis
XGLS	SO	T	0053	DD-pg 80	Glass Recipe Develop.	DH Davis
XGLS	SO	T	0054	DD-pg 93	TCLP Smple - No fines	DH Davis
XGLS	SO	T	0055	DD-pg 93	TCLP Smple - + -50m fines	DH Davis
XGLS	SO	T	0056	DD-pg 81	Glass Recipe Development	DH Davis
XGLS	SO	T	0057	DD pg 91	TCLP Sample - No Fines	DH Davis
XGLS	SO	T	0058	DD pg 91	TCLP Sample - + -50m fines	DH Davis
XGLS	SO	T	0059	DD-pg 78	GLASS Recipe Develop.	DH Davis

Continued on Page

Read and Understood By

Signed Date Signed Date

PROJECT

ID	Time	Weight	Notes/Sample Origin/Background
0/27/98	1345	109.7	from XGLS-SO-T-0059 – Dev Ser. -SO-D3-2
0/27/98	1345		from XGLS-SO-T-0059 – Dev Ser -SO-D3-2
0/21/98	1500	~300gm	Dev Series -SO-D3-3-HiFe1 ([redacted])
0/27/98	1400	~100gm	from XGLS-SO-T-0062, -Gls SO-D3-3
0/27/98	1400	~100gm	from XGLS-SO-T-0062, -Gls SO-D3-3
0/27/98	1100	~300gm	Devel. Series -SO-D3-4-HiFe2 ([redacted])
0/27/98	1600	~300gm	Devel Series-SO-D2-8 Rpt of XGLS-SO-T-0041
/27/98	1600	3.8gm	([redacted] -0.5%C)
			from XGLS-SO-T-0066 -2nd melt & pour
0/27/98	1630	~300gm	Devel Series SO-D2-8-[redacted]-Red C-0.25C
0/27/98	1630	1.6gm	" " " " " "
0/ /98	1700	~300gm	Devel Series SO-D2-8-red C [redacted] -0%C
0/27/98	1700	3.9gm	" " " " " " "
0/27/98	1730	67gm	Mo Coupon with Pb Metal under Glass (Good)
0/27/98	1730		Mo Coupon with PbS under Glass (Bad)
0/28/98	1000	125gm	from XGLS-SO-T-0065, Dev Ser. SO-D3-4-HiFe2 ([redacted])
0/28/98	1000	130gm	from XGLS-SO-T-0065, " " " "

Continued on Page

Read and Understood By

Signed Date Signed Date

SAMPLE NUMBER				Notebook Reference	Requirement	Sampled By
XGLS	SO	T	0076		TCLP-No Fines	DHDavis
XGLS	SO	T	0077		TCLP-+-50 Fines	DHDavis
XGLS	SO	T	0078		TCLP-No Fines	DHDavis
XGLS	SO	T	0079		TCLP-+(-50) Fines	DHDavis
XGLS	SO	T	0080	DD, p. 98	Glass Recipe Devel.	DHDavis
XGLS	SO	T	0081	DD, p 99	TCLP-Only -9.5 mm	DHDavis
XGLS	SO	T	0082	DD, p 100	Glass Recipe Dev.	DHDavis
XGLS	SO	T	0083	DD, p.100 EE, p.01	TCLP-Only-9.5 mm	DHDavis
XGLS	SO	T	0084	EE, pg. 02	Glass Recipe Devel	DHDavis
XGLS	SO	T	0085	EE, pg 02	TCLP	DHDavis
XGLS	SO	T	0086	EE, pg 04	Glass Recipe Devel	DHDavis
XGLS	SO	T	0087	EE, pg 05	TCLP	DHDavis
XGLS	SO	T	0088	EE, pg 05	Metal for Analysis	DHDavis
XGLS	SO	T	0089	EE, pg 06	Glass Recipe Devel	DHDavis
XGLS	SO	T	0090	EE, pg 07	TCLP	DHDavis
XGLS	SO	T	0091	EE, pg. 07	Metal for Anal	DHDavis
XGLS	SO	T	0092	EE, pg. 08	Glass Recipe Devel.	DHDavis
XGLS	SO	T	0093	EE, pg 09	TCLP	DHDavis
XGLS	SO	T	0094	EE, pg 10	Glass Recipe Devel	DHDavis
XGLS	SO	T	0095	EE, pg 11	TCLP	DHDavis
XGLS	SO	T	0096	EE, pg. 12	Glass Recipe Devel	DHDavis
XGLS	SO	T	0097	EE, pg. 13	TCLP	DHDavis
XGLS	SO	T	0098	EE, pg 14	Mo Corrosion in Glass	DHDavis
XGLS	SO	T	0099	EE, pg 14	" " " "	DHDavis

Continued on Page

Read and Understood By

Signed Date Signed Date

OJECT

Date	Time	Weight	Notes/Sample Origin/Background
28/98	1020	105.3g	from XGLS-SC-T-C038, Dev Ser SC-D3-5-Zr1 ([redacted])
28/98	1020	109.8g	" " " " " " "
28/98	1040	151 gm	from XGLS-SC-T-C039, Dev Ser SC-D3-6-Zr2 ([redacted])
28/98	1040	159 gm	" " " " " " "
28/98	1500	~300gm	Dev Ser = SO-D4-1 (60% W.L. [redacted])
28/98	1030	119 gm	from XGLS-SO-T-0080 (Dev. Ser. SO-D4-1)
28/98	1600	~300gm	Dev. Ser. SO-D4-2 (60 WL, [redacted])
29/98	1100	124gm	from XGLS-SO-T-0082 (Dev Ser SO-D4-2)
28/98	1700	~300gm	Dev Ser. SO-D4-3 (60 wt. WL, [redacted])
29/98	1200	121gm	from XGLS-SO-T-0084 (above)
29/98	1000	~300gm	Dev Ser SO-D4-4
2	121gm	1400	from XGLS-SO-T-0086 (above)
2	1400	0.95	" " " " "
29	1200	~300gm	Dev Ser SO-D4-5
29	1200	130gm	from XGLS-SO-T-0089 (above)
29	1200	0.38gm	from XGLS-SO-T-0089 (above)
29	1300	~300 gm	Dev. Series - SO-D4-6
29	1500		from XGLS-SO-T-0092
30	1200	~300gm	Dev. Series SO-D4-7 - (70 WL, [redacted]) (70 WL)
30	1400		from XGLS-SO-T-0094
30	1200	~300 g	Dev. Series - SO-D4-8 (60 WL, [redacted])
30	1400		from XGLS-SO-T-0096
2	0900		Mo Coupon in XGLS-SO-T-0014 (SO-D1-4 + 0.27% C)
2	0900		Mo Coupon in XGLS-SO-T-0016 (SO-D1-4 - no oxid. or nitr.)

Continued on Page

Read and Understood By

001177

Signed Date Signed Date

SAMPLE NUMBER	Notebook Reference	Requirement	SAMPLED By
XGLS SO T 0100	EE pg 16	Glass Recipe Develop	DH Davis
XGLS SO T 0101	EE pg 18	" " "	DH Davis
XGLS SO T 0102	EE pg 19	" " "	DH Davis
XGLS SO T 0103	EE pg 20	" " "	DH Davis
XGLS SO T 0104	EE, p. 22	Glass Recipe Dev	
XGLS SO T 0105	EE, p. 21	" " "	
XGLS SO T 0106	EE, p. 21	" " "	
XGLS SO T 0107	EE p. 25	" " "	DH Davis
XGLS SO T 0108	EE, p. 27	" " "	DH Davis
XGLS SO T 0109	EE, p. 28	" " "	DH Davis
[illegible] SO T 0110	EE, p. 29	" " "	DH Davis
XGLS SO T 0111	EE, p. 30	" " "	DH Davis
XGLS SO T 0112	EE, p. 31	" " "	DH Davis
XGLS SO T 0113	EE, p. 32	" " "	"
XGLS SO T 0114	EE, p. 33	" " "	DH Davis
XGLS SO T 0115	EE, p. 34	" " "	DH Davis
XGLS SO T 0116	EE, p. 35	" " "	"
XGLS SO T 0117	EE, p. 37 DHD	" " "	"
XGLS SO T 0118	EE, p. 36 DHD	" " "	"
XGLS SO T 0119	EE, p. 38	" " "	"
XGLS SO T 0120	EE, p. 39	" " "	"
XGLS SO T 0121	EE, p. 40	" " "	"
XGLS SO T 0122	EE, p. 11	TCLP	"
[illegible] SO T 0123	EE, p. 11	Glass Redox DHD	

Continued on Page

Read and Understood By

PROJECT

DATE	TIME	WEIGHT	NOTES/SAMPLE ORIGIN/Background
11/2/98	1800	~150gm	Glass SO-D3-1-[redacted] + 0.25%C
"	1900	"	" " + 0.50%C
"	2000	"	" " + 0.75%C
"	2100	"	" " ~~+ 1.00%C~~ → 0.125%C
11/3/98	2100	"	Glass-SO-D3-1-[redacted] + 0.063%C
11/3/98	2200		Glass-SO-D3-1-[redacted] - no added reduc.
11/3/98	2200		Glass-SO-D3-1-[redacted] - no added reduc
11/3/98	1200	≈300gm	Dev. Series SO-D4-11-C1 (Vrtn Redox)
11/3/98	1400	≈300gm	Dev. Series SO-D4-11(C0) (Vrtn Redox)
11/[illegible]/98	1000	≈300gm	Dev Series SO-D4-11-C2 (Vrtn Redox)
11/[illegible]/98	1300	≈300gm	Dev Series SO-D4-11-C3 (Vrtn Redox)
11/4/98	1500	≈300gm	Dev. Series SO-D4-11-C4 (Vrtn Redox)
11/4/98	1700	≈300gm	Dev Series SO-D4-11-S1 [Misweighed]
11/4/98	1900	≈200gm	Dev Series SO-D4-11-S2 (Vrtn Redox)
11/5/98	0900	≈200gm	Dev Series SO-D4-11-U1 (Vrtn Redox)
11/5/98	0800	≈200gm	Dev Series SO-D4-11-U2 (Vrtn Redox)
11/4/98	2000	≈200gm	Dev Series SO-D4-11-S1 (Vrtn Redox)
11/5/98	1100	≈150g	Dev Series - SO-D1-10 (C1 Redox Vrtn)
11/5/98	1200	"	" " - SO-D1-10 (C2 Redox Vrtn)
11/5/98	1300	"	" " - SO-D1-10 (C3 Redox Vrtn)
11/5/98	1400	"	" " - SO-D1-10 (C4 Redox Vrtn)
11/5/98		~300g	Repeat of SO-D1-10 - no carbon
11/5/98	1200	110gm	from XGLS-SO-T-0094 - Dup TCLP (SO-D4-7-70%)
[illegible]/98	1200	18gm	from XGLS-SO-T-0094 (as above)

Continued on Page

Read and Understood By

001179

Date Signed Date

PROJECT

Notebook No. E 2291
Continued From Page

Sample Number				Notebook Reference	Requirement	Sampled by
XGLS	SO	T	0124	EE, p. 13	TCLP - duplicate	DHDuer
XGLS	SO	T	0125	EE, p. 37	Redox Sample	DHDuer
XGLS	SO	T	0126	EE, p. 37	TCLP	DHDuer
			0127	EE, p. 40	TCLP	
			0128	EE, p. 40	TCLP	
XGLS	SO	T	0129	EE, p 16	GLASS Redox Analy	DHDuer
XGLS	SO	T	0130	EE,	Glass Redox Analy	DHDuer
XGLS	SO	T	0131	EE, p. 13	Redox Sample	DHDuer
XGLS	SO	T	0132	EE, p. 18	Condensed Metal for Glass	DHDuer
XGLS	SO	T	0133	EE, p. 40	Glass Redox Analysis	DHDuer
XGLS	SO	T	0134	EE, p 41	Metal Bead - Archive	DHD
X[illegible]	SO	T	0135	EE, p. 41	Glass Redox Analysis	DHD
XGLS	SO	T	0136	EE, p. 41	Glass Redox Analysis	DHD
XGLS	SO	T	0137	EE, p. 41	Glass Redox Analysis	DHD
XGLS	SO	T	0138	EE, p. 42	Glass Redox Analysis	DHD
XGLS	SO	T	0139	EE, p. 26	Glass Redox Analysis	DHD
XGLS	SO	T	0140	EE, p. 27	Glass Redox Analysis	DHD
XGLS	SO	T	0141	EE, p 42	" " "	DHD
XGLS	SO	T	0142	EE, p 42	" " "	DHD
XGLS	SO	T	0143	EE, p 42	" " "	DHD
XGLS	SO	T	0144	EE, p 43	" " "	DHD
XGLS	SO	T	0145	EE, 43	" " "	DHD
XGLS	SO	T	0146	EE, p 43	" " "	DHD
XGLS	SO	T	0147	EE, p 43	" " "	DHD

Continued on Page

Read and Understood By

ATE	TIME	WT.	Notes/SAMPLE ORIGIN/Background
5/98	1300	110gm	from XGLS-SO-T-0096 [-SO-D4-8] 60% WL, [redacted]
5/98	1300	14gm	from XGLS-SO-T-0118 [SO-D1-10-C2]
5/98	1300	111	from XGLS-SO-T-0118 [SO-D1-10-C2]
		110	from XGLS-SO-T-0121 [SO-D1-10-no reduc)
		113	from XGLS-SO-T-0121 [SO-D1-10-no reduc)
5/98	1650	15gm	from XGLS-SO-T-0100 [SO-D3-1-[redacted] 0.25%C]
5/98	1645	14gm	from XGLS-SO-T-0101 [SO-D3-1-[redacted] 0.5%C]
5/98	1300	14gm	from XGLS-SO-T-0096 [-SO-D4-8)
5/98	1800	~0.5gm	from XGLS-SO-T-0101 [SO-D3-1-[redacted] +0.5%C]
5/98	1800	12gm	from XGLS-SO-T-121 [SO-D1-10-no reduct.]
5/[redacted]	1900	~2gm	from XGLS-SO-T-0102 [SO-D3-1-[redacted] -0.75°C]
5	1900	12gm	" " " " " " " "
5/98	2000	18gm	from XGLS-SO-T-0103 [SO-D3-1-[redacted] -0.125%C]
5/98	2200	15gm	from XGLS-SO-T-0104 [SO-D3-1-[redacted] -0.063%C]
5/98	0900	14gm	from XGLS-SO-T-0106 [as above-No Reduction]
6/98	1000	16gm	from XGLS-SO-T-0107 [SO-D4-11-C1-0.1%C]
6/98	1030	26gm	from XGLS-SO-T-108 [SO-D4-11-C0-Zero Re]
6/98	1100	15gm	from XGLS-SO-T-109 [SO-D4-11-C2-.2%C]
6/98	1130	16gm	from XGLS-SO-T-110 [SO-D4-11-C3]
6/98	1200	19gm	from XGLS-SO-T-111 [" " " -C4]
6/98	1230	17gm	from XGLS-SO-T-0113 [SO-D4-11-S1]
6/98	1245	19gm	from XGLS-SO-T-0114 [SO-D4-11-U1]
6/98	1350	17gm	from XGLS-SO-T-0115 [SO-D4-11-U2]
6/[redacted]	1330		from XGLS-SO-T 0116 [SO-D4-11-S1]

Continued on Page

Read and Understood By

SAMPLE No.				Notebook Reference	Requirement	Sampler
XGLS	SO	T	0148	EE, p. 43	Glass Redox Analyses	DHD
XGLS	SO	T	0149	EE, p. 43	" " "	DHD
XGLS	SO	T	0150	EE, pg 44	" " "	DHD
XGLS	SO	T	0151	EE, pg. 44	Recipe Devel - Salt Eval	DHD
XGLS	SO	T	0152	EE, pg. 46	" " " "	DHD
XGLS	SO	T	0153	EE, pg. 47	TCLP	DHD
XGLS	SO	T	0154	" "	"	DHD
XGLS	SO	T	0155	" "	"	DHD
XGLS	SO	T	0156	" "	"	DHD
XGLS	SO	T	0157	" "	"	DHD
XGLS	SO	T	0158	" "	"	DHD
X[illegible]	SO	T	0159	EE, pg 48	Recipe Devel, - Salt Eval	DHD
X[illegible]S	SO	T	0160	EE, pg 50	" " " "	DHD
			0161	EE, pg 51	" " " "	
			0162	EE, pg 52	" " " "	
XGLS	SO	T	0163	EE, pg 54	Reductant Power	
XGLS	SO	T	0164	EE, pg 54	" "	
XGLS	SO	T	0165	EE, pg 55	" "	
\			0166	EE, pg 58	Glass Recipe Devel.	DHD
			0167	EE, pg 60	" " "	DHD
			0168	EE, pg. 61	" " "	DHD
			0169	EE, pg. 63	" " "	DHD
			0170	EE, pg 64	" " "	DHD
			0171	EE, pg 65	" " "	DHD
S[illegible]	SO	T	0172	EE, pg 76	TCLP	

Continued on Page 541

Read and Understood By

Signed Date Signed Date

OJECT

DATE	TIME	WEIGHT	Notes/Sample Origin/Background
/6/98	1350	12	from XGLS-SO-T-0117 [SO-D1-10-C1]
/6/98	1355		from XGLS-SO-T-0119 [SO-D1-16-C3]
/6/98	1430	14	from XGLS-SO-T-0120 [SO-D1-10-C4]
/6/98		~150gm	Dev Series-SO-D1-10-no carbon
/6/98		~150gm	Dev Series-SO-D3-1-[redacted]-no carb
/9/98		~110gm	Dev Ser-SO-D3-1-[redacted]-0.25%C
"		~110gm	Dev S-SO-D3-1-[redacted]-0.125%C
"		~110gm	Dev Serie ~~SO-D4-11-C1~~ as above, but 0.063%C
"		~110gm	Dev Series SO-D4-11-C1
"		~110gm	Dev Series SO-D4-11-CO
"		~110gm	Dev Ser SO-D4-11-S1
/[illegible]		~150gm	Dev Ser SO-D4-11-CO
		~150gm	Dev Ser. SO-D4-11-CO
11/9/98		~150gm	Dev Serie SO-D3-1-[redacted]-no carbon
11/9/98		~150g	" " SO-D1-10
/10/98		150gm	Rfn Na_2SO_4 with "Carbocite"
/10/98		150g	" " " Sugar
/10/98		150.	" " " Carbon powder
/12/98		~300gm	Dev Ser SO-D5-1-S1
/12/98		~300g	Dev Ser SO-D5-1-S2
/12/98		~300g	Dev Ser SO-D5-2-S1
/12/98		~300gm	Dev Ser SO-D5-2-S2
/12/98		~200g	Dev Ser SO-D5-1-S2 (Sugar added dissolved)
/12/98		~200g	Dev Ser SO-D5-2-S2 (Sugar added as dissolved)
11/[illegible]/98	16:00	100gm	30% surrogate $Mg_3(PO_4)_2$ variation

Continued on Page

Read and Understood By

001183

Signed Date Signed Date

SAMPLE NO.				Notebook Reference	Requirement	Sampler
SURR	SO	T	0173	EE, pg 76	TCLP	SLH
			0174	EE, pg 76		SLH
			0175	EE, pg 76		SLH
			0176	EE, pg 76		SLH
			0177	EE, pg 76		SLH
XGLS	SO	T	0178	EE, p59	Glass Redox Sample	DHD
XGLS	SO	T	0179	EE, p.59	TCLP Sample	DHD
XGLS	SO	T	0180	EE, p66	Glass Recipe Devel.	DHD
XGLS	SO	T	0181	EE, p.68	" " "	DHD
XGLS	SO	T	0182	EE, p.70	" " "	DHD
XGLS	SO	T	0183	EE, p.72	" " "	DHD
[illegible]S	SO	T	0184	EE, p.73	" " "	DHD
[illegible]LS	SO	T	0185	EE, p.75	" " "	DHD
XGLS	SO	T	0186	EE, p75	TCLP Analyses	DHD
XGLS	SO	T	0187	EE, p.75	Glass Redox-Corrosy	DHD
XGLS	SO	T	0188	EE, p.75	Glass Redox-Corrosy	DHD
XGLS	SO	T	0189	EE, p.72	TCLP Glass Analyses	DHD
XGLS	SO	T	0190	EE, p72	Glass Redox-Corrosy	DHD
XGLS	SO	T	0191	EE, pg 66	TCLP Analyses	DHD
XGLS	SO	T	0192	EE, pg 66	Glass Redox-Corrosy	DHD
XGLS	SO	T	0193	EE, pg 66	Glass Redox-Corrosy	DHD
XGLS	SO	T	0194	EE, p.68	TCLP Analyses	DHD
XGLS	SO	T	0195	EE, p.68	Glass Redox-Corrosy	DHD
XGLS	SO	T	0196	EE, p.68	Glass Redox-Corrosy	DHD
[illegible]S	SO	T	0197	EE, p 78	Glass Recipe Develop	DHD

Continued on Page

Read and Understood By

Signed Date

PROJECT

D	TIME	WEIGHT	Notes / Sample Origin / Background
1/12/98	1600	100gm	30% surrogate $Mg_3(PO_4)_2$ variation
↓	1600	↓	↓ ↓ ↓ ↓
	1600		
	1600		
	1600		
11/12		14gm	from XGLS-SO-T-0166 (SO-D5-1-S1)
11/12		113g	" " " " " " " "
11/12	2000	~300	Dev Series SO-D5-1-S3
11/12	2030	~300	Dev Series SO-D5-2-S3
11/13		~250	Dev Series SO-D5-3-S2
11/13		~250	Dev Series SO-D5-3-S3
11/13		~250	Dev Series SO-D5-4-S2
11/13		~250	Dev Series SO-D5-4-S3
11/13	1630	110gm	from XGLS-SO-T-0185, Dev Ser. SO-D5-4-S3
11/13	1630	14gm	" " " "
11/13	1630	13gm	" " " "
11/13	1800	110gm	from XGLS-SO-T-0183, Dev Ser SO-D5-3, S3
11/13	1800	14g	from XGLS-SO-T-0183, Dev Ser. SO-D5-3, S3
11/13	1830	110g	from XGLS-SO-T-0180, Dev Ser SO-D5-1-S3
11/13	1830	12g	" " " " " "
11/13	1830	12g	" " " " " "
11/13	2000	113g	from XGLS-SO-T-0181, Dev Series SO-D5-2-S3
11/13	2000	14g	" " " " "
11/13	2000	11g	" " " " "
11/14	1800	~300g	Dev. SERIES SO-D5-#1-S4

Continued on Page

Read and Understood By

Date Signed Date

:0
PROJECT

Notebook No. 2291
Continued From Page

SAMPLE NO.				Notebook Reference	Requirement	SAMPLER
XGLS	SO	T	0198	EE, pg 80	GLASS RECIPE DEVELOP.	DHD
XGLS	SO	T	0199	EE, p 78	Glass Redox - Corrosion	DHD
XGLS	SO	T	0200	EE, p 78	Glass Redox - Corrosion	DHD
XGLS	SO	T	0201	EE, p 80	Glass Redox - Corrosion	DHD
XGLS	SO	T	0202	EE, p 80	Glass Redox - Corrosion	DHD
XGLS	SO	T	0203	EE, p 80	TCLP	DHD
XGLS	SO	T	0204	EE, p. 80	TCLP	DHD
XGLS	SO	T	0205	EE, p 78	TCLP Analyses	DHD
XGLS	SO	T	0206	EE, p 78	~~TCLP Analyses DHD~~ ~~TCLP Analyses~~ ~~Redox Analyses - Corrosion~~	DHD ~~DHD~~
XGLS	SO	T	0207	EE, p. 64	Redox Analyses - Corrosion	DHD
XGLS	SO	T	0208	EE, p. 64	TCLP Analyses	DHD
XGLS	SO	T	0209	EE, p60	Redox Analyses	DHD
XGLS	SO	T	0210	EE, p60	TCLP Analyses	DHD
XGLS	SO	T	0211	EE, p63	Redox Analyses	DHD
XGLS	SO	T	0212	EE, p63	TCLP Analysis	DHD
XGLS	SO	T	0213	EE, p65	Redox Analyses - Corrosion	DHD
XGLS	SO	T	0214	EE, p65	TCLP Analyses	DHD
XGLS	SO	T	0215	EE, p52	Redox Analyses - Corrosion	DHD
XGLS	SO	T	0216	EE, p52	TCLP Analyses	DHD
XGLS	SO	T	0217	EE, p. 70	Redox Analyses, Corrosion	DHD
XGLS	SO	T	0218	EE, p 70	TCLP Analyses	DHD
XGLS	SO	T	0219	EE, p 74	Redox Analyses - Corrosion	DHD
XGLS	SO	T	0220	EE, p. 74	TCLP Analyses	DHD

Continued on Page

Read and Understood By

Signed Date Signed Date

SUBJECT

97	TIME	WEIGHT	NOTES/SAMPLE ORIGIN/BACKGROUND
/14	18:30	~300gm	Dev. Ser SO-D5-2-S4
/14	21:30	12g	from XGLS-SO-T-0197, Dev Ser SO-D5-1-S4
/14	21:30	12g	from XGLS-SO-T-0197, Dev Ser SO-D5-1-S4
/14	21:45	13g	from XGLS-SO-T-0198, Dev Ser SO-D5-2-S4
/14	2145	13g	from XGLS-SO-T-0198, Dev Ser SO-D5-2-S4
/15	1300	105gm	from XGLS-SO-T-0198, Dev Ser SO-D5-2-S4
/15	1300	105gm	from XGLS-SO-T-0198, Dev Ser SO-D5-2-S4
/15	1600		from XGLS-SO-T-0197, Dev Ser SO-D5-1-S4
/15	1600		from XGLS-SO-T-0197, Dev Ser SO-D5-1-S4
~~/15~~			~~from XGLS-SO-T-0170, D.S SO-D5-1-S2~~ diss sugar
/15	1700	13g	from XGLS-SO-T-0170, D.S. SO-D5-1-S2- diss sugar
/15	1700	109	from XGLS-SO-T-0170, SO-D5-1-S2- diss sugar
/15	1900	14g	from XGLS-SO-T-0167, SO-D5-1-S2
/15	1900		from XGLS-SO-T-0167, SO-D5-1-S2
/15	1915	13g	from XGLS-SO-T-0169, SO-D5-2-S2 sugar not diss
/15	1915	110g	from XGLS-SO-T-~~0170~~ 0169, SO-D5-2-S2 sugar not diss
/15	2100		from XGLS-SO-T-0171, SO-D5-2-S2- dissolve sugar
/15	2100		from XGLS-SO-T-0171, SO-D5-2-S2- dissolved sugar
/15	2145	12gm	from XGLS-SO-T-0168, SO-D5-2-S1
/15	2145	112gm	from XGLS-SO-T-0168, SO-D5-2-S1
/15	2215	15gm	from XGLS-SO-T-0182, SO-D5-3-S2
/15	2215	115gm	from XGLS-SO-T-0182, SO-D5-3-S2
/15	2230	14gm	from XGLS-SO-T-0184, SO-D5-4-S2
/15	2230		from XGLS-SO-T-0184, SO-D5-4-S2

Continued on Page

Read and Understood By

Signed Date Signed Date

SAMPLE NO.				NOTEBOOK REF.	REQUIREMENT		SAMPLER
SURR	~~SO~~ SZ	T	0220 (DMO)	~~N/A~~ EE-88	REQUESTED BY FDF FOR TCLP ANALYSIS		S. HOEFNER
SURR	SZ	T	0222	~~N/A~~ EE-89	REQUESTED BY FDF FOR TCLP ANALYSIS		S. HOEFNER
SURR	SO	T	0223		70% WATER DEMO SURROGATE VALIDATION (FDF)		D. BENNETT
SURR	SO	T	0224		70% WATER DEMO SURROGATE VALIDATION (FELS)		"
SURR	SO	T	0225	EE-	70% Water Demo Surr.-TCLP		Ginny
SURR	SO	T	0226	EE-	70% Water Demo Surr.-TCLP		Ginny
XGLS	SO	T	0227	FF-5	Salt/Metal Melt Check		WKD
XGLS	SO	T	0228	FF-6	" "		WKD
XGLS	SO	T	0229	FF-7	" "		WKD
XGLS	SO	T	0230	FF-8	" "		WKD

Copied to archive 12/5/98

Continued on Page

Read and Understood By

Signed Date Sign

OJECT

DA	TIME	WEIGHT	NOTES
11/20	15:30	~110g	Sample of S2 surrogate of 100% target $Mg_3(PO_4)_2$
11/20	15:30	~110g	Sample of S2 surrogate of 50% target $Mg_3(PO_4)_2$
11/27	16:00	~6 kg	SAMPLE OF SO SURROGATE - TAKEN FROM VALVE AT TANK BOTT.
"	"	~3 kg	CELL SAMPLE - SAME AS ABOVE
12/1/98	1800	1 liter	Sample of SO-70% Surr for TCLP
12/1/98	1800	1 liter	Duplicate of above
12/3/98		~~150~~ gm	Dev Series SO-D5B-S1 (new surrogate)
12/3		150gm	" SO-D5B-S2) "
12/3		150gm	" SO-D5B-S3 "
12/3		150g	" SO-D5B-S3)

Copied to archive 12/5/98

Continued on Page

Read and Understood By

Signed Date

Sample number				NOTEBOOK REF.	Requirement	Sampler
XGLS	SO	T	0231	FF-14	Testing by Mateg [redacted]	DZH
XGLS	SO	T	0232	FF-16	Full Testing by Corning	DZH
XGLS	SO	T	0233	FF-17	Redox - Cornity	DZH
XGLS	SO	T	0234	FF-17	Redox - Cornity	DZH
XGLS	SO	T	0235	FF-17	Redox - Cornity	DZH
SURR	SO	T	0236		TCE VALIDATION AT CCLS	DRS
SURR	SO	T	0237		TCE VALIDATION AT KAC	DRS
RAWM	SO	T	0238		Sample for archive	GLT
RAWM	SO	T	0239		Sample for Envitco	GLT
RAWM	SO	T	0240		sample for Archive	GLT
RAWM	SO	T	0241		sample for Envitco	GLT
RAWM	SO	T	0242		Sample for Archive	GLT
RAWM	SO	T	0243		Sample for Envitco	GLT
RAWM	SO	T	0244		Sample for Archive	GLT
RAWM	SO	T	0245		Sample for Envitco	GLT
RAWM	SO	T	0246		Sample for Archive	GLT
RAWM	SO	T	0247		Sample for Envitco	GLT
RAWM	SO	T	0248		Sample for Envitco	GLT
RAWM	SO	T	0249		Sample for Archive	GLT
RAWM	SO	T	0250		Sample for Archive	GLT
RAWM	SO	T	0251		Sample for Envitco	GLT
RAWM	SO	T	0252		Sample for Envitco	GLT
RAWM	SO	T	0253		Sample for Archive	GLT
RAWM	SO	T	0254		Sample for Archive	GLT

Continued on Page

Read and Understood By

ROJECT

A	TIME	Weight	NOTES
12/6	14:30	2200gm	Glass SO-D5B-2-S2
12/6	1500	1112gm	Glass SO-D5B-2-S2
12/6	1600	10gm	SO-DB5-2-S1 (1%C)
12/6	1600	5~~8~~ 1820gm	SO-DB5-2-~~S8~~ S3 (0.3%C)
12/6	1600	9gm	SO-DB5-2-S4 (0.4%C)
12/14	1500	~3000 ml	REVALIDATION SAMPLES - BATCH 001
12/14	1500	~3000 ml	REVALIDATION SAMPLES - BATCH 001
12/16	1500	~597.68gm	3 plastic (1000ml.) containers of Diatomaceous Earth
12/16	1500	~561.3gm	3 plastic 1000ml containers of Diatomaceous Earth
12/16	1520	~222.07gm	4 plastic 1000ml. containers of Fumed Silica
12/	1520	~191.8gm	4 plastic 1000ml. containers of Fumed Silica
12/	1520	~718.7gm	1 plastic 1000ml. cont. of Fine Silica
12/16	1530	~769.7gm	1 plastic 1000ml. cont. of Fine Silica
12/16	1620	~831.5gm	1 plastic 1000ml. cont. of Coarse Silica
12/16	1645	~717.1gm	1 plastic 1000ml. cont. of Coarse Silica
12/16	1700	~690.1gm	1 plastic 1000ml. cont. of Al_2O_3
12/16	1700	~645.0gm	1 plastic 1000ml. cont. of Al_2O_3
12/16	1700	~574.8gm	1 plastic 1000ml. " " $CaCO_3$
12/16	1700	~575.1gm	1 " " " " $CaCO_3$
12/16	1720	~~638~~ 645 646.1	1 " " " " BentoGrout
12/16	1720	~~678~~ 645 586.6	1 " " " " BentoGrout
12/16	1720	691.5gm	1 " " " " Feldspar
12/16	1720	685.6	1 " " " " Feldspar
12/	0920	~672.1	1 " " " " Na_2CO_3

Continued on Page

Read and Understood By

Sampler number				Notebook Ref.	Requirement	Sampler
RAWM	SO	T	0255		Sample for Envitco	GLT
RAWM	SO	T	0256		Sample for Archive	GLT
RAWM	SO	T	0257		Sample for Envitco	GLT
RAWM	SO	T	0258		Sample for Archive	GLT
RAWM	SO	T	0259		Sample for Envitco	GLT
RAWM	SO	T	0260		Sample for Archive	GLT
RAWM	SO	T	0261		Sample for Envitco	GLT
RAWM	SO	T	0262		Sample for Archive	GLT
RAWM	SO	T	0263		Sample for Envitco	GLT
RAWM	SO	T	0264		Sample for Archive	GLT
RAWM	SO	T	0265		Sample for Envitco	GLT
RAWM	SO	T	0266		Sample for Archive	GLT
RAWM	SO	T	0267		Sample for Envitco	GLT
RAWM	SO	T	0268		Sample for Archive	GLT
RAWM	SO	T	0269		Sample for Envitco	GLT
RAWM	SO	T	0270		Sample for Archive	R. Wilson
RAWM	SO	T	0271		Sample for Envitco	R. Wilson
RAWM	SO	T	0272		Sample for Archive	R. Wilson
RAWM	SO	T	0273		Sample for Envitco	R. Wilson
RAWM	SO	T	0274		Sample for Archive	
RAWM	SO	T	0275		Sample for Envitco	
RAWM	SO	T	0276		Sample for Archive	R. Wilson
RAWM	SO	T	0277		Sample for Envitco	R. Wilson
RAWM	SO	T	0278		Sample for Archive	

Continued on Page

Read and Understood By

Signed Date Signed Date

Di	TIME	Weight	Notes / Sample Origin
12/17	0920	~652.5g	1 (1000 ml) plastic cont. of Na_2CO_3
12/17	0930	~573.0g	1 plastic cont. of Na_2OH
12/17	0930	~540.0g	1 plastic cont. of Na_2OH
12/17	0940	~881.3g	1 plastic cont. of Li_2CO_3
12/17	0940	~855.9g	1 plastic cont. of Li_2CO_3
12/17	0950	~579.2g	1 plastic cont. of [redacted]
12/17	0950	~621.2g	1 plastic cont. of [redacted]
12/17	1000	~744.2g	" " " " $BaSO_4$
12/17	1000	~786.1g	" " " " $BaSO_4$
12/17	1000		" " " " Fe_2O_3
12/17	1000		" " " " Fe_2O_3
12	1000	~301.1g	" " " " $Mg_3(PO_4)_2$
12/17	1000	~290.3g	" " " " $Mg_3(PO_4)_2$
12/17	1020	~805.4g	" " " " Na_2NO_3
12/17	1020	~561.4g	" " " " Na_2NO_3
1/18/99	1245	~721.6g	1 500 mL plastic cont. of Na_2SeO_3
1/18/99	1245	~707.7g	" " " " " Na_2SeO_3
1/18/99	1245	~1237.0g	" " " " " PbO
1/18/99	1245	~1238.76g	" " " " " PbO
			" " " " " $PbCO_3$
			" " " " " $PbCO_3$
1/18/99	1245	~811.6g	" " " " " $PbSO_4$
1/18/99	1245	~815.56g	" " " " " $PbSO_4$
			" " " " " Na_2HAsO_4

Continued on Page

3
ROJECT

Notebook No. 2291
Continued From Page

Sample number				Notebook Ref.	Requirement	Sampled by
RAWM	SO	T	0279		Sample for Envitco	
RAWM	SO	T	0280		Sample for Archive	R Wilson
RAWM	SO	T	0281		Sample for Envitco	R. Wilson
RAWM	SO	T	0282		Sample for Archive	
RAWM	SO	T	0283		Sample for Envitco	
RAWM	SO	T	0284		Sample for Archive	GLT
RAWM	SO	T	0285		Sample for Envitco	GLT
RAWM	SO	T	0286		Sample for Archive	GLT
RAWM	SO	T	0287		Sample for Envitco	
DGLAS	SO	T	0288	II pg 19	Redox of Glass - Corning	DHD
DGLAS	SO	T	0289	HH pg 100	Redox of Glass - Corning	DHD
DGLAS	SO	T	0290	II pg. 19	Envitco Archive	DHD
DGLAS	SO	T	0291	HH pg 100	Envitco Archive	DHD
DGLAS	SO	T	0292		Envitco Archive	DHD
DGLAS	SO	T	0293		Corning Redox	DHD
DGLAS	SO	T	0294		Envitco Archive	DHD
DGLAS	SO	T	0295		Corning Redox	DHD
DGLAS	SO	T	0296		Possible SEM for Metal	DHD
DGLS	SO	T	0297		Analysis - QCA - Salts	DHD
FEED	SO	T	0298		Sample for Envitco	RDW
FEED	SO	T	0299		Sample for Archive	RDW
DGLS	SO	T	0300		Corning QCA/Redox	DHD
DGLS	SO	T	0301		Env Archive - duplicate	DHD

Continued on Page

Read and Understood By

001194

Signed | Date | Signed | Date

DC	Time	Weight	Notes / Sample Origin
			1 500 ml plastic container of Na_2HAsO_4
1/18/99	1245	~579.0g	1 500 ml " " of V_2O_5
1/18/99	1245	~384.4g	1 500 ml " " of V_2O_5
			1 500 ml " " of Na_2CrO_4
			1 500 ml " " of Na_2CrO_4
12/18/98	0830	646.2gm	1 1000 ml " " of Kerosene
12/18/98	0830	676.7gm	1 1000 ml " " of Kerosene
12/18/98	0830	867.5gm	1 1000 ml " " of n-Tributyl Phosphate
			1 1000 ml " " of n-Tributyl Phosphate
12/15/98	0600	~10gm	from EV-101 run - SO-D5B-2-
12/16/98	(midnite at 15th) 0000	~10gm	from EV-101 run - SO-D5B-2-
12/15/98	0600	~200gm	EV-101 - same as DGLAS-SO-T-0288
12/15/98	(midnite 12/15) 0000	~200gm	EV-101 - same as DGLAS-SO-T-0289.
12/14/98	1200	~300gm	EV-101 - early production
12/14/98	1200	~15gm	EV-101 - duplicate of - 0292 Archive
12/18/98	0600	~100gm	EV-101 - dip sample from top
12/18/98	0600	~15gm	taken on 1/8/99 - look at }
12/18/98	0600	~20gm	red oil @ final after C2 glass }
~~12/18/98~~ 1/8/99	1200	~30gm	Salt Collected on EV-101 @ Shut-down
1/11/99	0700		1 500 mL plastic Nalgene: Batch 006 FEED
1/11/99	0700		1 500 mL Nalgene Bottle: Batch 006 FEED
1/11/99	1000	155gm	EV-101 - Current Glass Drain
1/11/99	1000		EV-101 - Current Glass Drain - Dupl

Continued on Page

Read and Understood By

Signed Date Signed Date

OJECT

a[redacted] Number				Notebook Ref.	Requirements	Sampled by
GLS	SO	T	0302		Envitco Archive	DHD
GLS	SO	T	0303		ARCHIVE	KJH
GLS	SO	T	0304		ARCHIVE	KJH
GLS	SO	T	0305		ARCHIVE	KJH
GLS	SO	T	0306		ARCHIVE	KJH
GLS	SO	T	0307		Archive	KJH
GLS	SO	T	0308		Archive	KJH
GLS	SO	T	0309		Archive	KJH
GLS	SO	T	0310		Archive	KJH
GLS	SO	T	0311		Archive	KJH
GLS	SO	T	0312	II65	Archive of Glass Sample	DHD
[redacted]	SO	T	0313	II65	Corning - QCA, Redox	DHD
GLS	SO	T	0314		Archive - Drum Storage	MGE
GLS	SO	T	0315		Archive of Glass Sample	MGE
GLS	SO	T	0316		Corning - QCA, Redox	MGE
SGO	SO	T	0317		Envitco } ~ 2.92 kg total removed	AJ
SGO	SO	T	0318		Archive }	AJ
ALT	SO	T	0319		Envitco	[illegible]
SGO	SO	T	0320		Archive	AJ
~~GLS~~	~~SO~~	~~T~~	~~0321~~		~~Archive~~	ME
URR	SO	T	0322		ENVITCO ARCHIVE	CR
URR	SO	T	0323		ENVITCO ARCHIVE	CR
URR	SO	T	0324		ENVITCO ARCHIVE	CR
GLS	SO	T	0325		Archive	JC
[redacted]	SO	T	0326		~~Archive~~ JC	

Continued on Page

Read and Understood By

Signed Date Signed Date

DATE	TIME	Weight	Notes/Sample origin
-11-99	1500	222.69 g	Glass sample from drain orifice
-9-98		182 kg glass	DRUM #1 EV-101 CONVERSION GLASS
-10-98		182 kg glass	DRUM #2 EV-101 CONVR. GLASS
-16-98		225.6 kg glass	DRUM #3 EV-101 CONVR. GLASS
-16-98		205 kg glass	DRUM #4 EV-101 CONVR. GLASS
-17-98		235 kg glass	Drum #5 EV-101 CONVR. GLASS
-18-98		198.5 kg glass	Drum #6 EV-101 Convr. Glass
-11-99		177.6 kg glass	Drum #7 EV-101 Convr. Glass
-11-99		138.6 kg glass	Drum #8 EV-101 Convr. Glass
-12-99		178.7 kg glass	Drum #9 EV-101 Convr. Glass
/12/99	1030	~200 gm	Glass Drain Sample
/1[illegible]/99	1030	~156 gm	Glass Drain Sample
-1[illegible]-99	1145	JC 160.8 ~~[illegible]~~ kg glass	Drum #10 EV-101 Convr. Glass
-13-99	1029		Glass Drain Sample
-13-99	1029	157.8 kg glass	Glass Drain Sample
-13-99	1445	~250 gm	(Solid Offgas samples: Large
-13-99	1445	~250 gm	chuncks of rusty piping)
-14-99	0840	5.60 g	Salt from Conv. Glass
-14-99	0930	89 g	Offgas Solids Sample
1-14-99		~~171.7 kg glass~~	~~Drum #10 EV-101 Convr. Glass~~
-14-99	1800	1 liter full	(SURR Batch #001
-14-99	1800	1 liter full	SURR. Batch #001
-14-99	1800	1 liter 3/4 full	SURR BATCH #001)
-14-99		171.7 kg glass	Drum #11 EV-101 Convr. Glass

Continued on Page 2276 2301 2321

Read and Understood By

001197

Signed Date Signed Date

2 L

PROJECT

Notebook No. 2291

Continued From Page

Sample Number				Notebook Ref.	Requirements	Sampled By
DGLS	SO	T	0326		Archive	JC
DGLS	SO	T	0327		Archive	GLT
Feed	SO	T	0327		Archive	ME
DGLS	SO	T	0328		Archive - drum storage	GLT
FEED	SO	T	0329		Envitco	ME
FEED	SO	T	0330		FDF	ME
FEED	SO	T	0331		ARCHIVE	BMB
OGSO	SO	T	0332		ARCHIVE	BMB
DGLS	SO	T	0333		ARCHIVE	KJH
DGLS	SO	T	0334		ENVITCO	KP
FEED	SO	T	0335		ENVITCO	KP
[illegible]	SO	T	0336		ENVITCO	RCW
OGSO	SO	T	0337		ENVITCO	RCW
FEED SURR	SO	T	0338		ENVITCO	RCW
OGSO	SO	T	0339		ENVITCO	ME
DGLS	SO	T	0340		~~Archive~~ ME or ~~ENVITCO~~ ME	ME
SURR	SO	T	0341	GG 65	Envitco - LOD batch ~~#008~~	tank 2 MGE
SURR	SO	T	0342	GG 65	Envitco - LOD batch ~~#008~~	tank 3 MGE
DGLS	SO	T	0343		Envitco	[illegible]
FEED	SO	T	0344		Envitco	DCR
OGSO	SO	T	0345		Envitco	DCR
DGLS	SO	T	0346		Envitco	DCR
FEED	SO	T	0347		Archive	AJ
SURR	SO	T	0348		~~Envitco~~ Archive ME	AJ
[illegible]	SO	T	0349		Envitco	AJ

Continued on Page

Read and Understood By

001198

Signed Date Signed Date

DATE	TIME	Weight	Notes/Sample Origin
1-15-99		199.0 kg glass	Drum #12 EV-101 Convr. glass
1-15-99	1100	407.06 grams	Glass drained from EV-101 melter
1-15-99	1430	5295.12g	4 plastic (1000 ml) of Feed batch 001
1-15-99	1430	158.4 kg glass	Drum #13 EV-101 Conv. glass
1-15-99	1430	~~52~~ 3950.5g	3 plastic (1000 ml) of Feed Batch 001
1-15-99	1430	3952.26g	3 plastic (1000 ml) of Feed Batch 001
1/15/99	16:45	1370 g	1x 1000 ml poly from feed recirculation
1/15/99	1700	82g	1x 250 ml poly
1/15/99	1905	151.4 kg glass	30/55 gallon drum #14
1/15/99	1715	1915.7g	2x 1000 ml poly / Glass Drain
1/16/99	0010	1307.4g	(1) 1000 ml poly (Feed-Batch 001)
[illegible]/99	0025	913.66g	(2)x 1000 ml poly / Glass Drain
1/16/99	0305	83.01g	(1) 250 ml poly
1/16/99	0839	1306.37g	(1) 1000 mL poly / (Feed-Batch 001)
1/16/99	1300	22.99g	Off gas solids ten hours since last sample
1/16/99		161.0 kg	Drum #15 DGLS Batch 001 EV101
1/16/99	1420	~120 gm	Portion of batch #008 surrogate transferred to Poly Tank 2
1/16/99	1420	~120 gm	Portion batch #008 surrogate transferred to Poly Tank 3
1/16/99	1620	943.08 gm	(1)x 100 mL poly Glass Drain
1/16/99	1944	~~1205.91~~ g 1205.41 g DCR	(1) 1000 mL poly (Feed-Batch 001)
1/16/99	2320	115.62g	(1) 250 mL poly
1/16/99	2330	1482g	(2) 1000 mL poly Glass Drain
1/17/99	0430	1380.7g	(1) 1000 ml poly of Feed Batch 001
1/17/99	0500	1357.6g	(1) 1000 ml poly SORR Batch 005
[illegible]/99	0300	1401.2 g	(2) 1000 poly Glass Drain

Continued on Page

Read and Understood By

Signed Date Signed Date

Sample Number				Notebook Ref.	Requirements	Sampled By
FEED	SO	T	0350	—	Envitco	AJ
SURR	SO	T	0351	—	~~Envitco~~ FDF (ME)	AJ
SURR	SO	T	0352	—	Envitco	AJ
OSGS	SO	T	0354 ~~0352~~	—	Envitco	AJ
DGLS	SO	T	0353	—	Envitco	AJ
FEED ~~DGLS~~	SO	T	0355	—	Envitco	ME
Feed	SO	T	0356	—	Archive	ME
DGLS	SO	T	0357	—	Envitco	ME
FEED	SO	T	0358	—	Envitco	ME
FEED	SO	T	0359	—	Archive	ME
OSO ~~FEED~~	SO	T	0360	—	Envitco	ME
OSO	SO	T	0361	—	Archive	ME
FEED	SO	T	0362	—	Envitco	DCR
FEED	SO	T	0363	—	Archive	DCR
DGLS	SO	T	0364	—	Envitco	DCR
DGLS	SO	T	0365	—	Archive	DCR
OGSO	SO	T	0366	—	Envitco	DCR
OGSO	SO	T	0367	—	Archive	DCR
SURR	SO	T	0368	— Samples taken with sediment at bottom of Tank — Need to get additional samples when Batch is transferred to mixtank AJ	Envitco	AJ
SURR	SO	T	0369		FDF	AJ
SURR	SO	T	0370		GELS	AJ
SURR	SO	T	0371		Archive	AJ
FEED	SO	T	0372	—	Envitco	JC
FEED	SO	T	0373	—	Archive	JC

Continued on Page

Read and Understood By

Signed Date Signed Date

Date	Time	Weight	Notes/Sample Origin
1/17/99	0630	1368.9g	(1) 1000ml poly Alt. feed sample
1/17/99	0645	1351.2g	(1) 1000ml poly SoRR Batch 005
1/17/99	0730	1332.9g	(1) 1000ml poly SoRR Batch 005
1/17/99	0800	39.1g	(1) 250ml poly Offgas Solids
1/17/99	0530	1657.3g	(1) 1000ml poly Drain glass
1/17/99	1200	3840.64g	(3) 1000mL poly Initial Feed Batch 005
1/17/99	1200	4022.26g	(3) 1000mL poly initial Feed Batch 005
1/17/99	1500	1837g	(2) 1000ml poly Drain glass
1/17/99	1530	2791.1g	(3) 1000mL Feed from return
1/17/99	1530	2782.64g	(3) 1000ml Feed from return
1/17/99	1600	129.62g	(1) 500ml poly offgas Solids
1/17/99	1600	119.25g	(1) 500ml poly offgas solids
1/17/99	2145	1264.85g	(1) 1000mL poly Feed Batch 005
1/17/99	2145	1187.24g	(1) 1000mL poly Feed Batch 005
1/17/99	2215	1542.95g	(1) 1000mL poly Glass Drain
1/17/99	~~2215~~ DCR 2300	1504.78g	(1) 1000mL poly Glass Drain
1/17/99	2330	25.81g	(1) 250mL poly offgas solids
1/17/99	2330	18.52g	(1) 250mL poly offgas solids
1/18/99	0100	3.95 kg	(3) 1000ml poly Batch 007 tank 5
1/18/99	0100	3.94 kg	(3) 1000ml poly Batch 007 tank 5
1/18/99	0100	3.39 kg	(3) 1000ml poly Batch 007 tank 5
1/18/99	0100	4.01 kg	(3) 1000ml poly Batch 007 tank 5
1/18/99	0245	1125.34g	(1) 1000mL poly Feed Batch 5
1/18/99	0245	1120.04g	(1) 1000mL poly Feed Batch 5

Continued on Page

Read and Understood By

Signed Date Signed Date

PROJECT

Sample Number				Notebook Ref.	Requirements	Sampled by	Date
SALT	SO	T	0374		Envitco	JC	1-18-99
SALT	SO	T	0375		Archive	JC	1-18-99
FEED	SO	T	0376	—	Envitco	AJ	1-18-99
FEED	SO	T	0377	—	Archive	AJ	1-18-99
DGLS	SO	T	0378	—	Envitco	AJ	1-18-99
DGLS	SO	T	0379	—	FDF	AJ	1-18-99
DGLS	SO	T	0380	—	CELS	AJ	1-18-99
DGLS	SO	T	0381	—	Archive	AJ	1-18-99
DGLS	SO	T	0382	—	Archive	JC	1-18-99
DGLS	SO	T	0383	—	Archive	JC	1-18-99
DGLS	SO	T	0384	—	Envitco	JC	1-18-99
DGLS	SO	T	0385	—	FDF	JC	1-18-99
DGLS	SO	T	0386	—	CELS	JC	1-18-99
FEED	SO	T	0387	—	Envitco	ME	1-18-99
FEED	SO	T	0388	—	Archive	ME	1-18-99
~~FEED~~ DGSO	SO	T	0389	—	Envitco	ME	1-18-99
DGSO	SO	T	0390	—	Archive	ME	1-18-99
DGLS	SO	T	0391	—	FDF	ME	1-18-99
DGLS	SO	T	0392	—	CELS	ME	1-18-99
DGLS	SO	T	0393	—	Archive	ME	1-18-99
DGLS	SO	T	0394	—	Envitco	ME	1-18-99
FEED	SO	T	0395	—	Envitco	ME	1-18-99
FEED	SO	T	0396	—	Archive	ME	1-18-99
DGLS	SO	T	0397	—	FDF	SLH	1-18-99

Continued on Page

Read and Understood By

Signed Date Signed Date

PROJECT

Ti	Weight	Notes / Sample Origin
0141	260.05g	Salt Drain Batch #005
2141	265.58g	Salt Drain Batch #005
0500	1287.12g	Feed Sample Batch 005
0500	1208.69g	Feed Sample Batch 005
0300	1.69 Kg	Glass Drain
0300	1.72 Kg	Glass Drain
0300	1.68 Kg	Glass Drain
0300	1.62 Kg	Glass Drain
0600	965.49g	Glass Drain } * Both are same sample. Total wt. = 1.89 kg.
0600	923.62g	Glass Drain }
0600	~~1.71 kg~~ 1467.06g ME	Glass Drain in 2(l) Bottles weight in 1 reduced to 621.7g for subsample ME 1/9/99
0[illegible]	1.71 kg	Glass Drain
0600	1.72 kg	Glass Drain
0920	3 552.21g	Feed Sample Batch #005 } From recirculation line
0920	3 535.79g	Feed Sample Batch #005 }
0940	92.47g	Offgas Solids
0940	78.63	Offgas Solids
1000	761.5g	Glass Drain
1000	946.0g	Glass Drain
1000	1053.8g	Glass Drain
1000	716.5g	Glass Drain
1200	1140.01g	Feed sample Batch #005 } From recirculation line
1200	1199.9g	Feed Sample Batch #005 }
13[illegible]	624.0g	Glass Drain

Continued on Page

Read and Understood By

001203

Signed Date Signed Date

Sample Number				Notebook Ref.	Requirements	Sampled By	Date
DGLS	SO	T	0398	—	CELS	SLH	1-18-99
DGLS	SO	T	0399	—	Archive	SLH	1-18-99
DGLS	SO	T	0400	—	Envitco	SLH	1-18-99
SURR	SO	T	0401	—	Archive	MGE	1-18-99
SURR	SO	T	0402	—	Envitco	MGE	1-18-99
SURR	SO	T	0403	—	CELS	MGE	1-18-99
SURR	SO	T	0404	—	FDF	MGE	1-18-99
FEED	SO	T	0405	—	ENVITCO	ME	1-18-99
FEED	SO	T	0406	—	Archive	ME	1-18-99
OGSO	SO	T	0407	—	ENVITCO	ME	1-18-99
OGSO	SO	T	0408	—	Archive	ME	1-18-99
[illegible]	SO	T	0409	-	FDF	XP	1/18/99
[illegible]	SO	T	0410	-	CELS	XP	1/18/99
DGLS	SO	T	0411	-	Archive	XP	1/18/99
DGLS	SO	T	0412	-	ENVITCO	XP	1/18/99
SALT	SO	T	0413	-	Envitco	ME	1/18/99
FEED	SO	T	0414	-	Envitco	DCR	1/18/99
FEED	SO	T	0415	-	Archive	DCR	1/18/99
DGLS	SO	T	0416	-	FDF	XP	1/18/99
DGLS	SO	T	0417	-	CELS	XP	1/18/99
DGLS	SO	T	0418	-	Archive	XP	1/18/99
DGLS	SO	T	0419	-	ENVITCO	XP	1/18/99
FEED	SO	T	0420	-	Envitco	DCR	1/18/99
FEED	SO	T	0421	-	Archive	DCR	1/18/99

Continued on Page

Read and Understood By

001204

Signed | Date | Signed | Date

J	weight	Notes / Sample Origin
1300	565.6g	Glass Drain
1300	554.1g	Glass Drain
1300	631.3g	Glass Drain
1345	~~3827.6g~~ 3796.9g	Surrogate Sample 3 (1L) Bottles Batch 008B From Mix Tank
1345	3827.6g	" "
1345	3788.1g	" "
1345	3757.5g	" "
1500	1207.6g	Feed Sample Batch 005 From return
1500	1224.5g	Feed Sample Batch 005 from return
1600	43.1g	Offgas Solids
1600	40.4g	Offgas Solids
1	503.16g	Glass Drain
1	491.36g	↓
1630	308.36g	↓
1630	502.06g	↓
~~0630~~ 1700 DNE	385.8g	Reference notebook pg. JJ27 from salt drained at 0630 1/8/91
1755	1196.9g	(1) 1000 mL Batch 005, from return
1755	1178.5g	(1) 1000 mL Batch 005, from return
1910	659.1g	Glass Drain Homogenous
1910	637.7g	↓ "
1910	625.7g	↓ "
1910	543.7g	↓ "
2105	1139.4g	Feed Sample, Batch 005; from Return
2105	1129.0g	Feed Sample, Batch 005, from Return

Continued on Page

Read and Understood By

Signed Date Signed Date

Sample Number				Notebook Ref.	Requirements	Sampled by	Date
DGLS	SO	T	0422	—	FDF	XP	1/18/99
DGLS	SO	T	0423	—	CELS	XP	1/18/99
DGLS	SO	T	0424	—	Archive	XP	1/18/99
DGLS	SO	T	0425	—	ENVITCO	XP	1/18/99
FEED	SO	T	0426	—	Envitco	DCR	1/18/99
FEED	SO	T	0427	—	Archive	DCR	1/18/99
OGSO	SO	T	0428	—	Envitco	JC	1-19-99
OGSO	SO	T	0429	—	Archive	JC	1-19-99
DGLS	SO	T	0430	—	Envitco	AJ	1-19-99
DGLS	SO	T	0431	—	FDF	AJ	1-19-99
DGLS	SO	T	0432	—	CELS	AJ	1-19-99
DGLS	SO	T	0433	—	Archive	AJ	1-19-99
FEED	SO	T	0434	—	Envitco	AJ	1-19-99
FEED	SO	T	0435	—	Archive	AJ	1-19-99
SURR	SO	T	0436	—	Envitco	AJ	1-19-99
SURR	SO	T	0437	—	FDF	AJ	1-19-99
SURR	SO	T	0438	—	CELS	AJ	1-19-99
SURR	SO	T	0439	—	Archive	AJ	1-19-99
DGLS	SO	T	0440	—	Envitco	JC	1-19-99
DGLS	SO	T	0441	—	Archive	JC	1-19-99
DGLS	SO	T	0442	—	FDF	JC	1-19-99
DGLS	SO	T	0443	—	CELS	JC	1-19-99
FEED	SO	T	0444	—	Envitco	JC	1-19-99
FEED	SO	T	0445	—	Archive	JC	1-19-99

Continued on Page

Read and Understood By

Signed Date

Ti	Weight	Notes / Remarks / Sample Origin			
2210	611.6 g	Glass Drain - Homogenous			(1) L wide Mouth Poly
2210	598.3 g	↓			↓
2210	555.7 g	↓			↓
2210	619.6 g	↓			↓
2350	1091.0 g	Feed Sample, Batch 005, from return			(1) 1000 mL poly
2350	1091.5 g	Feed Sample, Batch 005, from return			(1) 1000 mL poly
0100	62.94 g	Offgas Solid Sample (1) 500 mL poly			
0100	88.73 g	Offgas Solid Sample (1) 500 mL poly			
0100	554.2 g	Glass Drain, Homogeneous, Drain Rate = 0.18 kg/min, (1) 1000 ml poly			
0100	597.0 g	↓	↓	↓	↓
0100	709.3 g	↓	↓	↓	↓
c	637.5 g	↓	↓	↓	↓
c b	1188.9 g	Feed Sample, Batch 005, (1) 1000 ml poly, from Return			
0300	1160.1 g	Feed Sample, Batch 005, (1) 1000 ml poly, from Return			
0315	3.9 kg	(3) 1000 ml poly, SURR From Mix tank, Batch 008A			
0315	3.9 kg	↓	↓	↓	
0315	3.9 kg	↓	↓	↓	
0315	3.9 kg	↓	↓	↓	
0400	613.1 g	Homogeneous Drain Glass, Drain rate = 0.22 kg/min			(1) 1000 mL poly
0400	749.9 g	↓	↓	↓	↓
0400	682.1 g	↓	↓	↓	↓
0400	712.5 g	↓	↓	↓	↓
0600	1312.4 g	Feed Sample, Batch 005, (1) 1000 mL poly, from Return			
0600	1306.0 g	Feed Sample, Batch 005, (1) 1000 mL poly, from Return			

Continued on Page

Read and Understood By

Signed | Date | Signed | Date

Sample Number				Notebook Ref.	Requirements	Sampled By	Date
SURR	SO	T	0446	—	CELS	JC	1-19-99
SURR	SO	T	0447	—	Archive	JC	1-19-99
SURR	SO	T	0448	—	Envitco	JC	1-19-99
SURR	SO	T	0449	—	FDF	JC	1-19-99
DGLS	SO	T	0450	—	FDF	JC	1-19-99
DGLS	SO	T	0451	—	Envitco	JC	1-19-99
DGLS	SO	T	0452	—	CELS	JC	1-19-99
DGLS	SO	T	0453	—	Archive	JC	1-19-99
FEED	SO	T	0454	—	Envitco	SLH	1/19/99
FEED	SO	T	0455	—	Archive	SLH	1/19/99
OGSO	SO	T	0456	—	Archive	ME	1/19/99
O[illegible]O	SO	T	0457	—	Envitco	ME	1/19/99
D[illegible]	SO	T	0458	—	Envitco	ME	1/19/99
DGLS	SO	T	0459	—	FDF	ME	1/19/99
DGLS	SO	T	0460	—	CELS	ME	1/19/99
DGLS	SO	T	0461	—	Archive	ME	1/19/99
DGLS	SO	T	0462	—	Envitco	ME	1/19/99
DGLS	SO	T	0463	—	Envitco	ME	1/19/99
FEED	SO	T	0464	—	Envitco	ME	1/19/99
FEED	SO	T	0465	—	Archive	ME	1/19/99
FEED	SO	T	0466	—	Envitco	SLH	1/19/99
FEED	SO	T	0467	—	Archive	SLH	1/19/99
DGLS	SO	T	0468	—	Envitco	ME	1/19/99
DGLS	SO	T	0469	—	Archive	ME	1/19/99

Continued on Page

Read and Understood By

001208

Signed | Date | Signed | Date

Time	Weight	Notes/Remarks/Sample Origin
0605	~~4334.2g~~ 4002.1g	SURR from Mix Tank Batch #007 (3) 1000mL poly
0605	3976.2g	↓ ↓ ↓ ↓
0605	4024.0g	↓ ↓ ↓ ↓
0605	4026.7g	↓ ↓ ↓ ↓
0700	798.9g	Homogeneous Drain Glass Drain rate = 0.18 kg/min (1) 1000mL poly
0700	1073.9g	↓ ↓ ↓
0700	659.8g	↓ ↓ ↓
0700	853.1g	↓ ↓ ↓
0910	1175.4g	Feed Sample, Batch 005 (1) 1000mL poly, from return
0910	1226.2g	Feed sample, Batch 005 (1) 1000mL poly, from return
0920	33.74g	Offgas solids sample (1) 250 ml poly,
[illegible]20	52.92g	offgas solids sample (1) 250ml poly,
1000	523.2g	Glass Drain, (1) 1000 mL poly, homogeneous, drain rate 0.18 kg/min
1000	735.6g	↓ ↓ ↓ ↓
1000	587.1g	↓ ↓ ↓ ↓
1000	549.3g	↓ ↓ ↓ ↓
1035	242.94g	Glass Drain sample subsampled DGLS-SO-T-0385 500ml poly
1030	355.49g	Glass Drain Sample in 500ml poly drain rate .18
1105	3977.4g	FEED Batch 007 (Initial) 3 (2l) Bottles
1105	3948.7g	FEED Batch 007 (initial) 3 (2l) Bottles
1200	1351.8g	FEED Sample, Batch 007, (1) 1000mL poly, from return
1200	1349.6g	FEED sample, Batch 007, (1) 1000mL poly, from return
1330	692.4g	Glass Drain sample, (1) 1000ml poly, homogeneous } drain rate
1330	657.8g	Glass Drain Sample, (1) 1000ml poly, homogeneous } 0.26

Continued on Page

Read and Understood By

001209

Signed Date Signed Date

Sample Number				Notebook Ref	Requirements	Sampled by	Date
DGLS	SO	T	0470	—	FDF	ME	1/19/99
DGLS	SO	T	0471	—	CELS	ME	1/19/99
FEED	SO	T	0472	—	Envitco	ME	1/19/98
FEED	SO	T	0473	—	Archive	ME	1/19/98
DGLS	SO	T	0474	—	FDF	DCR	1/19/99
DGLS	SO	T	0475	—	CELS	DCR	1/19/99
DGLS	SO	T	0476	—	ENVITCO	DCR	1/19/99
DGLS	SO	T	0477	—	ARCHIVE	DCR	1/19/99
OGSO	SO	T	0478	-	ENVITCO	DCR	1/19/99
OGSO	SO	T	0479	-	~~ENVITCO~~ ARCHIVE	DCR	1/19/99
TAPE	-	-	0480	-	ARCHIVE	DCR	1/19/99
FE[illegible]	SO	T	0481	-	ENVITCO	[illegible]	1/19/99
FEED	SO	T	0482	-	ARCHIVE	[illegible]	1/19/99
TAPE	-	-	0483	-	ARCHIVE	DCR	1/19/99
DGLS	SO	T	0484	-	FDF	DCR	1/19/99
DGLS	SO	T	0485	-	CELS	DCR	1/19/99
DGLS	SO	T	0486	-	Envitco	DCR	1/19/99
DGLS	SO	T	0487	-	Archive	DCR	1/19/99
FEED	SO	T	0488	-	Envitco	DCR	1/19/99
FEED	SO	T	0489	-	Archive	DCR	1/19/99
DGLS	SO	T	0490	-	FDF	DCR	1/19/99
DGLS	SO	T	0491	-	CELS	DCR	1/19/99
DGLS	SO	T	0492	-	Envitco	DCR	1/19/99
DGLS	SO	T	0493	-	Archive	DCR	1/19/99

Continued on Page

Read and Understood By

PROJECT

Time	Weight	Notes / Remarks / Sample Origin
1330	706.9g	Glass Drain Sample, (1) 1000 ml bottle, homogeneous } Glass drain ~~007~~ NG 1,2,6
1330	847.3g	Glass Drain Sample, (1) 1000 ml bottle, homogeneous }
1510	1344.1g	Feed sample, Batch 007, (1) 1000 mL poly, from return
1510	1339.1g	Feed sample, Batch 007, (1) 1000 mL poly, from return
1620	625.9g	Glass Drain Homogeneous (1) L Wide Mouth Poly bottle
1620	599.2g	↓
1620	869.2g	↓
1620	729.8g	↓
1705	33.7g	Off gas solid sample, (1) 250 mL poly
1705	32.37g	Off gas solid sample, (1) 250 mL poly
1745	–	Video Tapes 1/18/99 (1000) – 1/19/99 (~~6000~~ 1200), ~~6~~ (7) Tapes (#1-7)
[illegible]5	1313.1g	Feed sample, Batch 007, (1) 1L small mouth, from Return
1755	1337.6g	Feed Sample, Batch 007, (1) L small mouth, from Return
1800	–	Video Tape, 1/19/99 (1200-1800); (1) Tape (#8)
1905	568.9g	Glass Drain, Homogeneous, (1) L wide mouth poly, Drain Rate: 0.23
1905	585.0g	↓
1905	590.3g	↓
1905	549.3g	↓
2100	1295.3g	Feed sample, Batch 007, 1 L small mouth, recirculation
2100	1325.9g	Feed sample, Batch 007, 1 L small mouth, recirculation
2210	557.5g	Glass Drain, Homogeneous, (1) L wide mouth poly, Drain Rate: 0.31
2210	691.1g	↓
2210	651.7g	↓
2210	679.6g	↓

Continued on Page

Read and Understood By

001211

Signed Date Signed Date

SAMPLE NUMBER				NOTEBOOK REF.	REQUIREMENTS	SAMPLED BY	DATE
EED	SO	T	0494	–	Envitco	DCR	1/19/99
EED	SO	T	0495	–	Archive	DCR	1/19/99
APE	-	-	0496	–	Archive	DCR	1/19/99
GSO	SO	T	0497	–	Envitco	AJ	1/20/99
GSO	SO	T	0498	–	Archive	AJ	1/20/99
GLS	SO	T	0499	—	FDF	JC	1-20-99
GLS	SO	T	0500	—	Envitco	JC	1-20-99
GLS	SO	T	0501	—	Archive	JC	1-20-99
GLS	SO	T	0502	—	CELS	JC	1-20-99
EED	SO	T	0503	—	Archive	JC	1-20-99
EED	SO	T	0504	—	Envitco	JC	1-20-99
G	SO	T	0505	—	FDF	JC	1-20-99
G	SO	T	0506	—	CELS	JC	1-20-99
GLS	SO	T	0507	—	Envitco	JC	1-20-99
GLS	SO	T	0508	—	Archive	JC	1-20-99
APE	-	-	0~~4~~5 0509	—	Archive	AJ	1-20-99
EED	SO	T	0510	—	Archive	JC	1-20-99
EED	SO	T	0511	—	Envitco	JC	1-20-99
GLS	SO	T	0512	—	Envitco	JC	1-20-99
GLS	SO	T	0513	—	Archive	JC	1-20-99
GLS	SO	T	0514	—	CELS	JC	1-20-99
GLS	SO	T	0515	—	FDF	JC	1-20-99
EED	SO	T	0516	—	Archive	ME	1-20-99
EED	SO	T	0517	—	Envitco	ME	1-20-99

Continued on Page

Read and Understood By

Signed | Date | Signed | Date

T	WEIGHT	NOTES / REMARKS / SAMPLE ORIGIN
2400	1259.9g	Feed Sample, Batch 007, 1L small mouth poly, recirculation
2400	1261.2g	Feed Sample, Batch 007, 1L small mouth poly, recirculation
2400	—	Video Tape, (1800-2400), (1) Tape, #9
0100	129.17g	Off gas Solids (1) 500ml poly } Several pieces of insulation type material in samples
0100	130.12g	off gas Solids (1) 500ml poly }
0100	781.5g	Homogeneous Drain Glass, Drain rate=0.2 kg/min. (1) 1000 ml poly
0100	951.9g	↓ ↓ ↓
0100	753.0g	↓ ↓ ↓
0100	771.0g	↓ ↓ ↓
0300	1364.5g	Feed Sample, Recirculation, Batch 007, 1000ml poly
0300	1374.3g	Feed Sample, Recirc., Batch 007, 1000 ml poly
[illegible]00	737.2g	Homogeneous Drain Glass, Drain rate=0.2 kg/min (1) 1000 ml poly
[illegible]00	790.9g	↓ ↓ ↓
0400	725.0g	↓ ↓ ↓
0400	901.9g	↓ ↓ ↓
0600	—	Video Tape, 2400 - 0600, (1) Tape #10
0600	1350.8g	Feed Sample, Recirc., Batch 007, (1) 1000 mL poly
0600	1370.7g	Feed Sample, Recirc., Batch 007, (1) 1000mL poly
0700	864.8g	Homogeneous Drain Glass, Drain Rate=0.21 kg/min (1) 1000mL poly
0700	896.4g	↓ ↓ ↓
0700	1165.7g	↓ ↓ ↓
0700	1051.5g	↓ ↓ ↓
0900	1293.7g	Feed Sample, Recirc, Batch 007, (1) 1000ml poly
0900	1267.7g	Feed Sample, Recirc, Batch 007, (1) 1000ml poly

Continued on Page

Read and Understood By

Signed | Date | Signed | Date

PROJECT

Notebook No. 2291

Continued From Page

Sample Number				Notebook Reference	Requirements	Sampled by	Date
OGSO	SO	T	0518	—	Envitco	ME	1-20-99
OGSO	SO	T	0519	—	Archive	ME	1-20-99
OGSO	SO	T	0520	—	McGill	ME	1-20-99
~~DGSO~~ DGLS (MB)	SO	T	0521	—	Envitco	ME	1-20-99
DGLS	SO	T	0522	—	Archive	ME	1-20-99
DGLS	SO	T	0523	—	CELS	ME	1-20-99
DGLS	SO	T	0524	—	FRF	ME	1-20-99
FEED	SO	T	0525	—	Envitco	ME	1-20-99
FEED	SO	T	0526	—	Archive	ME	1-20-99
TAPE	—	—	0527	—	Archive	RCW	1-20-99
DGLS	SO	T	0528	—	Envitco	ME	1-20-99
D[illegible]S	SO	T	0529	—	FRF	ME	1-20-99
D[illegible]S	SO	T	0530	—	CELS	ME	1-20-99
DGLS	SO	T	0531	—	Archive	ME	1-20-99
FEED	SO	T	~~1~~ 0532 (MB)	—	Archive	ME	1-20-99
FEED	SO	T	0533	—	Envitco	ME	1-20-99
~~DGLS~~	~~SO~~	~~T~~	~~0534~~				
~~DGLS~~	~~SO~~	~~T~~	~~0535~~				
DGLS	SO	T	0536	—	Archive	ME	1-20-99
DGLS	SO	T	0537	—	Archive	ME	1-20-99
DGLS	SO	T	0538		Archive	ME	1-20-99
DGLS	SO	T	0539		Archive	ME	1-20-99
DGLS	SO	T	0540		Archive	ME	1-20-99
DGLS	SO	T	0541		Archive	ME	1-20-99

Continued on Page

Read and Understood By

001214

Signed | Date | Signed | Date

PROJECT

TI	WEIGHT	NOTES/REMARKS/SAMPLE ORIGIN
0915	65.86g	Offgas Solids (1) ~~500mL~~ 250 poly (ME)
0915	53.30g	Offgas solids (1) ~~500mL~~ 250 poly (ME)
0915	58.82g	offgas solids for McGill, (1) ~~500mL~~ 250 poly (ME)
1000	936.07g	Drain glass, homogeneous, (1) 1000mL poly — drain rate ~.33
1000	682.56g	↓
1000	628.26g	↓
1000	722.36g	↓
1200	1274.95g	Feed Sample from recirculation line Batch 007
1200	1289.96g	Feed Sample from recirculation line Batch 007
1200	—	Video Tape, 0600-1200, (1) Tape #11
1305	688.49g	Drain glass, (1) 1000mL poly, homogeneous — Drain Rate 0.23 kg/min
1[illegible]	697.58g	↓
1[illegible]5	765.95g	↓
1305	818.75g	↓
1455	1282.58g	Feed Sample from recirc. line Batch 007, 1L bottle
1455	1272.32g	Feed Sample from recirculation line Batch 007 1L bottle
		~~Drum #14 30/55 gallon drum EV101 conv. glass~~
		~~Drum #15~~
	184.7kg	Drum #16 — EV101 Glass Drain
	201.6kg	Drum #17 — EV101 Glass Drain
	149.8kg	Drum #18 — EV101 Glass Drain
	111.2kg	Drum #19 — EV101 Glass Drain
	158.1kg	Drum #20 — EV101 Glass Drain
	169.2kg	Drum #21 — EV101 Glass Drain

Continued on Page 70

Read and Understood By

Signed | Date | Signed | Date

PROJECT _____

Notebook No. E 2291

Continued From Page _____

SAMPLE NUMBER				NOTEBOOK REFERENCE	REQUIREMENTS	Sampled by	DATE
GLS	SO	T	0542	-	FDF	DCR	~~AP~~ 1/20/99
DGLS	SO	T	0543	-	CELS	DCR	1/20/99
DGLS	SO	T	0544	-	ENVITCO	DCR	1/20/99
DGLS	SO	T	0545	-	ARCHIVE	DCR	1/20/99
OGSO	SO	T	0546	-	ENVITCO	DCR	1/20/99
OGSO	SO	T	0547	-	ARCHIVE	DCR	1/20/99
FEED	SO	T	0548	-	Envitco	DCR	1/20/99
FEED	SO	T	0549	-	Archive	DCR	1/20/99
TAPE	-	.	0550	-	Archive	DCR	1/20/99
DGLS	SO	T	0551	-	FDF	DCR	1/20/99
DGLS	SO	T	0552	-	CELS	DCR	1/20/99
DGLS	SO	T	0553	-	ENVITCO	DCR	1/20/99
LS	SO	T	0554	-	ARCHIVE	DCR	1/20/99
ED	SO	T	0555	-	ENVITCO	DCR	1/20/99
FEED	SO	T	0556	-	ARCHIVE	DCR	1/20/99
DGLS	SO	T	0557	-	FDF	[illegible]	1/20/99
DGLS	SO	T	0558	-	CELS	[illegible]	1/20/99
DGLS	SO	T	0559	-	ENVITCO	[illegible]	1/20/99
DGLS	SO	T	0560	-	ARCHIVE	[illegible]	1/20/99
FEED	SO	T	0561	-	Envitco	DCR	1/20/99
FEED	SO	T	0562	-	Archive	DCR	1/20/99
TAPE	SO	T	0563	-	Archive	DCR	1/20/99
OGSO	SO	T	0564	-	Envitco	AS	1-21-99
OGSO	SO	T	0565	-	Archive	AS	1-21-99

Continued on Page

Read and Understood By

001216

Signed	Date	Signed	Date

TIME	WEIGHT	COMMENTS / NOTES / REMARKS
1015	621.0g	GLASS DRAIN (HOMOGENEOUS) 1L Poly Wide Mouth
1615	699.0g	" " "
1615	670.1g	" " "
1615	669.7g	" " "
1730	147.86g	offgas solids, 1 250 mL poly
1730	162.96g	offgas solids, 1 250 mL poly
1810	1212.91g	Feed, from recirculation, Batch 007, (1) 1000 mL poly small mouth
1810	1206.87g	Feed, from recirculation, Batch 007, (1) 1000 mL poly small mouth
1800	-	Tape #12, 1200-1800
1910	671.5g	Glass Drain, Homogeneous, 1L poly wide mouth, Drain Rate = 0.34 Kg/min
1910	758.9g	↓ ↓ ↓ ↓
1912	609.2g	↓ ↓ ↓ ↓
1[illegible]	609.5g	↓ ↓ ↓ ↓
2055	1372.65g	Feed Sample, Recirculation, Batch 007, (1) 1L poly small mouth
2055	1356.93g	Feed Sample, Recirculation, Batch 007, (1) 1L poly small mouth
2210	500.48g	Glass Drain, Homogeneous, 1L poly wide mouth, Drain Rate = 0.24 Kg/min
2210	508.63	↓ ↓ ↓ ↓
2210	630.18g	↓ ↓ ↓ ↓
2210	517.5g	↓ ↓ ↓ ↓
2350	1314.84g	Feed Sample, recirculation, Batch 008A, (1) 1L poly small mouth
2350	1319.99g	Feed Sample, recirculation, Batch 008A, (1) 1L poly small mouth
2400	—	Video Tape, 1800-2400, Tape #13
[illegible]100	48.03g	offgas solids (1) ~~250~~ 500 AS mL poly
[illegible]100	67.43g	Offgas Solids (1) ~~250~~ 500 AS mL poly

Continued on Page

Read and Understood By

Signed | Date | Signed | Date

Sample Number				Notebook Ref.	Requirements	Sampled by	Date
2LS	SO	T	0566	—	Envitco	JC	1-21-99
DGLS	SO	T	0567	—	Archive	JC	1-21-99
DGLS	SO	T	0568	—	CELS	JC	1-21-99
DGLS	SO	T	0569	—	FDF	JC	1-21-99
FEED	SO	T	0570	—	Envitco	JC	1-21-99
FEED	SO	T	0571	—	Archive	JC	1-21-99
DGLS	SO	T	0572	—	Envitco	AJ	1/21/99
DGLS	SO	T	0573	—	FDF	AJ	1/21/99
DGLS	SO	T	0574	—	CELS	AJ	1/21/99
DGLS	SO	T	0575	—	Archive	AJ	1/21/99
TAPE	SO	T	0576	—	Archive	AJ	1/21-99
FEED	SO	T	0577	—	Archive	JC	1-21-99
ED	SO	T	0578	—	Envitco	JC	1-21-99
LS	SO	T	0579	—	Archive	JC	1-21-99
DGLS	SO	T	0580	—	Envitco	JC	1-21-99
DGLS	SO	T	0581	—	FDF	JC	1-21-99
DGLS	SO	T	0582	—	CELS	JC	1-21-99
FEED	SO	T	0583	—	Archive	ME	1-21-99
FEED	SO	T	0584	—	Envitco	ME	1-21-99
FEED	SO	T	0585	—	Archive	ME	1-21-99
FEED	SO	T	0586	—	Envitco	ME	1-21-99
OGSO	SO	T	0587	—	Envitco	ME	1-21-99
OGSO	SO	T	0588	—	Archive	ME	1-21-99
TAPE	SO	T	0589	—	Archive	Raw	1-21-99
DGLS	SO	T	0590	—	Envitco	SLH	1-21-99

Continued on Page

Read and Understood By

001218

Signed	Date	Signed	Date

Time	Weight	Comments/Notes/Remarks
0000	973.27g	Homogeneous Drain Glass, Drain rate=0.31 kg/min, (1) 1000 mL poly
0100	983.41g	↓
0100	1126.07g	↓
0100	1033.46g	↓
0300	1389.71g	Feed Sample from Return, Batch 008A, (1) 1000 mL poly
0300	1384.79g	Feed Sample from Return, Batch 008A, (1) 1000 mL poly
0400	664.68g	Homogeneous Drain glass, Drain Rate = 0.16 kg/min, (1) 1000 mL poly
0400	724.86g	↓
0400	625.04g	↓
0400	826.24g	↓
0600	—	Tape # 14 0000 - 0600
0600	1444.86g	Feed Sample from Return, Batch 008A, (1) 1000 mL poly
0600	1455.95g	Feed Sample from Return, Batch 008A, (1) 1000 mL poly
0700	1043.08g	Homogeneous Drain Glass, Drain rate=0.20 kg/min, (1) 1000 mL poly
0700	1048.51g	↓
0700	808.07g	↓
0700	1007.46g	↓
0840	1326.50g	Feed Sample, initial Feed into Feed Tank, Batch 8A, (1) 1 bottle
0840	1342.85g	Feed Sample, initial Feed into Feed Tank Batch 8A (1) 1 bottle
0900	1384.52g	Feed Sample From Return, Batch 8A, (1) 1000 mL poly
0900	1403.10g	Feed Sample From Return, Batch 8A, (1) 1000 mL poly
0935	115.35g	Offgas solids (1) 500 mL poly
0935	132.71g	Offgas Solids (1) 500 mL poly
1015	—	Tape # 15 0600 - 1015 (End of 72-hr Demonstration)
1020	615.38g	Homogeneous Drain Glass, Drain rate = 0.33 kg/min, (1) 1000 mL poly

Continued on Page

Read and Understood By

001219

Signed | Date | Signed | Date

PROJECT

Notebook No. E 229 F

Continued From Page

Sample Number				Notebook Ref	Requirements	Sampled By	Date
GLS	SO	T	0591	—	FDF	SLH	1-21-99
DGLS	SO	T	0592	—	CELS	SLH	1-21-99
DGLS	SO	T	0593	—	Archive	SLH	1-21-99
DELS	SO	T	0594	JJ 56-57	Envitco	ME	1-21-99
FEED	SO	T	0595	—	Archive	ME	1-21-99
FEED	SO	T	0596	—	Envitco	ME	1-21-99
DGLS	SO	T	0597	—	Archive	SLH	1-21-99
DGLS	SO	T	0598	—	Envitco	SLH	1-21-99
OGSO	SO	T	0599	—	Envitco	DCR	1/21/99
OGSO	SO	T	0600	—	Archive	DCR	1/21/99
FEED	SO	T	0601	—	Envitco	DCR	1/21/99
FEED	SO	T	0602	—	Archive	DCR	1/21/99
GLS	SO	T	0603	—	Envitco	DCR	1/21/99
GLS	SO	T	0604	—	Archive	DCR	1/21/99
FEED	SO	T	0605	—	Archive	JC	1-22-99
FEED	SO	T	0606	—	Envitco	JC	1-22-99
DGLS	SO	T	0607	—	Envitco	JC	1-22-99
DGLS	SO	T	0608	—	Archive	JC	1-22-99
OGSO	SO	T	0609	—	Envitco	JC	1-22-99
OGSO	SO	T	0610	—	Archive	JC	1-22-99
FEED	SO	T	0611	—	Envitco	ME	1-22-99
FEED	SO	T	0612	—	Archive	ME	1-22-99
FEED	SO	T	0613	—	Envitco	ME	1-22-99
FEED	SO	T	0614	—	Archive	ME	1-22-99

Continued on Page

Read and Understood By

001220

Signed | Date | Signed | Date

	Weight	Comments / Notes / Remarks
1[illegible]20	571.50g	Homogeneous Drain, Drain Rate = ~~0.16 kg~~ 0.33 kg/min, (1) 1000 mL poly
1020	552.98g	↓ ↓ ↓ ↓ ↓
1020	671.44g	
1230	24.46g	Drain Ophs sample removed w/ rod (1) 250 mL poly
1410	1366.30g	Feed from Recirc. line, Batch 8A, (1) 1000 mL
1410	1365.05g	Feed from Recirc. line, Batch 8A, (1) 1000 mL
1450	668.90g	Homogeneous Drain, Drain Rate ≈ 0.5 kg/min (1) 1000 mL poly
1450	636.50g	↓ ↓ ↓ ↓ ↓
1710	60.15g	offgas solids, (1) 250 mL poly
1710	73.20g	offgas solids, (1) 250 mL poly
2210	1344.86g	Feed, Recirculation, Batch 008A, (1) 1L poly — Just after restarted drain
2210	1381.48g	Feed, Recirculation, Batch 008A, (1) 1L poly
2[illegible]	749.07g	Glass Drain, Homogeneous, Drain Rate = ~0.28 kg/min, (1) 1L poly
2[illegible]0	553.59g	↓ ↓ ↓ ↓
0630	1477.37g	Feed from Return, Batch 008A, (1) 1000 mL poly
0630	1472.69g	Feed from Return, Batch 008A, (1) 1000 mL poly
0600	727.89g	Homogeneous Drain Glass, Drain rate = 0.24 kg/min (1) 1000 mL poly
0600	929.97g	↓ ↓ ↓
0645	137.4g	Offgas Solid, (1) 500 mL poly
0645	152.1g	Offgas Solid, (1) 500 mL poly
0930	1339.60g	Initial Feed, Batch 008B, (1) 1000 mL poly
0930	1334.19g	Initial Feed, Batch 008B, (1) 1000 mL poly
1620	1401.05g	Feed from return, Batch 008B, (1) 1000 mL poly
1620	1383.5g	Feed from return, Batch 008B, (1) 1000 mL poly

Continued on Page

Read and Understood By

Signed Date Signed Date

OJECT

SAMPLE NUMBER				NOTEBOOK REF.	REQUIREMENTS	SAMPLED BY	DATE
OGSO	SO	T	0615	-	Envitco	ME	1/22/99
OGSO	SO	T	0616	-	Archive	ME	1/22/99
DGLS	SO	T	0617	-	Envitco	DCR	1/22/99
DGLS	SO	T	0618	-	Archive	DCR	1/22/99
FEED	SO	T	0619	-	Envitco	DCR	1/22/99
FEED	SO	T	0620	-	Archive	DCR	1/22/99
DGSO	SO	T	0621	—	Archive	JC	1/23/99
DGSO	SO	T	0622	—	Envitco	JC	1/23/99
DGLS	SO	T	0623	—	Archive	JC	1-23-99
DGLS	SO	T	0624	—	Envitco	JC	1-23-99
FEED	SO	T	0625	—	Envitco	JC	1-23-99
FEED	SO	T	0626	—	Archive	JC	1-23-99
DGLS	SO	T	0627	—	Archive	ME	1-23-99
DGLS	SO	T	0628	—	Archive	ME	1-23-99
DGLS	SO	T	0629	—	Archive	ME	1-23-99
DGLS	SO	T	0630	—	Archive	ME	1-23-99
DGLS	SO	T	0631	—	Archive	ME	1-23-99
DGLS	SO	T	0632	—	Archive	ME	1-23-99
DGLS	SO	T	0633	—	Archive	ME	1-23-99
DGLS	SO	T	0634	—	Archive	ME	1-23-99
			0635	—			
DGLS	SO	T	0636	—	Envitco	LT	1-23-99
DGLS	SO	T	0637	—	Archive	LT	1-23-99
FEED	SO	T	0638	—	Envitco	SH	1-23-99
FEED	SO	T	0639	—	Archive	SH	1-23-99

Continued on Page

Read and Understood By

001222

Signed | Date | Signed | Date

TI	WEIGHT	COMMENTS / NOTES / REMARKS
1630	70.64g	offgas solids, (1) 250mL poly
1630	77.40g	offgas solids, (1) 250 mL poly
2015	749.44g	Glass Drain, (1) 1L poly, Drain Rate: 0.37 Kg/min., Homogeneous
2015	783.4g	Glass Drain, (1) 1L poly, Drain Rate: 0.37 kg/min., Homogeneous
2310	1365.24g	Feed sample, Recirculation, Batch 008B, (1) 1L poly
2310	1359.65g	Feed sample, Recirculation, Batch 008B, (1) 1L poly
0030	134.3g	Offgas Solids (1) 500 mL poly
0030	137.13g	Offgas Solids, (1) 500 mL poly
0430	887.18g	Homogeneous Drain Glass, Drain rate=0.31 kg/min, (1) 1000 mL poly
0430	831.17g	Homogeneous Drain Glass, Drain rate=0.31 kg/min, (1) 1000 mL poly
0745	1489.66g	Feed Sample from Return, Batch 008 B, (1) 1000 mL poly
0[illegible]5	1489.55g	Feed Sample from Return, Batch 008B, (1) 1000mL poly
	165.7kg	Drum #22, EV101 Drain Glass From 1/19/99 1529 → 1/20/99 0533, 33 gal
	256.6kg	Drum #23, 33 gal Drum, EV101 Drain Glass From 1/20/99 0533 → 1/20/99 1832
	252.0kg	Drum #24, 33 gal Drum, EV-101 Drain Glass From 1/20/99 1832 → 1/21/99 0035
	256.3 kg	Drum #25, 33 gal Drum, EV-101 Drain Glass From 1/21/99 0035 → 1/21/99 1718
	276.3kg	Drum #26, 33 gal Drum, EV-101 Drain Glass From 1/21/99 2140 → 1/22/99 0330
	221.4kg	Drum #27, 33 gal Drum, EV-101 Drain Glass From 1/22/99 0330 → 1/22/99 2032
	233.2kg	Drum #28, 33 gal Drum, EV-101 Drain Glass From 1/22/99 2032 → 1/23/99 0855
		Drum #29
		Drum #30
1600 ~~1400~~	812.40g	Glass Drain, (1) 1L poly, Drain Rate = ~~0.085~~, Homogeneous
1600 ~~1400~~	802.41kg	Glass Drain, (1) 1L poly, Drain Rate = ~~0.08~~, Homogeneous
1610 ~~1410~~	812.40g 1361.95g	Feed Sample, Recirculation, Batch 008B (1) 1L poly
1610 ~~1410~~	1347.51g	✓ ✓ ✓ ✓

Continued on Page

Read and Understood By

...ong times written by 1st shift

001223

Signed | Date | Signed | Date

SUBJECT

Notebook No.

Continued From Page 2291

Sample Number				Notebook Ref.	Requirements	Sampled By	Date
UGSO	SO	T	0640	–	Archive	ME	1/23/99
OGSO	SO	T	0641	–	Envitco	ME	1/23/99
OGSO	SO	T	0642	–	Envitco	DCR	1/23/99
OGSO	SO	T	0643	–	Archive	DCR	1/23/99
FEED	SO	T	0644	–	Envitco	DCR	1/23/99
FEED	SO	T	0645	–	Archive	DCR	1/23/99
DGLS	SO	T	0646	–	Envitco	DCR	1/23/99
DGLS	SO	T	0647	–	Archive	DCR	1/23/99

Continued on Page

Read and Understood By

001224

Signed | Date | Signed | Date

Time	Weight	Comments / Notes / Remarks
1630	125.57g	off gas Solids } also added
1630	146.96g	Off gas Solids } 407 g to bucket
		off gas solids
		offgas solids
		feed sample
		feed sample
		Glass drain
		Glass drain

Continued on Page

Read and Understood By

Signed Date Signed Date

2291

S[illegible]e

Number	COC #	Analysis	Lab	Date
T-S-001-C	FDF-001	Dry Screen (Sieve) Analysis	CELS	
T-S-002-C	FDF-001	Dry Screen (Sieve) Analysis	CELS	
T-S-003-C	FDF-001	BET Surface Area	CELS	
SURR-SC-T-0019	FDF-002	30% SURR.-3-1gal	FDF	10/2
SO-DS-A	FDF-003	30% SURR-1-1gal	FDF	9/25
XGLS-SO-T-0026	FDF-004	GLASS Characteriz	CELS	10/2
XGLS-SO-T-0027	FDF-004	Redox	CELS	10/2
XGLS-SO-T-0028	FDF-004	Redox	CELS	10/2
XGLS-SO-T-0018	FDF-005	TCLP	Texidyne	10/2
-0020	"	"	"	"
-0021	"	"	"	"
-0023	"	"	"	"
-0024	"	"	"	"
-0025	"	"	"	"
-0029	"	"	"	"
~~XGLS-SO-T-0030~~	(RMS)			
VOID	FDF-006			
SALO-SO-T-0030	FDF-007	QCA - SEE REQ. FORM	CELS	10/5/98
SALO-SO-T-0031	"	" "	"	"
SURR-SO-T-0032 ~~SALO-SO~~	"	" "	"	"
RAWM-SO-T-0033	FDF-008	FDF-FOR TCLP PROBLEM SOLV ($PbCO_3$)	FDF	10/19/98
RAWM-SO-T-0034	FDF-008	FDF- " " " (PbO)	FDF	10/19/98
RAWM-SO-T-0035	FDF-008	FDF- " " " ($PbSO_4$)	"	"

COPIED TO ARCHIVE - 10/21/98

Continued on Page

Read and Understood By

R Burnett — Signed
10/21/98 — Date
Signed
Date

001226

PROJECT

Notebook No.

Continued From Page

2291

SAMPLE NUMBER	COC #	ANALYSIS	LAB	DATE
RAWM-SO-T-0036	FDF 009	TBD BY FDF ANB	FDF - Roberts	10/26/98
RAWM-SO-T-0037	FDF - 009	TBD BY FDF	FDF - Roberts	10/26/98
XGLS-SO-T-0042	FDF - 010	TCLP - Pb, Ba ANB	TEXIDYNE	10/27/98
-0043	"	"	"	"
-0045	"	"	"	"
-0046	"	"	"	"
-0048	"	"	"	"
-0055	"	"	"	"
-0057	"	"	"	"
-0049	"	"	"	"
-0058	"	"	"	"
-0060	"	"	"	"
-0061	"	"	"	"
-0063	"	"	"	"
XGLS-SO-T-0051	FDF - 011	" ANB	"	"
-0052	"	"	"	"
-0054	"	"	"	
-0064	"	"	"	"
XGLS-SO-T-0074	FDF-012	TCLP-Pb, Ba	Texidyne	10/28/98
-0075	"	"	"	"
-0076	"	"	"	"
-0077	"	"	"	"
-0078	"	"	"	"
-0079	"	"	"	"

Continued on Page

Read and Understood By

001227

Signed Date Signed Date

2291

Sample Number	COC#	Analysis	Lab	DATE
XGLS-SO-T-0081	FDF-014	TCLP	Texdyne	10/28
XGLS-SO-T-0083	"	"	"	10/29
XGLS-SO-T-0085	"	"	"	"
XGLS-SO-T-0087	"	"	"	"
XGLS-SO-T-0090	"	"	"	"
XGLS-SO-T-0093	"	"	"	"
XGLS-SO-T-0095	FDF-015	TCLP	"	10/30
XGLS-SO-T-0097	FDF-015	TCLP	"	10/30
XGLS-SO-T-0122	FDF-016	TCLP	"	11/5
XGLS-SO-T-0126	"	"	"	11/5
XGLS-SO-T-0124	"	"	"	"
XGLS-SO-T-0127	"	"	"	"
XGLS-SO-T-0128	"	"	"	"
XGLS-SO-T-0123	FDF-017	Redox	CELS	11/5
XGLS-SO-T-0125	"	"	"	"
XGLS-SO-T-0129	"	"	"	"
XGLS-SO-T-0130	"	"	"	"
XGLS-SO-T-0131	"	"	"	"
XGLS-SO-T-0121	FDF-019	Redox	CELS	11/5
XGLS-SO-T-0133	"	"	"	"
XGLS-SO-T-0135	"	"	"	"
XGLS-SO-T-0136	"	"	"	"
XGLS-SO-T-0137	"	"	"	"
XGLS-SO-T-0138	"	"	"	11/6

Continued on Page

Read and Understood By

Signed | Date | Signed | Date

PROJECT

Notebook No.

Continued From Page

2291

SAMPLE NUMBER	COC#	ANALYSIS	LAB	DATE
XGLS-SO-T-0139	FDF-019	Redox	CELS	11/6
XGLS-SO-T-0140	"	"	"	"
XGLS-SO-T-0141	"	"	"	"
XGLS-SO-T-0142	"	"	"	"
XGLS-SO-T-0143	"	"	"	"
XGLS-SO-T-0144	"	"	"	"
XGLS-SO-T-0145	FDF-018	"	"	"
XGLS-SO-T-0146	"	"	"	"
XGLS-SO-T-0147	"	"	"	"
XGLS-SO-T-0148	"	"	"	"
XGLS-SO-T-0149	"	"	"	"
GLS-SO-T-0150	"	"	"	"
XGLS-SO-T-0100 TCLP-0153	FDF-020	TCLP (Ba, Pb)	Texdyne	11/10/98
XGLS-SO-T-0103 TCLP-0154	"	"	"	"
XGLS-SO-T-0104 TCLP-0155	"	"	"	"
XGLS-SO-T-0107 TCLP-0156	"	TCLP (Ba, Pb, Zn)	"	"
XGLS-SO-T-0108 TCLP-0157	"	"	"	"
XGLS-SO-T-0116 TCLP-0158	"	"	"	"
	FDF-021 — VOID			
XGLS-SO-T-0220	FDF-022	TCLP	TEXDYNE	11/16/98
-0214		"		
0194		"		
-0204		"		
-0203		"		

Continued on Page

Read and Understood By

Signed Date Signed Date

SAMPLE NUMBER	COC #	ANALYSIS	LAB	DATE
XULS-SO-T-0186	022	TCLP	TEADYNE	11/16/98
-0191				
-0208				
-0205				
-0206				
-0218				
-0189				
XULS-SO-T-0213	023	REDOX	GELS	11/16/98
-0202				
-0195				
-0196				
-0201				
0215				
-0193				
-0200				
-0192				
-0207				
-0178				
-0199				
SURE-S2-T-6222	024	TCLP	FLUOR-DANIEL	11/20/98
-0221				
SURE-SO-T-0172	025	TCLP	FLUOR DANIEL	11/12/98
-0173				
-0174				
-0175				

Continued on Page

Read and Understood By

001230

Signed Date Signed Date

PROJECT

Notebook No. 229 I

Continued From Page

~~SURR-SO~~ SAMPLE	COC #	ANALYSIS	LAB	DATE
SURR-SO-T-0176	-025	TCLP	Fluor-Daniel	11/12/98
-0177	1	1	1	1
VOID	-026 (?)	NO RECORD OF THIS COC - VOID		
SURR-SO-T-0225	029	TCLP	Texidyne	12/1/98
SURR-SO-T-0226	029	TCLP	Texidyne	12/1/98
SURR-SO-T-0224	027	TCLP	CELS	11/27/98
SURR-SO-T-0223	028	TCLP	FDF	11/27/98
	AM3 ~~-027~~			

Copied to archive 12/5/98

Continued on Page

Read and Understood By

001231

Signed	Date	Signed	Date

SAMPLE	COC#	Analysis	Lab	DATE
XGLS-SO-T-0231	030	Melting Eval	Univ Prague	12/7
XGLS-SO-T-0232	031	GCA	Corning	12/7
		Liquidus, Etc		
XGLS-SO-T-0233	031	Redox	Corning	12/7
XGLS-SO-T-0234	031	Redox	Corning	12/7
XGLS-SO-T-0235	031	Redox	Corning	12/7
SURR-SO-T-0236	032	TCLP/VALIDATION	CEMS	12/14
SURR-SO-T-0237	033	TCLP/VALIDATION	EDF	12/14

Continued on Page

Read and Understood By

Signed Date Signed Date

Sample	COC	Analysis	LAB	Date
DGLAS-SO-T-0289	FDF 034	Redox	CORNING	12/18
" " " 0288	FDF 034	Redox	CORNING	12/18

Continued on Page

Read and Understood By

Sample Number				Notebook Ref.	Requirements	Sampled By	Date
OGSO	SO	T	0640	–	Archive	ME	1/23/99
OGSO	SO	T	0641	–	Envitco	ME	1/23/99
OGSO	SO	T	0642	–	Envitco	DCR	1/23/99
OGSO	SO	T	0643	–	Archive	DCR	1/23/99
~~FEED~~	~~SO~~	~~T~~	~~0644~~		~~Envitco~~	~~DCR~~	~~1/23/99~~
~~FEED~~	~~SO~~	~~T~~	~~0645~~	–	~~Archive~~	~~DCR~~	~~1/23/99~~
DGLS	SO	T	0646	–	Envitco	DCR	1/23/99
DGLS	SO	T	0647	–	Archive	DCR	1/23/99
MISC	SO	T	0648	–	Envitco	DCR	1/24/99
MISC	SO	T	0649	–	Envitco	DCR	1/24/99
DMW NOTE THIS SAMPLE WAS REMOVED AS SOLID COOLED LIKE ICON ORE							
[illegible]	SO	T	0650	–	ENVITCO	DCR	1/24/99
DGLS	SO	T	0651	–	Archive for FDF	~~SL~~ ME	1/~~25~~ 26/99
DGLS	SO	T	0652	–	Archive For FDF	ME	1/26/99
DGLS	SO	T	0653	–	Archive For FDF	ME	1/26/99
DGLS	SO	T	0654	–	Archive For FDF	ME	1/26/99
DGLS	SO	T	0655	–	Archive for FDF	ME	1/26/99
DGLS	SO	T	0656	–	Archive for FDF	ME	1/26/99
DGLS	SO	T	0657	–	Archive For FDF	ME	1/26/99
~~DGLS~~	~~SO~~	~~T~~	~~0658~~	–	~~Archive for FDF~~	~~ME~~	~~1/26/99~~
↳ already in a separate sample no need to							
SALT	SO	T	0658	–	ENVITCO	Raw	1/28/99
XGLS	SO	T	0659	FF 32	TCLP/Prague	[illegible]	2/11/99
MISC	SO	T	0660		Envitco	Raw	2/11/99

Continued on Page

Read and Understood By

001234

Signed | Date | Signed | Date

[redacted]	Weight	Comments / Notes / Remarks
1630	125.57g	off gas Solids } also added
1630	146.96g	Off gas Solids } 407 g to bucket
2305	110.50g	off gas solids, (1) 500 mL poly
2305	102.94g	off gas solids, (1) 500 mL poly
		~~Feed sample, (1) 1L poly, Recirculation, Batch 0003~~ Feed sample entered but was never taken.
		~~Feed sample, (1) 1L poly, Recirculation, Batch 0003~~
2110	748.87g	Glass drain, (1) 1L poly, Homogeneous, Drain Rate = .34 Kg/min
2110	648.52g	Glass drain, (1) 1L poly, Homogeneous, Drain Rate = .34 Kg/min
1735	14.78g	(1) 250 mL poly – soled salt from drain orifice – disintegrated upon cooling
1735	18.56g	(1) 250 mL poly – salt accumulation at drain orifice
DISINCERATED AS IT COOLED. COOL SAMPLE WAS DUST / FINE PARTICULATE MEC.		
[redacted]5	78.8g	(1) 500 mL poly, off gas solids
1100	173.84g	sub sample from DGLS-SO-T-0327 in (1) 1000 mL wide mouth
1100	1014.22g	subsample from DGLS-SO-T-0334 in (1) 1000 mL wide mouth
1100	457.71g	Subsample from DGLS-SO-T-0336 in (1) 1000 mL wide mouth
1100	475.37g	subsample from DGLS-SO-T-0343 in (1) 1000 mL wide mouth
1100	.840g ~~749~~ 794.9g	Subsample from DGLS-SO-T-~~0349~~ 0346 in (1) 1000 mL wide mouth poly
1110	794.9g	Subsample from DGLS-SO-T-0349 in (1) 1000 mL wide mouth poly
1120	713.56g	subsample from DGLS-SO-T-0353 in (1) 1000 mL wide mouth poly
~~1120~~	~~533.39g~~	~~subsample from DGLS-SO-T-0357 in (1) 1000 mL poly~~
sub sample		
1528	208.73 g	solidified salt from EV-101 melt surface / post mortem
	≈ 600 gm	SO-U1-1 - SAME AS SO-D5B-2-S2
1341		[redacted] Electrode [redacted]: Partial Oxidation during Shutdown
[redacted]		

Continued on Page

Read and Understood By

001235

Signed Date Signed Date

PROJECT

Notebook No. 2291

Continued From Page

Sample Number				Notebook Ref.	Requirements	Sampled By	Date
MISC	SO	T	0661		Envitco	RAW	2/11/99
MISC	SO	T	0662		Envitco	RAW	2/11/99
MISC	SO	T	0663		Envitco	RAW	2/11/99
XGLAS	SO	T	0664				2/11/99
MISC	SO	T	0665		Envitco	RAW	2/11/99
MISC	SO	T	0666		ENVITCO	RAW	2/11/99
MISC	SO	T	0667		Envitco	RAW	2/11/99
MISC	SO	T	0668		Envitco	RAW	2/11/99
OGDP	SO	T	0669		Envitco	~~RAW~~ MOW	~~2/11/99~~ 2/3/99 RAW
OGDP	SO	T	0670		Envitco	~~RAW~~ MOW	2/3/99
OGDP	SO	T	0671		Envitco	MOW	2/3/99
[illegible]SC	SO	T	0672		Envitco	RAW	2/11/99
[illegible]ALT	SO	T	0673		Envitco	RAW	1/23/99
SALT	SO	T	0674		Archive	RAW	1/23/99
XGLS	SO	T	0675		TCLP	DHD	2/11/99
XGLS	S1	T	0676		TCLP	DHD	2/11/99
XGLS	SO	T	0677	FF 37	Archive	DHD	2/11/99
XGLS	SO	T	0678	FF 37	TCLP	DHD	2/11/99
XGLS	SO	T	0679	FF 35	Archive	DHD	2/11/99
XGLS	SO	T	0680	FF 35	TCLP	DHD	2/11/99
XGLS	SO	T	0681	FF 39	Archive	DHD	2/11/99
XGLS	SO	T	0682	FF 39	TCLP	DHD	2/11/99
XGLS	SO	T	0683	FF 41	Archive	DHD	2/11/99
XGLS	SO	T	0684	FF 41	TCLP	DHD	2/11/99

Continued on Page

Read and Understood By

Signed Date Signed Date

PROJECT

T[redacted]	Weight	Comments / Notes / Remarks
13:58		[redacted] Electrode [redacted] Broken During Post Mort.
14:03		[redacted] Electrode [redacted]
14:08		Worn / Failed Electrode, [redacted]
16:17	492.7 g	Metallic Material found around metals drain: Post Mortem
16:22	496.8 g	Metallic Material found around metals drain: Post Mortem
16:25	155.98 g	Metallic Material recovered during Post Mortem
16:28	56.28 g	"High Shine" Metallic recovered during Post Mortem.
10:35	73.58 g	Solids collected at vertical/elbow/transition to EP.
15:00	5.40 g	Solids collected from elbow at west end wall.
15:30	8.48 g	Solids collected from straight pipe between elbow/offgas riser.
[redacted]	101.77 g	Devit from main tank bottom (Post Mortem).
~..00	552.39 g	Salt collected at end of 7800 kg processing
~11:00	575.92 g	Salt collected at end of 7800 kg processing
1800	~300g	Glass S0-U1-4 - 50% Waste Loading
1800	~300gm	Glass S1-U1-1 - 79% Waste Loading
1800	186 gm	GLASS S0-U1-5 (40% WL) - 0.2% C
1800	110 gm	GLASS S0-U1-5 (40% WL) - 0.2% C
1700	182 gm	GLASS S0-U1-6 (30% WL) - 0.2% C
1700	110 gm	" " " "
2000	192 gm	Glass S0-U1-4 (50% WL) - 0.2% C
2000	115 gm	" " " "
2100		Glass S1-U1-1 (79% WL - 0.2% C)
2100	Not Submitted	Glass S1-U1-1 (79% WL - 0.2% C)
[redacted]		Continued on Page

Read and Understood By

001237

Signed Date Signed Date

PROJECT

Notebook No.

Continued From Page 2291

SAMPLE Number				Notebook Reference	Requirements	Sampled By	DATE
XGLS	S1	T	0685	FF44	TCLP	MOW	2/12/99
XGLS	S1	T	0686	FF44	Arch	MOW	2/12/99
XGLS	S1	T	0687	FF 47	Archive		2/12/99
XGLS	S1	T	0688	FF47	TCLP	MOW	2/12/99
XGLS	S1	T	0689	FF 49	Archive	MOW	2/15/99
XGLS	S1	T	0690	FF49	TCLP	MOW	2/15/99
XGLS	S1	T	0691	FF 51	Archive	MOW	2/15/99
XGLS	S1	T	0692	FF51	TCLP	MOW	2/15/99
XGLS	S1	T	0693	FF53	Archive	MOW	2/15/99
XGLS	S1	T	0694	FF53	TCLP	MOW	2/15/99
XGLS	S1	T	0695	FF55	Archive	MOW	2/15/99
XGLS	S1	T	0696	FF55	TCLP	MOW	2/15/99
XGLS	S1	T	0697	FF57	Archive	MOW	2/17/99
XGLS	S1	T	0698	FF57	TCLP	MOW	2/17/99
XGLS	S1	T	0699	FF59	Archive	MOW	2/17/99
XGLS	S1	T	0700	FF59	TCLP	MOW	2/17/99
XGLS	S2	T	0701	FF61	Archive	MOW	2/17/99
XGLS	S2	T	0702	FF61	TCLP	MOW	2/17/99
XGLS	S2	T	0703	FF63	Archive	MOW	2/17/99
XGLS	S2	T	0704	FF63	TCLP	MOW	2/17/99
XGLS	S2	T	0705	FF65	Archive	MOW	2/18/99
XGLS	S2	T	0706	FF65	TCLP	MOW	2/18/99
XGLS	S2	T	0707	FF67	Archive	MOW	2/18/99
XGLS	S2	T	0708	FF67	TCLP	MOW	2/18/99

Continued on Page

Read and Understood By

001238

Signed Date Signed Date

TIME	Weight	Comments/Notes/Remarks
1100	~~114.92~~ ~~108.69~~g	Glass S1-U1-1 – 79% W.L – 0.3% C
1100	178.37	" " " "
		Glass S1-U1-2 – 70% W.L. 0.3% C
1100	108.62g	" " " "
1110	~~[illegible]~~ 195.26g	Glass S2-U1-~~2~~ – 60% W.L. 0.3% C
1110	120.83g	" " " " " " " "
1120	~~[illegible]~~ 172.35	Glass S1-U1-~~4~~ – 50% W.L 0.3% C
1120	140.63g	" " " "
~~1~~1610	182.85g	Glass S1-U1-5 – 40% W.L. 0.1% C
1610	108.60g	" " " "
1700	218.66g	Glass S1-U1-~~6~~ – 30% W.L. 0.1% C
[illegible]0	117.50g	" " " "
[illegible]00	216.85g	Glass S1-U1-~~3~~ – 60% W.L. 0.1% C
1000	106.89g	" " " "
1010	223.63g	Glass S1-U1-~~4~~ – 50% W.L. 0.1% C
1010	106.20g	" " " "
1030	65.78g	Glass S2-U1-1 – 79% W.L. 0.3% C
1030	110.16g	" " " "
1930	130.71g	Glass S2-U1-2 – 70% W.L. 0.3% C
1930	109.95g	" " " "
1000	212.89g	Glass S2-U1-3 – 60% W.L. 0.1% C
1000	108.17g	" " " "
1010	208.26g	Glass S2-U1-4 – 50% W.L. 0.1% C
1010	110.90g	" " " "

Continued on Page

Read and Understood By

001239

Signed Date Signed Date

PROJECT

Notebook No.

Continued From Page

2291

Sample Notebook Number				Notebook Reference	Requirements	Sampled by	Date
XGLS	S2	T	0709	FF69	Archive	MOW	2/18/99
XGLS	S2	T	0710	FF69	TCLP	MOW	2/18/99
XGLS	S2	T	0711	FF71	Archive	MOW	2/18/99
XGLS	S2	T	0712	FF72	TCLP	MOW	2/18/99
XGLS	S1	T	0713	FF49	SEM	MOW	2/23/99
XGLS	S1	T	0714	FF51	SEM	MOW	2/23/99
XGLS	S1	T	0715	FF86	Wt. Compare	MOW	2/23/99
XGLS	S1	T	0716	FF88	Wt. Compare	MOW	2/23/99
XGLS	S1	T	0717	FF90	Wt Compare	MOW	2/23/99
XGLS	S1	T	0718		SEM	MOW	2/23/99
XGLS	S1	T	0719	FF 73	Archive	MOW	2/23/99
XGLS	S1	T	0720	FF 73	TCLP	MOW	2/23/99
XGLS	S1	T	0721	FF 75	Archive	MOW	2/23/99
XGLS	S1	T	0722	FF 75	TCLP	MOW	2/23/99
XGLS	S1	T	0723	FF8377	Archive	MOW	2/24/99
XGLS	S1	T	0724	FF8377	TCLP	MOW	2/24/99
XGLS	S1	T	0725	FF8379	Archive	MOW	2/24/99
XGLS	S1	T	0726	FF8379	TCLP	MOW	2/24/99
XGLS	S1	T	0727	FF 81	Archive	MOW	2/24/99
XGLS	S1	T	0728	FF 81	TCLP	MOW	2/24/99
XGLS	S1	T	0729	FF1983	Archive	MOW	2/24/99
XGLS	S1	T	0730	FF1983	TCLP	MOW	2/24/99
XGLS	S1	T	0731	FF1985	Archive	MOW	2/24/99
XGLS	S1	T	0732	FF1985	TCLP	MOW	2/24/99

Continued on Page

Read and Understood By

Signed | Date | Signed | Date

001240

Time	Weight	Comments / Notes / Remarks
1020	205.97	Glass S2-U1-5 40% waste load - 0.1% carbon
1020	109.70	" " " "
1040	204.16	Glass S2-U1-6 30% waste load - 0.1% carbon
1040	112.24	" " " "
[illegible]	0.16g	Metal composite left from glass S1-U1-3 at 0.3% carbon
1500	0.28g	" " " " " S1-U1-4 at 0.3% carbon
1510	3.47g	Salts from S1-U2-3 at 50% wl 0.1% carbon
1510	4.90g	Salts from S1-U2-4 at 50% wl 0.1% carbon
1510	5.73	Salts from S1-U2-6 at 50% wl 0.1% carbon
1515	0.32g	Metal deposit left in glass S1-U1-6 at 0.2% carbon
1400	137.08	Glass S1-U1-3 60% wl - S2 or 0.2% carbon
[illegible]	113.22	" " " "
[illegible]00	150.31	Glass S1-U4-4 50% wl - S2 or 0.2% carbon
1400	111.70	" " " "
1430	212.91	Glass S1-U2-1 50% wl - 0.2% carbon
1430	110.56	" " " "
1440	198.42	Glass S1-U2-2 50% wl - 0.2% carbon
1440	109.21	" " " "
1450	189.20	Glass S1-U2-3 50% wl - 0.2% carbon
1450	107.02	" " " "
1500	215.14	Glass S1-U2-5 50% wl - 0.2% carbon
1500	107.06	" " " "
1510	202.86	Glass S1-U2-6 50% wl - 0.2% carbon
1510	108.17	" " " "

Continued on Page

Read and Understood By

Signed | Date | Signed | Date

Sample Number				Notebook Reference	Requirements	Sampled By	Date
XGLS	S1	T	0733	FF87	Archive	MOW	2/25/99
XGLS	S1	T	0734	FF87	TCLP	MOW	2/25/99
XGLS	S1	T	0735	FF89	Archive	MOW	2/25/99
XGLS	S1	T	0736	FF89	TCLP	MOW	2/25/99
XGLS	S1	T	0737	FF91	Archive	MOW	2/25/99
XGLS	S1	T	0738	FF91	TCLP	MOW	2/25/99
XGLS	S1	T	0739	FF93	Archive	MOW	2/25/99
XGLS	S1	T	0740	FF93	TCLP	MOW	2/25/99
XGLS	S1	T	0741	FF95	Archive	MOW	2/25/99
XGLS	S1	T	0742	FF95	TCLP	MOW	2/25/99
XGLS	S1	T	0743	FF97	Archive	MOW	2/25/99
XGLS	S1	T	0744	FF97	TCLP	MOW	2/25/99
XGLS	S1	T	0745	FF99	Archive	MOW	2/25/99
XGLS	S1	T	0746	FF99	TCLP	MOW	2/25/99
XGLS	S1	T	0747	FF92	Wt. Compar.	MOW	2/25/99
XGLS	S1	T	0748	GG5	Archive	DHW	3/3/99
XGLS	S1	T	0749	GG5	TCLP	DHW	3/3/99
XGLS	S1	T	0750	GG7	Archive	DHW	3/3/99
XGLS	S1	T	0751	GG7	TCLP-dup	DHW	3/3/99
XGLS	S1	T	0752	GG7	TCLP-dup	DHW	3/3/99
XGLS	S1	T	0753	GG9	Archive	DHW	3/3/99
XGLS	S1	T	0754	GG9	TCLP-dup	DHW	3/3/99
XGLS	S1	T	0755	GG9	TCLP-dup	DHW	3/3/99

Continued on Page

Read and Understood By

Signed Date Signed Date

Time	Weight	Comments/Notes/Remarks
1100	184.54	S1-U2-3 Glass 50% waste load at 0.1% carbon
1100	108.67	" " " "
1110	167.98	S1-U2-4 Glass 50% waste load at 0.1% carbon
1110	111.78	" " " "
1120	199.35	S1-U2-6 Glass 50% waste load at 0.1% carbon
1120	108.36	" " " "
1130	205.07	S1-U2-~~5~~ 7 Glass 50% waste load at 0.1% carbon
1130	105.65	" " " "
1140	150.15	S1-U2-~~7~~ 4 Glass 50% waste load at 0.2% carbon } Pr O
1140	106.32	" " " "
1150	174.74	S1-U2-9 Glass 50% waste load at 0.2% carbon
1150	109.18	" " " "
1200	208.80	S1-U2-10 Glass 50% waste load at 0.2% carbon
1200	110.02	" " " "
	6.85	Sacts Collected from Glass S1-U2-7 (10% Al_2O_3 add.)
1600	193 gm	Glass from U2 run - S1-U2-12 - (highly oxidized)
1600	108 gm	" " " " "
1700	138 gm	Glass from U2 run - S1-U2-14-S2
1700	110.5 g	" " " "
1700	111.0 gm	" " " "
1800	98 gm	Glass from U2 run - S1-U2-13-S2
1800	109.7 gm	" " " "
1800	109.4 gm	" " " "

Continued on Page

Read and Understood By

001243

Signed Date Signed Date

PROJECT

Notebook No.

Continued From Page 229 I

SAMPLE NUMBER				LAB BOOK REFERENCE	Requirements	Sampled By	Date
XGLS	S1	T	0756	GG 11	Archive	DHD	3/3/99
XGLS	S1	T	0757	GG 11	TCLP	DHD	3/3/99
XGLS	S1	T	0758	GG 13	Archive	DHD	3/3/99
XGLS	S1	T	0759	GG 13	TCLP	DHD	3/3/99
				(0759) DHD			
XGLS	S1	T	0760	GG 17	Archive	DHD	3/3/99
XGLS	S1	T	0761	GG 17	TCLP	DHD	3/3/99
XGLS	S1	T	0762	GG 15	Archive	DHD	3/3/99
XGLS	S1	T	0763	GG 15	TCLP	DHD	3/3/99
XGLS	S1	T	0764	GG 15	TCLP	DHD	3/3/99
XGLS	S1	T	0765	GG 15	possible SEM	DHD	3/3/99
XGLS	S1	T	0766	GG 25	TCLP	DHD	3/5/99
XGLS	S1	T	0767	GG 23	TCLP	DHD	3/5/99
XGLS	S1	T	0768	GG 22	TCLP	DHD	3/5/99

Continued on Page

Read and Understood By

001244

Signed | Date | Signed | Date

2291

ME	WEIGH	COMMENTS / Notes / REMARKS
0900	228g	Glass from U2 Series - S1-U2-8-s2
0900	109g	" " " " "
2200	217g	Glass from U2 Series - S1-U2-12-s2
2200	107g	" " " " "
2100	209g	Glass from U2 Series - S1-U2-14-s3
2100	108.7g	" " " " " "
2350	110gm	Glass from U2 Series - S1-U2-10-s3
2350	110g	" " " "
2350	110g	" " " "
2350		"Metallic" mat'l from S1-U2-10-S3 casting crucible.
00	110gm	Reduced Alkali - minus 4% - S1-U1-17-s2
300	94.2gm	" " - minus 3% - S1-U1-16-s2
1350	84.6	" " - minus 2% - S1-U1-15-s2

Continued on Page

Read and Understood By

001245

Signed | Date | Signed | Date

EnVitCo, Inc.
A COGEMA Group Company

SECTION 16

TOXICITY CHARACTERISTIC LEACHING PROCEDURE RESULTS

COMPUCHEM ANALYTICAL DATA PACKAGES

Document ID	Samples
98703 GL KJH INC 19990301 1020 0 Q	Demonstration Glass
98703 GL RAW INC 19990302 1000 0 Q	Demonstration Glass and Offgas Solids
98703 GL RAW INC 19990316 1330 0 Q	Salt
98703 GL RAW INC 19990316 0316 0 Q	Duplicate Salt Analysis
98703 GL RAW INC 19990316 1332 0 Q	Surrogate
98703 GL RAW INC 19990316 1333 0 Q	Duplicate Surrogate Analysis

98703 GL KTH INC 19990301 1020 OQ

kw: CompChem, TCLP, Data Package

2291

cc: RAW
DMB

cc cover only: DHD
KJH

COMPUCHEM

a division of Liberty Analytical Corp.

26/FEB/99

ENVITCO
3400 EXECUTIVE PARKWAY
TOLEDO, OH 43606

Subject: Report of Data - Account Number# 501224 Order# 34134

Enclosed are the results of analytical work performed in accordance with the referenced account number.

This report covers 20 sample(s) appearing on the attached listing.

Thank you for selecting CompuChem Environmental for your sample analysis. If you should have questions or require additional analytical services please contact your representative at 1-800-833-5097.

Sincerely,

Marlene A Swift

CompuChem Environmental
a division of Liberty Analytical

Attachment

501 Madison Avenue ■ Cary, N.C. 27513 ■ Tel: 919-379-4100 ■ Fax: 919-379-4050

COMPUCHEM

a division of Liberty Analytical Corp.

26/FEB/99

ENVITCO
3400 EXECUTIVE PARKWAY
TOLEDO, OH 43606

ACCOUNT #: 501224

CC#	SAMPLE-ID	RECEIPT DATE
929120	DGLSSOT0334	2/16/99
929125	DGLSSOT0334D	2/16/99
929126	DGLSSOT0364	2/16/99
929127	DGLSSOT0364D	2/16/99
929128	DGLSSOT0394	2/16/99
929129	DGLSSOT0394D	2/16/99
929130	DGLSSOT0419	2/16/99
929131	DGLSSOT0419D	2/16/99
929132	DGLSSOT0440	2/16/99
929133	DGLSSOT0440D	2/16/99
929134	DGLSSOT0468	2/16/99
929135	DGLSSOT0468D	2/16/99
929136	DGLSSOT0492	2/16/99
929137	DGLSSOT0492D	2/16/99
929138	DGLSSOT0544	2/16/99
929139	DGLSSOT0544D	2/16/99
929140	DGLSSOT0566	2/16/99
929141	DGLSSOT0566D	2/16/99
929142	DGLSSOT0590	2/16/99
929143	DGLSSOT0590D	2/16/99

TOTAL NUMBER OF SAMPLES = 20

501 Madison Avenue ■ Cary, N.C. 27513 ■ Tel: 919-379-4100 ■ Fax: 919-379-4050

CompuChem Environmental

I. SAMPLE DATA PACKAGE

SW-846

The sample data package shall include data for all analyses of all samples in one Sample Delivery Group (SDG) including field and analytical samples reanalyses, blanks, spikes, duplicates, and laboratory control samples The sample data package consists of the following:

A. Cover Page

B. Sample Data

C. Chain-of-Custody (CoC) Documentation

LAB CODE : COMPU

CONTRACT # : SW-846

CASE # : 34134

SDG # : 00001

A. Cover Page -

Inorganic Analyses Data Package

The Cover Page includes laboratory information, the Case and SDG numbers, the client ID numbers in alphanumeric order showing the client ID numbers cross-referenced with Lab ID numbers, comments, and completion of the statement on the use of ICP background and interelement correction for the samples.

On separate pages, the laboratory will include any problems encountered; both technical and administrative, the corrective action taken, and the resolution. This information is included in the Inorganic Case Summary Narrative which follows the Cover Page.

U.S. EPA - CLP

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134 SAS No.: _____ SDG No.:00001_

SOW No.: SW846__

EPA Sample No.	Lab Sample ID
_DGLSSOT0334__	_929120_____
DGLSSOT0334D	_929124_____
DGLSSOT0334M	_929122_____
DGLSSOT0334S	_929121_____
DGLSSOT0334D	_929125_____
_DGLSSOT0364__	_929126_____
DGLSSOT0364D	_929127_____
_DGLSSOT0394__	_929128_____
DGLSSOT0394D	_929129_____
_DGLSSOT0419__	_929130_____
DGLSSOT0419D	_929131_____
_DGLSSOT0440__	_929132_____
DGLSSOT0440D	_929133_____
_DGLSSOT0468__	_929134_____
DGLSSOT0468D	_929135_____
_DGLSSOT0492__	_929136_____
DGLSSOT0492D	_929137_____
_DGLSSOT0544__	_929138_____
DGLSSOT0544D	_929139_____
_DGLSSOT0566__	_929140_____

Were ICP interelement corrections applied ? Yes/No YES

Were ICP background corrections applied ? Yes/No YES
If yes - were raw data generated before application of background corrections ? Yes/No NO_

Comments:
____THE_FOLLOWING_ANALYTES_HAVE_BEEN_FLAGGED_WITH_AN_"E"_TO_INDICATE_____
____SERIAL_DILUTION_RESULTS_WHICH_WERE_OUTSIDE_CONTROL_LIMITS:_____
____NICKEL_____

I certify that 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 floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Thomas R. Cole for Name: Carol J. Yundell

Date: February 25, 1999 Title: Laboratory Manager

U.S. EPA - CLP

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134 SAS No.: _____ SDG No.:00001_

SOW No.: SW846__

EPA Sample No.	Lab Sample ID
DGLSSOT0566D	_929141_____
_DGLSSOT0590__	_929142_____
DGLSSOT0590D	_929143_____
_LEACHBLK_____	_929206_____

Were ICP interelement corrections applied ? Yes/No YES

Were ICP background corrections applied ? Yes/No YES

If yes - were raw data generated before application of background corrections ? Yes/No NO_

Comments:

____THE_FOLLOWING_ANALYTES_HAVE_BEEN_FLAGGED_WITH_AN_"E"_TO_INDICATE_____
____SERIAL_DILUTION_RESULTS_WHICH_WERE_OUTSIDE_CONTROL_LIMITS:_____
____NICKEL_____

I certify that 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 floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Thomas R. Cole for Name: Carol J. Handell

Date: February 25, 1999 Title: Laboratory Manager

CompuChem
a Division of Liberty Analytical Corp.
501 Madison Avenue Cary, NC 27513

INORGANIC CASE SUMMARY NARRATIVE
CASE # 34134 SDG # 00001
PROTOCOL # SW-846

The indicated Sample Delivery Group (SDG) consisting of ten (10) soil samples was received into the laboratory management system (LIMS) on February 16, 1999 intact and in good condition with Chain of Custody (COC) records in order. Sample ID's reported in this data package are noted by the receiving department on the COC if they differ from those listed by the samplers on the COC.

The samples were prepared as leachates. Each leachate was digested from two aliquots (original and duplicate samples) then analyzed for beryllium, nickel, thallium, vanadium, zinc, and the eight RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) using analytical methods delineated in SW-846 (Third Edition)-Update III.

SAMPLE IDs:

The following customer IDs are associated with this SDG:

DGLSSOT0334	DGLSSOT0334D	DGLSSOT0364	DGLSSOT0364D
DGLSSOT0394	DGLSSOT0394D	DGLSSOT0419	DGLSSOT0419D
DGLSSOT0440	DGLSSOT0440D	DGLSSOT0468	DGLSSOT0468D
DGLSSOT0492	DGLSSOT0492D	DGLSSOT0544	DGLSSOT0544D
DGLSSOT0566	DGLSSOT0566D	DGLSSOT0590	DGLSSOT0590D

INSTRUMENTAL QUALITY CONTROL:

All calibration verification solutions (ICV & CCV), blanks (ICB, CCB) and interference check samples (ICSA & ICSAB) associated with this data were confirmed to be within SW-846 allowable limits.

SAMPLE PREPARATION QUALITY CONTROL:

The sample preparation procedure verifications (LCSW & PBW) were found to be within acceptable ranges and all field samples were prepared and analyzed within the contract specified holding times.

MATRIX RELATED QUALITY CONTROL:

The sample matrix spike, CCN = 929021 (DGLSSOT0334S) and sample matrix spike duplicate, CCN = 929022 (DGLSSOT0334M) were found to be outside control limits for selenium. The reported concentrations for this analyte are flagged with an "N" on all associated Form 1 and on Form 5a.

An "N" indicates a matrix-related interference in the sample preparation procedure &/or analysis for the flagged analyte. This is normally the consequence of a relatively high anionic content in the sample or (for some sediments) an inconsistent sample matrix relative to that analyte.

SW-846 control limits for matrix spike recoveries are set at 75% to 125% of the analyte quantity added unless original sample concentrations exceed the true values of these "spikes" by a factor of four or more;

in this case effected analytes are not flagged even if recoveries fall outside percentage recovery control limits.

Post-digestion spikes are mandatory for analytes demonstrating unsatisfactory matrix spike recoveries during ICP analysis (excluding silver). The results of such spikes are presented on Form 5b.

Unsatisfactory recovery of post-digestion spikes of this type do not have bearing upon the aforementioned "N" flags, but may indicate interference during analysis &/or a solution matrix which is hostile to the analyte in question.

Satisfactory recovery of an analyte in a post-digestion spike of this type implies interference by the required preparation procedure or in the sample matrix itself. Lack of uniformity for an analyte in sediments will also result in satisfactory recovery of post-digestion spikes after failure in the related matrix spike.

The sample matrix duplicate, CCN = 929024 (DGLSSOT0334D) was inside control limits for the requested analytes.

SW-846 control limits for duplicate determinations are +/- 20% Relative Percent Difference (RPD) for concentrations greater than or equal to five times the CRDL in both the original and duplicate samples, and +/- the CRDL for concentrations less than five times the CRDL. The RPD is not calculated if both the original and duplicate values fall below the IDL.

A five-fold serial dilution of sample, CCN = 929120 (DGLSSOT0334L) was performed in accordance with SW-846 requirements for ICP analysis.

The adjusted sample concentrations were outside control limits for nickel, which is flagged with an "E" on all associated Form 1, the Cover Page and Form 9.

An "E" indicates that a chemical or physical interference effect was encountered during the analysis of the flagged analyte. As a result of this interference, all values for the analyte in the same matrix must be considered to be estimated quantities.

SW-846 control limits for serial dilution are defined as a deviation less than or equal to 10% in the dilution-adjusted concentrations from the original values for all analyte concentrations with values greater than fifty (50) times their respective Instrument Detection Limit (IDL) in the original sample.

This SDG package was processed using the Ward Scientific software. This software package has a seven character limitation on the Forms 13 and 14 -- any sample ID's which exceed seven characters are truncated from left to right on these forms.

Release of the data contained in this hard copy data package has been authorized by the laboratory manager or his designee, as verified by the following signature.

Thomas R. Cole
Chemist II
February 25, 1999

Note: This report is paginated for reference and accountability.

CompuChem
a Division of Liberty Analytical Corp.
501 Madison Avenue Cary, NC 27513

DATA REPORTING QUALIFIERS FOR INORGANICS

On Form I, under the column labeled "C" for concentration qualifier and "Q" for qualifier, each result is flagged with the specific data reporting qualifiers listed below, as appropriate. Up to five qualifiers may be reported on Form I for each analyte.

The C (concentration) qualifiers used are:

U: This flag indicates the analyte was analyzed for but not detected. This reported value was obtained from a reading that was less than the Instrument Detection Limit (IDL). The IDL will be adjusted to reflect any dilution and, for soils, the percent moisture.

B: This flag indicates the analyte was analyzed for and the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

The Q qualifiers used are:

E: This flag indicates an estimated value. This flag is used:

1. When the serial dilution (a five fold dilution for CLP and a four fold dilution for SW-846 method 6010A) results are not within 10%. The analyte concentration must be sufficiently high (minimally a factor of 50X above the IDL in the original sample).
2. When the analytical spike recovery associated with the sample is below 40% after two successive dilutions by Graphite Furnace Atomic Absorption (GFAA).

M: This flag applies to GFAA analyses for concentrations greater than the Contract Required Detection Limit (CRDL). This flag is only used for GFAA if the analytical sample or analytical spike duplicate injection reading is not within 20% of the Relative Standard Deviation (RSD).

N: This flag indicates the sample spike recovery is outside of control limits:

*: This flag is used for duplicate analysis when the sample and the sample duplicate results are not within control limits.

S: This flag applies to GFAA analyses to indicate the reported value was determined by the Method of Standard Additions (MSA).

W: This flag applies to GFAA analyses when the post-digestion spike (analytical spike) is out of control limits (85% - 115%), while sample absorbance is less than 50% of "spike" absorbance ["spike" is defined as (absorbance or concentration of spike sample) minus (absorbance or concentration of the sample)].

+: This flag applies to GFAA analyses when the correlation coefficient for the MSA is less than 0.995 after two MSA analyses.

NOTE: Entering "S", "W", or "+" is mutually exclusive. No combination of these qualifiers can appear in the same field for an analyte.

The extensions: D, S, M, L. A, added to the end of the client ID represent as follows:

D: matrix duplicate
S: matrix spike
M: matrix spike duplicate
L: serial dilution
A: post digestion spike

B. Sample Data

1. Results
2. Quality Control Data
3. Quarterly Verification of Instrument Performance
4. Raw Data
5. Digestion and Distillation Logs

LAB CODE : COMPU

CONTRACT # : SW-846

CASE # : 34134

SDG # : 00001

1. Results

Sample results shall be arranged in packets with the Inorganic Analysis Data Sheet (Form I - IN). These sample packets shall be placed in increasing Client Sample ID number order, considering both letters and numbers, and shall include all the samples in the SDG.

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

2291

DGLSSOT0419

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929130

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	71.4			P
7440-39-3	Barium___	805			P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium__	0.20	U		P
7440-47-3	Chromium_	15.6			P
7439-92-1	Lead_____	1920			P
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	59.9		E	P
7782-49-2	Selenium_	749		N	P
7440-22-4	Silver___	0.40	U		P
7440-28-0	Thallium_	2.4	U		P
7440-62-2	Vanadium_	5.5	B		P
7440-66-6	Zinc_____	370			P

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

DGLSSOT0419D

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929131

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	75.4	_		P_
7440-39-3	Barium___	847	_		P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.20	U		P_
7440-47-3	Chromium_	16.8	_		P_
7439-92-1	Lead_____	2010	_		P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	62.0	_	E	P_
7782-49-2	Selenium_	786	_	N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	6.6	B		P_
7440-66-6	Zinc_____	3000	_		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

DGLSSOT0492

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929136

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	10	B		P_
7440-39-3	Barium___	763			P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.20	U		P_
7440-47-3	Chromium_	35.7			P_
7439-92-1	Lead_____	1850			P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	73.2		E	P_
7782-49-2	Selenium_	22.4		N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	5.6	B		P_
7440-66-6	Zinc_____	2640			P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

2291

DGLSSOT0492D

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929137

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	10.0			P
7440-39-3	Barium	750			P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium	0.21	B		P
7440-47-3	Chromium	13.9			P
7439-92-1	Lead	1820			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	60.1		E	P
7782-49-2	Selenium	21.4		N	P
7440-22-4	Silver	0.40	U		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	6.0	B		P
7440-66-6	Zinc	341			P

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

DGLSSOT0334

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929120

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	17.6			P
7440-39-3	Barium___	850			P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium__	0.20	U		P
7440-47-3	Chromium_	14.5			P
7439-92-1	Lead_____	2640			P
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	139		E	P
7782-49-2	Selenium_	20.9		N	P
7440-22-4	Silver___	0.42	B		P
7440-28-0	Thallium_	2.4	U		P
7440-62-2	Vanadium_	4.4	B		P
7440-66-6	Zinc_____	325			P

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

Duplicate_(DGLSSOT0334D)

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

DGLSSOT0334D

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929125

Level (low/med): LOW_ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	20.4			P
7440-39-3	Barium	839			P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium	0.20	U		P
7440-47-3	Chromium	14.9			P
7439-92-1	Lead	2630			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	136		E	P
7782-49-2	Selenium	22.7		N	P
7440-22-4	Silver	0.40	U		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	4.7	B		P
7440-66-6	Zinc	4510			P

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

2291

DGLSSOT0364

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929126

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	72.5			P
7440-39-3	Barium___	743			P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium__	0.20	U		P
7440-47-3	Chromium_	14.8			P
7439-92-1	Lead____	1610			P
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	57.2		E	P
7782-49-2	Selenium_	501		N	P
7440-22-4	Silver___	0.51	B		P
7440-28-0	Thallium_	2.4	U		P
7440-62-2	Vanadium_	5.0	B		P
7440-66-6	Zinc____	1130			P

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

2291

DGLSSOT0364D

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929127

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	68.7			P
7440-39-3	Barium___	702			P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium__	0.20	U		P
7440-47-3	Chromium_	13.0			P
7439-92-1	Lead_____	1530			P
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	54.2		E	P
7782-49-2	Selenium_	479		N	P
7440-22-4	Silver___	0.40	U		P
7440-28-0	Thallium_	2.4	U		P
7440-62-2	Vanadium_	4.8	B		P
7440-66-6	Zinc_____	375			P

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

229 I

EPA SAMPLE NO.

DGLSSOT0394

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929128

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	11.4			P
7440-39-3	Barium___	935			P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium__	0.20	U		P
7440-47-3	Chromium_	13.7			P
7439-92-1	Lead____	2070			P
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	55.1		E	P
7782-49-2	Selenium_	21.6		N	P
7440-22-4	Silver___	0.40	U		P
7440-28-0	Thallium_	2.4	U		P
7440-62-2	Vanadium_	5.5	B		P
7440-66-6	Zinc____	316			P

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

2291

DGLSSOT0394D

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929129

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	9.3	B		P_
7440-39-3	Barium___	983			P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.20	U		P_
7440-47-3	Chromium_	14.4			P_
7439-92-1	Lead_____	2130			P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	58.1		E	P_
7782-49-2	Selenium_	22.0		N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	6.0	B		P_
7440-66-6	Zinc_____	329			P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN

SW846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

229 I

EPA SAMPLE NO.

DGLSSOT0440

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929132

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	12.2			P
7440-39-3	Barium___	890			P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium__	0.20	U		P
7440-47-3	Chromium_	21.5			P
7439-92-1	Lead_____	1760			P
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	57.1		E	P
7782-49-2	Selenium_	20.4		N	P
7440-22-4	Silver___	0.40	U		P
7440-28-0	Thallium_	2.4	U		P
7440-62-2	Vanadium_	0.68	B		P
7440-66-6	Zinc_____	374			P

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

DGLSSOT0440D

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929133

Level (low/med): LOW_ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	12.6			P
7440-39-3	Barium	852			P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium	0.25	B		P
7440-47-3	Chromium	19.4			P
7439-92-1	Lead	1690			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	54.5		E	P
7782-49-2	Selenium	18.9		N	P
7440-22-4	Silver	0.40	U		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	0.97	B		P
7440-66-6	Zinc	359			P

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

DGLSSOT0468

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929134

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	8.9	B		P_
7440-39-3	Barium___	978			P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.20	U		P_
7440-47-3	Chromium_	18.9			P_
7439-92-1	Lead_____	2100			P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	65.6		E	P_
7782-49-2	Selenium_	23.7		N	P_
7440-22-4	Silver___	0.47	B		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	7.0	B		P_
7440-66-6	Zinc_____	401			P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

U.S. EPA - CLP

229 1

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

DGLSSOT0468D

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929135

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	8.2	B		P_
7440-39-3	Barium___	917			P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.20	U		P_
7440-47-3	Chromium_	17.5			P_
7439-92-1	Lead_____	1970			P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	61.0		E	P_
7782-49-2	Selenium_	19.5		N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	6.4	B		P_
7440-66-6	Zinc____	374			P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN SW846

U.S. EPA - CLP

2291

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

DGLSSOT0544

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929138

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	9.5	B		P_
7440-39-3	Barium___	766			P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.20	U		P_
7440-47-3	Chromium_	22.4			P_
7439-92-1	Lead_____	2170			P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	71.1		E	P_
7782-49-2	Selenium_	24.0		N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	4.9	B		P_
7440-66-6	Zinc_____	389			P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

E 2291

EPA SAMPLE NO.

DGLSSOT0544D

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929139

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	8.4	B		P_
7440-39-3	Barium___	739			P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.20	U		P_
7440-47-3	Chromium_	13.9			P_
7439-92-1	Lead_____	2130			P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	63.5		E	P_
7782-49-2	Selenium_	29.5		N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	5.2	B		P_
7440-66-6	Zinc_____	378			P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

DGLSSOT0566

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929140

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	10.5	_		P_
7440-39-3	Barium___	765	_		P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.20	U		P_
7440-47-3	Chromium_	13.0	_		P_
7439-92-1	Lead_____	1780	_		P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	53.0	_	E	P_
7782-49-2	Selenium_	25.1	_	N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	4.9	B		P_
7440-66-6	Zinc_____	297	_		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

229 1

EPA SAMPLE NO.

DGLSSOT0566D

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929141

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	10.7	_		P_
7440-39-3	Barium___	783	_		P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.20	U		P_
7440-47-3	Chromium_	13.1	_		P_
7439-92-1	Lead_____	1820	_		P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	54.7	_	E	P_
7782-49-2	Selenium_	29.2	_	N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	5.5	B		P_
7440-66-6	Zinc_____	303	_		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

2291

DGLSSOT0590

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929142

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	9.2	B		P_
7440-39-3	Barium___	774			P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.20	U		P_
7440-47-3	Chromium_	17.4			P_
7439-92-1	Lead_____	1300			P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	57.3		E	P_
7782-49-2	Selenium_	17.8		N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	3.2	B		P_
7440-66-6	Zinc_____	318			P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

DGLSSOT0590D

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929143

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	11.5	_		P_
7440-39-3	Barium___	765	_		P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.20	U		P_
7440-47-3	Chromium_	16.4	_		P_
7439-92-1	Lead_____	1270	_		P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	56.1	_	E	P_
7782-49-2	Selenium_	19.7	_	N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	4.6	B		P_
7440-66-6	Zinc_____	313	_		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

LEACHBLK

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00001_

Matrix (soil/water): WATER Lab Sample ID: 929206

Level (low/med): LOW__ Date Received: 02/17/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	1.4	U		P_
7440-39-3	Barium___	5.8	B		P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.20	U		P_
7440-47-3	Chromium_	2.0	B		P_
7439-92-1	Lead_____	4.6			P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	13.3		E	P_
7782-49-2	Selenium_	18.6		N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	0.50	U		P_
7440-66-6	Zinc_____	18.9	B		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: MEDIUM

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

229 1

COMPUCHEM
a division of Liberty Analytical Corp.

98703 GL RAW INC 19990302 10000 Q
Key Words: CompuChem, TCLP, Data Package

cc: DMB

cc order m/y: DHD
KJH

01/MAR/99

ENVITCO
3400 EXECUTIVE PARKWAY
TOLEDO, OH 43606

Attn: ROBERT WILSON

Subject: Report of Data - Account Number# 501224 Order# 34134

Enclosed are the results of analytical work performed in accordance with the referenced account number.

This report covers 12 sample(s) appearing on the attached listing.

Thank you for selecting CompuChem Environmental for your sample analysis. If you should have questions or require additional analytical services please contact your representative at 1-800-833-5097.

Sincerely,

Marlene J. Swift

CompuChem Environmental
a division of Liberty Analytical

Attachment

COMPUCHEM

a division of Liberty Analytical Corp.

01/MAR/99

ENVITCO
3400 EXECUTIVE PARKWAY
TOLEDO, OH 43606

ACCOUNT #: 501224

CC#	SAMPLE-ID	RECEIPT DATE
929144	DGLSSOT0617	2/16/99
929149	DGLSSOT0617D	2/16/99
929150	DGLSSOT0647	2/16/99
929151	DGLSSOT0647D	2/16/99
929152	DGLSSOT0512	2/16/99
929153	DGLSSOT0512D	2/16/99
929154	OGSOSOT0360	2/16/99
929155	OGSOSOT0360D	2/16/99
929156	OGSOSOT0497	2/16/99
929157	OGSOSOT0497D	2/16/99
929158	OGSOSOT0587	2/16/99
929159	OGSOSOT0587D	2/16/99

TOTAL NUMBER OF SAMPLES = 12

501 Madison Avenue ■ Cary, N.C. 27513 ■ Tel: 919-379-4100 ■ Fax: 919-379-4050

CompuChem Environmental

I. SAMPLE DATA PACKAGE

SW-846

The sample data package shall include data for all analyses of all samples in one Sample Delivery Group (SDG), including field and analytical samples, reanalyses, blanks, spikes, duplicates, and laboratory control samples. The sample data package consists of the following:

A. Cover Page

B. Sample Data

C. Chain-of-Custody (CoC) Documentation

LAB CODE : COMPU

CONTRACT # : SW-846

CASE # : 34134

SDG # : 00002

A. Cover Page -

Inorganic Analyses Data Package

The Cover Page includes laboratory information, the Case and SDG numbers, the client ID numbers in alphanumeric order showing the client ID numbers cross-referenced with Lab ID numbers, comments, and completion of the statement on the use of ICP background and interelement correction for the samples.

On separate pages, the laboratory will include any problems encountered; both technical and administrative, the corrective action taken, and the resolution. This information is included in the Inorganic Case Summary Narrative which follows the Cover Page.

U.S. EPA - CLP

2291

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134 SAS No.: _____ SDG No.:00002_

SOW No.: SW846__

EPA Sample No.	Lab Sample ID
_DGLSSOT0512__	_929152_____
DGLSSOT0512D	_929153_____
_DGLSSOT0617__	_929144_____
DGLSSOT0617D	_929148_____
DGLSSOT0617M	_929146_____
DGLSSOT0617S	_929145_____
DGLSSOT0617D	_929149_____
_DGLSSOT0647__	_929150_____
DGLSSOT0647D	_929151_____
_LEACHBLK_____	_929206_____
_OGSOSOT0360__	_929154_____
OGSOSOT0360D	_929155_____
_OGSOSOT0497__	_929156_____
OGSOSOT0497D	_929157_____
_OGSOSOT0587__	_929158_____
OGSOSOT0587D	_929159_____
_____	_____
_____	_____
_____	_____
_____	_____

Were ICP interelement corrections applied ? Yes/No YES

Were ICP background corrections applied ? Yes/No YES
If yes - were raw data generated before application of background corrections ? Yes/No NO_

Comments:

I certify that 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 floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Thomas R. Cole for Name: Joe Basile

Date: March 1, 1999 Title: Laboratory Manager

CompuChem
a Division of Liberty Analytical Corp.
501 Madison Avenue Cary, NC 27513

INORGANIC CASE SUMMARY NARRATIVE
CASE # 34134 SDG # 00002
PROTOCOL # SW-846

The indicated Sample Delivery Group (SDG) consisting of six (6) soil samples was received into the laboratory management system (LIMS) on February 16, 1999 intact and in good condition with Chain of Custody (COC) records in order. Sample ID's reported in this data package are noted by the receiving department on the COC if they differ from those listed by the samplers on the COC.

The samples were prepared as leachates. Each leachate was digested from two aliquots (original and duplicate samples) then analyzed for beryllium, nickel, thallium, vanadium, zinc, and the eight RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) using analytical methods delineated in SW-846 (Third Edition)-Update III.

SAMPLE IDs:

The following customer IDs are associated with this SDG:

DGLSSOT0512	DGLSSOT0512D	DGLSSOT0617	DGLSSOT0617D
DGLSSOT0647	DGLSSOT0647D	OGSOSOT0360	OGSOSOT0360D
OGSOSOT0497	OGSOSOT0497D	OGSOSOT0587	OGSOSOT0587D

INSTRUMENTAL QUALITY CONTROL:

All calibration verification solutions (ICV & CCV), blanks (ICB, CCB) and interference check samples (ICSA & ICSAB) associated with this data were confirmed to be within SW-846 allowable limits.

SAMPLE PREPARATION QUALITY CONTROL:

The sample preparation procedure verifications (LCSW & PBW) were found to be within acceptable ranges and all field samples were prepared and analyzed within the contract specified holding times.

MATRIX RELATED QUALITY CONTROL:

The sample matrix spike, CCN = 929145 (DGLSSOT0617S) was found to be outside control limits for selenium. The reported concentration for this analyte is flagged with an "N" on all associated Form 1 and on Form 5a. The sample matrix spike duplicate, CCN = 929146 (DGLSSOT0617M) was found to be inside control limits for the requested analytes.

An "N" indicates a matrix-related interference in the sample preparation procedure &/or analysis for the flagged analyte. This is normally the consequence of a relatively high anionic content in the sample or (for some sediments) an inconsistent sample matrix relative to that analyte.

SW-846 control limits for matrix spike recoveries are set at 75% to 125% of the analyte quantity added unless original sample concentrations exceed the true values of these "spikes" by a factor of four or more; in this case effected analytes are not flagged even if recoveries fall outside percentage recovery control limits.

Post-digestion spikes are mandatory for analytes demonstrating unsatisfactory matrix spike recoveries during ICP analysis (excluding silver). The results of such spikes are presented on Form 5b.

Unsatisfactory recovery of post-digestion spikes of this type do not have bearing upon the aforementioned "N" flags, but may indicate interference during analysis &/or a solution matrix which is hostile to the analyte in question.

Satisfactory recovery of an analyte in a post-digestion spike of this type implies interference by the required preparation procedure or in the sample matrix itself. Lack of uniformity for an analyte in sediments will also result in satisfactory recovery of post-digestion spikes after failure in the related matrix spike.

The sample matrix duplicate, CCN = 929148 (DGLSSOT0617D) was inside SW-846 control limits for the requested analytes.

SW-846 control limits for duplicate determinations are +/- 20% Relative Percent Difference (RPD) for concentrations greater than or equal to five times the CRDL in both the original and duplicate samples, and +/- the CRDL for concentrations less than five times the CRDL. The RPD is not calculated if both the original and duplicate values fall below the IDL.

A five-fold serial dilution of sample, CCN = 929144 (DGLSSOT0617L) was performed in accordance with SW-846 requirements for ICP analysis.

The adjusted sample concentrations were inside control limits for all requested analytes.

SW-846 control limits for serial dilution are defined as a deviation less than or equal to 10% in the dilution-adjusted concentrations from the original values for all analyte concentrations with values greater than fifty (50) times their respective Instrument Detection Limit (IDL) in the original sample.

This SDG package was processed using the Ward Scientific software. This software package has a seven character limitation on the Forms 13 and 14 -- any sample ID's which exceed seven characters are truncated from left to right on these forms.

Release of the data contained in this hard copy data package has been authorized by the laboratory manager or his designee, as verified by the following signature.

Thomas R. Cole

Thomas R. Cole
Chemist II
March 1, 1999

Note: This report is paginated for reference and accountability.

CompuChem
a Division of Liberty Analytical Corp.
501 Madison Avenue Cary, NC 27513

DATA REPORTING QUALIFIERS FOR INORGANICS

On Form I, under the column labeled "C" for concentration qualifier and "Q" for qualifier, each result is flagged with the specific data reporting qualifiers listed below, as appropriate. Up to five qualifiers may be reported on Form I for each analyte.

The C (concentration) qualifiers used are:

U: This flag indicates the analyte was analyzed for but not detected. This reported value was obtained from a reading that was less than the Instrument Detection Limit (IDL). The IDL will be adjusted to reflect any dilution and, for soils, the percent moisture.

B: This flag indicates the analyte was analyzed for and the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

The Q qualifiers used are:

E: This flag indicates an estimated value. This flag is used:

1. When the serial dilution (a five fold dilution for CLP and a four fold dilution for SW-846 method 6010A) results are not within 10%. The analyte concentration must be sufficiently high (minimally a factor of 50X above the IDL in the original sample).
2. When the analytical spike recovery associated with the sample is below 40% after two successive dilutions by Graphite Furnace Atomic Absorption (GFAA).

M: This flag applies to GFAA analyses for concentrations greater than the Contract Required Detection Limit (CRDL). This flag is only used for GFAA if the analytical sample or analytical spike duplicate injection reading is not within 20% of the Relative Standard Deviation (RSD).

N: This flag indicates the sample spike recovery is outside of control limits:

*: This flag is used for duplicate analysis when the sample and the sample duplicate results are not within control limits.

S: This flag applies to GFAA analyses to indicate the reported value was determined by the Method of Standard Additions (MSA).

W: This flag applies to GFAA analyses when the post-digestion spike (analytical spike) is out of control limits (85% - 115%), while sample absorbance is less than 50% of "spike" absorbance ["spike" is defined as (absorbance or concentration of spike sample) minus (absorbance or concentration of the sample)].

+: This flag applies to GFAA analyses when the correlation coefficient for the MSA is less than 0.995 after two MSA analyses.

NOTE: Entering "S", "W", or "+" is mutually exclusive. No combination of these qualifiers can appear in the same field for an analyte.

The extensions: D, S, M, L, A, added to the end of the client ID represent as follows:

D: matrix duplicate
S: matrix spike
M: matrix spike duplicate
L: serial dilution
A: post digestion spike

B. Sample Data

1. Results
2. Quality Control Data
3. Quarterly Verification of Instrument Performance
4. Raw Data
5. Digestion and Distillation Logs

LAB CODE : COMPU

CONTRACT # : SW-846

CASE # : 34134

SDG # : 00002

1. Results

Sample results shall be arranged in packets with the Inorganic Analysis Data Sheet (Form I - IN). These sample packets shall be placed in increasing Client Sample ID number order, considering both letters and numbers, and shall include all the samples in the SDG.

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

DGLSSOT0512

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00002_

Matrix (soil/water): WATER Lab Sample ID: 929152

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	10.0	_		P_
7440-39-3	Barium___	1130	_		P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.26	B		P_
7440-47-3	Chromium_	17.0	_		P_
7439-92-1	Lead_____	2180	_		P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	73.2	_		P_
7782-49-2	Selenium_	26.3	_	N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	6.1	B		P_
7440-66-6	Zinc_____	349	_		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN SW846

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

DGLSSOT0512D

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00002_

Matrix (soil/water): WATER Lab Sample ID: 929153

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	13.3	_		P_
7440-39-3	Barium___	1190	_		P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.43	B		P_
7440-47-3	Chromium_	18.0	_		P_
7439-92-1	Lead_____	2310	_		P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	78.7	_		P_
7782-49-2	Selenium_	26.3	_	N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	6.2	B		P_
7440-66-6	Zinc_____	370	_		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

DGLSSOT0617

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00002_

Matrix (soil/water): WATER Lab Sample ID: 929144

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	15.2	_		P_
7440-39-3	Barium___	841	_		P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.27	B		P_
7440-47-3	Chromium_	22.4	_		P_
7439-92-1	Lead_____	1230	_		P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	55.3	_		P_
7782-49-2	Selenium_	22.5	_	N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	4.8	B		P_
7440-66-6	Zinc_____	376	_		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

Duplicate_(DGLSSOT0617D)

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

DGLSSOT0617D

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00002_

Matrix (soil/water): WATER Lab Sample ID: 929149

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	14.5	_		P_
7440-39-3	Barium___	780	_		P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.20	U		P_
7440-47-3	Chromium_	22.0	_		P_
7439-92-1	Lead_____	1180	_		P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	54.6	_		P_
7782-49-2	Selenium_	21.8	_	N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	4.1	B		P_
7440-66-6	Zinc_____	368	_		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

L 2291

EPA SAMPLE NO.

DGLSSOT0647

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00002_

Matrix (soil/water): WATER Lab Sample ID: 929150

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	11.5	_		P_
7440-39-3	Barium___	1210	_		P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.22	B		P_
7440-47-3	Chromium_	15.7	_		P_
7439-92-1	Lead_____	2260	_		P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	66.1	_		P_
7782-49-2	Selenium_	30.4	_	N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	6.3	B		P_
7440-66-6	Zinc_____	364	_		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

DGLSSOT0647D

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00002_

Matrix (soil/water): WATER Lab Sample ID: 929151

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	10.9	_		P_
7440-39-3	Barium___	1150	_		P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.20	U		P_
7440-47-3	Chromium_	14.7	_		P_
7439-92-1	Lead_____	2170	_		P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	62.0	_		P_
7782-49-2	Selenium_	26.4	_	N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	5.3	B		P_
7440-66-6	Zinc_____	332	_		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

LEACHBLK

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00002_

Matrix (soil/water): WATER Lab Sample ID: 929206

Level (low/med): LOW__ Date Received: 02/17/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	3.1	B		P_
7440-39-3	Barium___	2.3	B		P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	0.28	B		P_
7440-47-3	Chromium_	3.5	B		P_
7439-92-1	Lead_____	3.4			P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	13.9			P_
7782-49-2	Selenium_	30.7		N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	2.4	U		P_
7440-62-2	Vanadium_	0.50	U		P_
7440-66-6	Zinc_____	13.9	B		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

OGSOSOT0360

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00002_

Matrix (soil/water): WATER Lab Sample ID: 929154

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	52600			P
7440-39-3	Barium___	1980			P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium__	4.0	B		P
7440-47-3	Chromium_	53.1			P
7439-92-1	Lead_____	1740			P
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	1520			P
7782-49-2	Selenium_	503000		N	P
7440-22-4	Silver___	0.40	U		P
7440-28-0	Thallium_	117			P
7440-62-2	Vanadium_	0.50	U		P
7440-66-6	Zinc_____	25700			P

Color Before: YELLOW___ Clarity Before: CLEAR_ Texture: _____

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

OGSOSOT0360D

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00002_

Matrix (soil/water): WATER Lab Sample ID: 929155

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	52600			P
7440-39-3	Barium___	1960			P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium__	3.9	B		P
7440-47-3	Chromium_	52.2			P
7439-92-1	Lead_____	1720			P
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	1510			P
7782-49-2	Selenium_	501000		N	P
7440-22-4	Silver___	0.40	U		P
7440-28-0	Thallium_	112			P
7440-62-2	Vanadium_	0.50	U		P
7440-66-6	Zinc_____	25900			P

Color Before: YELLOW___ Clarity Before: CLEAR_ Texture: _____

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

OGSOSOT0497

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00002_

Matrix (soil/water): WATER Lab Sample ID: 929156

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	35200	_		P_
7440-39-3	Barium___	3910	_		P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	3.5	B		P_
7440-47-3	Chromium_	104	_		P_
7439-92-1	Lead_____	2810	_		P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	1520			P_
7782-49-2	Selenium_	382000	_	N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	34.1	_		P_
7440-62-2	Vanadium_	0.50	U		P_
7440-66-6	Zinc_____	26200	_		P_

Color Before: YELLOW___ Clarity Before: CLEAR_ Texture: _____

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN SW846

U.S. EPA - CLP

2291

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

OGSOSOT0497D

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00002_

Matrix (soil/water): WATER Lab Sample ID: 929157

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	35500	_		P_
7440-39-3	Barium___	3810	_		P_
7440-41-7	Beryllium	0.50	U		P_
7440-43-9	Cadmium__	3.5	B		P_
7440-47-3	Chromium_	101	_		P_
7439-92-1	Lead_____	2780	_		P_
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	1470	_		P_
7782-49-2	Selenium_	384000	_	N	P_
7440-22-4	Silver___	0.40	U		P_
7440-28-0	Thallium_	30.0	_		P_
7440-62-2	Vanadium_	0.50	U		P_
7440-66-6	Zinc_____	26200	_		P_

Color Before: YELLOW___ Clarity Before: CLEAR_ Texture: _____

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

U.S. EPA - CLP

2291

1

EPA SAMPLE NO.

INORGANIC ANALYSES DATA SHEET

OGSOSOT0587

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00002_

Matrix (soil/water): WATER Lab Sample ID: 929158

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	35000			P
7440-39-3	Barium___	2670			P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium__	3.0	B		P
7440-47-3	Chromium_	151			P
7439-92-1	Lead_____	1840			P
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	1150			P
7782-49-2	Selenium_	248000		N	P
7440-22-4	Silver___	0.40	U		P
7440-28-0	Thallium_	44.9			P
7440-62-2	Vanadium_	0.50	U		P
7440-66-6	Zinc_____	15800			P

Color Before: YELLOW___ Clarity Before: CLEAR_ Texture: _____

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

OGSOSOT0587D

Lab Name: COMPUCHEM_ENV._CORP._____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134_ SAS No.: _____ SDG No.: 00002_

Matrix (soil/water): WATER Lab Sample ID: 929159

Level (low/med): LOW__ Date Received: 02/16/99

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	35600			P
7440-39-3	Barium___	2710			P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium__	3.0	B		P
7440-47-3	Chromium_	154			P
7439-92-1	Lead____	1880			P
7439-97-6	Mercury__	0.10	U		CV
7440-02-0	Nickel___	1170			P
7782-49-2	Selenium_	252000		N	P
7440-22-4	Silver___	0.40	U		P
7440-28-0	Thallium_	43.4			P
7440-62-2	Vanadium_	0.50	U		P
7440-66-6	Zinc____	16000			P

Color Before: YELLOW___ Clarity Before: CLEAR_ Texture: _____

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN SW846

COMPUCHEM
division of Liberty Analytical Corp.

98703 GL RAW INC 19990316 1330 ø Q
KW: Compuchem, TCLP, Data Package
2291

12/MAR/99

CC: DMB, E. Nicaise
CC cover only: DHQ
KJH

ENVITCO
3400 EXECUTIVE PARKWAY
TOLEDO, OH 43606

Subject: Report of Data - Account Number# 501224 Order# 34134

Enclosed are the results of analytical work performed in accordance with the referenced account number.

This report covers 2 sample(s) appearing on the attached listing.

Thank you for selecting CompuChem Environmental for your sample analysis. If you should have questions or require additional analytical services please contact your representative at 1-800-833-5097.

Sincerely,

Diane Ellmore

CompuChem Environmental
a division of Liberty Analytical

Attachment

501 Madison Avenue ■ Cary, N.C. 27513 ■ Tel: 919-379-4100 ■ Fax: 919-379-4050

COMPUCHEM

division of Liberty Analytical Corp.

2291

12/MAR/99

ENVITCO
3400 EXECUTIVE PARKWAY
TOLEDO, OH 43606

ACCOUNT #: 501224

CC#	SAMPLE-ID	RECEIPT DATE
930757	SO-T-0375	3/06/99
930762	SO-T-0673	3/06/99

TOTAL NUMBER OF SAMPLES = 2

501 Madison Avenue ■ Cary, N.C. 27513 ■ Tel: 919-379-4100 ■ Fax: 919-379-4050

CompuChem Environmental

I. SAMPLE DATA PACKAGE

SW-846

The sample data package shall include data for all analyses of all samples in one Sample Delivery Group (SDG), including field and analytical samples, reanalyses, blanks, spikes, duplicates, and laboratory control samples. The sample data package consists of the following:

A. Cover Page

B. Sample Data

C. Chain-of-Custody (CoC) Documentation

LAB CODE : COMPU

CONTRACT # : SW-846

CASE # : 34134

SDG # : 00634

A. Cover Page -

Inorganic Analyses Data Package

The Cover Page includes laboratory information, the Case and SDG numbers, the client ID numbers in alphanumeric order showing the client ID numbers cross-referenced with Lab ID numbers, comments, and completion of the statement on the use of ICP background and interelement correction for the samples.

On separate pages, the laboratory will include any problems encountered; both technical and administrative, the corrective action taken, and the resolution. This information is included in the Inorganic Case Summary Narrative which follows the Cover Page.

U.S. EPA - CLP

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE 2291

Lab Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.: 00034

SOW No.: SW846

EPA Sample No.	Lab Sample ID
LEACH BLANK	930871
SO-T-0375	930757
SO-T-0375D	930761
SO-T-0375M	930759
SO-T-0375S	930758
SO-T-0673	930762

Were ICP interelement corrections applied ? Yes/No YES

Were ICP background corrections applied ? Yes/No YES
If yes - were raw data generated before application of background corrections ? Yes/No NO

Comments:
THE FOLLOWING ANALYTES HAVE BEEN FLAGGED WITH AN "E" TO INDICATE SERIAL DILUTION RESULTS WHICH WERE OUTSIDE CONTROL LIMITS:
BARIUM, CHROMIUM, NICKEL, SELENIUM

I certify that 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 floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Thomas R. Cole for Name: Joe Basile

Date: March 12, 1999 Title: Laboratory Manager

CompuChem
a Division of Liberty Analytical Corp.
501 Madison Avenue Cary, NC 27513

INORGANIC CASE SUMMARY NARRATIVE
CASE # 34134 SDG # 00034
PROTOCOL # SW-846

The indicated Sample Delivery Group (SDG) consisting of two (2) soil samples was received into the laboratory management system (LIMS) on March 6 , 1999 intact and in good condition with Chain of Custody (COC) records in order. Sample ID's reported in this data package are noted by the receiving department on the COC if they differ from those listed by the samplers on the COC.

The samples were prepared as leachates then analyzed for antimony, beryllium, nickel, thallium, vanadium, zinc, and the eight TCLP metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) using analytical methods delineated in SW-846 (Third Edition)-Update III.

Forms 1, 5, 6 and 9 for antimony are not reading the results accurately. The antimony results for the samples should be 100 ug/L with a U flag. Due to a software problem, the correct calculations will not appear on the forms. This data package is submitted with this notice.

SAMPLE IDs:

The following customer IDs are associated with this SDG:

SO-T-0375 SO-T-0673

INSTRUMENTAL QUALITY CONTROL:

All calibration verification solutions (ICV & CCV), blanks (ICB, CCB) and interference check samples (ICSA & ICSAB) associated with this data were confirmed to be within SW-846 allowable limits.

SAMPLE PREPARATION QUALITY CONTROL:

The sample preparation procedure verifications (LCSW & PBW) were found to be within acceptable ranges and all field samples were prepared and analyzed within the contract specified holding times.

MATRIX RELATED QUALITY CONTROL:

Due to heavy interference on antimony a post-digestion spike (PDS) was not performed per contract.

The sample matrix spike, CCN = 930758 (SO-T-0375S) and sample matrix spike duplicate, CCN = 930759 (SO-T-0375M) were found to be outside control limits for antimony. The reported concentrations for these analytes are flagged with an "N" on all associated Form 1 and on Form 5a.

An "N" indicates a matrix-related interference in the sample preparation procedure &/or analysis for the flagged analyte. This is normally the consequence of a relatively high anionic content in the sample or (for some sediments) an inconsistent sample matrix relative to that analyte.

SW-846 control limits for matrix spike recoveries are set at 75% to 125% of the analyte quantity added unless original sample concentrations exceed the true values of these "spikes" by a factor of four or more;

in this case effected analytes are not flagged even if recoveries fall outside percentage recovery control limits.

Post-digestion spikes are mandatory for analytes demonstrating unsatisfactory matrix spike recoveries during ICP analysis (excluding silver). The results of such spikes are presented on Form 5b.

Unsatisfactory recovery of post-digestion spikes of this type do not have bearing upon the aforementioned "N" flags, but may indicate interference during analysis &/or a solution matrix which is hostile to the analyte in question.

Satisfactory recovery of an analyte in a post-digestion spike of this type implies interference by the required preparation procedure or in the sample matrix itself. Lack of uniformity for an analyte in sediments will also result in satisfactory recovery of post-digestion spikes after failure in the related matrix spike.

The sample matrix duplicate, CCN = 930761 (SO-T-0375D) was inside control limits for the requested analytes.

SW-846 control limits for duplicate determinations are +/- 20% Relative Percent Difference (RPD) for concentrations greater than or equal to five times the CRDL in both the original and duplicate samples, and +/- the CRDL for concentrations less than five times the CRDL. The RPD is not calculated if both the original and duplicate values fall below the IDL.

A five-fold serial dilution of sample, CCN = 930757 (SO-T-0375L) was performed in accordance with SW-846 requirements for ICP analysis.

The adjusted sample concentrations were outside control limits for barium, chromium, nickel, and selenium, which are flagged with an "E" on all associated Form 1, the Cover Page and Form 9.

An "E" indicates that a chemical or physical interference effect was encountered during the analysis of the flagged analyte. As a result of this interference, all values for the analyte in the same matrix must be considered to be estimated quantities.

SW-846 control limits for serial dilution are defined as a deviation less than or equal to 10% in the dilution-adjusted concentrations from the original values for all analyte concentrations with values greater than fifty (50) times their respective Instrument Detection Limit (IDL) in the original sample.

This SDG package was processed using the Ward Scientific software. This software package has a seven character limitation on the Forms 13 and 14 -- any sample ID's which exceed seven characters are truncated from left to right on these forms.

Release of the data contained in this hard copy data package has been authorized by the laboratory manager or his designee, as verified by the following signature.

Thomas R. Cole
Chemist II
March 12, 1999

Note: This report is paginated for reference and accountability.

CompuChem
a Division of Liberty Analytical Corp.
501 Madison Avenue Cary, NC 27513

DATA REPORTING QUALIFIERS FOR INORGANICS

On Form I, under the column labeled "C" for concentration qualifier and "Q" for qualifier, each result is flagged with the specific data reporting qualifiers listed below, as appropriate. Up to five qualifiers may be reported on Form I for each analyte.

The C (concentration) qualifiers used are:

U: This flag indicates the analyte was analyzed for but not detected. This reported value was obtained from a reading that was less than the Instrument Detection Limit (IDL). The IDL will be adjusted to reflect any dilution and, for soils, the percent moisture.

B: This flag indicates the analyte was analyzed for and the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

The Q qualifiers used are:

E: This flag indicates an estimated value. This flag is used:

1. When the serial dilution (a five fold dilution for CLP and a four fold dilution for SW-846 method 6010A) results are not within 10%. The analyte concentration must be sufficiently high (minimally a factor of 50X above the IDL in the original sample).
2. When the analytical spike recovery associated with the sample is below 40% after two successive dilutions by Graphite Furnace Atomic Absorption (GFAA).

M: This flag applies to GFAA analyses for concentrations greater than the Contract Required Detection Limit (CRDL). This flag is only used for GFAA if the analytical sample or analytical spike duplicate injection reading is not within 20% of the Relative Standard Deviation (RSD).

N: This flag indicates the sample spike recovery is outside of control limits:

*: This flag is used for duplicate analysis when the sample and the sample duplicate results are not within control limits.

S: This flag applies to GFAA analyses to indicate the reported value was determined by the Method of Standard Additions (MSA).

W: This flag applies to GFAA analyses when the post-digestion spike (analytical spike) is out of control limits (85% - 115%), while sample absorbance is less than 50% of "spike" absorbance ["spike" is defined as (absorbance or concentration of spike sample) minus (absorbance or concentration of the sample)].

+: This flag applies to GFAA analyses when the correlation coefficient for the MSA is less than 0.995 after two MSA analyses.

NOTE: Entering "S", "W", or "+" is mutually exclusive. No combination of these qualifiers can appear in the same field for an analyte.

The extensions: D, S, M, L. A, added to the end of the client ID represent as follows:

D: matrix duplicate
S: matrix spike
M: matrix spike duplicate
L: serial dilution
A: post digestion spike

B. Sample Data

2291

1. Results
2. Quality Control Data
3. Quarterly Verification of Instrument Performance
4. Raw Data
5. Digestion and Distillation Logs

LAB CODE : COMPU

CONTRACT # : SW-846

CASE # : _____

SDG # : _____

1. Results

2291

Sample results shall be arranged in packets with the Inorganic Analysis Data Sheet (Form I - IN). These sample packets shall be placed in increasing Client Sample ID number order, considering both letters and numbers, and shall include all the samples in the SDG.

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

2291

LEACH BLANK

Lab Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.: 00034

Matrix (soil/water): WATER Lab Sample ID: 930871

Level (low/med): LOW Date Received: 03/10/99

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	1.4	B	N	P
7440-38-2	Arsenic	7.8	B		P
7440-39-3	Barium	3.4	B	E	P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium	0.20	U		P
7440-47-3	Chromium	0.80	U	E	P
7439-92-1	Lead	2.7	B		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	0.80	U	E	P
7782-49-2	Selenium	16.1	B	E	P
7440-22-4	Silver	0.40	U		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	0.50	U		P
7440-66-6	Zinc	0.80	U		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

SO-T-0375

Lab Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.: 00034

Matrix (soil/water): WATER Lab Sample ID: 930757

Level (low/med): LOW Date Received: 03/06/99

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	10.0	U	N	P
7440-38-2	Arsenic	44700			P
7440-39-3	Barium	66.2	B	E	P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium	4.7	B		P
7440-47-3	Chromium	522	B	E	P
7439-92-1	Lead	161	B		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	474	B	E	P
7782-49-2	Selenium	1420		E	P
7440-22-4	Silver	1.6	B		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	4190			P
7440-66-6	Zinc	2700	B		P

Color Before: YELLOW Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

Duplicate (SO-T-0375D)

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SO-T-0673

Lab Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.: 00034

Matrix (soil/water): WATER Lab Sample ID: 930762

Level (low/med): LOW Date Received: 03/06/99

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	10.0	U	N	P
7440-38-2	Arsenic	49300			P
7440-39-3	Barium	36.1	B	E	P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium	4.6	B		P
7440-47-3	Chromium	58.1	B	E	P
7439-92-1	Lead	58.9	B		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	113	B	E	P
7782-49-2	Selenium	1260		E	P
7440-22-4	Silver	1.2	B		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	3750			P
7440-66-6	Zinc	1650	B		P

Color Before: YELLOW Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

COMPUCHEM

division of Liberty Analytical Corp.

0316

98703 GL RAW INC 1999 0316 ¢ Q

KW: Compuchem, TCLP, Data Package

229.1

cc: DMB, F. Nicaise

12/MAR/99

ENVITCO
3400 EXECUTIVE PARKWAY
TOLEDO, OH 43606

cc cover only: DHD, KJH

Subject: Report of Data - Account Number# 501224 Order# 34134

Enclosed are the results of analytical work performed in accordance with the referenced account number.

This report covers 2 sample(s) appearing on the attached listing.

Thank you for selecting CompuChem Environmental for your sample analysis. If you should have questions or require additional analytical services please contact your representative at 1-800-833-5097.

Sincerely,

Diane Ellmore

CompuChem Environmental
a division of Liberty Analytical

Attachment

501 Madison Avenue ■ Cary, N.C. 27513 ■ Tel: 919-379-4100 ■ Fax: 919-379-4050

COMPUCHEM

division of Liberty Analytical Corp.

2291

12/MAR/99

ENVITCO
3400 EXECUTIVE PARKWAY
TOLEDO, OH 43606

ACCOUNT #: 501224

CC#	SAMPLE-ID	RECEIPT DATE
930975	SO-T-0375D	3/06/99
930980	SO-T-0673D	3/06/99

TOTAL NUMBER OF SAMPLES = 2

501 Madison Avenue ■ Cary, N.C. 27513 ■ Tel: 919-379-4100 ■ Fax: 919-379-4050

CompuChem Environmental

I. SAMPLE DATA PACKAGE

SW-846

The sample data package shall include data for all analyses of all samples in one Sample Delivery Group (SDG), including field and analytical samples, reanalyses, blanks, spikes, duplicates, and laboratory control samples. The sample data package consists of the following:

A. Cover Page

B. Sample Data

C. Chain-of-Custody (CoC) Documentation

LAB CODE : COMPU

CONTRACT # : SW-846

CASE # : 34134

SDG # : 0034D

A. Cover Page -

Inorganic Analyses Data Package

The Cover Page includes laboratory information, the Case and SDG numbers, the client ID numbers in alphanumeric order showing the client ID numbers cross-referenced with Lab ID numbers, comments, and completion of the statement on the use of ICP background and interelement correction for the samples.

On separate pages, the laboratory will include any problems encountered; both technical and administrative, the corrective action taken, and the resolution. This information is included in the Inorganic Case Summary Narrative which follows the Cover Page.

U.S. EPA - CLP

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

2291

I Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.:0034D

SOW No.: SW846

EPA Sample No.	Lab Sample ID
LEACH BLANK	930871
SO-T-0375D	930975
SO-T-0673D	930980

Were ICP interelement corrections applied ? Yes/No YES

Were ICP background corrections applied ? Yes/No YES

If yes - were raw data generated before application of background corrections ? Yes/No NO

Comments:

I certify that 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 floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Carol J. Gonzalez for Name: Joe Basile

Date: 3/12/99 Title: Inorganic Manager

CompuChem
501 Madison Avenue Cary, NC 27513

INORGANIC CASE SUMMARY NARRATIVE
CASE # 34134 SDG # 0034D
PROTOCOL #SW-846

The indicated Sample Delivery Group (SDG) consisting of two (2) soil samples was received into the laboratory management system (LIMS) on March 6, 1999 intact and in good condition with Chain of Custody (COC) records in order. Sample ID's reported in this data package are noted by the receiving department on the COC if they differ from those listed by the samplers on the COC.

The samples were leached and analyzed for antimony, beryllium, nickel, thallium, vanadium, zinc, and the eight RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) using analytical methods delineated in SW-846 (3rd edition) or EPA accepted CLP related modifications of those methods.

Form 1's for antimony are not reading the results accurately. The antimony results for the samples should be 100 ug/L with a U flag. Due to a software problem, the correct calculations will not appear on the forms. This package is submitted with this notice.

SAMPLE IDs:

The following customer IDs are associated with this SDG:

SO-T-0375D SO-T-0673D

INSTRUMENTAL QUALITY CONTROL:

All calibration verification solutions (ICV & CCV), blanks (ICB, CCB) and interference check samples (ICSA & ICSAB) associated with this data were confirmed to be within SW-846 allowable limits.

SAMPLE PREPARATION QUALITY CONTROL:

The sample preparation procedure verifications (LCSW & PBW) were found to be within acceptable ranges and all field samples were prepared and analyzed within the contract specified holding times.

MATRIX RELATED QUALITY CONTROL:

Matrix related quality control was not performed with this SDG.

This SDG package was processed using the Ward Scientific software. This software package has a seven character limitation on the Forms 13 and 14 -- any sample ID's which exceed seven characters are truncated from left to right on these forms.

Release of the data contained in this hard copy data package has been authorized by the laboratory manager or his designee, as verified by the following signature.

Carol J. Yandell
Senior Chemist
March 12, 1999

Note: This report is paginated for reference and accountability.

CompuChem
a Division of Liberty Analytical Corp.
501 Madison Avenue Cary, NC 27513

DATA REPORTING QUALIFIERS FOR INORGANICS

On Form I, under the column labeled "C" for concentration qualifier and "Q" for qualifier, each result is flagged with the specific data reporting qualifiers listed below, as appropriate. Up to five qualifiers may be reported on Form I for each analyte.

The C (concentration) qualifiers used are:

U: This flag indicates the analyte was analyzed for but not detected. This reported value was obtained from a reading that was less than the Instrument Detection Limit (IDL). The IDL will be adjusted to reflect any dilution and, for soils, the percent moisture.

B: This flag indicates the analyte was analyzed for and the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

The Q qualifiers used are:

E: This flag indicates an estimated value. This flag is used:

1. When the serial dilution (a five fold dilution for CLP and a four fold dilution for SW-846 method 6010A) results are not within 10%. The analyte concentration must be sufficiently high (minimally a factor of 50X above the IDL in the original sample).
2. When the analytical spike recovery associated with the sample is below 40% after two successive dilutions by Graphite Furnace Atomic Absorption (GFAA).

M: This flag applies to GFAA analyses for concentrations greater than the Contract Required Detection Limit (CRDL). This flag is only used for GFAA if the analytical sample or analytical spike duplicate injection reading is not within 20% of the Relative Standard Deviation (RSD).

N: This flag indicates the sample spike recovery is outside of control limits:

*: This flag is used for duplicate analysis when the sample and the sample duplicate results are not within control limits.

S: This flag applies to GFAA analyses to indicate the reported value was determined by the Method of Standard Additions (MSA).

W: This flag applies to GFAA analyses when the post-digestion spike (analytical spike) is out of control limits (85% - 115%), while sample absorbance is less than 50% of "spike" absorbance ["spike" is defined as (absorbance or concentration of spike sample) minus (absorbance or concentration of the sample)].

+: This flag applies to GFAA analyses when the correlation coefficient for the MSA is less than 0.995 after two MSA analyses.

NOTE: Entering "S", "W", or "+" is mutually exclusive. No combination of these qualifiers can appear in the same field for an analyte.

The extensions: D, S, M, L. A, added to the end of the client ID represent as follows:

D: matrix duplicate
S: matrix spike
M: matrix spike duplicate
L: serial dilution
A: post digestion spike

B. Sample Data

2291

1. Results
2. Quality Control Data
3. Quarterly Verification of Instrument Performance
4. Raw Data
5. Digestion and Distillation Logs

LAB CODE : COMPU

CONTRACT # : SW-846

CASE # : 34134

SDG # : 00340

1. Results

Sample results shall be arranged in packets with the Inorganic Analysis Data Sheet (Form I - IN). These sample packets shall be placed in increasing Client Sample ID number order, considering both letters and numbers, and shall include all the samples in the SDG.

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

LEACH BLANK

Lab Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.: 0034D

Matrix (soil/water): WATER Lab Sample ID: 930871

Level (low/med): LOW Date Received: 03/10/99

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	1.4	B		P
7440-38-2	Arsenic	7.8	B		P
7440-39-3	Barium	3.4	B		P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium	0.20	U		P
7440-47-3	Chromium	0.80	U		P
7439-92-1	Lead	2.7	B		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	0.80	U		P
7782-49-2	Selenium	16.1	B		P
7440-22-4	Silver	0.40	U		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	0.50	U		P
7440-66-6	Zinc	0.80	U		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

SO-T-0375D

Lab Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.: 0034D

Matrix (soil/water): WATER Lab Sample ID: 930975

Level (low/med): LOW Date Received: 03/06/99

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	10.0	U		P
7440-38-2	Arsenic	44300			P
7440-39-3	Barium	68.8	B		P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium	4.8	B		P
7440-47-3	Chromium	558	B		P
7439-92-1	Lead	170	B		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	504	B		P
7782-49-2	Selenium	1520			P
7440-22-4	Silver	1.9	B		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	4500			P
7440-66-6	Zinc	2890	B		P

Color Before: YELLOW Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

SO-T-0673D

Lab Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.: 0034D

Matrix (soil/water): WATER Lab Sample ID: 930980

Level (low/med): LOW Date Received: 03/06/99

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	10.0	U		P
7440-38-2	Arsenic	44400			P
7440-39-3	Barium	40.3	B		P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium	5.0	B		P
7440-47-3	Chromium	64.4	B		P
7439-92-1	Lead	65.1	B		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	125	B		P
7782-49-2	Selenium	1410			P
7440-22-4	Silver	1.7	B		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	4150			P
7440-66-6	Zinc	1830	B		P

Color Before: YELLOW Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

COMPUCHEM

a division of Liberty Analytical Corp.

2291

98703 GL RAW INC 19990316 1332 ϕ Q

KW: Compuchem, TCLP, Salts

CC: DMB, E. Nicaise

CC cover only: DHD, KJH

12/MAR/99

ENVITCO
3400 EXECUTIVE PARKWAY
TOLEDO, OH 43606

Subject: Report of Data - Account Number# 501224 Order# 34134

Enclosed are the results of analytical work performed in accordance with the referenced account number.

This report covers 3 sample(s) appearing on the attached listing.

Thank you for selecting CompuChem Environmental for your sample analysis. If you should have questions or require additional analytical services please contact your representative at 1-800-833-5097.

Sincerely,

Diane Ellmore

CompuChem Environmental
a division of Liberty Analytical

Attachment

501 Madison Avenue ■ Cary, N.C. 27513 ■ Tel: 919-379-4100 ■ Fax: 919-379-4050

COMPUCHEM

division of Liberty Analytical Corp.

2291

12/MAR/99

ENVITCO
3400 EXECUTIVE PARKWAY
TOLEDO, OH 43606

ACCOUNT #: 501224

CC#	SAMPLE-ID	RECEIPT DATE
930605	SO-T0446	3/05/99
930610	SO-T0438	3/05/99
930611	SO-T0403	3/05/99

TOTAL NUMBER OF SAMPLES = 3

501 Madison Avenue ■ Cary, N.C. 27513 ■ Tel: 919-379-4100 ■ Fax: 919-379-4050

CompuChem Environmental

I. SAMPLE DATA PACKAGE

SW-846

The sample data package shall include data for all analyses of all samples in one Sample Delivery Group (SDG), including field and analytical samples, reanalyses, blanks, spikes, duplicates, and laboratory control samples. The sample data package consists of the following:

A. Cover Page

B. Sample Data

C. Chain-of-Custody (CoC) Documentation

LAB CODE : COMPU

CONTRACT # : SW-846

CASE # : 34134

SDG # : 00033

A. Cover Page -

Inorganic Analyses Data Package

The Cover Page includes laboratory information, the Case and SDG numbers, the client ID numbers in alphanumeric order showing the client ID numbers cross-referenced with Lab ID numbers, comments, and completion of the statement on the use of ICP background and interelement correction for the samples.

On separate pages, the laboratory will include any problems encountered; both technical and administrative, the corrective action taken, and the resolution. This information is included in the Inorganic Case Summary Narrative which follows the Cover Page.

U.S. EPA - CLP

2291

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

I Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.:00033

SOW No.: SW846

EPA Sample No.	Lab Sample ID
LEACH_BLANK1	930726
LEACH_BLANK2	930727
SO-T0403	930611
SO-T0438	930610
SO-T0446	930605
SO-T0446D	930609
SO-T0446M	930607
SO-T0446S	930606

Were ICP interelement corrections applied ? Yes/No YES

Were ICP background corrections applied ? Yes/No YES

If yes - were raw data generated before application of background corrections ? Yes/No NO

Comments:

I certify that 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 floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Thomas R. Cole for Name: Joe Basile

Date: March 12, 1999 Title: Laboratory Manager

CompuChem
a Division of Liberty Analytical Corp.
501 Madison Avenue Cary, NC 27513

INORGANIC CASE SUMMARY NARRATIVE
CASE # 34134 SDG # 00033
PROTOCOL # SW-846

The indicated Sample Delivery Group (SDG) consisting of three (3) soil samples was received into the laboratory management system (LIMS) on March 5, 1999 intact and in good condition with Chain of Custody (COC) records in order. Sample ID's reported in this data package are noted by the receiving department on the COC if they differ from those listed by the samplers on the COC.

The samples were prepared as leachates then analyzed for antimony, beryllium, nickel, thallium, vanadium, zinc, and the eight TCLP metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) using analytical methods delineated in SW-846 (Third Edition)-Update III.

SAMPLE IDs:

The following customer IDs are associated with this SDG:

SO-T0403 SO-T0438 SO-T0446

INSTRUMENTAL QUALITY CONTROL:

All calibration verification solutions (ICV & CCV), blanks (ICB, CCB) and interference check samples (ICSA & ICSAB) associated with this data were confirmed to be within SW-846 allowable limits.

SAMPLE PREPARATION QUALITY CONTROL:

The sample preparation procedure verifications (LCSW & PBW) were found to be within acceptable ranges and all field samples were prepared and analyzed within the contract specified holding times.

MATRIX RELATED QUALITY CONTROL:

The sample matrix spike, CCN = 930606 (SO-T0446S) and sample matrix spike duplicate, CCN = 930607 (SO-T0446M) were found to be inside control limits for the requested analytes.

SW-846 control limits for matrix spike recoveries are set at 75% to 125% of the analyte quantity added unless original sample concentrations exceed the true values of these "spikes" by a factor of four or more; in this case effected analytes are not flagged even if recoveries fall outside percentage recovery control limits.

The sample matrix duplicate, CCN = 930609 (SO-T0446D) was inside control limits for the requested analytes.

SW-846 control limits for duplicate determinations are +/- 20% Relative Percent Difference (RPD) for concentrations greater than or equal to five times the CRDL in both the original and duplicate samples, and +/- the CRDL for concentrations less than five times the CRDL. The RPD is not calculated if both the original and duplicate values fall below the IDL.

A five-fold serial dilution of sample, CCN = 930605 (SO-T0446L) was performed in accordance with SW-846 requirements for ICP analysis.

The adjusted sample concentrations were inside control limits for the requested analytes.

SW-846 control limits for serial dilution are defined as a deviation less than or equal to 10% in the dilution-adjusted concentrations from the original values for all analyte concentrations with values greater than fifty (50) times their respective Instrument Detection Limit (IDL) in the original sample.

This SDG package was processed using the Ward Scientific software. This software package has a seven character limitation on the Forms 13 and 14 -- any sample ID's which exceed seven characters are truncated from left to right on these forms.

Release of the data contained in this hard copy data package has been authorized by the laboratory manager or his designee, as verified by the following signature.

Thomas R. Cole
Thomas R. Cole
Chemist II
March 12, 1999

Note: This report is paginated for reference and accountability.

CompuChem
a Division of Liberty Analytical Corp.
501 Madison Avenue Cary, NC 27513

DATA REPORTING QUALIFIERS FOR INORGANICS

On Form I, under the column labeled "C" for concentration qualifier and "Q" for qualifier, each result is flagged with the specific data reporting qualifiers listed below, as appropriate. Up to five qualifiers may be reported on Form I for each analyte.

The C (concentration) qualifiers used are:

U: This flag indicates the analyte was analyzed for but not detected. This reported value was obtained from a reading that was less than the Instrument Detection Limit (IDL). The IDL will be adjusted to reflect any dilution and, for soils, the percent moisture.

B: This flag indicates the analyte was analyzed for and the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

The Q qualifiers used are:

E: This flag indicates an estimated value. This flag is used:

1. When the serial dilution (a five fold dilution for CLP and a four fold dilution for SW-846 method 6010A) results are not within 10%. The analyte concentration must be sufficiently high (minimally a factor of 50X above the IDL in the original sample).
2. When the analytical spike recovery associated with the sample is below 40% after two successive dilutions by Graphite Furnace Atomic Absorption (GFAA).

M: This flag applies to GFAA analyses for concentrations greater than the Contract Required Detection Limit (CRDL). This flag is only used for GFAA if the analytical sample or analytical spike duplicate injection reading is not within 20% of the Relative Standard Deviation (RSD).

N: This flag indicates the sample spike recovery is outside of control limits:

*: This flag is used for duplicate analysis when the sample and the sample duplicate results are not within control limits.

S: This flag applies to GFAA analyses to indicate the reported value was determined by the Method of Standard Additions (MSA).

W: This flag applies to GFAA analyses when the post-digestion spike (analytical spike) is out of control limits (85% - 115%), while sample absorbance is less than 50% of "spike" absorbance ["spike" is defined as (absorbance or concentration of spike sample) minus (absorbance or concentration of the sample)].

+: This flag applies to GFAA analyses when the correlation coefficient for the MSA is less than 0.995 after two MSA analyses.

NOTE: Entering "S", "W", or "+" is mutually exclusive. No combination of these qualifiers can appear in the same field for an analyte.

The extensions: D, S, M, L. A, added to the end of the client ID represent as follows:

D: matrix duplicate
S: matrix spike
M: matrix spike duplicate
L: serial dilution
A: post digestion spike

B. Sample Data

1. Results
2. Quality Control Data
3. Quarterly Verification of Instrument Performance
4. Raw Data
5. Digestion and Distillation Logs

LAB CODE : COMPU

CONTRACT # : SW-846

CASE # : 34134

SDG # : ØØØ33

1. Results

Sample results shall be arranged in packets with the Inorganic Analysis Data Sheet (Form I - IN). These sample packets shall be placed in increasing Client Sample ID number order, considering both letters and numbers, and shall include all the samples in the SDG.

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

LEACH BLANK1

Lab Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.: 00033

Matrix (soil/water): WATER Lab Sample ID: 930726

Level (low/med): LOW Date Received: 03/08/99

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	2.9	B		P
7440-38-2	Arsenic	4.2	B		P
7440-39-3	Barium	32.8	B		P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium	0.34	B		P
7440-47-3	Chromium	1.3	B		P
7439-92-1	Lead	30.5	B		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	10.3	B		P
7782-49-2	Selenium	14.3	B		P
7440-22-4	Silver	0.40	U		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	0.64	B		P
7440-66-6	Zinc	0.80	U		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

LEACH BLANK2

Lab Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.: 00033

Matrix (soil/water): WATER Lab Sample ID: 930727

Level (low/med): LOW Date Received: 03/08/99

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	1.0	U		P
7440-38-2	Arsenic	1.7	B		P
7440-39-3	Barium	0.62	B		P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium	0.20	U		P
7440-47-3	Chromium	0.80	U		P
7439-92-1	Lead	5.0	B		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	0.80	U		P
7782-49-2	Selenium	15.2	B		P
7440-22-4	Silver	0.40	U		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	0.50	U		P
7440-66-6	Zinc	0.80	U		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

SO-T0403

Lab Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.: 00033

Matrix (soil/water): WATER Lab Sample ID: 930611

Level (low/med): LOW Date Received: 03/05/99

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	1.0	B		P
7440-38-2	Arsenic	3180			P
7440-39-3	Barium	122	B		P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium	0.20	U		P
7440-47-3	Chromium	214	B		P
7439-92-1	Lead	95500			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	5.1	B		P
7782-49-2	Selenium	954			P
7440-22-4	Silver	0.40	U		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	104	B		P
7440-66-6	Zinc	2380	B		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

L 2291

SO-T0438

Lab Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.: 00033

Matrix (soil/water): WATER Lab Sample ID: 930610

Level (low/med): LOW Date Received: 03/05/99

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	3.6	B		P
7440-38-2	Arsenic	5420			P
7440-39-3	Barium	137	B		P
7440-41-7	Beryllium	0.75	B		P
7440-43-9	Cadmium	0.20	U		P
7440-47-3	Chromium	580	B		P
7439-92-1	Lead	115000			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	5.3	B		P
7782-49-2	Selenium	2110			P
7440-22-4	Silver	0.40	U		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	204	B		P
7440-66-6	Zinc	4100	B		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

SO-T0446

Lab Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.: 00033

Matrix (soil/water): WATER Lab Sample ID: 930605

Level (low/med): LOW Date Received: 03/05/99

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	6.8	B		P
7440-38-2	Arsenic	84.2	B		P
7440-39-3	Barium	319	B		P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium	0.21	B		P
7440-47-3	Chromium	12.1	B		P
7439-92-1	Lead	29900			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	11.9	B		P
7782-49-2	Selenium	275	B		P
7440-22-4	Silver	0.40	U		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	3.5	B		P
7440-66-6	Zinc	487	B		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

Duplicate (SO-T0446D)

COMPUCHEM

a division of Liberty Analytical Corp.

2291

98703 6L RAW INC 19990316 1338 Ø Q

KW: Compuchem, TCLP, Salts

CC: DMB, E. Nicaise

CC cover only: DHD, KJH

12/MAR/99

ENVITCO
3400 EXECUTIVE PARKWAY
TOLEDO, OH 43606

Subject: Report of Data - Account Number# 501224 Order# 34134

Enclosed are the results of analytical work performed in accordance with the referenced account number.

This report covers 3 sample(s) appearing on the attached listing.

Thank you for selecting CompuChem Environmental for your sample analysis. If you should have questions or require additional analytical services please contact your representative at 1-800-833-5097.

Sincerely,

Diane Ellmore

CompuChem Environmental
a division of Liberty Analytical

Attachment

501 Madison Avenue ■ Cary, N.C. 27513 ■ Tel: 919-379-4100 ■ Fax: 919-379-4050

COMPUCHEM

a division of Liberty Analytical Corp.

2291

12/MAR/99

ENVITCO
3400 EXECUTIVE PARKWAY
TOLEDO, OH 43606

ACCOUNT #: 501224

CC#	SAMPLE-ID	RECEIPT DATE
930981	SO-T0446D	3/05/99
930986	SO-T0438D	3/05/99
930987	SO-T0403D	3/05/99

TOTAL NUMBER OF SAMPLES = 3

501 Madison Avenue ■ Cary, N.C. 27513 ■ Tel: 919-379-4100 ■ Fax: 919-379-4050

CompuChem Environmental

I. SAMPLE DATA PACKAGE

SW-846

The sample data package shall include data for all analyses of all samples in one Sample Delivery Group (SDG), including field and analytical samples, reanalyses, blanks, spikes, duplicates, and laboratory control samples. The sample data package consists of the following:

A. Cover Page

B. Sample Data

C. Chain-of-Custody (CoC) Documentation

LAB CODE : COMPU

CONTRACT # : SW-846

CASE # : 34134

SDG # : 00330

A. Cover Page -

Inorganic Analyses Data Package

The Cover Page includes laboratory information, the Case and SDG numbers, the client ID numbers in alphanumeric order showing the client ID numbers cross-referenced with Lab ID numbers, comments, and completion of the statement on the use of ICP background and interelement correction for the samples.

On separate pages, the laboratory will include any problems encountered; both technical and administrative, the corrective action taken, and the resolution. This information is included in the Inorganic Case Summary Narrative which follows the Cover Page.

U.S. EPA - CLP

2291

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

I Name: COMPUCHEM_____ Contract: SW-846____

Lab Code: COMPU_ Case No.: 34134 SAS No.: _____ SDG No.:0033D_

SOW No.: SW846__

EPA Sample No.	Lab Sample ID
_LEACH_BLANK1_	_930726_____
_LEACH_BLANK2_	_930727_____
_SO-T0403D____	_930987_____
_SO-T0438D____	_930986_____
_SO-T0446D____	_930981_____

Were ICP interelement corrections applied ? Yes/No YES

Were ICP background corrections applied ? Yes/No YES
If yes - were raw data generated before application of background corrections ? Yes/No NO_

Comments:

I certify that 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 floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Thomas R. Cole for Name: Joe Basile

Date: March 12, 1999 Title: Laboratory Manager

CompuChem
a Division of Liberty Analytical Corp.
501 Madison Avenue Cary, NC 27513

INORGANIC CASE SUMMARY NARRATIVE
CASE # 34134 SDG # 0033D
PROTOCOL # SW-846

The indicated Sample Delivery Group (SDG) consisting of three (3) soil samples was received into the laboratory management system (LIMS) on March 5, 1999 intact and in good condition with Chain of Custody (COC) records in order. Sample ID's reported in this data package are noted by the receiving department on the COC if they differ from those listed by the samplers on the COC.

The samples were prepared as leachates then analyzed for antimony, beryllium, nickel, thallium, vanadium, zinc, and the eight TCLP metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) using analytical methods delineated in SW-846 (Third Edition)-Update III.

SAMPLE IDs:

The following customer IDs are associated with this SDG:

SO-T0403D SO-T0438D SO-T0446D

INSTRUMENTAL QUALITY CONTROL:

All calibration verification solutions (ICV & CCV), blanks (ICB, CCB) and interference check samples (ICSA & ICSAB) associated with this data were confirmed to be within SW-846 allowable limits.

SAMPLE PREPARATION QUALITY CONTROL:

The sample preparation procedure verifications (LCSW & PBW) were found to be within acceptable ranges and all field samples were prepared and analyzed within the contract specified holding times.

MATRIX RELATED QUALITY CONTROL:

No matrix quality control samples were prepared and analyzed in this case.

This SDG package was processed using the Ward Scientific software. This software package has a seven character limitation on the Forms 13 and 14 -- any sample ID's which exceed seven characters are truncated from left to right on these forms.

Release of the data contained in this hard copy data package has been authorized by the laboratory manager or his designee, as verified by the following signature.

Thomas R. Cole
Thomas R. Cole
Chemist II
March 12, 1999

B. Sample Data

1. Results
2. Quality Control Data
3. Quarterly Verification of Instrument Performance
4. Raw Data
5. Digestion and Distillation Logs

LAB CODE : COMPU

CONTRACT # : SW-846

CASE # : 34134

SDG # : ØØ33Ø

1. Results

229 1

Sample results shall be arranged in packets with the Inorganic Analysis Data Sheet (Form I - IN). These sample packets shall be placed in increasing Client Sample ID number order, considering both letters and numbers, and shall include all the samples in the SDG.

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

LEACH BLANK1

Lab Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.: 0033D

Matrix (soil/water): WATER Lab Sample ID: 930726

Level (low/med): LOW Date Received: 03/08/99

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	3.7	B		P
7440-38-2	Arsenic	4.9	B		P
7440-39-3	Barium	34.9	B		P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium	0.20	U		P
7440-47-3	Chromium	4.4	B		P
7439-92-1	Lead	23.4	B		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	9.9	B		P
7782-49-2	Selenium	17.9	B		P
7440-22-4	Silver	0.40	U		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	2.8	B		P
7440-66-6	Zinc	0.80	U		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

LEACH BLANK2

Lab Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.: 0033D

Matrix (soil/water): WATER Lab Sample ID: 930727

Level (low/med): LOW Date Received: 03/08/99

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	1.6	B		P
7440-38-2	Arsenic	1.4	U		P
7440-39-3	Barium	0.37	B		P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium	0.20	U		P
7440-47-3	Chromium	0.80	U		P
7439-92-1	Lead	2.7	B		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	0.80	U		P
7782-49-2	Selenium	19.4	B		P
7440-22-4	Silver	0.40	U		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	0.50	U		P
7440-66-6	Zinc	0.80	U		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

SO-T0403D

Lab Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.: 0033D

Matrix (soil/water): WATER Lab Sample ID: 930987

Level (low/med): LOW Date Received: 03/05/99

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	2.9	B		P
7440-38-2	Arsenic	5390			P
7440-39-3	Barium	133	B		P
7440-41-7	Beryllium	0.83	B		P
7440-43-9	Cadmium	0.27	B		P
7440-47-3	Chromium	602	B		P
7439-92-1	Lead	119000			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	5.5	B		P
7782-49-2	Selenium	2100			P
7440-22-4	Silver	0.40	U		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	204	B		P
7440-66-6	Zinc	4310			P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

SO-T0438D

Lab Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.: 0033D

Matrix (soil/water): WATER Lab Sample ID: 930986

Level (low/med): LOW Date Received: 03/05/99

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	2.2	B		P
7440-38-2	Arsenic	3120			P
7440-39-3	Barium	125	B		P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium	0.20	U		P
7440-47-3	Chromium	218	B		P
7439-92-1	Lead	93100			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	5.1	B		P
7782-49-2	Selenium	940			P
7440-22-4	Silver	0.42	B		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	102	B		P
7440-66-6	Zinc	2440	B		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

2291

EPA SAMPLE NO.

SO-T0446D

Lab Name: COMPUCHEM Contract: SW-846

Lab Code: COMPU Case No.: 34134 SAS No.: SDG No.: 0033D

Matrix (soil/water): WATER Lab Sample ID: 930981

Level (low/med): LOW Date Received: 03/05/99

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	2.3	B		P
7440-38-2	Arsenic	80.0	B		P
7440-39-3	Barium	316	B		P
7440-41-7	Beryllium	0.50	U		P
7440-43-9	Cadmium	0.29	B		P
7440-47-3	Chromium	11.8	B		P
7439-92-1	Lead	28900			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	11.2	B		P
7782-49-2	Selenium	263	B		P
7440-22-4	Silver	0.40	U		P
7440-28-0	Thallium	2.4	U		P
7440-62-2	Vanadium	3.7	B		P
7440-66-6	Zinc	472	B		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

Duplicate (SO-T0446DD)

EnVitCo, Inc.
A COGEMA Group Company

2291

SECTION 17

QUANTITATIVE CHEMICAL ANALYSIS RESULTS

CELS – CORNING LABORATORY SERVICES

ANALYTICAL DATA PACKAGES

Document ID	Samples
98703 PR RAW INC 19990319 0852 0 Q	Offgas Solids, Salt, Feed, and Miscellaneous
98703 PR RAW INC 19990319 0858 0 Q	Demonstration Glass
98703 PR RAW INC 19981105 0854 0 Q	Silica Particle Size Distribution and Surface Area
98703 PR RAW INC 19990305 1517 0 Q	Feed Analysis

Corning Incorporated
CELS—Laboratory Services
Technology Sales & Licensing
HP ME 03 078 G6
Corning, New York 14831
800-235-2357
607-974-6601
fax 607-974-6522

2291

98703 PR RAW INC 19990319 0858 Ø Q
KW: CELS, Demo Glass, Analytical Results
cc: DMB, E. Nicaise, G. Stegen
cc cover: DHD, KJH

March 17, 1999

CORNING

Mr. Robert Wilson
ENVITCO, INC.
3400 Executive Parkway
P.O. Box 2451
Toledo, OH 43606-0451

CELS Client No. : 275111-013
Date Received : February 11, 1999
Date Reported : March 11, 1999
Reviewed & Approved by : Connie L. Fieno
Connie L. Fieno
Analysis Coordinator

Copy to: CELS File

Sample Identification:

Sample 1: DGLS-SO-T-0327; 1-15-99
Sample 2: DGLS-SO-T-0357; 1-17-99
Sample 3: DGLS-SO-T-0392; 1-18-99
Sample 4: DGLS-SO-T-0417; 1-18-99
Sample 5: DGLS-SO-T-0443; 1-19-99
Sample 6: DGLS-SO-T-0471; 1-19-99
Sample 7: DGLS-SO-T-0491; 1-19-99
Sample 8: DGLS-SO-T-0514; 1-20-99
Sample 9: DGLS-SO-T-0543; 1-20-99
Sample 10: DGLS-SO-T-0568; 1-21-99
Sample 11: DGLS-SO-T-0592; 1-21-99
Sample 12: DGLS-SO-T-0636; 1-23-99
Sample 13: DGLS-SO-T-0646; 1-23-99

Analysis Reported:

Exhibit	
A	Quantitative Chemical Analysis
B	Physical Properties
C	Semi-Quantitative Spectrographic Analysis
D	Devitrification Test
E	High Temperature Viscosity including Electrical Resistivity Analysis

Client Purchase Order No.: 36031

Direct questions regarding this report to Connie Fieno, CELS office.

NOTE: This report shall not be reproduced, except in full, without the written approval of CELS - Corning Laboratory Services.

001357

CONFIDENTIAL: This CELS report information is to be used only for 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis

Sample Description:
Sample 1: DGLS-SO-T-0327; 1-15-99, Sample 2: DGLS-SO-T-0357; 1-17-99
Sample 3: DGLS-SO-T-0392; 1-18-99, Sample 4: DGLS-SO-T-0417; 1-18-99

Folder No.: 18597-99

Oxide	Sample 1 (Wt%)	Sample 2 (Wt%)	Sample 3 (Wt%)	Sample 4 (Wt%)	Test Method
K_2O	[redacted]				FES
Li_2O	[redacted]				FES
Na_2O	[redacted]				FES
Al_2O_3	[redacted]				ICP
As_2O_3	0.10	0.11	0.10	0.11	ICP
BaO	3.84	3.86	3.88	3.83	ICP
CaO	[redacted]				ICP
Cr_2O_3	0.13	0.14	0.14	0.12	ICP
MgO	0.79	0.68	0.73	0.74	ICP
MoO_3	0.23	0.19	0.20	0.19	ICP
NiO	0.31	0.32	0.32	0.32	ICP
P_2O_5	0.64	0.62	0.62	0.68	ICP
PbO	9.50	10.1	9.91	9.87	ICP
SiO_2	56.7	56.4	56.0	56.4	ICP
V_2O_5	0.057	0.059	0.061	0.061	ICP
ZnO	[redacted]				ICP
SO_3	1.03	1.13	1.17	1.22	LECO
S-2	<0.002	<0.002	<0.002	<0.002	TITR

Element	Sample 1 (ppm)	Sample 2 (ppm)	Sample 3 (ppm)	Sample 4 (ppm)	Test Method
Se	28.8	10.4	8.89	6.86	HYDR

Legend:
FES: Flame Emission Spectroscopy
ICP: Inductively Coupled Plasma Spectroscopy
LECO: LECO ® Instrumentation
TITR: Titrimetry
HYDR: Vapor Hydration

R_2O = K, Li, Na = 9.2 % Average

Additives = Ca, Zn, Al = 16.5 % Average

001358

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis

Sample Description:
Sample 5: DGLS-SO-T-0443; 1-19-99, Sample 6: DGLS-SO-T-0471; 1-19-99
Sample 7: DGLS-SO-T-0491; 1-19-99, Sample 8: DGLS-SO-T-0514; 1-20-99

Folder No.: 18597-99

Oxide	Sample 5 (Wt%)	Sample 6 (Wt%)	Sample 7 (Wt%)	Sample 8 (Wt%)	Test Method
K_2O	[redacted]				FES
Li_2O	[redacted]				FES
Na_2O	[redacted]				FES
Al_2O_3	[redacted]				ICP
As_2O_3	0.12	0.12	0.13	0.13	ICP
BaO	3.80	3.91	3.89	3.87	ICP
CaO	[redacted]				ICP
Cr_2O_3	0.12	0.12	0.11	0.12	ICP
MgO	0.75	0.77	0.78	0.79	ICP
MoO_3	0.20	0.21	0.20	0.20	ICP
NiO	0.32	0.31	0.31	0.32	ICP
P_2O_5	0.68	0.70	0.80	0.81	ICP
PbO	9.79	9.86	9.73	9.73	ICP
SiO_2	56.5	56.0	56.5	56.6	ICP
V_2O_5	0.062	0.062	0.065	0.066	ICP
ZnO	[redacted]				ICP
SO_3	1.22	1.24	1.23	1.23	LECO
S-2	<0.002	<0.002	<0.002	<0.002	TITR

Element	Sample 5 (ppm)	Sample 6 (ppm)	Sample 7 (ppm)	Sample 8 (ppm)	Test Method
Se	5.94	6.33	6.51	5.64	HYDR

Legend:
FES: Flame Emission Spectroscopy
ICP: Inductively Coupled Plasma Spectroscopy
LECO: LECO ® Instrumentation
TITR: Titrimetry
HYDR: Vapor Hydration

R_2O = K, Li, Na = 9.2 % Average

Additives = Ca, Zn, Al = 16.7 % Average

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis

Sample Description:
Sample 9: DGLS-SO-T-0543; 1-20-99, Sample 10: DGLS-SO-T-0568; 1-21-99
Sample 11: DGLS-SO-T-0592; 1-21-99, Sample 12: DGLS-SO-T-0636; 1-23-99

Folder No.: 18597-99

Oxide	Sample 9 (Wt%)	Sample 10 (Wt%)	Sample 11 (Wt%)	Sample 12 (Wt%)	Test Method
K_2O	[redacted]				FES
Li_2O	[redacted]				FES
Na_2O	[redacted]				FES
Al_2O_3	[redacted]				ICP
As_2O_3	0.12	0.13	0.13	0.13	ICP
BaO	3.92	3.93	3.94	3.81	ICP
CaO	[redacted]				ICP
Cr_2O_3	0.12	0.11	0.12	0.10	ICP
MgO	0.80	0.81	0.82	0.83	ICP
MoO_3	0.21	0.21	0.21	0.19	ICP
NiO	0.32	0.32	0.32	0.31	ICP
P_2O_5	0.79	0.85	0.85	0.92	ICP
PbO	9.78	9.77	9.74	9.84	ICP
SiO_2	56.6	56.4	56.4	56.1	ICP
V_2O_5	0.066	0.066	0.067	0.067	ICP
ZnO	[redacted]				ICP
SO_3	1.18	1.22	1.15	1.30	LECO
S-2	<0.002	<0.002	<0.002	<0.002	TITR

Element	Sample 9 (ppm)	Sample 10 (ppm)	Sample 11 (ppm)	Sample 12 (ppm)	Test Method
Se	4.37	3.83	3.76	3.00	HYDR

Legend:
FES: Flame Emission Spectroscopy
ICP: Inductively Coupled Plasma Spectroscopy
LECO: LECO ® Instrumentation
TITR: Titrimetry
HYDR: Vapor Hydration

R_2O = K, Li, Na = 9.3 % Average

Additives = Ca, Zn, Al = 16.6 % Average

001360

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis

Sample Description:

Sample 13: DGLS-SO-T-0646; 1-23-99

Folder No.: 18597-99

Oxide	Sample 13 (Wt%)	Test Method
K_2O	[redacted]	FES
Li_2O	[redacted]	FES
Na_2O	[redacted]	FES
Al_2O_3	[redacted]	ICP
As_2O_3	0.14	ICP
BaO	3.78	ICP
CaO	[redacted]	ICP
Cr_2O_3	0.10	ICP
MgO	0.84	ICP
MoO_3	0.18	ICP
NiO	0.31	ICP
P_2O_5	0.89	ICP
PbO	9.85	ICP
SiO_2	56.2	ICP
V_2O_5	0.067	ICP
ZnO	[redacted]	ICP
SO_3	1.28	LECO
S-2	<0.002	TITR

Element	Sample 13 (ppm)	Test Method
Se	3.49	HYDR

Legend:
FES: Flame Emission Spectroscopy
ICP: Inductively Coupled Plasma Spectroscopy
LECO: LECO ® Instrumentation
TITR: Titrimetry
HYDR: Vapor Hydration

R_2O = K, Li, Na = 9.3 % Average

Additives = Ca, Zn, Al = 16.5 % Average

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A: Quantitative Chemical Analysis

NOTE: The methodology used measures the elemental concentration. The results are reported in oxide form.

Accuracy Statement

The following is a guideline of the accuracy of the Atomic Spectroscopy chemical analysis.

The actual accuracy depends on the specific element and the matrix of the material being analyzed. Also, the approximate composition of the material is required to achieve this accuracy.

Major Components - Levels >2%:

Accuracy is generally +/- 0.5 to 1, relative % of absolute value.

i.e. for a level of 30.0%, the absolute standard deviation will range between 0.15% and 0.30%

Minor Components - Levels between 0.5% to 2.0%:

Accuracy is +/- 1 to 5, relative % of absolute value.

Note: The relative error will be less as the value approaches the 2% level.

i.e. for a level of 1.0%, the absolute standard deviation will range between 0.01% and 0.05%

Minor to Trace Components - Levels < 0.5%:

Accuracy is +/- 2 to 20, relative % of absolute value.

Note: The relative error will be higher as the value approaches trace levels..

i.e. for a level of 0.1%, the absolute standard deviation will range between 0.002% and 0.02%

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis

Sample Description:
Sample 1: DGLS-SO-T-0327; 1-15-99, Sample 2: DGLS-SO-T-0357; 1-17-99, Sample 3: DGLS-SO-T-0392; 1-18-99, Sample 4: DGLS-SO-T-0417; 1-18-99, Sample 5: DGLS-SO-T-0443; 1-19-99
Sample 6: DGLS-SO-T-0471; 1-19-99, Sample 7: DGLS-SO-T-0491; 1-19-99, Sample 8: DGLS-SO-T-0514; 1-20-99, Sample 9: DGLS-SO-T-0543; 1-20-99, Sample 10: DGLS-SO-T-0568; 1-21-99
Sample 11: DGLS-SO-T-0592; 1-20-99, Sample 12: DGLS-SO-T-0636; 1-23-99, Sample 13: DGLS-SO-T-0646; 1-23-99

Folder No.: 18597-99

Redox Analysis

Oxide	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Test Method
Total Fe, expressed as Fe2O3	2.23	2.27	2.27	2.28	2.29	ICP
FeO	0.31	0.29	0.31	0.31	0.34	COLOR
Fe Total	1.56	1.59	1.59	1.59	1.60	Calculated
Fe+2	0.241	0.225	0.241	0.241	0.264	Calculated
Ratio Fe+2/Fe (total)	0.155	0.142	0.152	0.151	0.165	Calculated

Oxide	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10	Test Method
Total Fe, expressed as Fe2O3	2.33	2.29	2.32	2.32	2.30	ICP
FeO	0.32	0.33	0.24	0.30	0.31	COLOR
Fe Total	1.63	1.60	1.62	1.62	1.61	Calculated
Fe+2	0.249	0.257	0.187	0.233	0.241	Calculated
Ratio Fe+2/Fe (total)	0.153	0.160	0.115	0.144	0.150	Calculated

Oxide	Sample 11	Sample 12	Sample 13	Test Method
Total Fe, expressed as Fe2O3	2.31	2.27	2.28	ICP
FeO	0.29	0.35	0.32	COLOR
Fe Total	1.62	1.59	1.59	Calculated
Fe+2	0.225	0.272	0.249	Calculated
Ratio Fe+2/Fe (total)	0.140	0.171	0.156	Calculated

Legend:
ICP: Inductively Coupled Plasma Spectroscopy
COLOR: Colorimetry

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis
Folder 18597- Standard Information (DGLS-SO-T-All)
ICP:
Matrix Matched Standards:

Fusion: Volume of Flask : 100ml
Acid Blank Concentration: 1%HNO3
Flux Concentration: 1300ppm Na

HF/HClO4: Volume of Flask : 100ml
Acid Blank Concentration: 2% HCl

ACD(As): Volume of Flask : 100ml
Acid Blank Concentration: 5% HF

Element	Concentration in Standard (ppm)
Al	8.055
As	4.995
Ba	2.084
Ca	2.147
Cr	1.006
Fe	1.984
Mg	0.9748
Mo	2.012
Ni	2.002
P	2.001
Pb	10.05
Si	30.14
V	1.864
Zn	2.042

Sulfur /Carbon via LECO:

Analyte	Standard Value	Tolerance	Standard Reading
S	0.0131	+/-0.0008	0.0131

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Folder 18597- Standard Information (Order 1-DGLS-SO-T-0327)
ICP:

Matrix Matched Standards:

FES Analysis:

HF/HClO4: Volume of Flask : 500ml
H2O Blank used for Baseline

Element	Concentration in Standard (ppm)					
	Sample 1		Sample 2,3		Sample 4-13	
	.1g/250ml	.1g/500ml	.1g/250ml	.1g/500ml	.1g/250ml	.1g/500ml
K	2.4	1.2	2.4	1.2	2.4	1.2
Li	7.4	3.7	7.8	3.9	7.8	3.9
Na	14.2	7.1	13.2	6.6	13.0	6.5

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis
Sample ID: DGLS-SO-T-0327
Folder 18597- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1001	1000
Analysis 2:	0.1001	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1012	100
Analysis 2:	0.1027	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.099	0.097	0.10
BaO	Fusion	3.84	3.84	3.84
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.13	0.13	0.13
Fe2O3	Fusion	2.23	2.23	2.23
FeO	Colormetric	0.309	0.319	0.31
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.78	0.80	0.79
MoO3	Fusion	0.23	0.23	0.23
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.31	0.30	0.31
P2O5	Fusion	0.64	0.64	0.64
PbO	Fusion	9.48	9.52	9.50
S-2	Titration	<0.002	-	-
SiO2	Fusion	56.7	56.6	56.7
V2O5	Fusion	0.057	0.057	0.057
ZnO	Fusion	[redacted]		

R_2O = K, Li, Na = 9.5 % Average

Additives = Ca, Zn, Al = 16.4 % Average

Element	Dissolution	Analysis 1 ppm	Analysis 2 ppm	Average ppm
Se	Vapor Hydride	28.8	-	-

Element	Reading 1	Reading 2	Reading 3	Average
S	1.03	1.03	1.03	1.03

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis
Sample ID: DGLS-SO-T-0357
Folder 18597- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1017	1000
Analysis 2:	0.1028	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1040	100
Analysis 2:	0.1033	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.11	0.11	0.11
BaO	Fusion	3.87	3.84	3.86
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.14	0.13	0.14
Fe2O3	Fusion	2.27	2.27	2.27
FeO	Colormetric	0.288	0.288	0.29
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.66	0.70	0.68
MoO3	Fusion	0.19	0.19	0.19
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.32	0.31	0.32
P2O5	Fusion	0.60	0.64	0.62
PbO	Fusion	10.0	10.1	10.1
S-2	Titration	<0.002	-	-
SiO2	Fusion	56.0	56.8	56.4
V2O5	Fusion	0.058	0.059	0.059
ZnO	Fusion	[redacted]		

R_2O = K, Li, Na = 6.4 % Average

Additives = Ca, Zn, Al = 16.5 % Average

Element	Dissolution	Analysis 1 ppm	Analysis 2 ppm	Average ppm
Se	Vapor Hydride	10.4	-	-

Element	Reading 1	Reading 2	Reading 3	Average
S	1.13	1.13	1.12	1.13

001367

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis
Sample ID: DGLS-SO-T-0392
Folder 18597- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1010	1000
Analysis 2:	0.1006	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1004	100
Analysis 2:	0.1014	100

Oxide	Dissolution	Analysis 1 Wt.%	Analysis 2 Wt.%	Average Wt.%
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.10	0.10	0.10
BaO	Fusion	3.88	3.87	3.88
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.14	0.13	0.14
Fe2O3	Fusion	2.27	2.27	2.27
FeO	Colormetric	0.309	0.313	0.31
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.73	0.73	0.73
MoO3	Fusion	0.19	0.20	0.20
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.32	0.31	0.32
P2O5	Fusion	0.62	0.62	0.62
PbO	Fusion	9.92	9.89	9.91
S-2	Titration	<0.002	-	-
SiO2	Fusion	56.0	56.0	56.0
V2O5	Fusion	0.61	0.60	0.61
ZnO	Fusion	[redacted]		

R_2O = K, Li, Na = 9.3 % Average

Additives = Ca, Zn, Al = 16.6 % Average

Element	Dissolution	Analysis 1 ppm	Analysis 2 ppm	Average ppm
Se	Vapor Hydride	8.89	-	-

Element	Reading 1	Reading 2	Reading 3	Average
S	1.19	1.16	1.17	1.17

001368

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis
Sample ID: DGLS-SO-T-0417
Folder 18597- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1002	1000
Analysis 2:	0.1003	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1000	100
Analysis 2:	0.1016	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.11	0.11	0.11
BaO	Fusion	3.81	3.86	3.83
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.12	0.12	0.12
Fe2O3	Fusion	2.30	2.26	2.28
FeO	Colormetric	0.313	0.313	0.31
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.74	0.73	0.74
MoO3	Fusion	0.19	0.19	0.19
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.32	0.32	0.32
P2O5	Fusion	0.67	0.69	0.68
PbO	Fusion	9.91	9.83	9.87
S-2	Titration	<0.002	-	-
SiO2	Fusion	56.2	56.7	56.4
V2O5	Fusion	0.061	0.060	0.061
ZnO	Fusion	[redacted]		

R_2O = K, Li, Na = 9.3 % Average

Additives = Ca, Zn, Al = 1.66 % Average

Element	Dissolution	Analysis 1 ppm	Analysis 2 ppm	Average ppm
Se	Vapor Hydride	8.21	5.50	6.86

Element	Reading 1	Reading 2	Reading 3	Average
S	1.22	1.19	1.24	1.22

001369

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis
Sample ID: DGLS-SO-T-0443
Folder 18597- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1004	1000
Analysis 2:	0.1004	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1014	100
Analysis 2:	0.1033	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.11	0.12	0.12
BaO	Fusion	3.82	3.77	3.80
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.12	0.12	0.12
Fe2O3	Fusion	2.29	2.29	2.29
FeO	Colormetric	0.337	0.336	0.34
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.75	0.75	0.75
MoO3	Fusion	0.20	0.20	0.20
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.31	0.32	0.32
P2O5	Fusion	0.65	0.70	0.68
PbO	Fusion	9.80	9.77	9.79
S-2	Titration	<0.002	-	-
SiO2	Fusion	56.5	56.5	56.5
V2O5	Fusion	0.062	0.061	0.062
ZnO	Fusion	[redacted]		

R_2O = K, Li, Na = 22 % Average

Additives = Ca, Zn, Al = 16.7 % Average

Element	Dissolution	Analysis 1 ppm	Analysis 2 ppm	Average ppm
Se	Vapor Hydride	5.94	-	-

Element	Reading 1	Reading 2	Reading 3	Average
S	1.22	1.23	1.20	1.22

001370

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis
Sample ID: DGLS-SO-T-0471
Folder 18597- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1000	1000
Analysis 2:	0.1011	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1025	100
Analysis 2:	0.1012	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.12	0.12	0.12
BaO	Fusion	3.88	3.93	3.91
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.12	0.12	0.12
Fe2O3	Fusion	2.33	2.32	2.33
FeO	Colormetric	0.324	0.324	0.32
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.77	0.77	0.77
MoO3	Fusion	0.21	0.21	0.21
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.31	0.31	0.31
P2O5	Fusion	0.70	0.70	0.70
PbO	Fusion	9.88	9.84	9.86
S-2	Titration	<0.002	-	-
SiO2	Fusion	56.2	55.8	56.0
V2O5	Fusion	0.062	0.062	0.062
ZnO	Fusion	[redacted]		

R_2O = K, Li, Na = 9.2 % Average
Additives = Ca, Zn, Al = 16.9 % Average

Element	Dissolution	Analysis 1 ppm	Analysis 2 ppm	Average ppm
Se	Vapor Hydride	6.33	-	-

Element	Reading 1	Reading 2	Reading 3	Average
S	1.24	1.25	1.23	1.24

001371

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis
Sample ID: DGLS-SO-T-0491
Folder 18597- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1000	1000
Analysis 2:	0.1000	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1005	100
Analysis 2:	0.1032	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.12	0.15	0.13
BaO	Fusion	3.87	3.90	3.89
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.11	0.11	0.11
Fe2O3	Fusion	2.29	2.29	2.29
FeO	Colormetric	0.334	0.334	0.33
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.78	0.77	0.78
MoO3	Fusion	0.20	0.20	0.20
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.31	0.31	0.31
P2O5	Fusion	0.78	0.82	0.80
PbO	Fusion	9.73	9.73	9.73
S-2	Titration	<0.002	-	-
SiO2	Fusion	56.5	56.5	56.5
V2O5	Fusion	0.066	0.064	0.065
ZnO	Fusion	[redacted]		

R_2O = K, Li, Na = 9.02 % Average

Additives = Ca, Zn, Al = 16.6% Average

Element	Dissolution	Analysis 1 ppm	Analysis 2 ppm	Average ppm
Se	Vapor Hydride	6.51	-	-

Element	Reading 1	Reading 2	Reading 3	Average
S	1.26	1.21	1.23	1.23

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis
Sample ID: DGLS-SO-T-0514
Folder 18597- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1014	1000
Analysis 2:	0.1004	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1010	100
Analysis 2:	0.1003	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.12	0.13	0.13
BaO	Fusion	3.87	3.86	3.87
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.11	0.12	0.12
Fe2O3	Fusion	2.31	2.32	2.32
FeO	Colormetric	0.243	0.243	0.24
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.79	0.79	0.79
MoO3	Fusion	0.20	0.20	0.20
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.32	0.31	0.32
P2O5	Fusion	0.81	0.81	0.81
PbO	Fusion	9.72	9.74	9.73
S-2	Titration	<0.002	-	-
SiO2	Fusion	56.5	56.7	56.6
V2O5	Fusion	0.067	0.065	0.066
ZnO	Fusion	[redacted]		

R_2O = K. Li, Na = 9.2 % Average

Additives = Ca, Zn, Al = 16.6 % Average

Element	Dissolution	Analysis 1 ppm	Analysis 2 ppm	Average ppm
Se	Vapor Hydride	5.64	-	-

Element	Reading 1	Reading 2	Reading 3	Average
S	1.23	1.23	1.23	1.23

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis
Sample ID: DGLS-SO-T-0543
Folder 18597- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1004	1000
Analysis 2:	0.1001	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1007	100
Analysis 2:	0.1028	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.12	0.12	0.12
BaO	Fusion	3.92	3.91	3.92
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.12	0.11	0.12
Fe2O3	Fusion	2.32	2.31	2.32
FeO	Colormetric	0.299	0.309	0.30
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.80	0.80	0.80
MoO3	Fusion	0.21	0.20	0.21
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.32	0.32	0.32
P2O5	Fusion	0.79	0.79	0.79
PbO	Fusion	9.74	9.82	9.78
S-2	Titration	<0.002	-	-
SiO2	Fusion	56.6	56.6	56.6
V2O5	Fusion	0.066	0.065	0.066
ZnO	Fusion	[redacted]		

R_2O = K, Li, Na = 9.2 % Average

Additives = Ca, Zn, Al = 16.7 % Average

Element	Dissolution	Analysis 1 ppm	Analysis 2 ppm	Average ppm
Se	Vapor Hydride	5.01	3.73	4.37

Element	Reading 1	Reading 2	Reading 3	Average
S	1.19	1.18	1.19	1.18

001374

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis
Sample ID: DGLS-SO-T-0568
Folder 18597- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1011	1000
Analysis 2:	0.1001	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1010	100
Analysis 2:	0.1019	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.13	0.13	0.13
BaO	Fusion	3.94	3.91	3.93
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.11	0.11	0.11
Fe2O3	Fusion	2.29	2.31	2.30
FeO	Colormetric	0.313	0.313	0.31
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.81	0.81	0.81
MoO3	Fusion	0.20	0.21	0.21
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.32	0.32	0.32
P2O5	Fusion	0.84	0.85	0.85
PbO	Fusion	9.76	9.77	9.77
S-2	Titration	<0.002	-	-
SiO2	Fusion	56.1	56.7	56.4
V2O5	Fusion	0.065	0.067	0.066
ZnO	Fusion	[redacted]		

R_2O = K. Li, Na = 2.2 % Average

Additives = Ca, Zn, Al = 16.6 % Average

Element	Dissolution	Analysis 1 ppm	Analysis 2 ppm	Average ppm
Se	Vapor Hydride	3.83	-	-

Element	Reading 1	Reading 2	Reading 3	Average
S	1.22	1.22	1.23	1.22

001375

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis
Sample ID: DGLS-SO-T-0592
Folder 18597- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1000	1000
Analysis 2:	0.1000	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1002	100
Analysis 2:	0.1045	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.13	0.13	0.13
BaO	Fusion	3.95	3.93	3.94
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.11	0.12	0.12
Fe2O3	Fusion	2.31	2.31	2.31
FeO	Colormetric	0.277	0.295	0.29
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.82	0.82	0.82
MoO3	Fusion	0.21	0.20	0.21
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.32	0.32	0.32
P2O5	Fusion	0.86	0.84	0.85
PbO	Fusion	9.77	9.71	9.74
S-2	Titration	<0.002	-	-
SiO2	Fusion	56.1	56.6	56.4
V2O5	Fusion	0.067	0.066	0.067
ZnO	Fusion	[redacted]		

R_2O = K, Li, Na = 9.2 % Average

Additives = Ca, Zn, Al = 16.6 % Average

Element	Dissolution	Analysis 1 ppm	Analysis 2 ppm	Average ppm
Se	Vapor Hydride	3.76	-	-

Element	Reading 1	Reading 2	Reading 3	Average
S	1.15	1.14	1.17	1.15

001376

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis
Sample ID: DGLS-SO-T-0636
Folder 18597- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1001	1000
Analysis 2:	0.1003	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1008	100
Analysis 2:	0.1015	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.13	0.13	0.13
BaO	Fusion	3.81	3.80	3.81
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.10	0.10	0.10
Fe2O3	Fusion	2.29	2.25	2.27
FeO	Colormetric	0.346	0.346	0.35
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.83	0.82	0.83
MoO3	Fusion	0.19	0.18	0.19
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.30	0.32	0.31
P2O5	Fusion	0.95	0.88	0.92
PbO	Fusion	9.82	9.86	9.84
S-2	Titration	<0.002	-	-
SiO2	Fusion	56.3	55.9	56.1
V2O5	Fusion	0.068	0.066	0.067
ZnO	Fusion	[redacted]		

R_2O = K. Li, Na = 9.3 % Average

Additives = Ca, Zn, Al = 16.5% Average

Element	Dissolution	Analysis 1 ppm	Analysis 2 ppm	Average ppm
Se	Vapor Hydride	3.00	-	-

Element	Reading 1	Reading 2	Reading 3	Average
S	1.29	1.32	1.29	1.30

001377

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit A : Quantitative Chemical Analysis
Sample ID: DGLS-SO-T-0646
Folder 18597- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1042	1000
Analysis 2:	0.1004	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1072	100
Analysis 2:	0.1002	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.13	0.14	0.14
BaO	Fusion	3.76	3.80	3.78
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.10	0.10	0.10
Fe2O3	Fusion	2.26	2.29	2.28
FeO	Colormetric	0.316	0.316	0.32
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.83	0.84	0.84
MoO3	Fusion	0.17	0.18	0.18
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.31	0.31	0.31
P2O5	Fusion	0.89	0.89	0.89
PbO	Fusion	9.89	9.80	9.85
S-2	Titration	<0.002	-	-
SiO2	Fusion	56.5	55.9	56.2
V2O5	Fusion	0.068	0.066	0.067
ZnO	Fusion	[redacted]		

R_2O = K, Li, Na = 9.3 % Average

Additives = Ca, Zn, Al = 16.6 % Average

Element	Dissolution	Analysis 1 ppm	Analysis 2 ppm	Average ppm
Se	Vapor Hydride	3.49	-	-

Element	Reading 1	Reading 2	Reading 3	Average
S	1.30	1.29	1.27	1.28

001378

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit B : Physical Properties Analysis

Sample Description:

Sample 1: DGLS-SO-T-0327; 1-15-99, Sample 2: DGLS-SO-T-0357; 1-17-99, Sample 3: DGLS-SO-T-0392; 1-18-99, Sample 4: DGLS-SO-T-0417; 1-18-99, Sample 5: DGLS-SO-T-0443; 1-19-99
Sample 6: DGLS-SO-T-0471; 1-19-99, Sample 7: DGLS-SO-T-0491; 1-19-99, Sample 8: DGLS-SO-T-0514; 1-20-99, Sample 9: DGLS-SO-T-0543; 1-20-99, Sample 10: DGLS-SO-T-0568; 1-21-99
Sample 11: DGLS-SO-T-0592; 1-20-99, Sample 12: DGLS-SO-T-0636; 1-23-99, Sample 13: DGLS-SO-T-0646; 1-23-99

Folder No.: 18597-99

Determination	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Test Method
Anneal Point (°C)	-	-	483	-	-	ASTM C336
Strain Point (°C)	-	-	449	-	-	ASTM C336
Density (gm/cm^3)	2.812	2.821	2.821	2.813	2.813	ASTM C693

Determination	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10	Test Method
Anneal Point (°C)	-	-	483	-	484	ASTM C336
Strain Point (°C)	-	-	449	-	451	ASTM C336
Density (gm/cm^3)	2.810	2.820	2.817	2.821	2.817	ASTM C693

Determination	Sample 11	Sample 12	Sample 13	Test Method
Anneal Point (°C)	-	481	-	ASTM C336
Strain Point (°C)	-	447	-	ASTM C336
Density (gm/cm^3)	2.813	2.794	2.816	ASTM C693

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit C : Semi-Quantitative Spectrographic Analysis

Sample Description:
Sample 1: DGLS-SO-T-0327; 1-15-99, Sample 3: DGLS-SO-T-0392; 1-18-99, Sample 11: DGLS-SO-T-0592; 1-20-99

Folder No.: 18597-99

RESULTS (Reported As The *"ELEMENT"*)

Range(Wt%)	Sample 1	Sample 3	Sample 11
>30	Si	Si	Si
10-30	-	-	-
3.0-10	[redacted]Pb+	[redacted]Pb+	[redacted]Pb+
[redacted]	[redacted]	[redacted]	[redacted]
1.0-3.0	Ba,Fe[redacted]	Ba,Fe[redacted]	Ba,Fe[redacted]
0.3-1.0	[redacted]Mg,Mo-,P	[redacted]Mg,Mo-,P	[redacted]Mg,Mo-,P
0.1-0.3	As-,Ni+	As-,Ni+	As-,Ni+
[redacted]	[redacted]	[redacted]	[redacted]
0.03-0.1	Cr,V	Cr,V	Cr,V
0.01-0.03	Mn,Sr,Ti	Mn,Sr,Ti	Mn,Sr,Ti
0.003-0.01	B,Zr(?)	B,Zr(?)	B,Zr(?)
[redacted]	[redacted]	[redacted]	[redacted]
0.001-0.003	Cu,Sn-	Cu	Cu
<0.001	Ag,Bi,Ga	Ag,Bi,Ga,Sn	Ag,Bi,Ga,Sn

Typical detection limits (Wt%) for the ELEMENTS EXAMINED are listed below. They are ONLY general guidelines. Detection limits are composition affected.

0.3%	- K,P	0.01%	- Ba,Na,Sb,Zr
0.1%	- As,Cd,Li	0.003%	- Al,Ca,Co,In,Ni,Si,Ti
0.03%	- Nb,Zn	<0.001%	- Ag,B,Be,Bi,Cu,Cr,Fe,Ga,Mg,Mn,Pb,Sn,Sr,V

[(+) = Upper Range, (-) = Lower Range, (?) = Possibly Present]

Analyst Comments: [redacted]

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit C : Semi-Quantitative Spectrographic Analysis (Continued)

BELOW is a list of the ELEMENTS that are determined by spectrographic analysis. Analyses are divided into three categories: GENERAL QUANTITATIVE, NOBLE METALS, AND RARE EARTHS.

Analysis for the Noble Metals and/or Rare Earths must be requested, if needed. They are not part of the General Quantitative Analysis. They can be requested by the group or by the element of interest.

GENERAL QUANTITATIVE ANALYSIS Ag, Al, As, B, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cu, Fe, Ga, Ge, In, K, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Sb, Si, Sn, Sr, Ti, V, Zn, Zr. (If requested) Ta-0.1%, Te-0.1%, Tl-0.01%, W-0.3-1%

NOBLE METALS ANALYSIS

ELEMENT	DETECTION %
Au	0.003
Ga	0.001
Hf	0.1
In	0.001
Ir	0.01
Pd	0.001
Pt	0.01
Re	0.03
Rh	0.001
Ru	0.03

RARE EARTHS ANALYSIS

ELEMENT	DETECTION %	ELEMENT	DETECTION%
Ce	0.1	Nd	0.3
Dy	0.1	Pr	0.1
Er	0.1	Sc	0.01
Eu	0.01	Sm	0.1
Gd	0.03	Tb	0.03
Ho	0.03	Tm	0.01
La	0.1	Y	0.003
Lu	0.01	Yb	0.001

Semi-Quantitative Spectrographic Analysis RESULTS are reported as weight percent of the ELEMENT (NOT as the oxide). To convert weight percent element to weight percent oxide, MULTIPLY the percent element by the appropriate factor listed in the table below.

FACTORS FOR CONVERSION

Ag2O	1.07	Eu2O3	1.16	MoO3	1.50	SrO	1.18
Al2O3	1.89	FeO	1.29	Na2O	1.35	Ta2O5	1.22
As2O3	1.32	Fe2O3	1.43	Nb2O5	1.43	Tb4O7	1.18
As2O5	1.53	Ga2O3	1.34	Nd2O3	1.17	TeO2	1.25
B2O3	3.22	Gd2O3	1.15	NiO	1.27	TiO2	1.67
BaO	1.12	GeO2	1.44	P2O5	2.29	Tl2O	1.04
BeO	2.78	PbO	1.08	PbO2	1.15	Tl2O3	1.12
Bi2O3	1.11	Ho2O3	1.15	Pr2O3	1.17	Tm2O3	1.14
CaO	1.40	HfO2	1.18	RuO4	1.63	VO	1.31
CdO	1.14	In2O3	1.12	RuO2	1.32	VO2	1.63
CeO2	1.23	K2O	1.20	Sb2O3	1.20	V2O5	1.79
Co3O4	1.36	La2O3	1.17	Sb2O5	1.33	WO2	1.17
Cr2O3	1.46	Li2O	2.15	Sc2O3	1.53	WO3	1.26
CuO	1.25	Lu2O3	1.14	SiO2	2.14	Y2O3	1.27
Cu2O	1.13	MgO	1.66	Sm2O3	1.16	Yb2O3	1.14
Dy2O3	1.15	MnO	1.29	SnO	1.13	ZnO	1.24
Er2O3	1.14	MnO2	1.58	SnO2	1.27	ZrO2	1.35

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit D : Devitrification Test

Sample Description:

Sample 3: DGLS-SO-T-0392; 1-18-99, Sample 8: DGLS-SO-T-0514; 1-20-99, Sample 10: DGLS-SO-T-0568; 1-21-99, Sample 12: DGLS-SO-T-0636; 1-23-99

A Pt. boat was filled with –20 mesh crushed glass sample and melted in a gradient furnace for 24 hours. Observations were made on the slab sample with 150x magnification.

Sample ID	Maximum Temp. of crystallization (degrees C)			Possible Crystalline
	Air	Internal	Platinum Phase	
Sample 3	1100	1070	1070	Spinel
	950	940	940	Diopside (second phase)
Sample 8	1150	1150	1125	Spinel
	930	920	920	Diopside
Sample 10	1100	1075	1070	Spinel
	955	950	950	Diopside
Sample 12:	1030	1030	1025	Spinel
	940	940	930	Diopside

Note:* 95% confidence limits on maximum temperature of crystallization are estimated to be +/- 15 degrees C. More analysis is required for positive identification of the crystalline phases (e.g. SEM/EDX, X-ray diff.,...)

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 2: DGLS-SO-T-0357; 1-17-99

Folder No.: 18597-99

Experimental Data

Temperature (C)	Resistivity (ohm-in) 1KHz	Viscosity (poises)	Log Viscosity
1,096.7	4.80E+00	7.756E+02	2.890
1,085.0	5.20E+00	8.958E+02	2.952
1,041.5	6.30E+00	1.592E+03	3.202
999.1	7.80E+00	2.832E+03	3.452
955.1	9.90E+00	5.650E+03	3.752
910.9	1.54E+01	1.279E+04	4.107
862.3	2.05E+01	3.455E+04	4.538
817.0	3.03E+01	9.932E+04	4.997
768.2	5.17E+01	3.776E+05	5.577
724.7	8.82E+01	1.563E+06	6.194

Physical Properties

			Approx.
Softening Point:		C	
Anneal Point:		C	
Strain Point:		C	
0-300 Expansion	97	10-7/C	☑
Density:	2.821	g/cc	☐

Viscosity Levels

10 ^ 3	1,076	C
10 ^ 4	924	C
10 ^ 5	817	C
10 ^ 6	738	C

Comment: CELS: DGLS-SO-T-0357 (Glass Frit Sple #2) 1-17-99
Used cooling rate of 2C/min.

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 2: DGLS-SO-T-0357; 1-17-99

Folder No.: 18597-99

Least-Squares Fulcher Fit Analysis

Segment: 1 $Log10(Viscosity) = A + B/(T - T_0)$ where $A = -1.690$, $B = 4{,}068.2$, $T_0 = 208.6$

Temp Meas'd	Visc Meas'd	Temp Calc'd	Visc Calc'd	Temp Diff	Log Visc Diff
1,096.7	7.756E+02	1,097.0	7.782E+02	-0.3	-0.001
1,085.0	8.958E+02	1,085.0	8.955E+02	0.0	0.000
1,041.5	1.592E+03	1,040.3	1.566E+03	1.2	0.007
999.1	2.832E+03	999.8	2.862E+03	-0.7	-0.005
955.1	5.650E+03	956.2	5.749E+03	-1.0	-0.008
910.9	1.279E+04	910.4	1.267E+04	0.5	0.004
862.3	3.455E+04	861.8	3.418E+04	0.5	0.005
817.0	9.932E+04	817.0	9.933E+04	0.0	0.000
768.2	3.776E+05	768.4	3.808E+05	-0.3	-0.004
724.7	1.563E+06	724.6	1.558E+06	0.1	0.001

Std Deviation of Temperature = 0.8 Std Deviation of Viscosity = 0.006

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 2: DGLS-SO-T-0357; 1-17-99

Folder No.: 18597-99

Least-Squares Fulcher Fit Estimates

Segment: 1 $Log10(Viscosity) = A + B/(T - T_0)$ where $A = -1.690$, $B = 4{,}068.2$, $T_0 = 208.6$

Temp (Deg C)	Viscosity (Poises)	Log Visc	Error Log Visc	Log Visc	Temp Deg C	Temp Error
1,075	1.013E+03	3.006	0.005	3.0	1,076	1.0
1,050	1.397E+03	3.145	0.005	4.0	924	0.5
1,025	1.965E+03	3.293	0.005	5.0	817	0.5
1,000	2.823E+03	3.451	0.004	6.0	738	0.5
975	4.154E+03	3.618	0.004			
950	6.273E+03	3.797	0.004			
925	9.748E+03	3.989	0.004			
900	1.564E+04	4.194	0.004			
875	2.600E+04	4.415	0.004			
850	4.497E+04	4.653	0.004			
825	8.132E+04	4.910	0.004			
800	1.546E+05	5.189	0.005			
775	3.110E+05	5.493	0.006			
750	6.676E+05	5.824	0.006			

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

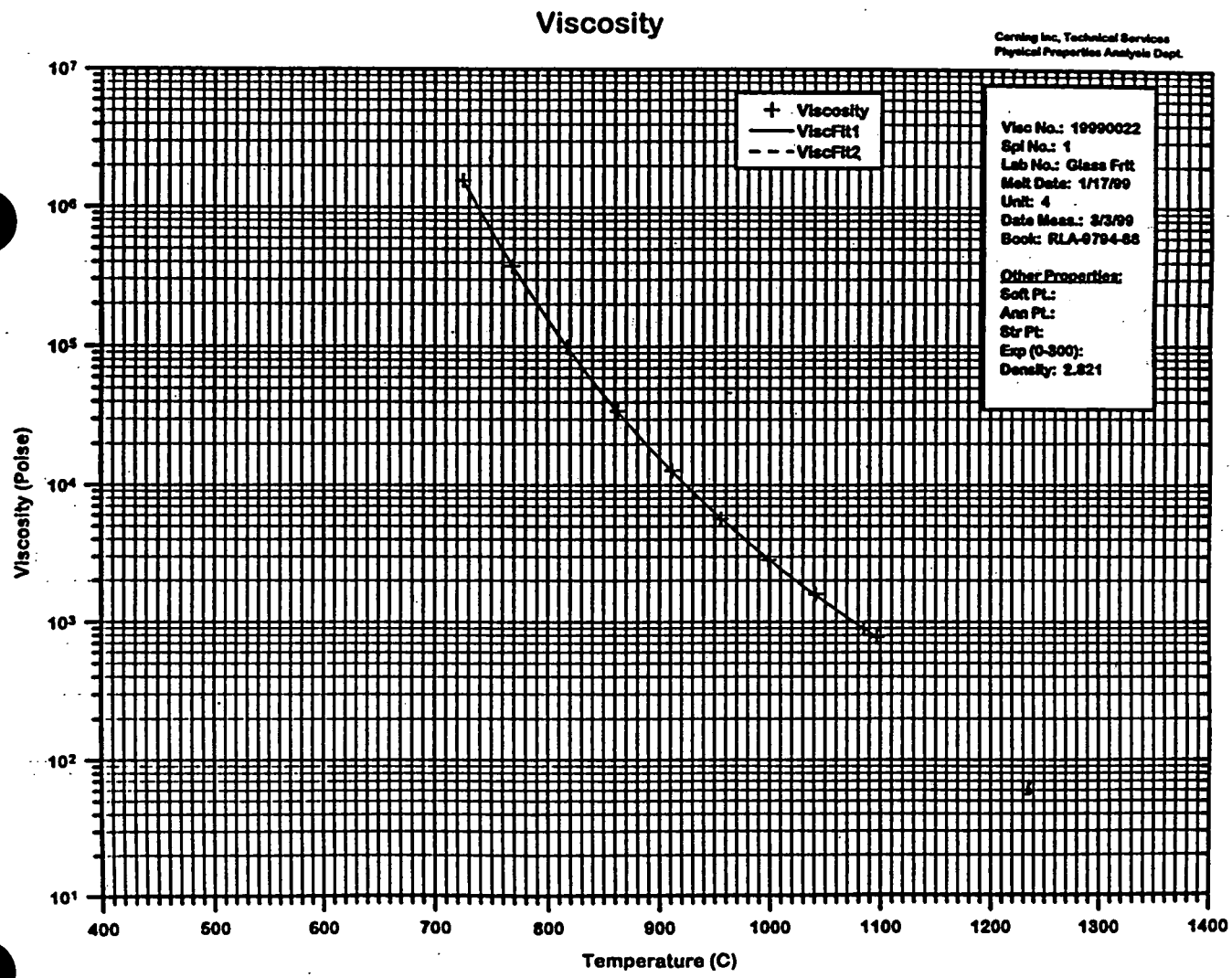
CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 2: DGLS-SO-T-0357; 1-17-99

Folder No.: 18597-99



001386

LABORATORY ANALYSIS REPORT

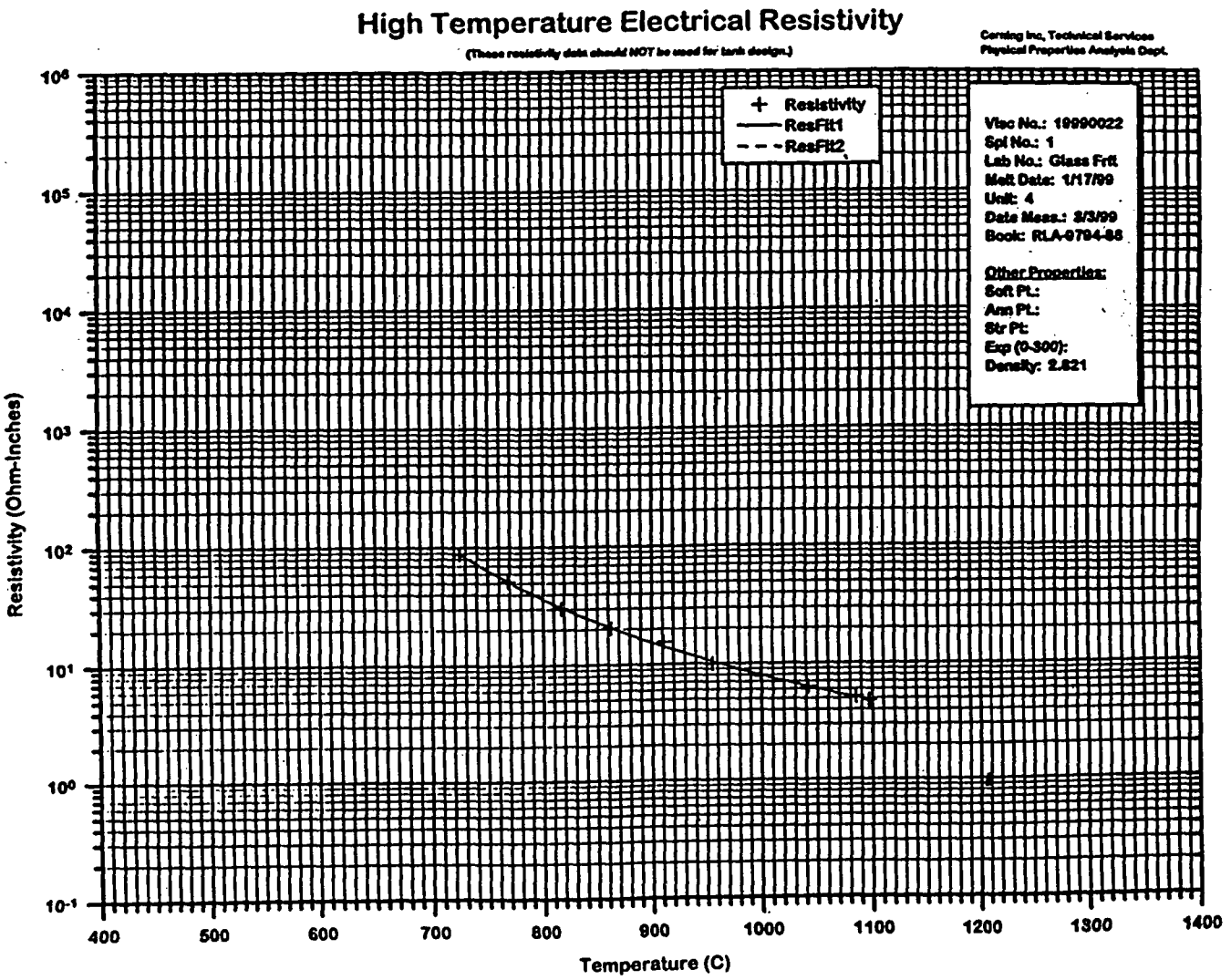
CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 2: DGLS-SO-T-0357; 1-17-99

Folder No.: 18597-99



CONFIDENTIAL This CELS report information is to be used only for account 275111

LABORATORY ANALYSIS REPORT

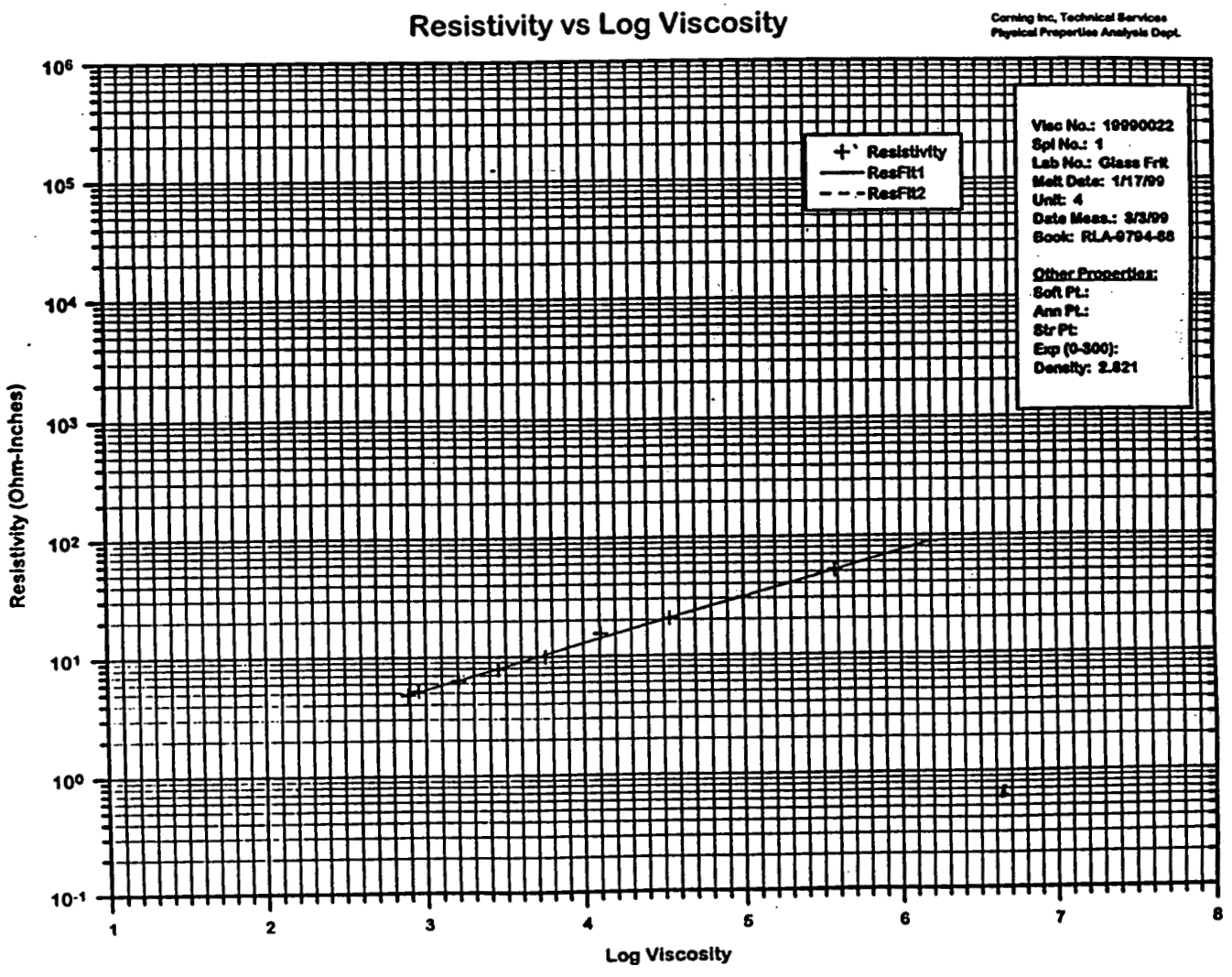
CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 2: DGLS-SO-T-0357; 1-17-99

Folder No.: 18597-99



001388

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 3: DGLS-SO-T-0392; 1-18-99

Folder No.: 18597-99

Experimental Data

Temperature (C)	Resistivity (ohm-in) 1KHz	Viscosity (poises)	Log Viscosity
1,109.4	3.80E+00	6.997E+02	2.845
1,086.4	4.30E+00	9.083E+02	2.958
1,043.0	5.30E+00	1.560E+03	3.193
1,002.2	6.60E+00	2.768E+03	3.442
960.5	8.50E+00	5.438E+03	3.735
914.6	1.17E+01	1.208E+04	4.082
866.2	1.75E+01	3.227E+04	4.509
820.3	2.59E+01	9.059E+04	4.957
773.0	4.30E+01	3.212E+05	5.507
729.0	7.33E+01	1.312E+06	6.118

Physical Properties

			Approx.
Softening Point:		C	
Anneal Point:	483	C	
Strain Point:	449	C	
0-300 Expansion	97	10-7/C	☑
Density:	2.821	g/cc	☐

Viscosity Levels

10 ^ 3	1,079	C
10 ^ 4	925	C
10 ^ 5	817	C
10 ^ 6	737	C

Comment: CELS: DGLS-SO-T-0392 (Glass Frit Sample #3) 1-18-99
Used cooling rate of 2C/min.

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 3: DGLS-SO-T-0392; 1-18-99

Folder No.: 18597-99

Least-Squares Fulcher Fit Analysis

Segment: 1 $Log10(Viscosity) = A + B/(T - T_0)$ where $A = -1.690$, $B = 4{,}108.8$, $T_0 = 202.5$

Temp Meas'd	Visc Meas'd	Temp Calc'd	Visc Calc'd	Temp Diff	Log Visc Diff
1,109.4	6.997E+02	1,108.6	6.928E+02	0.9	0.004
1,086.4	9.083E+02	1,086.5	9.091E+02	-0.1	0.000
1,043.0	1.560E+03	1,044.0	1.580E+03	-0.9	-0.005
1,002.2	2.768E+03	1,003.1	2.806E+03	-0.9	-0.006
960.5	5.438E+03	959.9	5.382E+03	0.6	0.004
914.6	1.208E+04	914.4	1.202E+04	0.2	0.002
866.2	3.227E+04	865.4	3.172E+04	0.8	0.007
820.3	9.059E+04	820.7	9.133E+04	-0.3	-0.004
773.0	3.212E+05	773.5	3.258E+05	-0.5	-0.006
729.0	1.312E+06	728.8	1.302E+06	0.2	0.003

Std Deviation of Temperature = 0.8 Std Deviation of Viscosity = 0.006

001390

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 3: DGLS-SO-T-0392; 1-18-99

Folder No.: 18597-99

Least-Squares Fulcher Fit Estimates

Segment: 1 $Log10(Viscosity) = A + B/(T - T_0)$ where $A = -1.690$, $B = 4{,}108.8$, $T_0 = 202.5$

Temp (Deg C)	Viscosity (Poises)	Log Visc	Error Log Visc	Log Visc	Temp Deg C	Temp Error
1,100	7.732E+02	2.888	0.006	3.0	1,079	1.1
1,075	1.046E+03	3.019	0.006	4.0	925	0.5
1,050	1.440E+03	3.158	0.005	5.0	817	0.5
1,025	2.022E+03	3.306	0.005	6.0	737	0.5
1,000	2.900E+03	3.462	0.005			
975	4.257E+03	3.629	0.004			
950	6.412E+03	3.807	0.004			
925	9.936E+03	3.997	0.004			
900	1.589E+04	4.201	0.004			
875	2.631E+04	4.420	0.004			
850	4.529E+04	4.656	0.004			
825	8.144E+04	4.911	0.005			
800	1.538E+05	5.187	0.005			
775	3.071E+05	5.487	0.006			
750	6.532E+05	5.815	0.007			

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

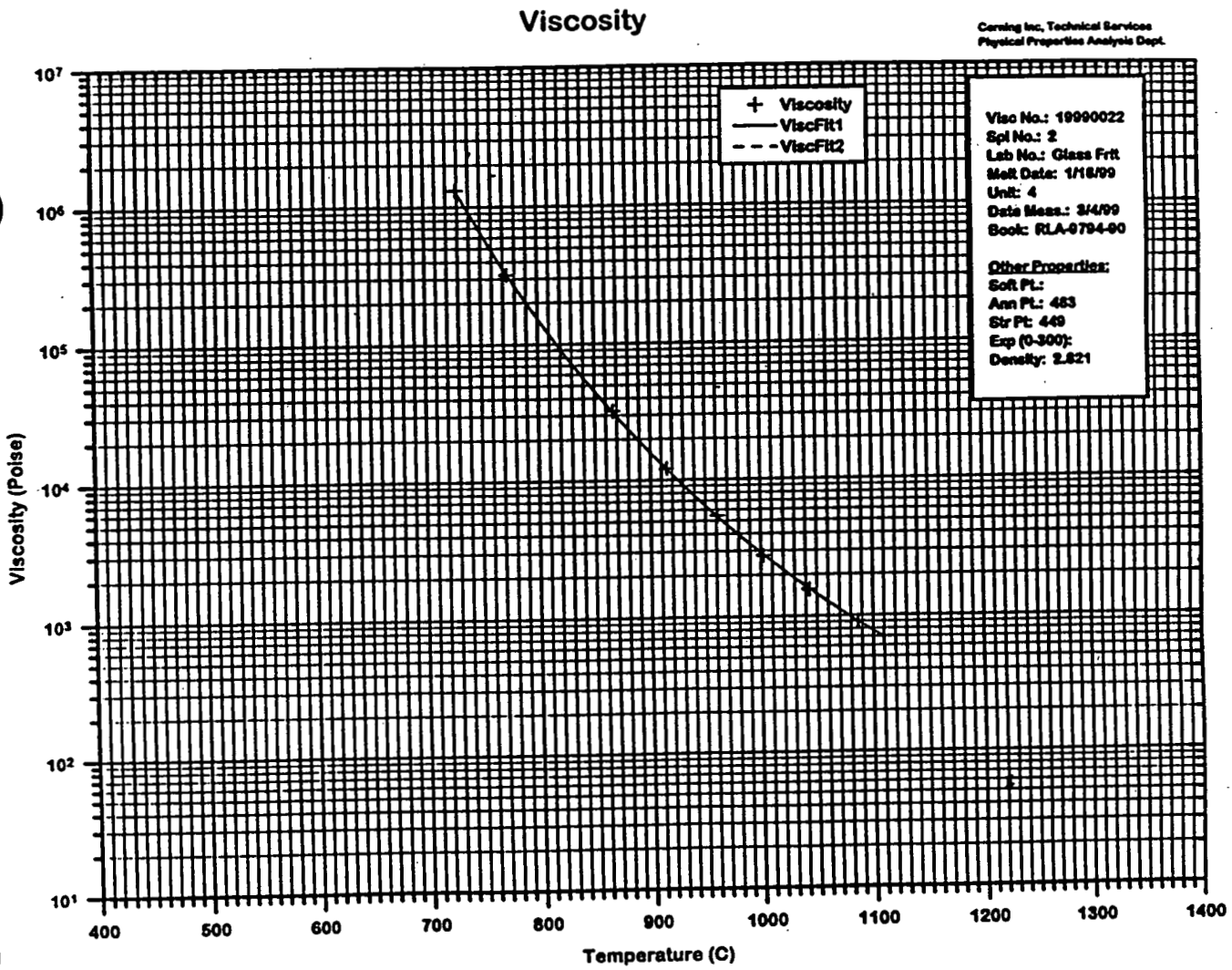
CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 3: DGLS-SO-T-0392; 1-18-99

Folder No.: 18597-99



001392

LABORATORY ANALYSIS REPORT

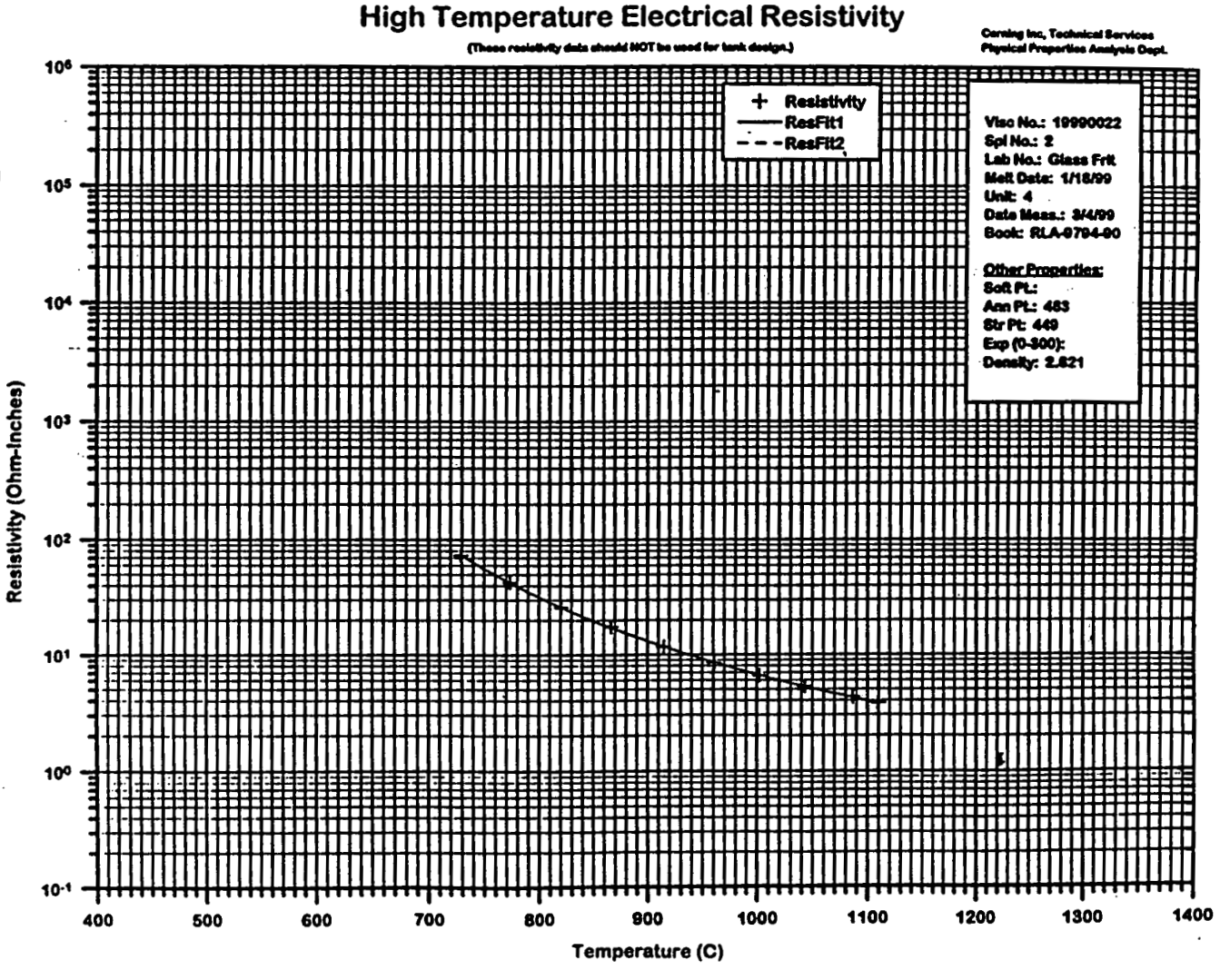
CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 3: DGLS-SO-T-0392; 1-18-99

Folder No.: 18597-99



LABORATORY ANALYSIS REPORT

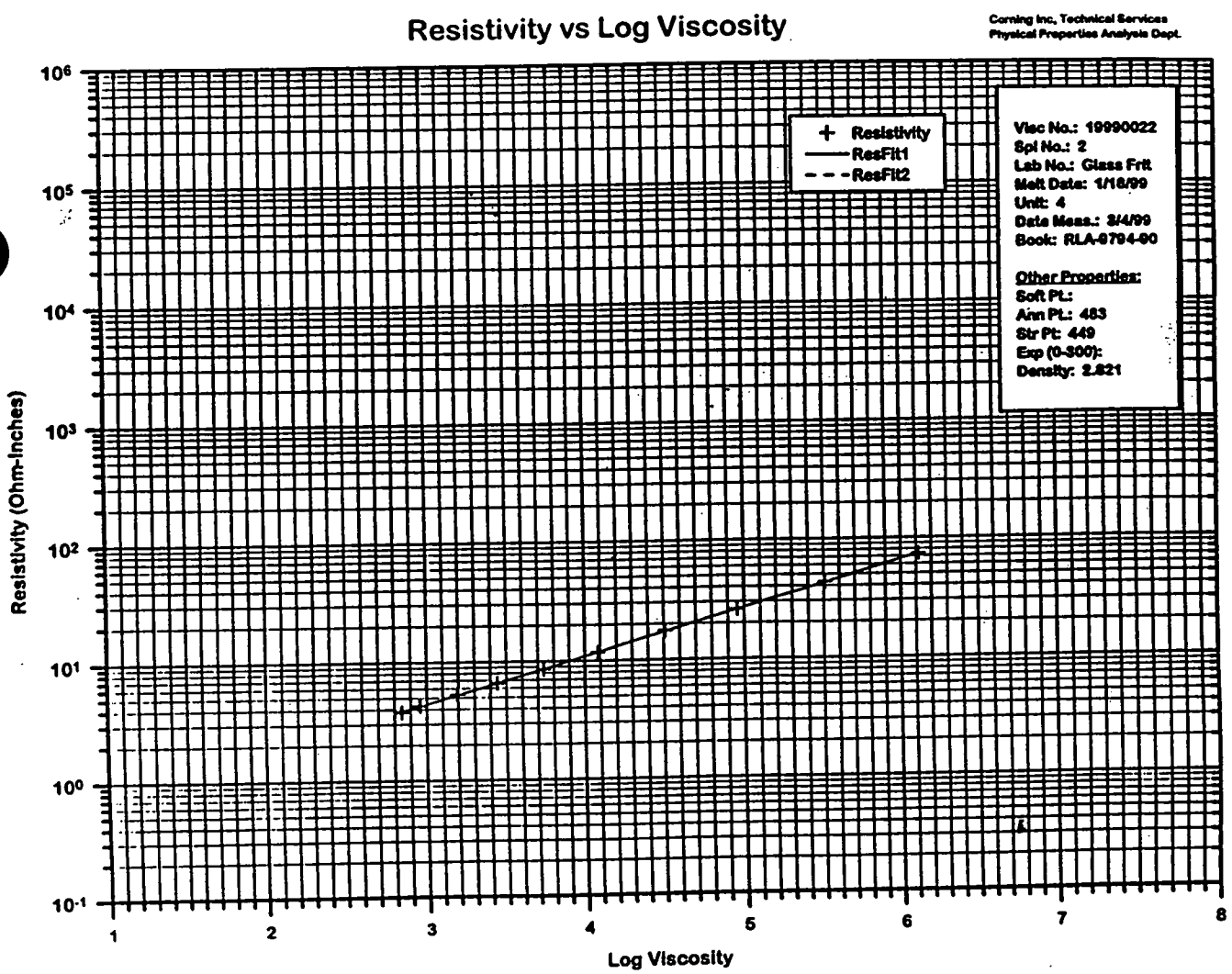
CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 3: DGLS-SO-T-0392; 1-18-99

Folder No.: 18597-99



001394

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 8: DGLS-SO-T-0514; 1-20-99

Folder No.: 18597-99

Experimental Data

Temperature (C)	Resistivity (ohm-in) 1KHz	Viscosity (poises)	Log Viscosity
1,110.5	3.70E+00	6.807E+02	2.833
1,090.5	4.20E+00	8.451E+02	2.927
1,047.2	5.20E+00	1.484E+03	3.171
1,003.8	6.60E+00	2.768E+03	3.442
962.4	8.50E+00	5.078E+03	3.706
917.9	1.16E+01	1.133E+04	4.054
873.1	1.62E+01	2.755E+04	4.440
829.0	2.37E+01	7.310E+04	4.864
785.1	3.71E+01	2.303E+05	5.362
742.4	6.08E+01	8.248E+05	5.916
720.1	8.19E+01	1.851E+06	6.267

Physical Properties

			Approx.
Softening Point:		C	
Anneal Point:	483	C	
Strain Point:	449	C	
0-300 Expansion	97	10-7/C	☑
Density:	2.817	g/cc	☐

Viscosity Levels

10 ^ 3	1,078	C
10 ^ 4	924	C
10 ^ 5	817	C
10 ^ 6	737	C

Comment: CELS: DGLS-SO-T-0514 (Glass Frit Sample #8) 1-20-99
Used cooling rate of 2C/min.

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 8: DGLS-SO-T-0514; 1-20-99

Folder No.: 18597-99

Least-Squares Fulcher Fit Analysis

Segment: 1 $Log10(Viscosity) = A + B/(T - T_0)$ where $A = -1.642$, $B = 4{,}027.2$, $T_0 = 210.3$

Temp Meas'd	Visc Meas'd	Temp Calc'd	Visc Calc'd	Temp Diff	Log Visc Diff
1,110.5	6.807E+02	1,110.3	6.791E+02	0.2	0.001
1,090.5	8.451E+02	1,091.8	8.584E+02	-1.3	-0.007
1,047.2	1.484E+03	1,047.0	1.480E+03	0.2	0.001
1,003.8	2.768E+03	1,002.5	2.716E+03	1.3	0.008
962.4	5.078E+03	963.4	5.163E+03	-1.0	-0.007
917.9	1.133E+04	917.3	1.122E+04	0.5	0.004
873.1	2.755E+04	872.5	2.720E+04	0.6	0.006
829.0	7.310E+04	829.3	7.363E+04	-0.3	-0.003
785.1	2.303E+05	785.3	2.315E+05	-0.2	-0.002
742.4	8.248E+05	743.2	8.460E+05	-0.8	-0.011
720.1	1.851E+06	719.5	1.810E+06	0.6	0.010

Std Deviation of Temperature = 0.9 Std Deviation of Viscosity = 0.008

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 8: DGLS-SO-T-0514; 1-20-99

Folder No.: 18597-99

Least-Squares Fulcher Fit Estimates

Segment: 1 $Log10(Viscosity) = A + B/(T - T_0)$ where $A = -1.642$, $B = 4{,}027.2$, $T_0 = 210.3$

Temp (Deg C)	Viscosity (Poises)	Log Visc	Error Log Visc	Log Visc	Temp Deg C	Temp Error
1,100	7.669E+02	2.885	0.008	3.0	1,078	1.4
1,075	1.037E+03	3.016	0.007	4.0	924	0.6
1,050	1.427E+03	3.154	0.007	5.0	817	0.6
1,025	2.002E+03	3.301	0.006	6.0	737	0.7
1,000	2.871E+03	3.458	0.006			
975	4.214E+03	3.625	0.006			
950	6.349E+03	3.803	0.005			
925	9.844E+03	3.993	0.005			
900	1.576E+04	4.197	0.005			
875	2.613E+04	4.417	0.005			
850	4.507E+04	4.654	0.005			
825	8.127E+04	4.910	0.006			
800	1.541E+05	5.188	0.006			
775	3.091E+05	5.490	0.007			
750	6.613E+05	5.820	0.008			
725	1.524E+06	6.183	0.009			

This CELS Confidential information is to be used only for account 275111

LABORATORY ANALYSIS REPORT

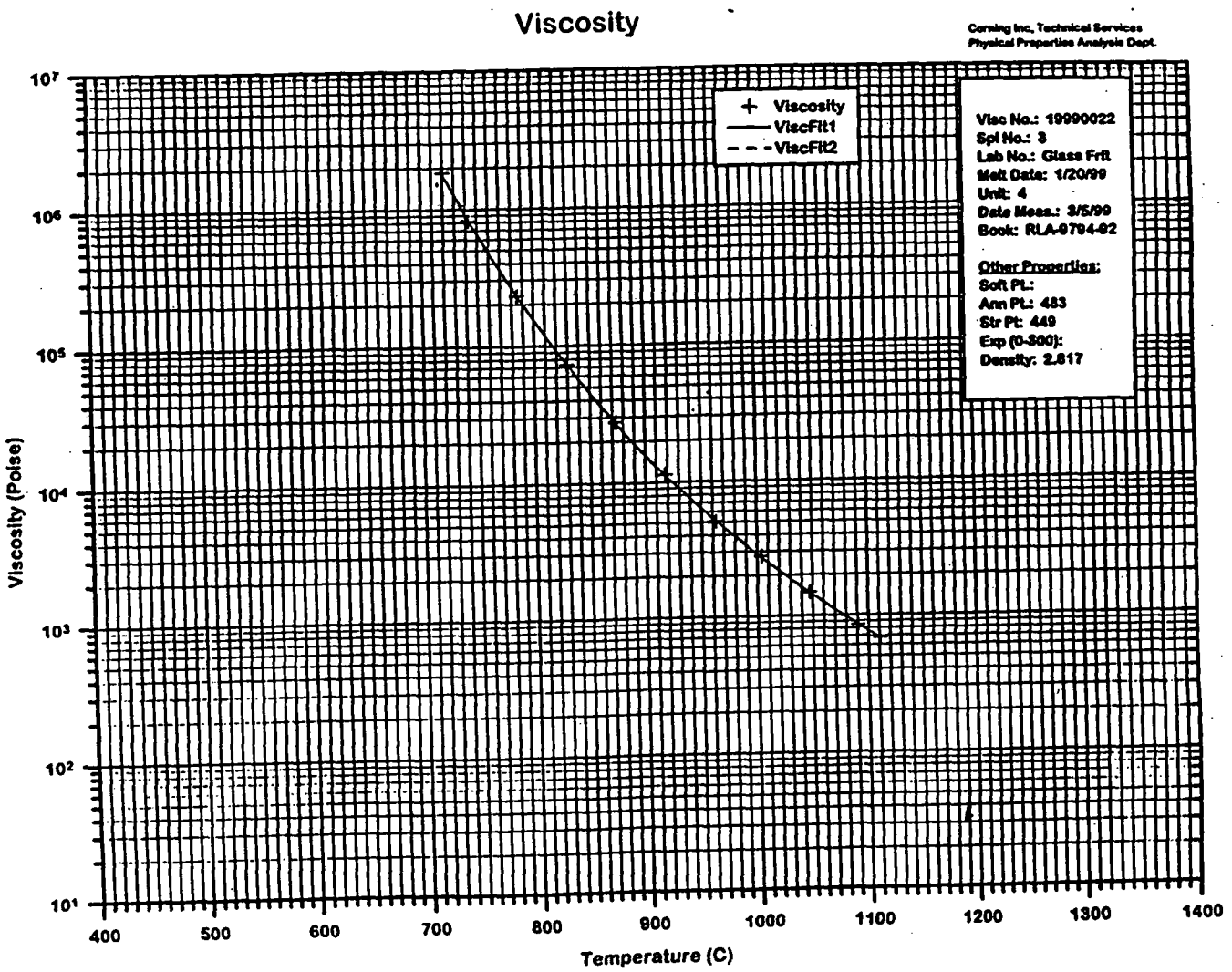
CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 8: DGLS-SO-T-0514; 1-20-99

Folder No.: 18597-99



001338

LABORATORY ANALYSIS REPORT

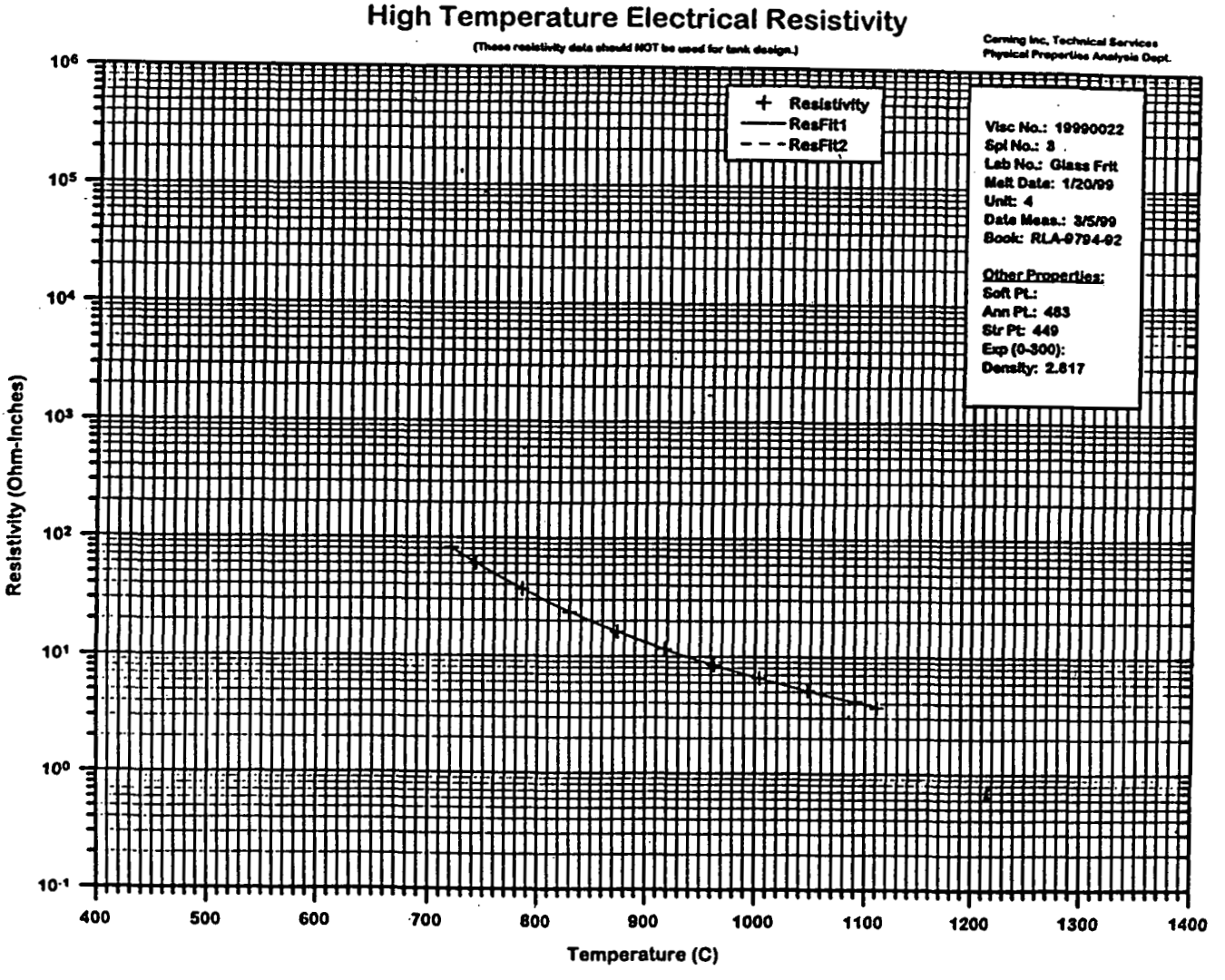
CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 8: DGLS-SO-T-0514; 1-20-99

Folder No.: 18597-99



001339

LABORATORY ANALYSIS REPORT

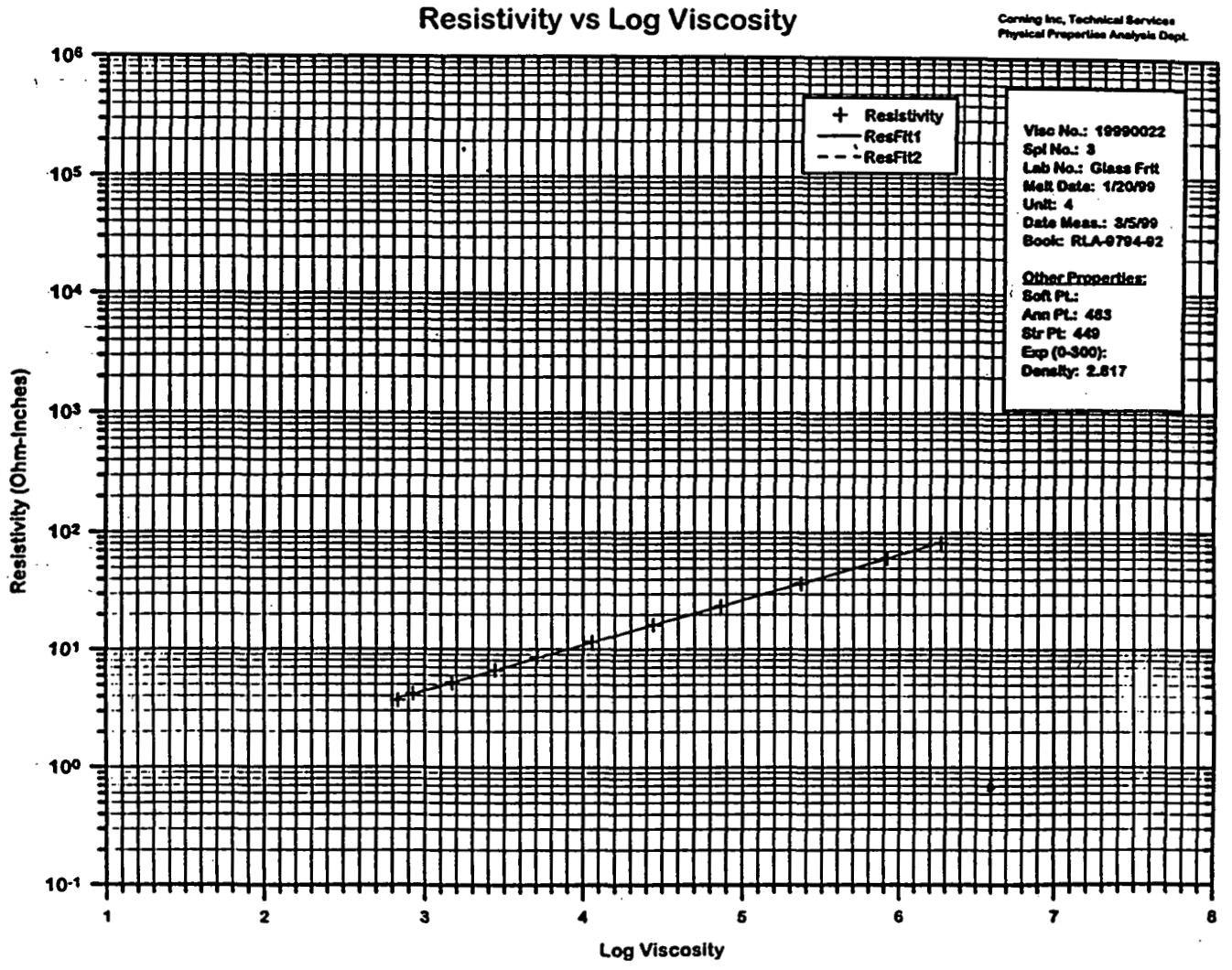
CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 8: DGLS-SO-T-0514; 1-20-99

Folder No.: 18597-99



001400

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 11: DGLS-SO-T-0592; 1-21-99

Folder No.: 18597-99

Experimental Data

Temperature (C)	Resistivity (ohm-in) 1KHz	Viscosity (poises)	Log Viscosity
1,127.4	3.40E+00	6.248E+02	2.796
1,085.7	4.10E+00	9.886E+02	2.995
1,044.0	5.10E+00	1.679E+03	3.225
1,006.1	6.40E+00	2.867E+03	3.457
964.4	8.30E+00	5.367E+03	3.730
923.1	1.10E+01	1.085E+04	4.035
881.3	1.50E+01	2.465E+04	4.392
842.6	2.10E+01	5.756E+04	4.760
805.4	3.01E+01	1.450E+05	5.161
763.2	4.77E+01	4.770E+05	5.678
728.1	7.45E+01	1.444E+06	6.160

Physical Properties

			Approx.
Softening Point:		C	
Anneal Point:		C	
Strain Point:		C	
0-300 Expansion	97	10-7/C	☑
Density:	2.813	g/cc	☐

Viscosity Levels

10 ^ 3	1,085	C
10 ^ 4	928	C
10 ^ 5	819	C
10 ^ 6	739	C

Comment: CELS: DGLS-SO-T-0592 (Glass Frit Sample #11) 1-21-99

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 11: DGLS-SO-T-0592; 1-21-99

Folder No.: 18597-99

Least-Squares Fulcher Fit Analysis

Segment: 1 $Log10(Viscosity) = A + B/(T - T_0)$ where $A = -1.547$, $B = 3{,}955.9$, $T_0 = 215.3$

Temp Meas'd	Visc Meas'd	Temp Calc'd	Visc Calc'd	Temp Diff	Log Visc Diff
1,127.4	6.248E+02	1,126.2	6.167E+02	1.2	0.006
1,085.7	9.886E+02	1,086.2	9.949E+02	-0.5	-0.003
1,044.0	1.679E+03	1,044.2	1.684E+03	-0.2	-0.001
1,006.1	2.867E+03	1,005.8	2.852E+03	0.3	0.002
964.4	5.367E+03	965.0	5.412E+03	-0.5	-0.004
923.1	1.085E+04	923.9	1.100E+04	-0.8	-0.006
881.3	2.465E+04	881.4	2.468E+04	-0.1	-0.001
842.6	5.756E+04	842.5	5.740E+04	0.1	0.001
805.4	1.450E+05	805.0	1.432E+05	0.5	0.006
763.2	4.770E+05	762.8	4.699E+05	0.5	0.006
728.1	1.444E+06	728.6	1.466E+06	-0.4	-0.007

Std Deviation of Temperature = 0.7 Std Deviation of Viscosity = 0.006

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 11: DGLS-SO-T-0592; 1-21-99

Folder No.: 18597-99

Least-Squares Fulcher Fit Estimates

Segment: 1 $Log10(Viscosity) = A + B/(T - T_0)$ where $A = -1.547$, $B = 3{,}955.9$, $T_0 = 215.3$

Temp (Deg C)	Viscosity (Poises)	Log Visc	Error Log Visc	Log Visc	Temp Deg C	Temp Error
1,125	6.330E+02	2.801	0.006	3.0	1,085	1.0
1,100	8.400E+02	2.924	0.005	4.0	928	0.5
1,075	1.133E+03	3.054	0.005	5.0	819	0.4
1,050	1.556E+03	3.192	0.005	6.0	739	0.5
1,025	2.180E+03	3.338	0.004			
1,000	3.119E+03	3.494	0.004			
975	4.570E+03	3.660	0.004			
950	6.873E+03	3.837	0.004			
925	1.064E+04	4.027	0.003			
900	1.699E+04	4.230	0.003			
875	2.813E+04	4.449	0.003			
850	4.846E+04	4.685	0.004			
825	8.728E+04	4.941	0.004			
800	1.653E+05	5.218	0.005			
775	3.315E+05	5.520	0.005			
750	7.093E+05	5.851	0.006			

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

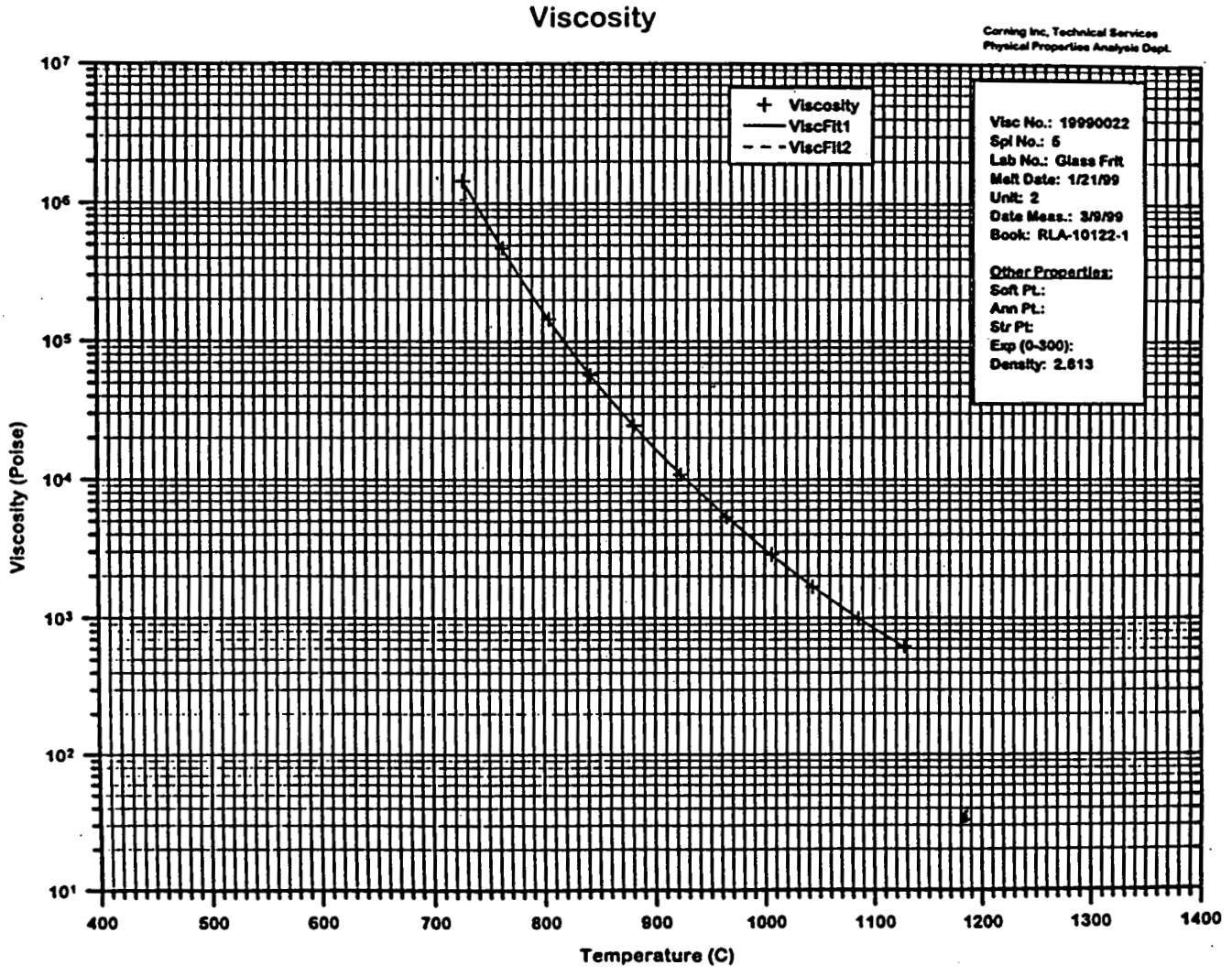
CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 11: DGLS-SO-T-0592; 1-21-99

Folder No.: 18597-99



001404

LABORATORY ANALYSIS REPORT

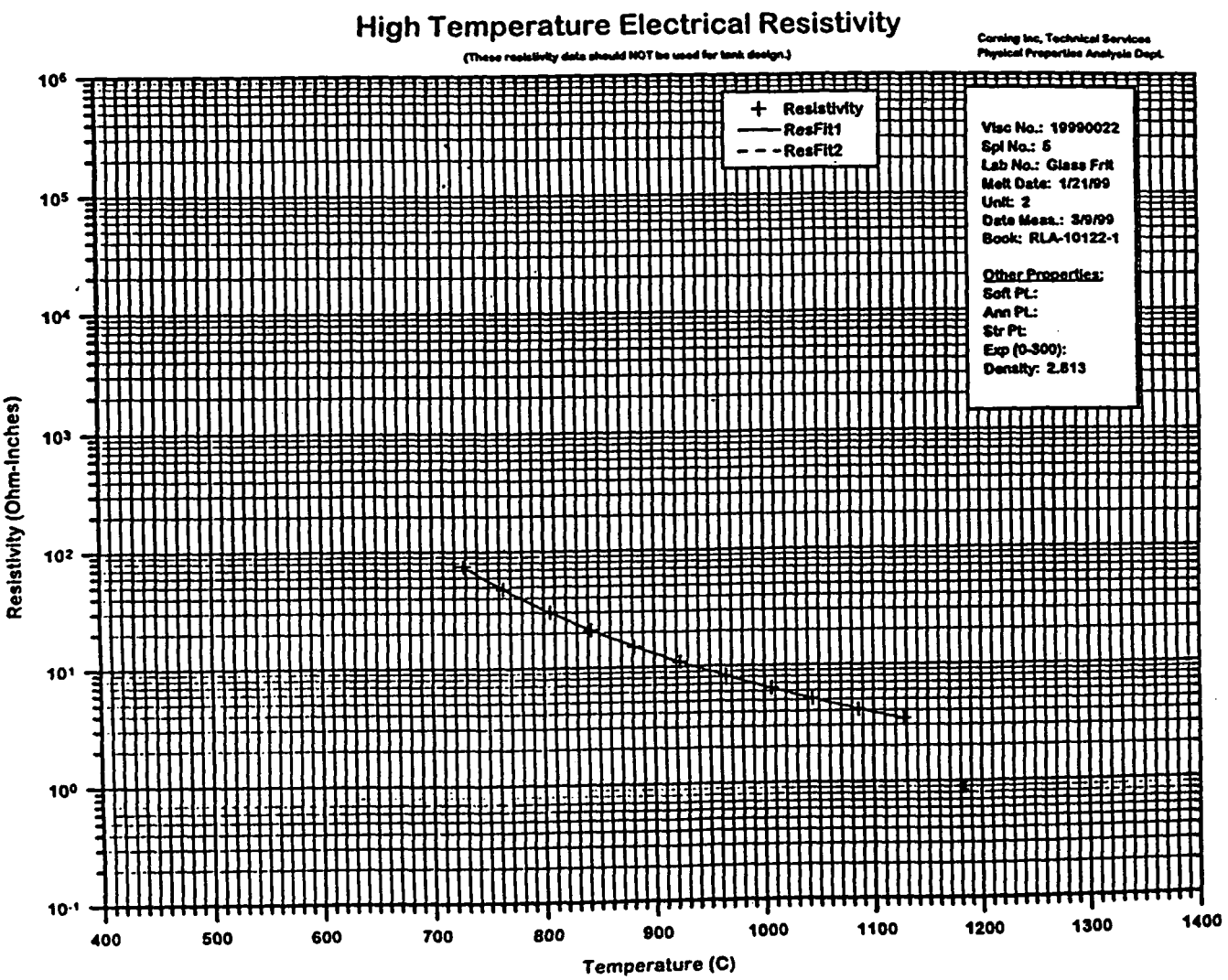
CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 11: DGLS-SO-T-0592; 1-21-99

Folder No.: 18597-99



001405

LABORATORY ANALYSIS REPORT

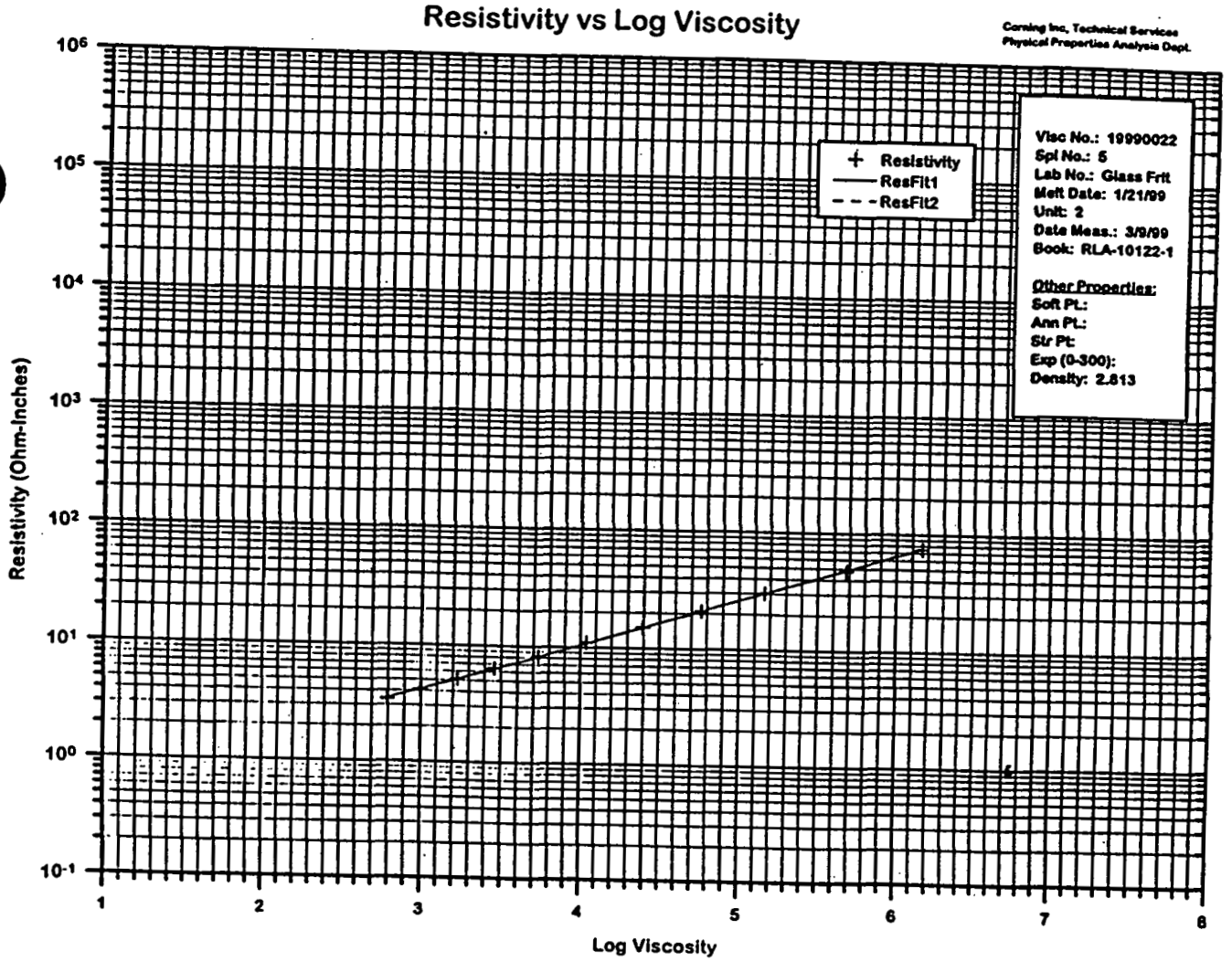
CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 11: DGLS-SO-T-0592; 1-21-99

Folder No.: 18597-99



001406

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 13: DGLS-SO-T-0646; 1-23-99

Folder No.: 18597-99

Experimental Data

Temperature (C)	Resistivity (ohm-in) 1KHz	Viscosity (poises)	Log Viscosity
1,118.1	3.70E+00	6.301E+02	2.799
1,097.8	4.10E+00	7.945E+02	2.900
1,054.5	5.00E+00	1.320E+03	3.120
1,010.5	6.30E+00	2.371E+03	3.375
967.8	8.10E+00	4.590E+03	3.662
906.5	1.22E+01	1.335E+04	4.126
860.2	1.79E+01	3.434E+04	4.536
812.7	2.75E+01	1.015E+05	5.007
759.2	4.93E+01	4.548E+05	5.658
715.9	8.53E+01	2.004E+06	6.302

Physical Properties

			Approx.
Softening Point:		C	
Anneal Point:		C	
Strain Point:		C	
0-300 Expansion	97	10-7/C	☑
Density:	2.816	g/cc	☐

Viscosity Levels

10 ^ 3	1,078	C
10 ^ 4	921	C
10 ^ 5	814	C
10 ^ 6	735	C

Comment: CELS: DGLS-SO-T-0646 (Glass Frit Sample #13) 1-23-99
Used cooling rate of 2C/min.

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 13: DGLS-SO-T-0646; 1-23-99

Folder No.: 18597-99

Least-Squares Fulcher Fit Analysis

Segment: 1 $Log10(Viscosity) = A + B/(T - T_0)$ where $A = -1.426$, $B = 3{,}751.1$, $T_0 = 230.2$

Temp Meas'd	Visc Meas'd	Temp Calc'd	Visc Calc'd	Temp Diff	Log Visc Diff
1,118.1	6.301E+02	1,117.9	6.291E+02	0.1	0.001
1,097.8	7.945E+02	1,097.3	7.898E+02	0.5	0.003
1,054.5	1.320E+03	1,055.2	1.332E+03	-0.8	-0.004
1,010.5	2.371E+03	1,011.5	2.404E+03	-1.0	-0.006
967.8	4.590E+03	967.4	4.563E+03	0.4	0.003
906.5	1.335E+04	905.9	1.318E+04	0.7	0.005
860.2	3.434E+04	859.4	3.369E+04	0.9	0.008
812.7	1.015E+05	813.3	1.033E+05	-0.7	-0.007
759.2	4.548E+05	759.7	4.620E+05	-0.5	-0.007
715.9	2.004E+06	715.6	1.982E+06	0.3	0.005

Std Deviation of Temperature = 0.8 Std Deviation of Viscosity = 0.007

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 13: DGLS-SO-T-0646; 1-23-99

Folder No.: 18597-99

Least-Squares Fulcher Fit Estimates

Segment: 1 $Log10(Viscosity) = A + B/(T - T_0)$ where $A = -1.426$, $B = 3,751.1$, $T_0 = 230.2$

Temp (Deg C)	Viscosity (Poises)	Log Visc	Error Log Visc	Log Visc	Temp Deg C	Temp Error
1,100	7.699E+02	2.886	0.007	3.0	1,078	1.2
1,075	1.033E+03	3.014	0.006	4.0	921	0.6
1,050	1.411E+03	3.149	0.006	5.0	814	0.6
1,025	1.965E+03	3.293	0.005	6.0	735	0.6
1,000	2.797E+03	3.447	0.005			
975	4.076E+03	3.610	0.005			
950	6.097E+03	3.785	0.005			
925	9.389E+03	3.973	0.004			
900	1.493E+04	4.174	0.004			
875	2.462E+04	4.391	0.004			
850	4.226E+04	4.626	0.005			
825	7.591E+04	4.880	0.005			
800	1.435E+05	5.157	0.006			
775	2.878E+05	5.459	0.007			
750	6.169E+05	5.790	0.008			
725	1.428E+06	6.155	0.009			

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

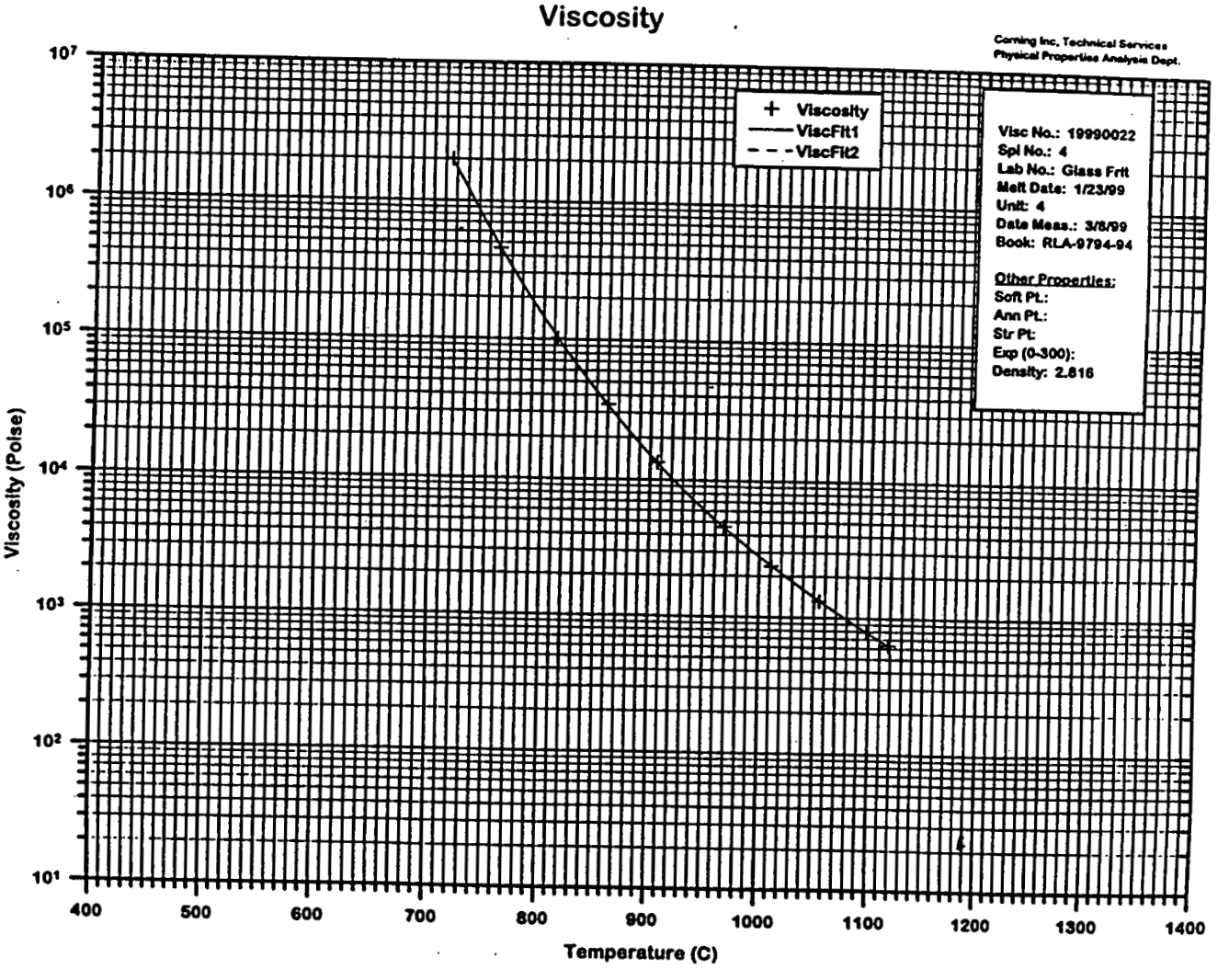
CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 13: DGLS-SO-T-0646; 1-23-99

Folder No.: 18597-99



CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

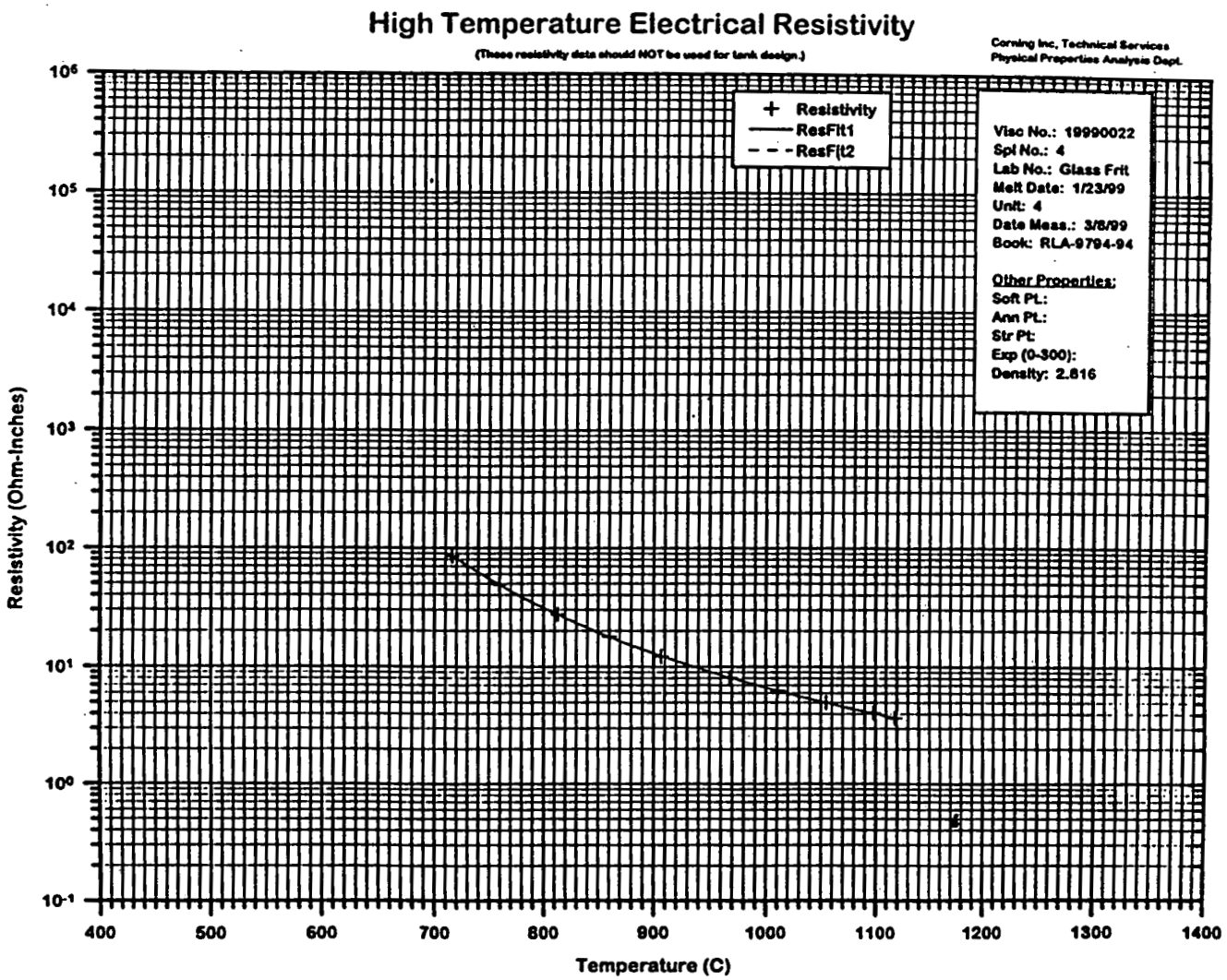
CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 13: DGLS-SO-T-0646; 1-23-99

Folder No.: 18597-99



001411

LABORATORY ANALYSIS REPORT

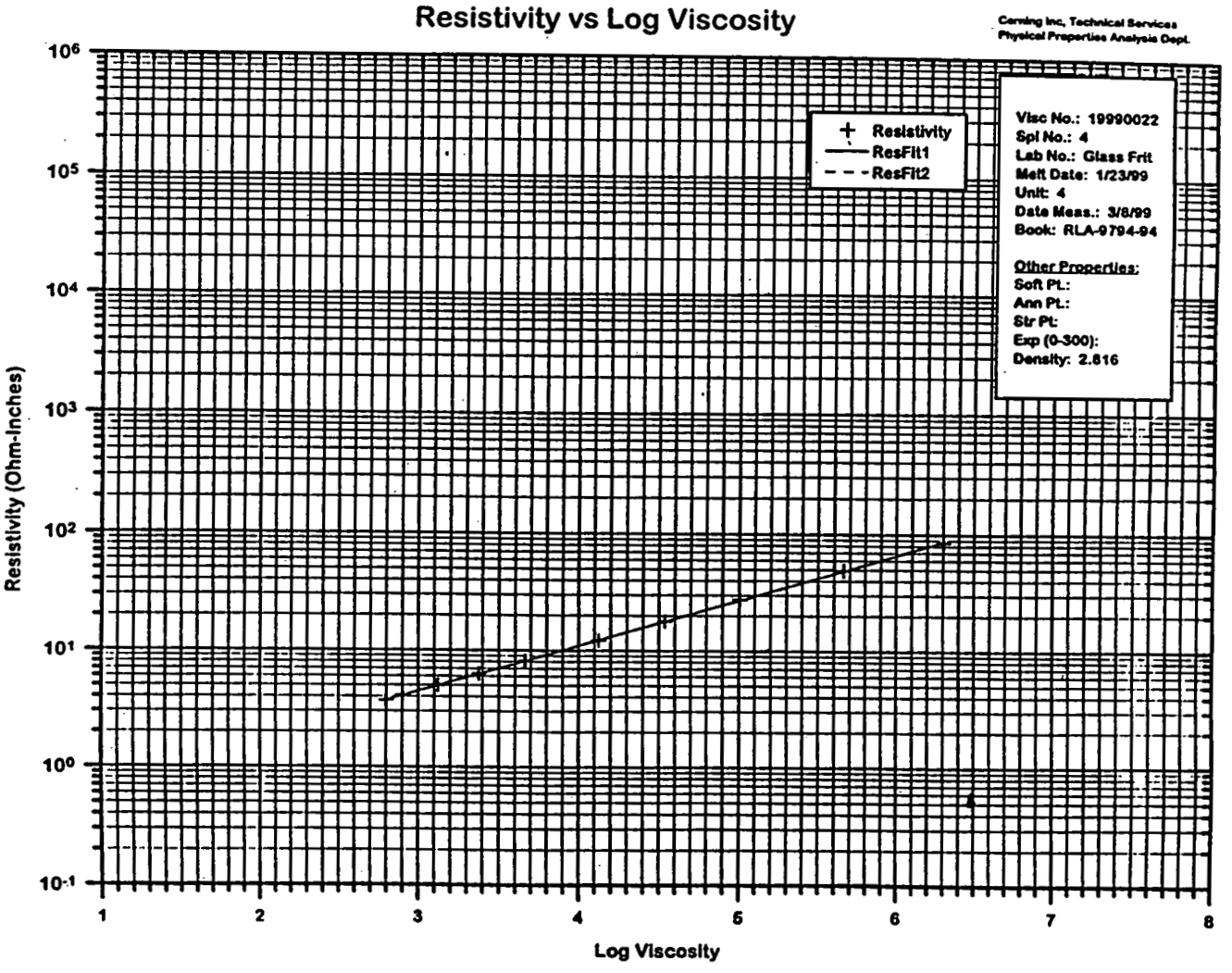
CELS Client No.: 275111-013

Exhibit E : High Temperature Viscosity including Electrical Resistivity Analysis

Sample Description:

Sample 13: DGLS-SO-T-0646; 1-23-99

Folder No.: 18597-99



CONFIDENTIAL: This CELS report information is to be used only for account 275111.

Corning Incorporated
CELS — Laboratory Services
Technology Sales & Licensing
HP ME 03 078 G6
Corning, New York 14831
800-235-2357
607-974-6601
fax 607-974-6522

98703 PR RAW INC 19990319 085 229 1
KW: CELS, Demo, Analytical Results
cc: DMB, E. Nicaise, G. Stegen
cc cover: DHD, KJH

March 17, 1999

Mr. Robert Wilson
ENVITCO, INC.
3400 Executive Parkway
P.O. Box 2451
Toledo, OH 43606-0451

CELS Client No. : 275111-014
Date Received : February 15, 1999
Date Reported : March 12, 1999
Reviewed & Approved by : Connie L. Fieno
Connie L. Fieno
Analysis Coordinator

CORNING

Copy to: CELS File

Sample Identification:

Sample 1: 06S0-SO-T-0622, Offgas Solids; 1-23-99
Sample 2: 06S0-SO-T-0361, Offgas Solids; 1-17-99
Sample 3: 06S0-SO-T-0389, Offgas Solids; 1-18-99
Sample 4: 06S0-SO-T-0498, Offgas Solids; 1-20-99
Sample 5: 06S0-SO-T-0546, Offgas Solids; 1-20-99
Sample 6: 06S0-SO-T-0588, Offgas Solids; 1-21-99
Sample 7: SALT-SO-T-0375, Salts; 1-18-99
Sample 8: SALT-SO-T-0658, Salts; 1-28-99
Sample 9: SALT-SO-T-0673, Salts; 1-23-99
Sample 10: MISC-SO-T-0672, Devitrified Glass; 2-11-9
Sample 11: FEED-SO-T-0638 Slurry Feed; 1-23-99

Analysis Reported:

Exhibit	
A	Quantitative Chemical Analysis
B	Density via Gas Pycnometer
C	Semi-Quantitative Spectrographic Analysis
D	X-ray Diffraction Analysis

Comment: Sample 11 (FEED-SO-T-0638 Slurry Feed; 1-23-99) above, had an LOI run at 600°C on the LOD sample from CELS Client No.: 275111-012

Client Purchase Order No.: 36031

Direct questions regarding this report to Connie Fieno, CELS office.

NOTE: This report shall not be reproduced, except in full, without the written approval of CELS - Corning Laboratory Services.

CONFIDENTIAL: This CELS report information is to be used only for 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A : Quantitative Chemical Analysis

Sample Description:
Sample 1: 06S0-SO-T-0622, Offgas Solids; 1-23-99, Sample 2: 06S0-SO-T-0361, Offgas Solids; 1-17-99
Sample 3: 06S0-SO-T-0389, Offgas Solids; 1-18-99, Sample 4: 06S0-SO-T-0498, Offgas Solids; 1-20-99

Folder No.: 19245-99

Oxide	Sample 1 (Wt%)	Sample 2 (Wt%)	Sample 3 (Wt%)	Sample 4 (Wt%)	Test Method
K_2O	0.60	0.55	0.19	0.45	FES
Li_2O	1.72	1.57	0.55	1.28	FES
Na_2O	3.44	3.47	1.47	2.89	FES
Al_2O_3	1.95	1.89	1.15	2.22	ICP
As_2O_3	0.50	0.53	0.26	0.42	ICP
BaO	1.29	1.34	0.46	1.22	ICP
CaO	1.25	1.43	1.08	1.34	ICP
Cr_2O_3	0.41	0.38	0.21	0.33	ICP
Fe_2O_3 (1)	14.0	13.8	58.8	26.1	ICP
MgO	0.22	0.25	0.24	0.24	ICP
MoO_3	0.60	0.46	0.078	0.36	ICP
NiO	0.095	0.10	0.067	0.10	ICP
P_2O_5	7.25	5.89	1.21	5.03	ICP
PbO	36.8	38.3	8.58	26.8	ICP
SiO_2	9.37	10.9	7.48	10.1	ICP
V_2O_5	0.014	0.017	0.012	0.016	ICP
ZnO	0.73	0.92	0.61	0.82	ICP
C	0.39	0.46	0.89	0.62	LECO
SO_3	13.5	13.9	5.12	11.1	LECO

Element	Sample 1 (Wt%)	Sample 2 (Wt%)	Sample 3 (Wt%)	Sample 4 (Wt%)	Test Method
Se	1.75	1.79	0.46	1.23	HYDR

(1) Total Fe expressed as Fe_2O_3

Legend:
FES: Flame Emission Spectroscopy
ICP: Inductively Coupled Plasma Spectroscopy
LECO: LECO ® Instrumentation
HYDR: Vapor Hydration

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A : Quantitative Chemical Analysis
Sample Description:
Sample 5: 06S0-SO-T-0546, Offgas Solids; 1-20-99, Sample 6: 06S0-SO-T-0588, Offgas Solids; 1-21-99
Sample 7: SALT-SO-T-0375, Salts; 1-18-99, Sample 8: SALT-SO-T-0658, Salts; 1-28-99

Folder No.: 19245 and 19620-99

Oxide	Sample 5 (Wt%)	Sample 6 (Wt%)	Sample 7 (Wt%)	Sample 8 (Wt%)	Test Method
K_2O	0.39	0.43	2.41	2.34	FES
Li_2O	1.09	1.24	8.47	7.56	FES
Na_2O	2.44	2.68	14.5	13.7	FES
Al_2O_3	1.87	1.76	0.004	0.096	ICP
As_2O_3	0.36	0.44	0.14	0.17	ICP
BaO	1.05	1.03	12.7	9.49	ICP
CaO	1.31	1.26	4.84	6.57	ICP
Cr_2O_3	0.29	0.35	0.014	0.021	ICP
Fe_2O_3 (1)	36.6	36.8	0.016	0.022	ICP
MgO	0.23	0.22	0.019	0.040	ICP
MoO_3	0.29	0.37	1.40	12.9	ICP
NiO	0.10	0.11	<0.005	0.033	ICP
P_2O_5	4.15	4.58	2.32	2.74	ICP
PbO	21.9	21.3	-	-	ICP
SiO_2	9.21	8.12	0.13	0.095	ICP
SrO	-	-	0.049	0.069	ICP
V_2O_5	0.014	0.014	0.032	0.029	ICP
ZnO	0.76	0.76	-	-	ICP
C	0.67	0.56	-	-	LECO
SO_3	9.54	10.7	56	46	LECO

Element	Sample 5 (Wt%)	Sample 6 (Wt%)	Sample 7 (Wt%)	Sample 8 (Wt%)	Test Method
Se	1.01	1.12	-	-	HYDR

(1) Total Fe expressed as Fe_2O_3

Legend:
FES: Flame Emission Spectroscopy
ICP: Inductively Coupled Plasma Spectroscopy
LECO: LECO ® Instrumentation
HYDR: Vapor Hydration

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A : Quantitative Chemical Analysis
Sample Description:
Sample 9: SALT-SO-T-0673, Salts; 1-23-99, Sample 10: MISC-SO-T-0672, Devitrified Glass; 2-11-99
Sample 11: FEED-SO-T-0638 Slurry Feed; 1-23-99
Folder No.: 19245 and 19620-99

Oxide	Sample 9 (Wt%)	Sample 10 (Wt%)	Sample 11 (Wt%)	Test Method
K_2O	2.51	[redacted]		FES
Li_2O	8.50	[redacted]		FES
Na_2O	14.9	[redacted]		FES
Al_2O_3	0.16	[redacted]		ICP
As_2O_3	0.14	0.084	0.11	ICP
BaO	12.8	2.43	3.33	ICP
CaO	4.46	[redacted]		ICP
Cr_2O_3	0.013	0.073	0.074	ICP
Fe_2O_3 (1)	0.027	-	2.10	ICP
MgO	0.016	2.00	0.75	ICP
MoO_3	1.47	0.086	<0.005	ICP
NiO	<0.005	0.18	0.30	ICP
P_2O_5	2.34	0.49	0.84	ICP
PbO	-	5.59	9.85	ICP
SiO_2	0.11	62.8	54.1	ICP
SrO	0.047	-	-	ICP
V_2O_5	0.033	0.041	0.063	ICP
ZnO	-	[redacted]		ICP
C	-	-	0.93	LECO
SO_3	55	1.02	2.85	LECO
LOI	-	-	14.7	LOI
Element	**Sample 9 (Wt%)**	**Sample 10 (Wt%)**	**Sample 11 (Wt%)**	**Test Method**
Se	-	0.026	0.026	HYDR

(1) Total Fe expressed as Fe_2O_3

Legend:
FES: Flame Emission Spectroscopy
ICP: Inductively Coupled Plasma Spectroscopy
LECO: LECO ® Instrumentation
HYDR: Vapor Hydration
LOI: Loss on Ignition at 600°C

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A: Quantitative Chemical Analysis

NOTE: The methodology used measures the elemental concentration. The results are reported in oxide form.

Accuracy Statement

The following is a guideline of the accuracy of the Atomic Spectroscopy chemical analysis.

The actual accuracy depends on the specific element and the matrix of the material being analyzed. Also, the approximate composition of the material is required to achieve this accuracy.

Major Components - Levels >2%:

Accuracy is generally +/- 0.5 to 1, relative % of absolute value.

i.e. for a level of 30.0%, the absolute standard deviation will range between 0.15% and 0.30%

Minor Components - Levels between 0.5% to 2.0%:

Accuracy is +/- 1 to 5, relative % of absolute value.

Note: The relative error will be less as the value approaches the 2% level.

i.e. for a level of 1.0%, the absolute standard deviation will range between 0.01% and 0.05%

Minor to Trace Components - Levels < 0.5%:

Accuracy is +/- 2 to 20, relative % of absolute value.

Note: The relative error will be higher as the value approaches trace levels..

i.e. for a level of 0.1%, the absolute standard deviation will range between 0.002% and 0.02%

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A : Quantitative Chemical Analysis

Sample Description:

Sample 10: MISC-SO-T-0672, Devitrified Glass; 2-11-99

Folder No.: 19245-99

Redox Analysis

Oxide	Sample 10	Test Method
Total Fe, expressed as Fe2O3	1.71	ICP
FeO	0.24	COLOR
Fe Total	1.20	Calculated
Fe+2	0.187	Calculated
Ratio Fe+2/Fe (total)	0.156	Calculated

Legend:
ICP: Inductively Coupled Plasma Spectroscopy
COLOR: Colorimetry

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A : Quantitative Chemical Analysis
Folder 19245- Standard Information (Offgas)
ICP:
Matrix Matched Standards:
Fusion: Volume of Flask : 100ml
Acid Blank Concentration: 1%HNO3
Flux Concentration: 1300ppm Na

Element	Concentration in Standard (ppm)
Al	2.220
Ba	1.011
Ca	1.051
Cr	0.9917
Fe	44.03
Mg	0.9422
Mo	1.070
Ni	1.019
P	3.042
Pb	37.83
Si	8.037
V	1.023
Zn	1.400

ACD: Volume of Flask : 100ml
Acid Blank Concentration: 5% HF

Element	Concentration in Standard (ppm)
As	5.001

Sulfur /Carbon via LECO:

Analyte	Standard Value	Tolerance	Standard Reading
S	0.0375	+/-0.0006	0.03774
C	0.043	+/-0.002	0.04282

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A : Quantitative Chemical Analysis
Folder 19245- Standard Information (Salts)
ICP:
Matrix Matched Standards:

Fusion: Volume of Flask : 100ml
Acid Blank Concentration: 1%HNO3
Flux Concentration: 1300ppm Na
Flux Concentration: 1600ppm Ba

Element	Concentration in Standard (ppm)
Al	1.918
As	2.001
Ba	31.20
Ca	47.50
Cr	0.9610
Fe	1.060
Mg	0.9985
Mo	43.08
Ni	1.020
P	8.001
Si	5.033
Sr	1.022
V	1.042

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A : Quantitative Chemical Analysis
Folder 19245- Standard Information (Devit and Slurry Feed)
ICP:
Matrix Matched Standards:
Fusion: Volume of Flask : 100ml
Acid Blank Concentration: 1%HNO3
Flux Concentration: 1300ppm Na

Element	Concentration in Standard (ppm)
Al	8.032
Ba	2.392
Ca	2.359
Cr	0.9818
Fe	2.161
Mg	1.026
Mo	1.006
Ni	1.001
P	1.018
Pb	22.36
Si	24.80
V	0.9990
Zn	2.475

ACD: Volume of Flask : 100ml
Acid Blank Concentration: 5% HF

Element	Concentration in Standard (ppm)
As	5.001

Sulfur /Carbon via LECO:

Analyte	Standard Value	Tolerance	Standard Reading
S	0.0375	+/-0.0006	0.03774
C	0.043	+/-0.002	0.04282

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Folder 19245- Standard Information (06S0-SO-T-0622 Offgas Solids)
ICP:

Matrix Matched Standards:

FES Analysis:

HF/HClO4: Volume of Flask : 500ml
H2O Blank used for Baseline

Element	Concentration in Standard (ppm)					
	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
	.1g/500ml	**.1g/500ml**	**.1g/500ml**	**.1g/500ml**	**.1g/500ml**	**.1g/500ml**
K	1.0	0.9	0.3	0.8	0.7	0.7
Li	1.6	1.5	0.5	1.2	1.1	1.1
Na	5.1	5.1	2.1	4.3	3.6	3.9

Element	Concentration in Standard (ppm)					
	Sample 7	Sample 8	Sample 9	Sample 10	Sample 11	
	.1g/1000ml	**.1g/1000ml**	**.1g/1000ml**	**.1g/500ml**	**.1g/250ml**	**.1g/500ml**
K	2.0	2.0	2.0	1.1	2.4	1.2
Li	4.0	3.5	4.0	2.5	8.0	4.0
Na	10.8	10.2	11.0	12.0	10.6	5.3

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A : Quantitative Chemical Analysis
Sample ID: (06S0-SO-T-0622 Offgas Solids)
Folder 19245 - Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1023	1000
Analysis 2:	0.1001	1000
HF/HClO4:		
Analysis 1:	0.1000	500
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1003	100
Analysis 2:	0.1000	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	1.93	1.96	1.95
As2O3	ACD	0.51	0.49	0.50
BaO	Fusion	1.30	1.28	1.29
CaO	Fusion	1.26	1.24	1.25
Cr2O3	Fusion	0.41	0.41	0.41
Fe2O3	Fusion	13.9	14.0	14.0
K2O	HF/HClO4	0.60	0.60	0.60
Li2O	HF/HClO4	1.71	1.73	1.72
MgO	Fusion	0.22	0.21	0.22
MoO3	Fusion	0.60	0.60	0.60
Na2O	HF/HClO4	3.44	3.43	3.44
NiO	Fusion	0.092	0.098	0.095
P2O5	Fusion	7.25	7.25	7.25
PbO	Fusion	36.8	36.7	36.8
SiO2	Fusion	9.25	9.49	9.37
V2O5	Fusion	0.014	0.013	0.014
ZnO	Fusion	0.74	0.72	0.73

Element	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Se	Vapor Hydride	1.945	1.558	1.75

Element	Reading 1	Reading 2	Reading 3	Average
SO3	13.4	13.6	13.6	13.5
C	0.41	0.37	0.38	0.39

001423

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A : Quantitative Chemical Analysis
Sample ID: (06S0-SO-T-0361 Offgas Solids)
Folder 19245- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1001	1000
Analysis 2:	0.1000	1000
HF/HClO4:		
Analysis 1:	0.1000	500
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1001	100
Analysis 2:	0.1000	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	1.90	1.88	1.89
As2O3	ACD	0.52	0.54	0.53
BaO	Fusion	1.32	1.35	1.34
CaO	Fusion	1.44	1.41	1.43
Cr2O3	Fusion	0.37	0.39	0.38
Fe2O3	Fusion	13.9	13.7	13.8
K2O	HF/HClO4	0.55	0.55	0.55
Li2O	HF/HClO4	1.57	1.57	1.57
MgO	Fusion	0.25	0.24	0.25
MoO3	Fusion	0.44	0.48	0.46
Na2O	HF/HClO4	3.46	3.47	3.47
NiO	Fusion	0.10	0.10	0.10
P2O5	Fusion	5.85	5.93	5.89
PbO	Fusion	38.2	38.3	38.3
SiO2	Fusion	11.1	10.7	10.9
V2O5	Fusion	0.018	0.016	0.017
ZnO	Fusion	0.91	0.93	0.92

Element	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt%
Se	Vapor Hydride	1.924	1.662	1.79

Element	Reading 1	Reading 2	Reading 3	Average
SO3	13.7	14.2	13.8	13.9
C	0.45	0.46	0.46	0.46

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A : Quantitative Chemical Analysis
Sample ID: (06S0-SO-T-0389 Offgas Solids)
Folder 19245- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1003	1000
Analysis 2:	0.1001	1000
HF/HClO4:		
Analysis 1:	0.1000	500
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1001	100
Analysis 2:	0.1023	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	1.13	1.16	1.15
As2O3	ACD	0.26	0.26	0.26
BaO	Fusion	0.46	0.46	0.46
CaO	Fusion	1.09	1.07	1.08
Cr2O3	Fusion	0.21	0.20	0.21
Fe2O3	Fusion	58.8	58.7	58.8
K2O	HF/HClO4	0.18	0.19	0.19
Li2O	HF/HClO4	0.54	0.55	0.55
MgO	Fusion	0.24	0.23	0.24
MoO3	Fusion	0.082	0.074	0.078
Na2O	HF/HClO4	1.43	1.51	1.48
NiO	Fusion	0.067	0.066	0.067
P2O5	Fusion	1.25	1.17	1.21
PbO	Fusion	8.65	8.50	8.58
SiO2	Fusion	7.49	7.47	7.48
V2O5	Fusion	0.011	0.012	0.012
ZnO	Fusion	0.61	0.61	0.61

Element	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Se	Vapor Hydride	0.488	0.438	0.46

Element	Reading 1	Reading 2	Reading 3	Average
SO3	5.08	5.15	5.14	5.12
C	0.88	0.89	0.88	0.89

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A : Quantitative Chemical Analysis
Sample ID: (06S0-SO-T-0498 Offgas Solids)
Folder 19245- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1007	1000
Analysis 2:	0.1004	1000
HF/HClO4:		
Analysis 1:	0.1000	500
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1007	100
Analysis 2:	0.1008	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	2.16	2.28	2.22
As2O3	ACD	0.41	0.42	0.42
BaO	Fusion	1.22	1.22	1.22
CaO	Fusion	1.34	1.34	1.34
Cr2O3	Fusion	0.32	0.34	0.33
Fe2O3	Fusion	26.1	26.0	26.1
K2O	HF/HClO4	0.45	0.45	0.45
Li2O	HF/HClO4	1.28	1.28	1.28
MgO	Fusion	0.24	0.23	0.24
MoO3	Fusion	0.36	0.36	0.36
Na2O	HF/HClO4	2.89	2.88	2.89
NiO	Fusion	0.10	0.10	0.10
P2O5	Fusion	5.01	5.04	5.03
PbO	Fusion	26.8	26.8	26.8
SiO2	Fusion	10.1	10.1	10.1
V2O5	Fusion	0.016	0.015	0.016
ZnO	Fusion	0.82	0.82	0.82

Element	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Se	Vapor Hydride	1.336	1.130	1.23

Element	Reading 1	Reading 2	Reading 3	Average
SO3	11.2	11.0	11.1	11.1
C	0.61	0.62	0.63	0.62

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A : Quantitative Chemical Analysis
Sample ID: (06S0-SO-T-0546 Offgas Solids)
Folder 19245- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1003	1000
Analysis 2:	0.1001	1000
HF/HClO4:		
Analysis 1:	0.1000	500
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1091	100
Analysis 2:	0.1049	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	1.83	1.91	1.87
As2O3	ACD	0.35	0.36	0.36
BaO	Fusion	1.00	1.10	1.05
CaO	Fusion	1.26	1.36	1.31
Cr2O3	Fusion	0.28	0.30	0.29
Fe2O3	Fusion	36.5	36.6	36.6
K2O	HF/HClO4	0.40	0.38	0.39
Li2O	HF/HClO4	1.14	1.04	1.09
MgO	Fusion	0.23	0.22	0.23
MoO3	Fusion	0.28	0.29	0.29
Na2O	HF/HClO4	2.50	2.40	2.45
NiO	Fusion	0.094	0.10	0.10
P2O5	Fusion	4.07	4.23	4.15
PbO	Fusion	21.7	22.0	21.9
SiO2	Fusion	9.21	9.21	9.21
V2O5	Fusion	0.013	0.015	0.014
ZnO	Fusion	0.75	0.77	0.76

Element	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Se	Vapor Hydride	1.144	0.872	1.01

Element	Reading 1	Reading 2	Reading 3	Average
SO3	9.48	9.65	9.47	9.54
C	0.67	0.67	0.69	0.67

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A : Quantitative Chemical Analysis
Sample ID: (06S0-SO-T-0588 Offgas Solids)
Folder 19245- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1000	1000
Analysis 2:	0.1036	1000
HF/HClO4:		
Analysis 1:	0.1000	500
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1009	100
Analysis 2:	0.1011	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	1.80	1.71	1.76
As2O3	ACD	0.44	0.43	0.44
BaO	Fusion	1.07	0.98	1.03
CaO	Fusion	1.17	1.34	1.26
Cr2O3	Fusion	0.33	0.36	0.35
Fe2O3	Fusion	36.8	36.8	36.8
K2O	HF/HClO4	0.43	0.43	0.43
Li2O	HF/HClO4	1.24	1.24	1.24
MgO	Fusion	0.21	0.22	0.22
MoO3	Fusion	0.37	0.36	0.37
Na2O	HF/HClO4	2.66	2.69	2.68
NiO	Fusion	0.10	0.11	0.11
P2O5	Fusion	4.58	4.58	4.58
PbO	Fusion	21.1	21.4	21.3
SiO2	Fusion	8.18	8.06	8.12
V2O5	Fusion	0.012	0.016	0.014
ZnO	Fusion	0.75	0.77	0.76

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Se	Vapor Hydride	1.130	1.106	1.12

Element	Reading 1	Reading 2	Reading 3	Average
SO3	10.7	10.7	10.8	10.7
C	0.56	0.57	0.56	0.56

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A : Quantitative Chemical Analysis
Sample ID: SALT-SO-T-0375, Salts
Folder 19245- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1002	1000
Analysis 2:	0.1006	1000
HF/HClO4:		
Analysis 1:	0.1000	1000
Analysis 2:	0.1000	1000

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	<0.005	<0.005	<0.005
As2O3	Fusion	0.14	0.13	0.14
BaO	Fusion	12.6	12.7	12.7
CaO	Fusion	4.85	4.83	4.84
Cr2O3	Fusion	0.013	0.014	0.014
Fe2O3	Fusion	0.015	0.017	0.016
K2O	HF/HClO4	2.41	2.41	2.41
Li2O	HF/HClO4	8.50	8.44	8.47
MgO	Fusion	0.019	0.019	0.019
MoO3	Fusion	1.41	1.39	1.40
Na2O	HF/HClO4	14.5	14.5	14.5
NiO	Fusion	<0.005	<0.005	<0.005
P2O5	Fusion	2.33	2.30	2.32
SiO2	Fusion	0.13	0.12	0.13
SrO	Fusion	0.050	0.047	0.049
V2O5	Fusion	0.032	0.031	0.032

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A : Quantitative Chemical Analysis
Sample ID: SALT-SO-T-0658, Salts
Folder 19245- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1000	1000
Analysis 2:	0.1004	1000
HF/HClO4:		
Analysis 1:	0.1000	1000
Analysis 2:	0.1000	1000

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	0.093	0.098	0.096
As2O3	Fusion	0.17	0.16	0.17
BaO	Fusion	9.49	9.48	9.49
CaO	Fusion	6.47	6.67	6.57
Cr2O3	Fusion	0.021	0.020	0.021
Fe2O3	Fusion	0.020	0.023	0.022
K2O	HF/HClO4	2.34	2.34	2.34
Li2O	HF/HClO4	7.59	7.53	7.56
MgO	Fusion	0.039	0.040	0.040
MoO3	Fusion	12.8	13.0	12.9
Na2O	HF/HClO4	13.7	13.7	13.7
NiO	Fusion	0.032	0.034	0.033
P2O5	Fusion	2.75	2.72	2.74
SiO2	Fusion	0.092	0.097	0.095
SrO	Fusion	0.069	0.069	0.069
V2O5	Fusion	0.029	0.028	0.029

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A : Quantitative Chemical Analysis
Sample ID: SALT-SO-T-0673, Salts
Folder 19245- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1001	1000
Analysis 2:	0.1008	1000
HF/HClO4:		
Analysis 1:	0.1000	1000
Analysis 2:	0.1000	1000

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	0.15	0.16	0.16
As2O3	Fusion	0.13	0.15	0.14
BaO	Fusion	12.8	12.7	12.8
CaO	Fusion	4.45	4.46	4.46
Cr2O3	Fusion	0.014	0.011	0.013
Fe2O3	Fusion	0.029	0.024	0.027
K2O	HF/HClO4	2.52	2.50	2.51
Li2O	HF/HClO4	8.50	8.50	8.50
MgO	Fusion	0.016	0.016	0.016
MoO3	Fusion	1.46	1.47	1.47
Na2O	HF/HClO4	14.9	14.9	14.9
NiO	Fusion	<0.005	<0.005	<0.005
P2O5	Fusion	2.31	2.37	2.34
SiO2	Fusion	0.11	0.11	0.11
SrO	Fusion	0.050	0.044	0.047
V2O3	Fusion	0.032	0.033	0.033

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A : Quantitative Chemical Analysis
Sample ID: MISC-SO-T-0672, Devitrified Glass
Folder 19245- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1008	1000
Analysis 2:	0.1001	1000
HF/HClO4:		
Analysis 1:	0.1000	500
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1001	100
Analysis 2:	0.1007	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.082	0.086	0.084
BaO	Fusion	2.39	2.46	2.43
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.072	0.073	0.073
Fe2O3	Fusion	1.71	1.71	1.71
FeO	Colormetric	0.243	0.244	0.24
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	2.00	2.00	2.00
MoO3	Fusion	0.085	0.086	0.086
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.18	0.18	0.18
P2O5	Fusion	0.49	0.48	0.49
PbO	Fusion	5.58	5.60	5.59
SiO2	Fusion	62.9	62.7	62.8
V2O5	Fusion	0.040	0.041	0.041
ZnO	Fusion	[redacted]		

R_2O = K. Li, Na = 11.5 % Average

Additives = Ca, Zn, Al = 13.8% Average

Element	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Se	Vapor Hydride	0.0270	0.0244	0.026

Element	Reading 1	Reading 2	Reading 3	Average
SO3	1.02	1.01	1.03	1.02

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit A : Quantitative Chemical Analysis
Sample ID: FEED-SO-T-0638 Slurry Feed
Folder 19245- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1003	1000
Analysis 2:	0.1008	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1013	100
Analysis 2:	0.1027	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.11	0.11	0.11
BaO	Fusion	3.29	3.36	3.33
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.073	0.075	0.074
Fe2O3	Fusion	2.08	2.11	2.10
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.75	0.75	0.75
MoO3	Fusion	<0.005	<0.005	<0.005
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.29	0.30	0.30
P2O5	Fusion	0.81	0.86	0.84
PbO	Fusion	9.86	9.83	9.85
SiO2	Fusion	54.0	54.1	54.1
V2O5	Fusion	0.063	0.063	0.063
ZnO	Fusion	[redacted]		

R_2O = K, Li, Na = 8.5 % Average

Additives = Ca, Zn, Al = 14.9 % Average

Element	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Se	Vapor Hydride	0.0277	0.0234	0.026

Element	Reading 1	Reading 2	Reading 3	Average
SO3	2.84	2.85	2.86	2.85
C	0.93	0.90	0.95	0.93

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit B : Density via Gas Pycnometer

Sample Description:

Sample 5: 06S0-SO-T-0546, Offgas Solids; 1-20-99, Sample 6: 06S0-SO-T-0588, Offgas Solids; 1-21-99

Folder No.: 18703-99

Determination	Sample 5	Sample 6
Density (g/cm^3)	3.74	3.66

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit C : Semi-Quantitative Spectrographic Analysis

Sample Description:

Sample 2: 06S0-SO-T-0361, Offgas Solids; 1-17-99, Sample 3: 06S0-SO-T-0389, Offgas Solids; 1-18-99
Sample 4: 06S0-SO-T-0498, Offgas Solids; 1-20-99

Folder No.: 18703-99

RESULTS (Reported As The "***ELEMENT***")

Range(Wt%)	Sample 2	Sample 3	Sample 4
>30	-	Fe	Fe
10-30	Pb+	-	Pb
3.0-10	Fe,Si	Pb,Si-	Si
1.0-3.0	[redacted]P+	P	[redacted]P+
0.3-1.0	[redacted]As-,Ba[redacted]	[redacted]Ba-[redacted]	Ba[redacted]
0.1-0.3	Cr-,Mo+	Mn	As+,Cr-,Mn,Mo+
0.03-0.1	Mg,Ni	As,B,Cr,Cu-,Mg,Ni	B,Mg+,Ni
0.01-0.03	B,Mn+,Sb(?)	Mo,Sb(?)	Cu+,Sb(?),Ti
0.003-0.01	Cu,Ti,V	Ti	V
0.001-0.003	Ag-,Bi,Sn,Sr+	Co,Sn,Sr,V	Ag-,Bi,Sn,Sr+
<0.001	-	Ag,Bi	-

Typical detection limits (Wt%) for the ELEMENTS EXAMINED are listed below. They are ONLY general guidelines. Detection limits are composition affected.

0.3%	- K,P	0.01%	- Ba,Na,Sb,Zr
0.1%	- As,Cd,Li	0.003%	- Al,Ca,Co,In,Ni,Si,Ti
0.03%	- Nb,Zn	<0.001%	- Ag,B,Be,Bi,Cu,Cr,Fe,Ga,Mg,Mn,Pb,Sn,Sr,V

[(+) = Upper Range, (-) = Lower Range, (?) = Possibly Present]

Analyst Comments: * For samples #1 - #3 Zr was not determined due to Fe interference.

For samples #1 - #3 Li appears to be present, but could not be determined due to interference.

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit C : Semi-Quantitative Spectrographic Analysis

Sample Description:

Sample 7: SALT-SO-T-0375, Salts; 1-18-99, Sample 8: SALT-SO-T-0658, Salts; 1-28-99
Sample 9: SALT-SO-T-0673, Salts; 1-23-99

Folder No.: 18703-99

RESULTS (Reported As The "***ELEMENT***")

Range(Wt%)	Sample 7	Sample 8	Sample 9
>30	-	-	-
10-30	Na-	Na-	Na-
3.0-10	Ba,Ca	Ba,Ca,Mo	Ba,Ca
1.0-3.0	Li+,Mo	Li+,Pb	Li+,Mo
0.3-1.0	K+,P,Pb+	K+,P	K+,P,Pb+
0.1-0.3	-	-	-
0.03-0.1	As,Si,Sr	As+,Si-,Sr	As+,Si,Sr
0.01-0.03	V	Mg,V-	V
0.003-0.01	Al,Mg+	Al,Cr-,Ni	Al,Fe,Mg+
0.001-0.003	Cr+,Fe(?),Ni	-	Cr,Ni+
<0.001	Mn	Mn	Mn

Typical detection limits (Wt%) for the ELEMENTS EXAMINED are listed below. They are ONLY general guidelines. Detection limits are composition affected.

0.3%	- K,P	0.01%	- Ba,Na,Sb,Zr
0.1%	- As,Cd,Li	0.003%	- Al,Ca,Co,In,Ni,Si,Ti
0.03%	- Nb,Zn	<0.001%	- Ag,B,Be,Bi,Cu,Cr,Fe,Ga,Mg,Mn,Pb,Sn,Sr,V

[(+) = Upper Range, (-) = Lower Range, (?) = Possibly Present]

Analyst Comments:

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit C : Semi-Quantitative Spectrographic Analysis (Continued)

BELOW is a list of the ELEMENTS that are determined by spectrographic analysis. Analyses are divided into three categories: GENERAL QUANTITATIVE, NOBLE METALS, AND RARE EARTHS.

Analysis for the Noble Metals and/or Rare Earths must be requested, if needed. They are not part of the General Quantitative Analysis. They can be requested by the group or by the element of interest.

GENERAL QUANTITATIVE ANALYSIS Ag, Al, As, B, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cu, Fe, Ga, Ge, In, K, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Sb, Si, Sn, Sr, Ti, V, Zn, Zr. (If requested) Ta-0.1%, Te-0.1%, Tl-0.01%, W-0.3-1%

NOBLE METALS ANALYSIS

ELEMENT	DETECTION %
Au	0.003
Ga	0.001
Hf	0.1
In	0.001
Ir	0.01
Pd	0.001
Pt	0.01
Re	0.03
Rh	0.001
Ru	0.03

RARE EARTHS ANALYSIS

ELEMENT	DETECTION %	ELEMENT	DETECTION%
Ce	0.1	Nd	0.3
Dy	0.1	Pr	0.1
Er	0.1	Sc	0.01
Eu	0.01	Sm	0.1
Gd	0.03	Tb	0.03
Ho	0.03	Tm	0.01
La	0.1	Y	0.003
Lu	0.01	Yb	0.001

Semi-Quantitative Spectrographic Analysis RESULTS are reported as weight percent of the ELEMENT (NOT as the oxide). To convert weight percent element to weight percent oxide, MULTIPLY the percent element by the appropriate factor listed in the table below.

FACTORS FOR CONVERSION

Ag2O	1.07	Eu2O3	1.16	MoO3	1.50	SrO	1.18
Al2O3	1.89	FeO	1.29	Na2O	1.35	Ta2O5	1.22
As2O3	1.32	Fe2O3	1.43	Nb2O5	1.43	Tb4O7	1.18
As2O5	1.53	Ga2O3	1.34	Nd2O3	1.17	TeO2	1.25
B2O3	3.22	Gd2O3	1.15	NiO	1.27	TiO2	1.67
BaO	1.12	GeO2	1.44	P2O5	2.29	Tl2O	1.04
BeO	2.78	PbO	1.08	PbO2	1.15	Tl2O3	1.12
Bi2O3	1.11	Ho2O3	1.15	Pr2O3	1.17	Tm2O3	1.14
CaO	1.40	HfO2	1.18	RuO4	1.63	VO	1.31
CdO	1.14	In2O3	1.12	RuO2	1.32	VO2	1.63
CeO2	1.23	K2O	1.20	Sb2O3	1.20	V2O5	1.79
Co3O4	1.36	La2O3	1.17	Sb2O5	1.33	WO2	1.17
Cr2O3	1.46	Li2O	2.15	Sc2O3	1.53	WO3	1.26
CuO	1.25	Lu2O3	1.14	SiO2	2.14	Y2O3	1.27
Cu2O	1.13	MgO	1.66	Sm2O3	1.16	Yb2O3	1.14
Dy2O3	1.15	MnO	1.29	SnO	1.13	ZnO	1.24
Er2O3	1.14	MnO2	1.58	SnO2	1.27	ZrO2	1.35

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-014

Exhibit D : X-ray Diffraction Analysis

Sample Description:

Sample 10: MISC-SO-T-0672, Devitrified Glass; 2-11-99

A sample of devitrified glass was received for X-ray diffraction analysis. The sample was ground into a fine powder, back-loaded into a standard holder and scanned from 5-70 degrees two-theta. The following is a summary of the results obtained from the analysis. The XRD search match was limited using the chemistry supplied by the QSA analysis.

Possible crystalline phases:

Wolllastonite, $CaSiO_3$, JCPDS file no. 43-1460

Albite, $NaAlSi_3O_8$, JCPDS file no. 20-572

Augite, $Ca(Mg,Fe,Al)(Si,Al)_2O_6$, JCPDS file no. 41-1483

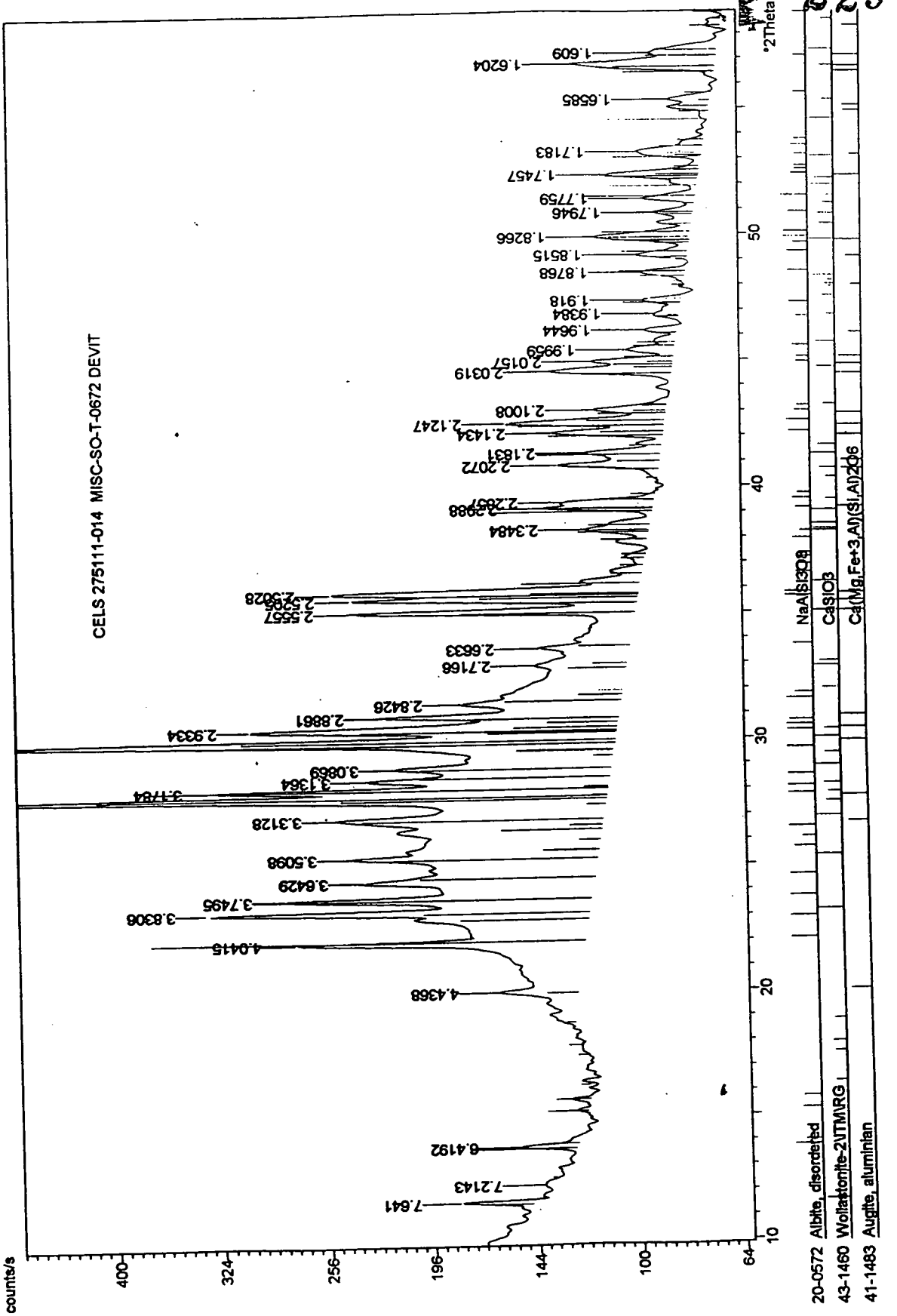
Diopside, $Ca(Mg,Al)(Si,Al)_2O_6$, JCPDS file no. 41-1370

Comments:

Many forms of the phases identified exist. Evaluation of a thin section of the devitrified glass by optical microscopy may provide additional information.

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

2291


CELS 275111-014 MISC-SO-T-0672 DEVIT
counts/s
400
324
256
196
144
100
64
10
20
30
40
50
°2Theta
7.641
7.2143
6.4192
4.4368
4.0415
3.8306
3.7495
3.6429
3.5098
3.3128
3.1784
3.1364
3.0869
2.9334
2.8861
2.8428
2.7166
2.6633
2.5557
2.5298
2.5028
2.3484
2.2988
2.2857
2.2072
2.1831
2.1434
2.1247
2.1008
2.0319
2.0157
1.9959
1.9644
1.9384
1.918
1.8768
1.8515
1.8266
1.7946
1.7759
1.7457
1.7183
1.6585
1.6204
1.609
20-0572 Albite, disordered
NaAlSi3O8
43-1460 Wollastonite-2VTMURG
CaSiO3
41-1483 Augite, aluminian
Ca(Mg,Fe+3,Al)(Si,Al)2O6

CELS - Corning Laboratory Services
Corning Incorporated
S&A Receiving; Houghton Park
HP-ME-03-078 Pulteney Street
Corning, NY 14831

PR RAW INC 19981105 0854 Q
KW: CELS, Sieve Analysis, Revised Report

Corning 2291

Fax Transmittal Sheet

Date: 11/4/98 3:59 PM

To: Mr. Robert Wilson
Envitco, Inc.

Fax No.: (419)537-7299

From: Marie Booth/Administrative Assistant
CELS - Corning Laboratory Services
1-800-235-2357
(607)974-6522 (Fax)
Internet: www.cels.corning.com

Subject: Analytical Report

TOTAL Number of Pages to Follow: 6

Reports #275111-001, 002 and 003 will be sent via Airborne tomorrow.

Corning Incorporated
CELS—Laboratory Services
Technology Sales & Licensing
HP ME 03 078 G6
Corning, New York 14831
800-235-2357
607-974-6601
fax 607-974-6522

2291

November 4, 1998

Mr. Robert Wilson
ENVITCO, INC.
3400 Executive Parkway
P.O. Box 2451
Toledo, OH 43606-0451

CELS Client No. : 275111-001 **CORNING**
Date Received : September 2, 1998
Date Reported : September 23, 1998
Reviewed & Approved by : Linda P. Adams
Linda P. Adams
Technical Sales Engineer

Copy to: CELS File

Sample Identification:

Sample 1: T-S-001-C Silica (Coarse); 9-1-98
Sample 2: T-S-002-C Silica (Fine); 9-1-98
Sample 3: T-S-003-C Silica (Fume); 9-1-98

Analysis Reported:

Exhibit

A Particle Size Distribution via Sieve Analysis
B Surface Area

Comments

CORRECTED COPY
DATE 11/4/98 pg. 5 corrected graph

Client Purchase Order No.: 36031

Direct questions regarding this report to Linda Adams, CELS office.

NOTE: This report shall not be reproduced, except in full, without the written approval of CELS - Corning Laboratory Services.

CONFIDENTIAL: This CELS report information is to be used only for 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-001

2291

Exhibit A : Particle Size Distribution via Sieve Analysis

Sample Description:

Sample 1: T-S-001-C Silica (Coarse); 9-1-98

Folder No.: 13781-98

Dry Screen:

Procedure:

Test : Corning Procedure #451004-003, which complies with ASTM C-429, "Standard Test Method for Sieve Analysis of Raw Materials for Glass Manufacture".

The requested procedure, ASTM D-422, was specifically written for soil samples. We therefore followed the internal procedure (developed for glass and glassy raw materials), but we used the screen sizes specified in ASTM D-422.

Sieve Calibration: - Screens are sent out and calibrated by Tyler Instrumentation.

Shaking Time – 15 minutes

Accuracy and Precision:

Not defined for this test

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

2291

LABORATORY ANALYSIS REPORT

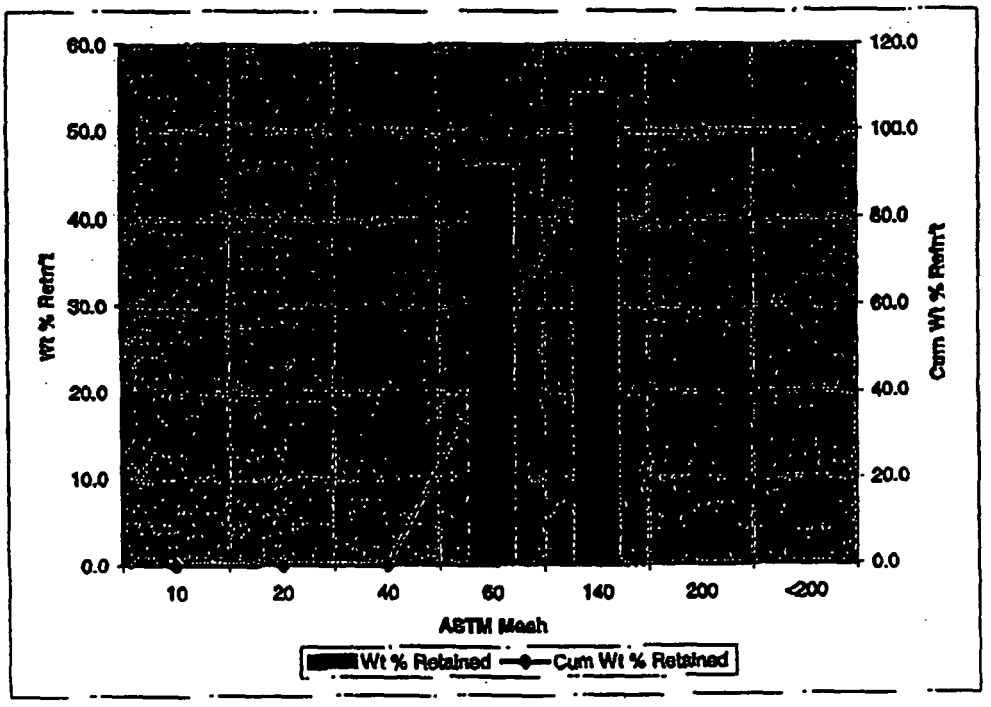
CELS Client No.: 275111-001

Exhibit A : Particle Size Distribution via Sieve Analysis

Sample Description: Sample 1: T-S-001-C Silica (Coarse); 9-1-98

Folder No.: 13781-98

ASTM Mesh	Tyler Mesh	Opening microns	Wt % Retained	Cum Wt % Retained
4	4	4750	0.0	0.0
10	9	2000	0.0	0.0
20	20	850	0.0	0.0
40	35	425	0.0	0.0
60	60	250	45.9	45.9
140	150	106	54.1	99.9
200	200	75	0.0	100.0
<200	<200	<45	0.0	100.0



001443

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-001

Exhibit A : Particle Size Distribution via Sieve Analysis

Sample Description:

Sample 2: T-S-002-C Silica (Fine); 9-1-98

Folder No.: 13781-98

Wet Screen:

Procedure:

Test : Corning Procedure #451004-003, which complies with ASTM C-429, "Standard Test Method for Sieve Analysis of Raw Materials for Glass Manufacture".

The requested procedure, ASTM D-422, was specifically written for soil samples. We therefore followed the internal procedure (developed for glass and glassy raw materials), but we used the screen sizes specified in ASTM D-422.

Sieve Calibration: - Screens are sent out and calibrated by Tyler Instrumentation.

Shaking Time – 15 minutes

NOTE: The dry screen portion of the procedure did not work for sample labeled "Fine". Typically, this happens when there is too much static charge in the sample, and the material tends to ball up.

The sample had to be run with the Wet Sieve portion of the procedure first:

- The sample was put in a beaker and wet with DI water
- The wet sample was rinsed through a –325 mesh screen.
- All the material <325 mesh was discarded
- The material retained on top of the screen was dried at 105°C.
- The dried material was run through the requested sieves.

Accuracy and Precision:

Not defined for this test

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

2291

LABORATORY ANALYSIS REPORT

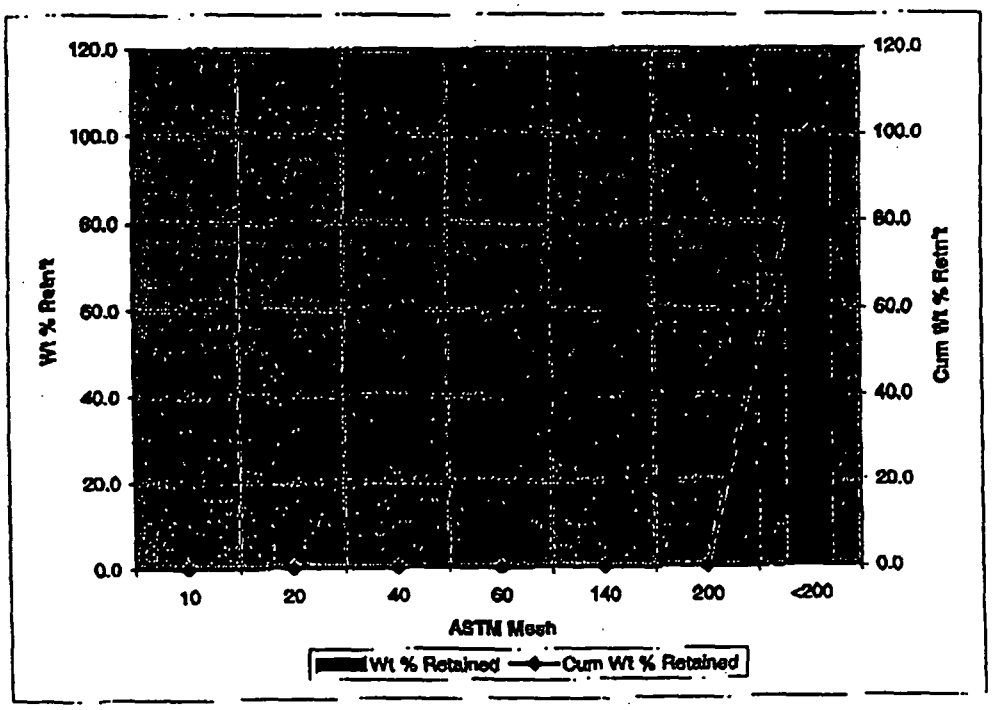
CELS Client No.: 275111-001

Exhibit A : Particle Size Distribution via Sieve Analysis

Sample Description: Sample 2: T-S-002-C Silica (Fine); 9-1-98

Folder No.: 13781-98

ASTM Mesh	Tyler Mesh	Opening microns	Wt % Retained	Cum Wt % Retained
4	4	4750	0.0	0.0
10	9	2000	0.0	0.0
20	20	850	0.0	0.0
40	35	425	0.0	0.0
60	60	250	0.0	0.0
140	150	106	0.1	0.1
200	200	75	0.0	0.1
<200	<200	<45	100.0	100.1



001445

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

2291

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-001

Exhibit B : Surface Area Analysis

Sample Description:

Sample 3: T-S-003-C Silica (Fume); 9-1-98

Folder No.: 13781-98

Surface Area via BET Analysis

Procedure: Corning Internal Procedure # 451008-001, complies with ASTM D-4567 and C-1069.

The sample was outgassed on the Quantector outgassing unit at 280°C for 30 minutes prior to analysis. The analysis was performed on a single point N2 BET Micromeritics Flowsorb 2300.

Weight of Sample Used:
Run #1 – 0.02 grams
Run #2 – 0.06 grams

Accuracy and Precision:

Standard Information - The instrument is calibrated using a NIST Raw Material #8570. Acceptable Tolerances on this are 9.69 m^2/s -10.71 m^2/s. For this sample analysis, the standard ran 10.00 m^2/s.

Precision – 0.5%;
Accuracy RSD 2.0 %

These numbers assume that all conditions are met, for example, that the particles are spherical.

Results:

1st Run – 193
2nd Run – 196

Average – 195

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

Corning Incorporated
CELS—Laboratory Services
Technology Sales & Licensing
HP ME 03 078 G6
Corning, New York 14831
800-235-2357
607-974-6601
fax 607-974-6522

E 2291

98703 PR RAW INC 19981105 0854 ¢ Q
KW: CELS, Sieve Analysis, Revised Report

November 4, 1998

Mr. Robert Wilson
ENVITCO, INC.
3400 Executive Parkway
P.O. Box 2451
Toledo, OH 43606-0451

CELS Client No. : 275111-001 **CORNING**
Date Received : September 2, 1998
Date Reported : September 23, 1998
Reviewed & Approved by : Linda P. Adams
Linda P. Adams
Technical Sales Engineer

Copy to: CELS File

Sample Identification:

Sample 1: T-S-001-C Silica (Coarse); 9-1-98
Sample 2: T-S-002-C Silica (Fine); 9-1-98
Sample 3: T-S-003-C Silica (Fume); 9-1-98

Analysis Reported:

Exhibit

A Particle Size Distribution via Sieve Analysis
B Surface Area

Comments

CORRECTED COPY
DATE 11/4/98 pg 5 correct graph

Client Purchase Order No.: 36031

Direct questions regarding this report to Linda Adams, CELS office.

NOTE: This report shall not be reproduced, except in full, without the written approval of CELS - Corning Laboratory Services.

001447

CONFIDENTIAL: This CELS report information is to be used only for 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-001

Exhibit A : Particle Size Distribution via Sieve Analysis

Sample Description:

Sample 1: T-S-001-C Silica (Coarse); 9-1-98

Folder No.: 13781-98

Dry Screen:

Procedure:

Test : Corning Procedure #451004-003, which complies with ASTM C-429, "Standard Test Method for Sieve Analysis of Raw Materials for Glass Manufacture".

The requested procedure, ASTM D-422, was specifically written for soil samples. We therefore followed the internal procedure (developed for glass and glassy raw materials), but we used the screen sizes specified in ASTM D-422.

Sieve Calibration: - Screens are sent out and calibrated by Tyler Instrumentation.

Shaking Time – 15 minutes

Accuracy and Precision:

Not defined for this test

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

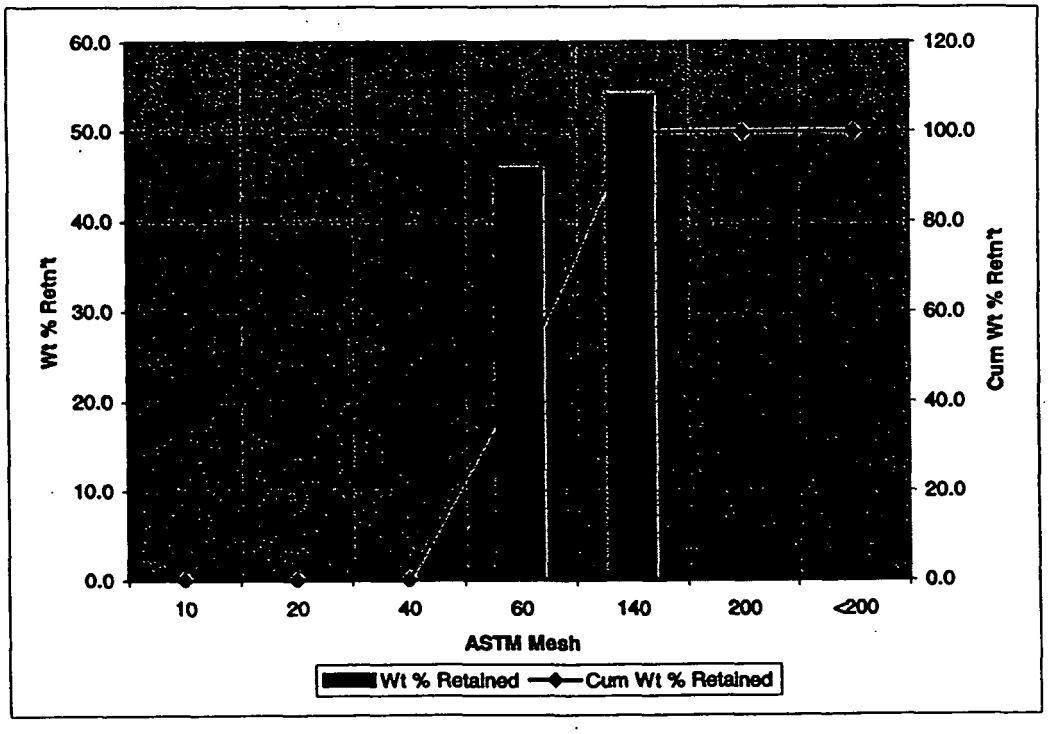
CELS Client No.: 275111-001

Exhibit A : Particle Size Distribution via Sieve Analysis

Sample Description: Sample 1: T-S-001-C Silica (Coarse); 9-1-98

Folder No.: 13781-98

ASTM Mesh	Tyler Mesh	Opening microns	Wt % Retained	Cum Wt % Retained
4	4	4750	0.0	0.0
10	9	2000	0.0	0.0
20	20	850	0.0	0.0
40	35	425	0.0	0.0
60	60	250	45.9	45.9
140	150	106	54.1	99.9
200	200	75	0.0	100.0
<200	<200	<45	0.0	100.0



001449

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-001

Exhibit A : Particle Size Distribution via Sieve Analysis

Sample Description:

Sample 2: T-S-002-C Silica (Fine); 9-1-98

Folder No.: 13781-98

Wet Screen:

Procedure:

Test : Corning Procedure #451004-003, which complies with ASTM C-429, "Standard Test Method for Sieve Analysis of Raw Materials for Glass Manufacture".

The requested procedure, ASTM D-422, was specifically written for soil samples. We therefore followed the internal procedure (developed for glass and glassy raw materials), but we used the screen sizes specified in ASTM D-422.

Sieve Calibration: - Screens are sent out and calibrated by Tyler Instrumentation.

Shaking Time – 15 minutes

NOTE: The dry screen portion of the procedure did not work for sample labeled "Fine". Typically, this happens when there is too much static charge in the sample, and the material tends to ball up.

The sample had to be run with the Wet Sieve portion of the procedure first:

- The sample was put in a beaker and wet with DI water
- The wet sample was rinsed through a –325 mesh screen.
- All the material <325 mesh was discarded
- The material retained on top of the screen was dried at 105°C.
- The dried material was run through the requested sieves.

Accuracy and Precision:

Not defined for this test

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

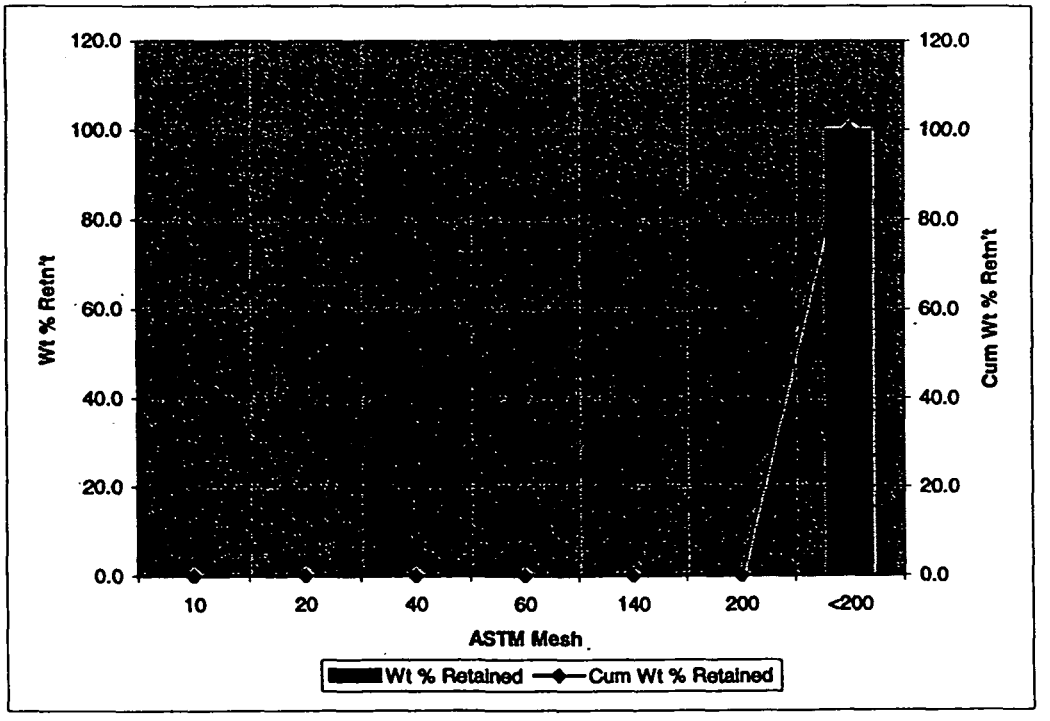
CELS Client No.: 275111-001

Exhibit A : Particle Size Distribution via Sieve Analysis

Sample Description: Sample 2: T-S-002-C Silica (Fine); 9-1-98

Folder No.: 13781-98

ASTM Mesh	Tyler Mesh	Opening microns	Wt % Retained	Cum Wt % Retained
4	4	4750	0.0	0.0
10	9	2000	0.0	0.0
20	20	850	0.0	0.0
40	35	425	0.0	0.0
60	60	250	0.0	0.0
140	150	106	0.1	0.1
200	200	75	0.0	0.1
<200	<200	<45	100.0	100.1



CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-001

Exhibit B : Surface Area Analysis

Sample Description:

Sample 3: T-S-003-C Silica (Fume); 9-1-98

Folder No.: 13781-98

Surface Area via BET Analysis

Procedure: Corning Internal Procedure # 451008-001, complies with ASTM D-4567 and C-1069.

The sample was outgassed on the Quantector outgassing unit at 280°C for 30 minutes prior to analysis. The analysis was performed on a single point N2 BET Micromeritics Flowsorb 2300.

Weight of Sample Used:
Run #1 – 0.02 grams
Run #2 – 0.06 grams

Accuracy and Precision:

Standard Information - The instrument is calibrated using a NIST Raw Material #8570. Acceptable Tolerances on this are 9.69 m^2/s -10.71 m^2/s. For this sample analysis, the standard ran 10.00 m^2/s.

Precision ~ 0.5%;
Accuracy RSD 2.0 %

These numbers assume that all conditions are met, for example, that the particles are spherical.

Results:

1st Run – 193
2nd Run – 196

Average – 195

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

2291

CELS - Corning Laboratory Services
Corning Incorporated
S&A Receiving: Houghton Park
HP-ME-03-078 Pulteney Street
Corning, NY 14831

Corning

Fax Transmittal Sheet

98703 PR RAW INC 19990305 1517 Ø;

KW: CELS, Feed Data, EV-101

cc: DMB, DHD, KJH, BPT, WJT

Date: 3/3/99 2:08 PM

To: Mr. Robert Wilson
Envitco, Inc.

Fax No.: (419)537-7299

From: Marie Booth/Administrative Assistant
CELS - Corning Laboratory Services
1-800-235-2357
(607)974-6522 (Fax)
Internet: www.cels.corning.com

Subject: Analytical Report

TOTAL Number of Pages to Follow: 23

Corning Incorporated
CELS—Laboratory Services
Technology Sales & Licensing
HP ME 03 078 G6
Corning, New York 14831
800-235-2357
607-974-6601
fax 607-974-6522

2291

March 3, 1999

Mr. Robert Wilson
ENVITCO, INC.
3400 Executive Parkway
P.O. Box 2451
Toledo, OH 43606-0451

CELS Client No. : 275111-012 **CORNING**
Date Received : February 9, 1999
Date Reported : February 26, 1999
Reviewed & Approved by : Connie L. Fieno
Connie L. Fieno
Analysis Coordinator

Copy to: CELS File

Sample Identification:

Sample 1: FEED-SO-T-0488 Slurry Feed; 1-19-99
Sample 2: FEED-SO-T-0517 Slurry Feed; 1-17-99
Sample 3: FEED-SO-T-0555 Slurry Feed; 1-20-99
Sample 4: FEED-SO-T-0584 Slurry Feed; 1-21-99
Sample 5: FEED-SO-T-0330 Slurry Feed; 1-15-99
Sample 6: FEED-SO-T-0358 Slurry Feed; 1-17-99
Sample 7: FEED-SO-T-0395 Slurry Feed; 1-18-99
Sample 8: FEED-SO-T-0454 Slurry Feed; 1-18-99
Sample 9: FEED-SO-T-0606 Slurry Feed; 1-22-99
Sample 10: FEED-SO-T-0611 Slurry Feed; 1-22-99
Sample 11: FEED-SO-T-0638 Slurry Feed; 1-23-99

Analysis Reported:

Exhibit

A Quantitative Chemical Analysis

B Density via Gas Pycnometer

C Semi-Quantitative Spectrographic Analysis

Client Purchase Order No.: 36031

Comment: Chemical analysis was done on the residue

Direct questions regarding this report to Connie Fieno, CELS office.

NOTE: This report shall not be reproduced, except in full, without the written approval of CELS - Corning Laboratory Services.

CONFIDENTIAL: This CELS report information is to be used only for 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-012

Exhibit A : Quantitative Chemical Analysis

Sample Description:
Sample 1: FEED-SO-T-0488 Slurry Feed; 1-19-99 Sample 2: FEED-SO-T-0517 Slurry Feed; 1-17-99
Sample 3: FEED-SO-T-0555 Slurry Feed; 1-20-99 Sample 4: FEED-SO-T-0584 Slurry Feed; 1-21-99

Folder No.: 18647 and 18527-99

Oxide	Sample 1 (Wt%)	Sample 2 (Wt%)	Sample 3 (Wt%)	Sample 4 (Wt%)	Test Method
[redacted]					FES
[redacted]					FES
[redacted]					FES
Al_2O_3	[redacted]				ICP
As_2O_3	0.083	0.097	0.11	0.11	ICP
BaO	4.25	4.31	4.17	4.08	ICP
CaO	[redacted]				ICP
Cr_2O_3	0.059	0.052	0.069	0.071	ICP
Fe_2O_3 (1)	2.29	2.38	2.31	2.25	ICP
MgO	0.82	0.84	0.81	0.80	ICP
NiO	0.33	0.35	0.34	0.32	ICP
P_2O_5	0.93	0.95	0.92	0.89	ICP
PbO	10.0	10.1	10.2	10.2	ICP
SiO_2	52.6	53.0	52.9	53.9	ICP
V_2O_5	0.068	0.070	0.069	0.068	ICP
ZnO	[redacted]				ICP
SO_3	2.5	2.7	2.6	2.6	LECO
LOD	60.0	67.0	60.6	59.4	LOD
LOI	71.1	72.2	71.1	68.2	LOI
Element	**Sample 1 (Wt%)**	**Sample 2 (Wt%)**	**Sample 3 (Wt%)**	**Sample 4 (Wt%)**	**Test Method**
Se	0.012	0.013	0.016	0.015	HYDR
C	3.1	3.2	3.3	3.2	LECO

R_2O = K, Li, Na = 7.5 % Average

Additives = Ca, Zn, Al = 16.5% Average

(1) Total Fe expressed as Fe_2O_3

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-012

Exhibit A : Quantitative Chemical Analysis

Sample Description:
Sample 5: FEED-SO-T-0330 Slurry Feed; 1-15-99 Sample 6: FEED-SO-T-0358 Slurry Feed; 1-17-99
Sample 7: FEED-SO-T-0395 Slurry Feed; 1-18-99 Sample 8: FEED-SO-T-0454 Slurry Feed; 1-18-99

Folder No.: 18647 and 18527-99

Oxide	Sample 5 (Wt%)	Sample 6 (Wt%)	Sample 7 (Wt%)	Sample 8 (Wt%)	Test Method
K_2O	[redacted]				FES
Li_2O	[redacted]				FES
Na_2O	[redacted]				FES
Al_2O_3	[redacted]				ICP
As_2O_3	0.12	0.11	0.12	0.12	ICP
BaO	4.22	4.31	4.45	4.88	ICP
CaO	[redacted]				ICP
Cr_2O_3	0.088	0.072	0.062	0.072	ICP
Fe_2O_3 (1)	2.28	2.30	2.42	2.61	ICP
MgO	0.81	0.81	0.85	0.92	ICP
NiO	0.33	0.33	0.34	0.36	ICP
P_2O_5	0.90	0.89	0.93	1.02	ICP
PbO	9.76	9.78	10.0	10.9	ICP
SiO_2	52.9	52.7	51.7	47.0	ICP
V_2O_5	0.068	0.067	0.070	0.078	ICP
ZnO	[redacted]				ICP
SO_3	2.7	2.7	2.9	2.9	LECO
LOD	52.9	67.6	73.0	72.8	LOD
LOI	69.3	72.5	77.2	78.5	LOI
Element	**Sample 5 (Wt%)**	**Sample 6 (Wt%)**	**Sample 7 (Wt%)**	**Sample 8 (Wt%)**	**Test Method**
Se	0.015	0.013	0.010	0.013	HYDR
C	3.3	3.3	3.5	3.5	LECO

(1) Total Fe expressed as Fe_2O_3

R_2O = K, Li, Na = 7.7 % Average

Additives = Ca, Zn, Al = 17.4 % Average

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-012

Exhibit A : Quantitative Chemical Analysis

Sample Description:
Sample 9: FEED-SO-T-0606 Slurry Feed; 1-22-99 Sample 10: FEED-SO-T-0611 Slurry Feed; 1-22-99
Sample 11: FEED-SO-T-0638 Slurry Feed; 1-23-99

Folder No.: 18647 and 18527-99

Oxide	Sample 9 (Wt%)	Sample 10 (Wt%)	Sample 11 (Wt%)	Test Method
K_2O	[redacted]			FES
Li_2O	[redacted]			FES
Na_2O	[redacted]			FES
Al_2O_3	[redacted]			ICP
As_2O_3	0.12	0.12	0.13	ICP
BaO	4.22	3.51	3.69	ICP
CaO	[redacted]			ICP
Cr_2O_3	0.061	0.069	0.059	ICP
Fe_2O_3 (1)	2.27	2.27	2.36	ICP
MgO	0.81	0.81	0.83	ICP
NiO	0.31	0.33	0.34	ICP
P_2O_5	0.94	0.95	0.93	ICP
PbO	10.1	10.5	10.8	ICP
SiO_2	52.7	52.3	52.9	ICP
V_2O_5	0.069	0.067	0.073	ICP
ZnO	[redacted]			ICP
SO_3	2.7	2.2	2.3	LECO
LOD	64.9	66.7	64.0	LOD
LOI	70.2	71.1	69.3	LOI
Element	**Sample 9 (Wt%)**	**Sample 10 (Wt%)**	**Sample 11 (Wt%)**	**Test Method**
Se	0.010	0.012	0.011	HYDR
C	3.1	3.1	3.1	LECO

R_2O = K, Li, Na = 7.3 % Average

Additives = Ca, Zn, Al = 16.4 % Average

(1) Total Fe expressed as Fe_2O_3

001457

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

229 1

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-012

Exhibit A: Quantitative Chemical Analysis

Legend:

FES:	Flame Emission Spectroscopy
ICP:	Inductively Coupled Plasma Spectroscopy
LECO:	LECO ® Instrumentation
TITR:	Titrimetry
HYDR:	Vapor Hydration
LOD:	Loss on Drying at 110°C
LOI:	Loss on Ignition at 900°C

NOTE: The methodology used measures the elemental concentration. The results are reported in oxide form.

Accuracy Statement

The following is a guideline of the accuracy of the Atomic Spectroscopy chemical analysis.

The actual accuracy depends on the specific element and the matrix of the material being analyzed. Also, the approximate composition of the material is required to achieve this accuracy.

Major Components - Levels >2%:

Accuracy is generally +/- 0.5 to 1, relative % of absolute value.

i.e. for a level of 30.0%, the absolute standard deviation will range between 0.15% and 0.30%

Minor Components - Levels between 0.5% to 2.0%:

Accuracy is +/- 1 to 5, relative % of absolute value.

Note: The relative error will be less as the value approaches the 2% level.

i.e. for a level of 1.0%, the absolute standard deviation will range between 0.01% and 0.05%

Minor to Trace Components - Levels < 0.5%:

Accuracy is +/- 2 to 20, relative % of absolute value.

Note: The relative error will be higher as the value approaches trace levels..

i.e. for a level of 0.1%, the absolute standard deviation will range between 0.002% and 0.02%

001458

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

2291

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-012

Exhibit A : Quantitative Chemical Analysis
Folder 18597- Standard Information
ICP:
Matrix Matched Standards:

Fusion: Volume of Flask : 100ml
Acid Blank Concentration: 1%HNO3
Flux Concentration: 1300

ACD(As): Volume of Flask : 100ml
Acid Blank Concentration: 5% HF

Element	Concentration in Standard (ppm)
Al	8.040
As	4.995
Ba	3.098
Ca	5.653
Cr	1.014
Fe	3.216
Mg	1.089
Ni	0.9998
P	2.022
Pb	10.06
Si	27.38
V	2.116
Zn	2.244

Sulfur /Carbon via LECO:

Analyte	Standard Value	Tolerance	Standard Reading
S	0.0131	+/-0.0008	0.0131
C	0.0343	+/-0.0012	0.0340

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-012

Folder 18647- Standard Information

ICP:

Matrix Matched Standards:

FES Analysis:

HF/HClO4: Volume of Flask : 500 H2O
H2O Blank used for Baseline

Element	Concentration in Standard (ppm)					
	Sample 1		Sample 2		Sample 3	
	.1g/250ml	.1g/500ml	.1g/250ml	.1g/500ml	.1g/250ml	.1g/500ml
K	2.4	1.2	2.4	1.2	2.4	1.2
Li	6.8	3.4	6.8	3.4	7.0	3.5
Na	9.0	4.5	8.8	4.4	10.4	5.2

Element	Concentration in Standard (ppm)					
	Sample 4		Sample 5		Sample 6	
	.1g/250ml	.1g/500ml	.1g/250ml	.1g/500ml	.1g/250ml	.1g/500ml
K	2.4	1.2	2.4	1.2	2.4	1.2
Li	7.0	3.5	7.2	3.6	7.0	3.5
Na	9.8	4.9	8.8	4.4	9.0	4.5

Element	Concentration in Standard (ppm)					
	Sample 7		Sample 8		Sample 9	
	.1g/250ml	.1g/500ml	.1g/250ml	.1g/500ml	.1g/250ml	.1g/500ml
K	2.4	1.2	2.8	1.4	2.4	1.2
Li	6.8	3.4	8.2	4.1	6.8	3.4
Na	8.4	4.2	9.0	4.5	8.6	4.3

Element	Concentration in Standard (ppm)					
	Sample 10		Sample 11			
	.1g/250ml	.1g/500ml	.1g/250ml	.1g/500ml		
K	2.4	1.2	2.4	1.2		
Li	6.6	3.3	6.6	3.3		
Na	9.0	4.5	8.6	4.3		

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

2291

CELS Client No.: 275111-012

Exhibit A : Quantitative Chemical Analysis
Sample ID: FEED-SO-T-0488 Slurry Feed
Folder 18647- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1009	1000
Analysis 2:	0.1013	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1003	100
Analysis 2:	0.1040	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.082	0.085	0.084
BaO	Fusion	4.28	4.22	4.25
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.057	0.060	0.059
Fe2O3	Fusion	2.30	2.28	2.29
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.82	0.81	0.82
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.33	0.33	0.33
P2O5	Fusion	0.93	0.92	0.93
PbO	Fusion	10.04	10.00	10.0
SeO2	Vapor Hydride	0.0123	0.0123	0.012
SiO2	Fusion	52.5	52.7	52.6
V2O3	Fusion	0.069	0.067	0.068
ZnO	Fusion	[redacted]		

Element	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Se	Vapor Hydride	0.0123	0.0123	0.012

Element	Reading 1	Reading 2	Reading 3	Average
C	3.1	3.0	3.1	3.1
S	2.5	2.5	2.5	2.5

R_2O = K, Li, Na = 7.43 % Average

Additives = Ca, Zn, Al = 16.4% Average

001461

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-012

2291

Exhibit A : Quantitative Chemical Analysis
Sample ID: FEED-SO-T-0517 Slurry Feed
Folder 18647- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1013	1000
Analysis 2:	0.1001	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1029	100
Analysis 2:	0.1046	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.095	0.099	0.097
BaO	Fusion	4.33	4.28	4.31
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.052	0.052	0.052
Fe2O3	Fusion	2.39	2.36	2.38
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.84	0.83	0.84
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.35	0.34	0.35
P2O5	Fusion	0.94	0.96	0.95
PbO	Fusion	10.09	10.13	10.10
SiO2	Fusion	52.7	53.3	53.0
V2O3	Fusion	0.070	0.069	0.070
ZnO	Fusion	[redacted]		

Element	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Se	Vapor Hydride	0.0125	0.0125	0.013

Element	Reading 1	Reading 2	Reading 3	Average
C	3.3	3.3	3.2	3.2
S	2.8	2.6	2.7	2.7

R_2O = K, Li, Na = 7.33 % Average

Additives = Ca, Zn, Al = 16.8 % Average

001462

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

2291

CELS Client No.: 275111-012

Exhibit A : Quantitative Chemical Analysis
Sample ID: FEED-SO-T-0555 Slurry Feed
Folder 18647- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1010	1000
Analysis 2:	0.1003	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1066	100
Analysis 2:	0.1039	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.11	0.11	0.11
BaO	Fusion	4.16	4.18	4.17
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.067	0.070	0.069
Fe2O3	Fusion	2.31	2.31	2.31
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.81	0.81	0.81
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.33	0.35	0.34
P2O5	Fusion	0.93	0.90	0.92
PbO	Fusion	10.15	10.19	10.2
SiO2	Fusion	52.9	52.9	52.9
V2O3	Fusion	0.068	0.069	0.069
ZnO	Fusion	[redacted]		

R_2O = K, Li, Na = 8.0 % Average

Additives = Ca, Zn, Al = 16.3 % Average

Element	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average. Wt %
Se	Vapor Hydride	0.0155	0.0155	0.016

Element	Reading 1	Reading 2	Reading 3	Average
C	3.1	3.5	3.3	3.3
S	2.6	2.6	2.7	2.6

001463

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-012

Exhibit A : Quantitative Chemical Analysis
Sample ID: FEED-SO-T-0584 Slurry Feed
Folder 18647- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1015	1000
Analysis 2:	0.1008	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1033	100
Analysis 2:	0.1084	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.10	0.11	0.11
BaO	Fusion	4.07	4.08	4.08
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.072	0.069	0.071
Fe2O3	Fusion	2.23	2.27	2.25
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.80	0.80	0.80
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.31	0.32	0.32
P2O5	Fusion	0.89	0.88	0.89
PbO	Fusion	10.21	10.23	10.2
SiO2	Fusion	53.90	53.90	53.9
V2O3	Fusion	0.068	0.068	0.068
ZnO	Fusion	[redacted]		

Element	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Se	Vapor Hydride	0.0146	0.0146	0.015

Element	Reading 1	Reading 2	Reading 3	Average
C	3.2	3.1	-	3.2
S	2.6	2.6	-	2.6

R_2O = K, Li, Na = 7.8 % Average

Additives = Ca, Zn, Al = 16.4 % Average

001464

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-012

Exhibit A : Quantitative Chemical Analysis
Sample ID: FEED-SO-T-0330 Slurry Feed
Folder 18647- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.0997	1000
Analysis 2:	0.0999	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1014	100
Analysis 2:	0.1057	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.12	0.12	0.12
BaO	Fusion	4.23	4.20	4.22
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.089	0.086	0.088
Fe2O3	Fusion	2.29	2.27	2.28
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.81	0.80	0.81
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.32	0.33	0.33
P2O5	Fusion	0.92	0.87	0.90
PbO	Fusion	9.77	9.74	9.76
SiO2	Fusion	52.9	52.8	52.9
V2O3	Fusion	0.069	0.067	0.068
ZnO	Fusion	[redacted]		

R_2O = K, Li, Na = 7.6 % Average

Additives = Ca, Zn, Al = 16.6 % Average

Element	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Se	Vapor Hydride	0.0151	0.0151	0.015

Element	Reading 1	Reading 2	Reading 3	Average
C	3.3	3.3	-	3.3
S	2.7	2.8	2.8	2.7

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-012

Exhibit A : Quantitative Chemical Analysis
Sample ID: FEED-SO-T-0358 Slurry Feed
Folder 18647- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.0998	1000
Analysis 2:	0.1003	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1088	100
Analysis 2:	0.1108	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.11	0.11	0.11
BaO	Fusion	4.32	4.30	4.31
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.073	0.071	0.072
Fe2O3	Fusion	2.29	2.30	2.30
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.81	0.81	0.81
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.32	0.33	0.33
P2O5	Fusion	0.91	0.87	0.89
PbO	Fusion	9.74	9.82	9.78
SiO2	Fusion	52.4	52.9	52.7
V2O3	Fusion	0.066	0.067	0.067
ZnO	Fusion	[redacted]		

Element	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Se	Vapor Hydride	0.0132	0.0132	0.013

Element	Reading 1	Reading 2	Reading 3	Average
C	3.3	3.3	3.2	3.3
S	2.7	2.7	2.6	2.7

R_2O = K, Li, Na = 7.5 % Average

Additives = Ca, Zn, Al = 16.7% Average

001466

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

2291

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-012

Exhibit A : Quantitative Chemical Analysis
Sample ID: FEED-SO-T-0395 Slurry Feed
Folder 18647- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1008	1000
Analysis 2:	0.1001	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1006	100
Analysis 2:	0.1050	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.12	0.12	0.12
BaO	Fusion	4.43	4.47	4.45
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.061	0.063	0.062
Fe2O3	Fusion	2.40	2.44	2.42
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.84	0.85	0.85
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.34	0.34	0.34
P2O5	Fusion	0.92	0.94	0.93
PbO	Fusion	10.06	9.98	10.0
SiO2	Fusion	51.7	51.7	51.7
V2O3	Fusion	0.069	0.071	0.070
ZnO	Fusion	[redacted]		

Element	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Se	Vapor Hydride	0.0102	0.0102	0.010

Element	Reading 1	Reading 2	Reading 3	Average
C	3.5	3.5	3.4	3.5
S	2.9	2.9	2.9	2.9

R_2O = K, Li, Na = 7.3 % Average

Additives = Ca, Zn, Al = 17.3% Average

001467

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

2291

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-012

Exhibit A : Quantitative Chemical Analysis
Sample ID: FEED-SO-T-0454 Slurry Feed
Folder 18647- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1005	1000
Analysis 2:	0.1005	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1083	100
Analysis 2:	0.1076	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.12	0.12	0.12
BaO	Fusion	4.87	4.88	4.88
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.070	0.073	0.072
Fe2O3	Fusion	2.61	2.61	2.61
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.91	0.92	0.92
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.36	0.36	0.36
P2O5	Fusion	1.03	1.01	1.02
PbO	Fusion	10.84	10.85	10.9
SiO2	Fusion	46.9	47.0	47.0
V2O3	Fusion	0.078	0.077	0.078
ZnO	Fusion	[redacted]		

Element	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Se	Vapor Hydride	0.0126	0.0126	0.013

Element	Reading 1	Reading 2	Reading 3	Average
C	3.6	3.5	3.4	3.5
S	3.0	3.0	2.8	2.9

R_2O = K. Li, Na = 7.3 % Average

Additives = Ca, Zn, Al = 18.9 % Average

001468

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

2291

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-012

Exhibit A : Quantitative Chemical Analysis
Sample ID: FEED-SO-T-0606 Slurry Feed
Folder 18647- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1005	1000
Analysis 2:	0.1007	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1015	100
Analysis 2:	0.1094	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.12	0.12	0.12
BaO	Fusion	4.22	4.21	4.22
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.063	0.059	0.061
Fe2O3	Fusion	2.27	2.26	2.27
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.81	0.81	0.81
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.31	0.31	0.31
P2O5	Fusion	0.94	0.94	0.94
PbO	Fusion	10.06	10.04	10.1
SiO2	Fusion	52.6	52.7	52.7
V2O3	Fusion	0.068	0.070	0.069
ZnO	Fusion	[redacted]		

Element	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Se	Vapor Hydride	0.0105	0.0102	0.010

Element	Reading 1	Reading 2	Reading 3	Average
C	3.1	3.0	-	3.1
S	2.7	2.8	2.6	2.7

R_2O = K, Li, Na = 7.3 % Average

Additives = Ca, Zn, Al = 16.3 % Average

001469

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-012

Exhibit A : Quantitative Chemical Analysis
Sample ID: FEED-SO-T-0611 Slurry Feed
Folder 18647- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1010	1000
Analysis 2:	0.1003	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1084	100
Analysis 2:	0.1054	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.11	0.12	0.12
BaO	Fusion	3.51	3.50	3.51
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.069	0.068	0.069
Fe2O3	Fusion	2.30	2.23	2.27
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.81	0.80	0.81
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.33	0.32	0.33
P2O5	Fusion	0.98	0.92	0.95
PbO	Fusion	10.35	10.46	10.5
SiO2	Fusion	52.6	52.0	52.3
V2O3	Fusion	0.068	0.065	0.067
ZnO	Fusion	[redacted]		

Element	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Se	Vapor Hydride	0.0120	0.0120	0.012

Element	Reading 1	Reading 2	Reading 3	Average
C	3.1	3.1	-	3.1
S	2.2	2.2	-	2.2

R_2O = K. Li, Na = 7.3 % Average

Additives = Ca, Zn, Al = 16.3 % Average

001470

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-012

Exhibit A : Quantitative Chemical Analysis
Sample ID: FEED-SO-T-0638 Slurry Feed
Folder 18647- Quantitative Chemical Analysis

	Sample Weight (gram)	Volume Mix (ml)
Fusion:		
Analysis 1:	0.1001	1000
Analysis 2:	0.1000	1000
HF/HClO4:		
Analysis 1:	0.1000	250
Analysis 2:	0.1000	500
Cold Acid:		
Analysis 1:	0.1039	100
Analysis 2:	0.1083	100

Oxide	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Al2O3	Fusion	[redacted]		
As2O3	ACD	0.13	0.12	0.13
BaO	Fusion	3.70	3.67	3.69
CaO	Fusion	[redacted]		
Cr2O3	Fusion	0.061	0.056	0.059
Fe2O3	Fusion	2.37	2.35	2.36
K2O	HF/HClO4	[redacted]		
Li2O	HF/HClO4	[redacted]		
MgO	Fusion	0.83	0.82	0.83
Na2O	HF/HClO4	[redacted]		
NiO	Fusion	0.34	0.34	0.34
P2O5	Fusion	0.93	0.93	0.93
PbO	Fusion	10.82	10.83	10.8
SiO2	Fusion	52.7	53.0	52.9
V2O3	Fusion	0.074	0.071	0.073
ZnO	Fusion	[redacted]		

Element	Dissolution	Analysis 1 Wt %	Analysis 2 Wt %	Average Wt %
Se	Vapor Hydride	0.0107	0.0107	0.011

Element	Reading 1	Reading 2	Reading 3	Average
C	3.2	3.1	3.1	3.1
S	2.4	2.3	2.3	2.3

R_2O = K, Li, Na = 7.2 % Average

Additives = Ca, Zn, Al = 16.7% Average

001471

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

2291

CELS Client No.: 275111-012

Exhibit B : Density via Gas Pycnometer

Sample Description:

Sample 2: FEED-SO-T-0517 Slurry Feed; 1-17-99
Sample 4: FEED-SO-T-0584 Slurry Feed; 1-21-99
Sample 5: FEED-SO-T-0330 Slurry Feed; 1-15-99
Sample 7: FEED-SO-T-0395 Slurry Feed; 1-18-99
Sample 9: FEED-SO-T-0606 Slurry Feed; 1-22-99
Sample 10: FEED-SO-T-0611 Slurry Feed; 1-22-99
Sample 11: FEED-SO-T-0638 Slurry Feed; 1-23-99

Folder No.: 18527-99

Determination	Sample 2	Sample 4	Sample 5	Sample 7
Density (gm/cm^3)	1.28	1.28	1.31	1.20

Determination	Sample 9	Sample 10	Sample 11
Density (gm/cm^3)	1.29	1.27	1.31

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

2291

CELS Client No.: 275111-012

Exhibit C : Semi-Quantitative Spectrographic Analysis

Sample Description: Sample 1: FEED-SO-T-0488 Slurry Feed; 1-19-99, Sample 4: FEED-SO-T-0584 Slurry Feed; 1-21-99, Sample 5: FEED-SO-T-0330 Slurry Feed; 1-15-99

Folder No.: 18527-99

RESULTS (Reported As The "***ELEMENT***")

Range(Wt%)	Sample 1	Sample 4	Sample 5
>30	-	-	Si
10-30	Si+	Si+	-
3.0-10	[redacted]Pb	[redacted],Pb	[redacted],Pb+
1.0-3.0	Ba+,Fe-[redacted]	Ba+,Fe[redacted]	Ba+,Fe-[redacted]
0.3-1.0	[redacted],Mg,P	[redacted]-,Mg,P	[redacted],Mg
0.1-0.3	Ni	Ni	Ni+
0.03-0.1	As,Cr-,V	As,Cr-,V	As,Cr-,V
0.01-0.03	Mn,Sr,Ti	Mn,Sr,Ti	Mn,Sr,Ti
0.003-0.01	B,Zr(?)	B,Zr(?)	B,Zr(?)
0.001-0.003	Co	Co	Co
<0.001	Ag,Bi,Cu,Ga	Ag,Bi,Cu,Ga	Ag,Bi,Cu,Ga

Typical detection limits (Wt%) for the ELEMENTS EXAMINED are listed below. They are ONLY general guidelines. Detection limits are composition affected.

0.3%	- K,P	0.01%	- Ba,Na,Sb,Zr
0.1%	- As,Cd,Li	0.003%	- Al,Ca,Co,In,Ni,Si,Ti
0.03%	- Nb,Zn	<0.001%	- Ag,B,Be,Bi,Cu,Cr,Fe,Ga,Mg,Mn,Pb,Sn,Sr,V

[(+) = Upper Range, (-) = Lower Range, (?) = Possibly Present]

[redacted]

001473

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-012

Exhibit C : Semi-Quantitative Spectrographic Analysis

Sample Description: Sample 7: FEED-SO-T-0395 Slurry Feed; 1-18-99, Sample 9: FEED-SO-T-0606 Slurry Feed; 1-22-99, Sample 10: FEED-SO-T-0611 Slurry Feed; 1-22-99

Folder No.: 18527-99

RESULTS (Reported As The "*ELEMENT*")

Range(Wt%)	Sample 7	Sample 9	Sample 10
>30	Si	Si	Si
10-30	-	-	-
3.0-10	[redacted],Fe-,Pb+	[redacted]Fe-,Pb+	[redacted],Fe-,Pb+
1.0-3.0	Ba+[redacted]	Ba+[redacted]	Ba-[redacted]
0.3-1.0	[redacted],Mg,P	[redacted],Mg,P	[redacted],Mg,P
0.1-0.3	Ni+	Ni+	Ni+
0.03-0.1	As,Cr-,V	As,Cr-,V	As,Cr-,V
0.01-0.03	Mn,Sr,Ti	Mn,Sr,Ti	Mn,Sr,Ti
0.003-0.01	B,Zr(?)	B,Zr(?)	B,Zr(?)
0.001-0.003	Co,Cu-	Co,Cu-	Co
<0.001	Ag,Bi,Ga	Ag,Bi,Ga	Ag,Bi,Cu,Ga

Typical detection limits (Wt%) for the ELEMENTS EXAMINED are listed below. They are ONLY general guidelines. Detection limits are composition affected.

0.3%	- K,P	0.01%	- Ba,Na,Sb,Zr
0.1%	- As,Cd,Li	0.003%	- Al,Ca,Co,In,Ni,Si,Ti
0.03%	- Nb,Zn	<0.001%	- Ag,B,Be,Bi,Cu,Cr,Fe,Ga,Mg,Mn,Pb,Sn,Sr,V

[(+) = Upper Range, (-) = Lower Range, (?) = Possibly Present]

Analyst Comments:

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

2291

CELS Client No.: 275111-012

Exhibit C : Semi-Quantitative Spectrographic Analysis

Sample Description: Sample 11: FEED-SO-T-0638 Slurry Feed; 1-23-99

Folder No.: 18527-99

RESULTS (Reported As The "*ELEMENT*")

Range(Wt%)	Sample 11
>30	Si
10-30	-
3.0-10	[redacted]Fe-,Pb+
1.0-3.0	Ba+[redacted]
0.3-1.0	[redacted]Mg,Ni-,P
0.1-0.3	-
0.03-0.1	As,Cr-,V
0.01-0.03	Mn,Sr,Ti
0.003-0.01	B,Zr(?)
0.001-0.003	Co,Cu-
<0.001	Ag,Bi,Ga

Typical detection limits (Wt%) for the ELEMENTS EXAMINED are listed below. They are ONLY general guidelines. Detection limits are composition affected.

0.3%	- K,P	0.01%	- Ba,Na,Sb,Zr
0.1%	- As,Cd,Li	0.003%	- Al,Ca,Co,In,Ni,Si,Ti
0.03%	- Nb,Zn	<0.001%	- Ag,B,Be,Bi,Cu,Cr,Fe,Ga,Mg,Mn,Pb,Sn,Sr,V

[(+) = Upper Range, (-) = Lower Range, (?) = Possibly Present]

001475

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

LABORATORY ANALYSIS REPORT

CELS Client No.: 275111-012

Exhibit C : Semi-Quantitative Spectrographic Analysis (Continued)

BELOW is a list of the ELEMENTS that are determined by spectrographic analysis. Analyses are divided into three categories: GENERAL QUANTITATIVE, NOBLE METALS, AND RARE EARTHS.

Analysis for the Noble Metals and/or Rare Earths must be requested, if needed. They are not part of the General Quantitative Analysis. They can be requested by the group or by the element of interest.

GENERAL QUANTITATIVE ANALYSIS Ag, Al, As, B, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cu, Fe, Ga, Ge, In, K, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Sb, Si, Sn, Sr, Ti, V, Zn, Zr. (If requested) Ta-0.1%, Te-0.1%, Tl-0.01%, W-0.3-1%

NOBLE METALS ANALYSIS

ELEMENT	DETECTION %
Au	0.003
Ga	0.001
Hf	0.1
In	0.001
Ir	0.01
Pd	0.001
Pt	0.01
Re	0.03
Rh	0.001
Ru	0.03

RARE EARTHS ANALYSIS

ELEMENT	DETECTION %	ELEMENT	DETECTION%
Ce	0.1	Nd	0.3
Dy	0.1	Pr	0.1
Er	0.1	Sc	0.01
Eu	0.01	Sm	0.1
Gd	0.03	Tb	0.03
Ho	0.03	Tm	0.01
La	0.1	Y	0.003
Lu	0.01	Yb	0.001

Semi-Quantitative Spectrographic Analysis RESULTS are reported as weight percent of the ELEMENT (NOT as the oxide). To convert weight percent element to weight percent oxide, MULTIPLY the percent element by the appropriate factor listed in the table below.

FACTORS FOR CONVERSION

Ag2O	1.07	Eu2O3	1.16	MoO3	1.50	SrO	1.18
Al2O3	1.89	FeO	1.29	Na2O	1.35	Ta2O5	1.22
As2O3	1.32	Fe2O3	1.43	Nb2O5	1.43	Tb4O7	1.18
As2O5	1.53	Ga2O3	1.34	Nd2O3	1.17	TeO2	1.25
B2O3	3.22	Gd2O3	1.15	NiO	1.27	TiO2	1.67
BaO	1.12	GeO2	1.44	P2O5	2.29	Tl2O	1.04
BeO	2.78	PbO	1.08	PbO2	1.15	Tl2O3	1.12
Bi2O3	1.11	Ho2O3	1.15	Pr2O3	1.17	Tm2O3	1.14
CaO	1.40	HfO2	1.18	RuO4	1.63	VO	1.31
CdO	1.14	In2O3	1.12	RuO2	1.32	VO2	1.63
CeO2	1.23	K2O	1.20	Sb2O3	1.20	V2O5	1.79
Co3O4	1.36	La2O3	1.17	Sb2O5	1.33	WO2	1.17
Cr2O3	1.46	Li2O	2.15	Sc2O3	1.53	WO3	1.26
CuO	1.25	Lu2O3	1.14	SiO2	2.14	Y2O3	1.27
Cu2O	1.13	MgO	1.66	Sm2O3	1.16	Yb2O3	1.14
Dy2O3	1.15	MnO	1.29	SnO	1.13	ZnO	1.24
Er2O3	1.14	MnO2	1.58	SnO2	1.27	ZrO2	1.35

CONFIDENTIAL: This CELS report information is to be used only for account 275111.

EnVitCo, Inc.
A COGEMA Group Company

SECTION 18

ENVITCO POPT BATCH SHEETS

ENVITCO POPT BATCH SHEET

Batch Number: 005
Date Surrogate Batched: 12/9/98
Batched By: MOW & DMB

Surrogate Compound	Weight Added (kg)	Feed Batch Weight %
Na2HAsO4-7H2O	1.28	0.07
BaSO4	36.8	1.93
Na2CrO4	1.21	0.06
Fe2O3	11.35	0.60
Mg3(PO4)2-5H2O	8.8	0.46
NaNO3	4.65	0.24
NiO	1.95	0.10
PbO	25.55	1.34
PbCO3	30	1.58
PbSO4	11.9	0.63
Na2SeO3	0.45	0.02
Coarse SiO2	86.2	4.53
Fine SiO2	84.7	4.45
Fumed SiO2	49.8	2.62
V2O5	0.41	0.02
ZnO	0.05	0.00
Kerosene	4.1	0.22
Tributyl Phosphate	4.1	0.22
Diatomaceous Earth	8.6	0.45
Feldspar	82.4	4.33
Dry SurrogateTotal	**454.3**	**23.86**
BentoGrout	40.8	2.14
Dry Surrogate+BentoGrout	**495.1**	**26.00**
Water	**1199.8**	**63.02**
Total Surrogate	**1694.9**	**89.02**
Total Additives	**209.0**	**10.98**
Total Melter Feed Batch	**1903.9**	**100.00**

S0-D Surrogate - Adjusted from original Contract recipe with respect to:

1. Fumed SiO2 increased by 20% at expense of coarse SiO2
2. Magnesium Phosphate reduced by 38% and coarse SiO2 increased by this amount

ENVITCO POPT BATCH SHEET

Batch Number: 006
Date Surrogate Batched: 12/15/98
Batched By: MOW

Surrogate Compound	Weight Added (kg)	Feed Batch Weight %
Na2HAsO4-7H2O	1.277	0.07
BaSO4	36.8	2.00
Na2CrO4	1.22	0.07
Fe2O3	11.3	0.62
Mg3(PO4)2-5H2O	8.8	0.48
NaNO3	4.65	0.25
NiO	1.9	0.10
PbO	25.55	1.39
PbCO3	29.8	1.62
PbSO4	11.9	0.65
Na2SeO3	0.45	0.02
Coarse SiO2	85	4.63
Fine SiO2	85.25	4.64
Fumed SiO2	49.7	2.71
V2O5	0.41	0.02
ZnO	0.05	0.00
Kerosene	4.15	0.23
Tributyl Phosphate	4.2	0.23
Diatomaceous Earth	8.6	0.47
Feldspar	82.4	4.49
Dry SurrogateTotal	**453.4**	**24.69**
BentoGrout	40.8	2.22
Dry Surrogate+BentoGrout	**494.2**	**26.91**
Water	**1134.0**	**61.75**
Total Surrogate	**1628.2**	**88.66**
Total Additives	**208.3**	**11.34**
Total Melter Feed Batch	**1836.5**	**100.00**

S0-D Surrogate - Adjusted from original Contract recipe with respect to:

1. Fumed SiO2 increased by 20% at expense of coarse SiO2
2. Magnesium Phosphate reduced by 38% and coarse SiO2 increased by this amount

ENVITCO POPT BATCH SHEET

Batch Number: 007
Date Surrogate Batched: 1/8/99
Batched By: MOW

Surrogate Compound	Weight Added (kg)	Feed Batch Weight %
Na2HAsO4-7H2O	1.27	0.07
BaSO4	36.8	1.99
Na2CrO4	1.22	0.07
Fe2O3	11.35	0.61
Mg3(PO4)2-5H2O	8.8	0.48
NaNO3	4.6	0.25
NiO	1.95	0.11
PbO	29.5	1.60
PbCO3	30	1.62
PbSO4	11.95	0.65
Na2SeO3	0.45	0.02
Coarse SiO2	85.2	4.61
Fine SiO2	85.05	4.61
Fumed SiO2	49.8	2.70
V2O5	0.41	0.02
ZnO	0.05	0.00
Kerosene	4.15	0.22
Tributyl Phosphate	4.15	0.22
Diatomaceous Earth	8.6	0.47
Feldspar	81.8	4.43
Dry SurrogateTotal	**457.1**	**24.76**
BentoGrout	40.8	2.21
Dry Surrogate+BentoGrout	**497.9**	**26.97**
Water	**1139.6**	**61.73**
Total Surrogate	**1637.5**	**88.69**
Total Additives	**208.8**	**11.31**
Total Melter Feed Batch	**1846.3**	**100.00**

S0-D Surrogate - Adjusted from original Contract recipe with respect to:

1. Fumed SiO2 increased by 20% at expense of coarse SiO2
2. Magnesium Phosphate reduced by 38% and coarse SiO2 increased by this amount

ENVITCO POPT BATCH SHEET

Batch Number: 008A
Date Surrogate Batched: 1/16/99
Batched By: MOW & DMB

Surrogate Compound	Weight Added (kg)	Feed Batch Weight %
Na2HAsO4-7H2O	1.436	0.04
BaSO4	41.2	1.24
Na2CrO4	1.364	0.04
Fe2O3	12.675	0.38
Mg3(PO4)2-5H2O	9.875	0.30
NaNO3	5.175	0.16
NiO	2.165	0.07
PbO	28.525	0.86
PbCO3	33.7	1.02
PbSO4	13.325	0.40
Na2SeO3	0.502	0.02
Coarse SiO2	95.5	2.88
Fine SiO2	95.05	2.86
Fumed SiO2	56.575	1.70
V2O5	0.455	0.01
ZnO	0.052	0.00
Kerosene	4.625	0.14
Tributyl Phosphate	4.6	0.14
Diatomaceous Earth	9.9	0.30
Feldspar	92.5	2.79
Dry SurrogateTotal	**509.2**	**15.34**
BentoGrout	45.4	1.37
Dry Surrogate+BentoGrout	**554.6**	**16.71**
Water	**2532.2**	**76.28**
Total Surrogate	**3086.8**	**92.99**
Total Additives	**232.8**	**7.01**
Total Melter Feed Batch	**3319.5**	**100.00**

S0-D Surrogate - Adjusted from original Contract recipe with respect to:

1. Fumed SiO2 increased by 20% at expense of coarse SiO2
2. Magnesium Phosphate reduced by 38% and coarse SiO2 increased by this amount

ENVITCO POPT BATCH SHEET

Batch Number: 008B
Date Surrogate Batched: 1/16/99
Batched By: MOW & DMB

Surrogate Compound	Weight Added (kg)	Feed Batch Weight %
Na2HAsO4-7H2O	1.437	0.04
BaSO4	41	1.24
Na2CrO4	1.364	0.04
Fe2O3	12.725	0.38
Mg3(PO4)2-5H2O	9.875	0.30
NaNO3	5.175	0.16
NiO	2.225	0.07
PbO	28.525	0.86
PbCO3	33.7	1.02
PbSO4	13.325	0.40
Na2SeO3	0.503	0.02
Coarse SiO2	95.3	2.87
Fine SiO2	95.05	2.86
Fumed SiO2	56.175	1.69
V2O5	0.455	0.01
ZnO	0.053	0.00
Kerosene	4.625	0.14
Tributyl Phosphate	4.6	0.14
Diatomaceous Earth	9.7	0.29
Feldspar	92.3	2.78
Dry SurrogateTotal	**508.1**	**15.31**
BentoGrout	45.4	1.37
Dry Surrogate+BentoGrout	**553.5**	**16.68**
Water	2532.2	**76.29**
Total Surrogate	**3085.7**	**92.97**
Total Additives	**233.3**	**7.03**
Total Melter Feed Batch	**3319.0**	**100.00**

S0-D Surrogate - Adjusted from original Contract recipe with respect to:

1. Fumed SiO2 increased by 20% at expense of coarse SiO2
2. Magnesium Phosphate reduced by 38% and coarse SiO2 increased by this amount

EnVitCo, Inc.
A COGEMA Group Company

229 1

SECTION 19

R.O.M. PROJECT COSTING AND SCHEDULE DATA

19.0 R.O.M. PROJECT COSTING AND SCHEDULE DATA

The following section provides R.O.M. cost estimates for the full-scale vitrification process, by system, to the degree possible based on pre-conceptual design data. The main components are identified to provide FDF with an understanding of the limits and bounds of the costing exercise.

Assumptions, limitations, and constraints related to the cost data are provided with each system.

Envitco has not provided cost data for those items deemed to be a) facility size or facility design dependent (piping runs for non-integrated systems, power takeoff requirements, etc.), b) systems or services that are common to all technologies (receiving, mixing, or staging tankage and pumps, concentration tankage and pumps, pre-process or post-process material handling, etc.) or c) facility services or equipment as listed below:

- HVAC
- cooling towers
- air compressors/accumulators/dryers (except as noted)
- backup power generators
- centralized controls or monitoring systems
- fire protection
- fork lifts, cranes, or similar facility based equipment
- tooling or equipment related to maintenance areas
- other similar equipment, services or devices.

19.1 Cost Basis and Buildup

Envitco has developed the costs presented herein based on the Facility Design Basis and related assumptions presented in Section 6.1 of this document, and the constraints established in the Contract (Contract No. 98WO002240). Due to an inability to predict the exact nature of the eventual RFP for treatment of the silo wastes (i.e. treatment contract or equipment contract, design codes, facility requirements, etc.), Envitco has approached this costing exercise assuming the application of good engineering practice, conforming to commercial design, construction and operating codes.

19.1.1 System 15: Silo Residue and Feed Blending System

Envitco will not provide cost detail for the Silo Residue and Feed Blending System, since the tankage, pumping and related piping is felt to be common to all technology providers. Envitco has supplied tank sizes for FDF's scaling and estimating purposes.

19.1.2 System 16: Melter Feeding

Envitco will not provide cost detail for the Melter Feeding System tankage and recirculation pumps, since the tankage, pumping and related piping is felt to be common to all technology providers. Envitco has supplied tank and pump sizing for FDF's scaling and estimating purposes. Any melter-specific feed devices (metering pumps, feed nozzles, etc.) have been captured in the System 17 (Melter) cost estimate.

19.1.3 System 17: Melter

System 17 includes the melter and all direct supporting systems that are specific to the melter operation and control system. This does not include facility services and support systems not directly tied to the melter/melter process (e.g. cooling towers, compressors, backup power systems, facility monitoring, HVAC, etc.) as noted above.

NOTE: The melter is presented as a complete system. No other items are required to complete this estimate. Installation costs beyond the site construction costs will be limited to the required services connections (air, water, nitrogen, power, offgas). Interconnecting piping, wiring, or other connections within the system bounds are included in this estimate.

Table 19.1.3-1—System 17-Melter Construction Materials

SYSTEM	ITEM DESCRIPTION	Qty	Unit Cost	Total Costs
FURNACE				
	REFRACTORY	S.A or		
17	MELTER	VOLUME		
17	SALT DRAIN			
17	GLASS DRAIN BAY			
17	MOLD CHARGES			
17	FIREPROOFING - CONTAINMENT			
17	STAINLESS STEEL SHELL WATER COOLERS			
17	TANK BINDING STEEL			
17	SUPERSTRUCTURE BINDING & ROOF SUPPORT			
17	FOUNDATION and SUPPORT STEEL			
17	ACCESS STEEL			
17	GUARDS			
17	ISOLATION			
17	T/C's - IN-GLASS			
17	T/C's - ATMOSPHERE.			
17	BUBBLER ELEMENTS - ABOVE GLASS			
17	MELTER, GLASS DR.& DISCH. TV CAMERAS -			
17	MELTER & GLASS DR. PLENUM PRESSURE.			
17	HEATING ELEMENTS			
17	GLASS LEVEL DETECTOR			
17	GLASS DRAIN COMPONENTS			
17	GLASS DRAIN SKIMMER			
17	SALT DRAIN SEALS			
17	METALLIC SLUDGE DRAIN COMPONENTS			
17	MONITORING PKG.			
17	TEMP. MONITORING (TYPE K T/C)			
17	TANK ELECTRODES			
17	BAY ELECTRODES			
17	ELECTRODE HOLDERS			
17	ELECTRODE HOLDER MOUNT & MECHANISM			
POWER AND CONTROL				
17	SUPPORT AND ACCESS STEEL			
17	MELTING POWER CENTER COOLING FAN			
17	POWER SUPPLY W/MANUAL PANEL			
17	CONTACTOR & PROCESS DISCONNECTS			
17	FURNACE MCC			
17	PC CONTROL PACKAGE & MANUAL PANELS			
17	MISCELLANEOUS ELECTRICAL DEVICES			
17	WIRE AND CABLE			
17	AIR COOLED CABLES			
17	WATER COOLED CABLES			
17	BUS BARS, SUPPORTS & SHUNTS			

Table 19.1.3-2—System 17-Melter Construction Materials –Cont.

UTILITY SUPPORT SYSTEMS					
17	SUPPORT STEEL				
17	BACKUP GENERATOR (cooling water and offgas only)				NOT INCLUDED
17	COOLING TOWER				NOT INCLUDED
17	C.W. PUMP (one operating and one backup)				NOT INCLUDED
17	C.W. LOOP COMPONENTS (flow measurement not indicators)				
17	C.W. DELTA PRESSURE MEASUREMENT				
17	N2 STORAGE TANK				NOT INCLUDED
17	N_2 LOOP COMPONENTS & SOURCE AUTO SWITCH PKG..				
17	BUBBLER CONTROL & SOURCE AUTO SWITCH PKG..		0		
17	COMPRESSOR (100 PSI 850 scfm)				NOT INCLUDED
17	CA LOOP COMPONENTS				
17	CA RECEIVER - 1000 gallon				
17	INSTRUMENT AIR FILTERS				NOT INCLUDED
17	INSTRUMENT AIR DISTR. COMPONENTS				
17	PIPE & FITTINGS				
FREIGHT AND SPECIALTY EQUIPMENT					
	FREIGHT	US TONS	LBS		
	MELTER				
	POWER				
	OTHER SUPPORT STEEL				
SPARE PARTS					
	ALLOY SHELL COOLERS		18		
	T/C'S - INGLASS		2		
	BUBBLER ELEMENTS		1		
	MELTER CAMERA		1		
	DRAIN COMPONENTS		1		
	MONITORING PKG.		1		
	ELECTRODES		1		
	ELECTRODE HOLDER		1		
	L/C PACKAGE		1		
		TOTAL (SYSTEM 17 ENGINEERING AND MATERIALS)			$ 12,504,537.00

NOTE: The nitrogen tank is to be provided by the nitrogen supplier, and is not included in the material costs. This is described further in Section 19.2.1.

19.1.3.1 Installation

Installation is assumed to be conducted by Cincinnati Trade Union personnel under the direction of Envitco. The following level of effort and appropriate labor categories will be required for the melter installation based on Envitco experience.

Table 19.1.3.1-1 System 17 Melter Installation Labor Estimate

Labor Category	Level of Effort
Masons	1200 hrs
Masons Tenders	1500 hrs
Iron Workers	2000 hrs
Sheetmetal Workers	600 hrs
Millwright	1600 hrs
Electrician	1600 hrs
Pipefitter	1600 hrs
Laborer	2400 hrs
Timekeeper/Mat'l Mgr.	700 hrs
General Supervisor	700 hrs

19.1.3.2 System 17 Melter Installation Oversight and Cold Startup Oversight/Training Support

Envitco will provide the personnel necessary to conduct oversight and construction consulting services to the skilled trades personnel and associated supervisory personnel as provided by the construction contractor. Envitco will provide these persons as a supplement to the supervision personnel. The oversight effort presented here does not replace the supervisory function or personnel

Cold Startup and Training Support assistance will also be provided as necessary. The following is an estimate of the costs associated with providing those personnel. This does not include any costs associated with the development of a formalized training program, training materials, or other similar costs.

These estimates are provided in Table 19.1.3.2-1 below.

Table 19.1.3.2-1: System 17 Melter Installation Oversight and Cold Startup Oversight/Training Support

Task	Basis	Cost
Installation Oversight	20% of construction labor + expenses	$229,000
Cold Startup Oversight /Training	4 persons/4 months + expenses	$302,000

19.1.4 System 18: Offgas Treatment System

System 18-Offgas Treatment System includes the offgas treatment system from the melter to the interface with the FDF supplied RCS. It does not include the following:

- interface or equipment related to central control system
- piping supports
- auxiliary system interfaces (utilities, air/water piping, etc.)
- HVAC
- civil works
- cell lining, drip trays, etc.
- stairways, ladders
- gas analyzers

Table 19.1.4-1 System 18-Offgas Treatment System Equipment and Construction Materials

700	OFFGAS TREATMENT										
701	18	HEMF									
			HEMF								
			HEMF								
			Pouring cell HEMF								
									1	$ 935,000.00	$ 935,000.00
	18	PREFILTER									
			Prefilter								
			prefillter rotry valve								
			prefilter rotary valve								
			prefilter screw								
									1	$ 461,000.00	$ 461,000.00
	18	SCRUBBER									
			scrubber								
			scrubber heat exchanger								
			scrubber pump								
			NaOH dosing pump								
			NaOH storage tank								
									1	$ 205,000.00	$ 205,000.00
	18	EOG Quench									
			EOG High Temp Quench Tank								
			EOG Heat Exchanger								
			EOG quench pump								
			EOG quench pump								
									1	$ 569,000.00	$ 569,000.00
	18	Other									
			dust unloading station								
			cooler								
			electric reheater								
			first stage HEPA filter								
			melter fans								
			scrubber blowdown tank								
			OEG cooler								
			EOG reheater								
			EOG HEPA								
			EOG fans								
			emergency water tank								
			emergency water pump								
			scurbber blowdown pump								
									1	$ 1,148,000.00	$ 1,148,000.00
	18	SPARE PARTS									
									1	$ 271,000.00	$ 271,000.00
	18	FREIGHT									
			OFFGAS					40	80000	$ 0.20	$ 16,000.00
		OFFGAS TREATMENT EQUIPMENT AND MATERIAL SUBTOTAL									$ 3,605,000.00

19.1.4.1 Engineering Estimate

Due to the special operating, maintenance, and performance requirements of the offgas treatment system, the engineering effort should be distributed between the equipment supplier and the contractor. FDF will be required to consider the need for a supplemental engineering package by the contractor for process and facility engineering requirements required for proper design of the offgas treatment system.

19.1.4.2 Installation

Installation is assumed to be conducted by Cincinnati Trade Union personnel under the direction of SGN. The following level of effort and appropriate labor categories will be required for the installation based on SGN experience.

Table 19.1.4.2-1 System 18 Installation Labor Estimate

Labor Category	Level of Effort
Masons	700 hrs
Mechanical Erector	1500 hrs
Iron Workers	3200 hrs
Sheetmetal Workers	4600 hrs
Millwright	1100 hrs
Electrician	1300 hrs
Laborer	5900 hrs

19.1.4.3 System 18 Offgas Treatment System Installation Oversight and Cold Startup Oversight/Training Support

Envitco/SGN will provide the personnel necessary to conduct oversight and construction consulting services to the skilled trades personnel and associated supervisory personnel as provided by construction contractor. Envitco/SGN will provide these persons as a supplement to the supervision personnel. The oversight presented here does not replace the supervisory function or personnel

Cold Startup and Training Support assistance will also be provided as necessary. The following is an estimate of the costs associated with providing those personnel. This does not include any costs associated with the development of a formalized training program, training materials, or other similar costs.

These estimates are provided in Table 19.1.4.3-1 below.

Table 19.1.4.3-1 System 18 Offgas System Installation Oversight and Cold Startup Oversight/ Training Support Estimate

Task	Basis	Cost
Installation Oversight	5% of construction labor + expenses	$327,000
Cold Startup Oversight/Training	3 persons/2.5 months + expenses	$199,000

19.1.5 System 19: Secondary Waste Treatment

System 19 includes only the filtration systems required to treat the blowdown from the offgas treatment system to meet the requirements of a) the AWR recycle water specifications, or b) the AWWT receiving limits. The unit operations identified represent those operations that are specific to the vitrification process and integrated offgas treatment system.

Table 19.1.5-1 System 19 Secondary Waste System Costs

SYSTEM	ITEM DESCRIPTION							QTY	UNIT COST	TOTAL COST
19	SECONDARY WASTE									
		SCRUBBER WASTE FILTER UNIT						1	90,000	90,000
		SCRUBBER WASTE REVERSE OSMOSIS UNIT AND PUMP						1	80,000	80,000

19.1.5.1 System 19 Secondary Waste Treatment Installation Oversight and Cold Startup Oversight/Training Support

Envitco/Cogema Engineering will provide the personnel necessary to conduct oversight and construction consulting services to the skilled trades personnel and associated supervisory personnel as provided by construction contractor. Envitco/Cogema Engineering will provide these persons as a supplement to the supervision personnel. The oversight presented here does not replace the supervisory function or personnel

Cold Startup and Training Support assistance will also be provided as necessary. The following is an estimate of the costs associated with providing those

personnel. This does not include any costs associated with the development of a formalized training program, training materials, or other similar costs.

These estimates are provided in Table 19.1.5.1-1 below.

Table 19.1.5.1-1 System 18 Offgas System Installation Oversight, Cold Startup Oversight/ Training Support Estimate

Task	Basis	Cost
Installation Oversight	2 persons/1.5 months + expenses	$93,000
Cold Startup Oversight/Training	2 persons/4 months + expenses	$199,000

19.1.6 System 20: Radon Control System (RCS)

The RCS is not considered in this cost estimate. Based on the results of the demonstration, and the elimination of the burner system in the full-scale design, the offgas volume predicted should be within the RCS limits. Therefore, it is not anticipated that any modifications will be required to the RCS, thereby avoiding any additional costs.

19.1.7 System 23 (Glass Pouring Material Handling) and System 24 (Disposal Package Loading)

System 23 (Glass Pouring and Material Handling) and System 24 (Disposal Package Loading) are presented together due to commonality of function and proximity within the process.

System 23 (as proposed in the conceptual full-scale design package) includes 1) the conveyance system used to stage the empty subcontainers, 2) the entrance and exit airlocks connecting the conveyors to the pouring enclosure, 3) the pouring enclosure itself, and 4) the exit conveyance system.

The cost data presented herein is limited to those items identified in Table 19.1.4-1, and does not include the following items:

- centralized control system
- piping supports
- auxiliary systems (auxiliary power and utilities, valving, piping, etc.)
- HVAC
- civil works
- cell lining and drip trays

- stairways, ladders, platforms and decking
- CRP
- monitoring

Table 19.1.7-1 System 23: (Glass Pouring Material Handling) and 24 (Disposal Package Loading) Equipment and Construction Materials

SYSTEM	ITEM DESCRIPTION										
23	POURING ENCLOSURE										
		feed conveyor									
		pouring tunnel airlock									
		trap									
		airlock monorail crane									
		pouring tunnel airlock									
		poouring deflectors charger									
		pouring conveyor									
		pouring enclosure									
		cooling tunnel airlock									
		airlock monorail crane									
		trap									
		cooling conveyor									
		cooling tunnel airlock									
		trap									
		handling crane									
		casting cooling jacket									
		forklift		NOT INCLUDED							
		heat exchanger		NOT INCLUDED							
		pump		NOT INCLUDED							
	GLASS COLLECTION EQUIPMENT SUBTOTAL									1,995,000	$ 1,995,000
DISPOSAL PACKAGE LOADING											
24	PACKAGE LOADING										
		loading hatch									
		handling crane		NOT INCLUDED							
		transfer trolley		NOT INCLUDED							
		lid lifting device		NOT INCLUDED							
	DISPOSAL PACKAGE LOADING SYSTEM SUBTOTAL									125,000	$ 125,000
23/24	SPARE PARTS										
								1	70,000	70,000	$ 70,000
23/24	FREIGHT										
	FREIGHT						US TONS	LBS			
		OFFGAS					40	80000	0	8,000	$ 8,000
	POURING ENCLOSURE/SUBCONTAINER LOADING SYSTEM EQUIPMENT SUBTOTAL										$ 2,198,000.00

19.1.7.1 Engineering Estimate

Due to the special operating, maintenance, and performance requirements of the pouring enclosure, airlocks, and subcontainer indexing system, the engineering effort should be distributed between the equipment supplier and the contractor. FDF will be required to consider the need for a supplemental engineering package by the contractor for design of the cooling jackets, integration with the melter structure, integration with the ventilation system, and other process and facility engineering requirements.

19.1.7.2 Installation

Installation is assumed to be conducted by Cincinnati Trade Union personnel under the direction of SGN. The following level of effort and appropriate labor categories will be required for the installation based on SGN experience.

Table 19.1.7.2-1 System 23/24 Installation Labor Estimate

Labor Category	Level of Effort
Mechanical Erector	2100 hrs
Sheetmetal Workers	2300 hrs
Millwright	300 hrs
Electrician	1400 hrs
Laborer	4800 hrs

19.1.7.3 System 23 (Glass Pouring Material Handling) and System 24 (Disposal Package Loading) Installation Oversight and Cold Startup Oversight/Training Support

Envitco/SGN will provide the personnel necessary to conduct oversight and construction consulting services to the skilled trades personnel and associated supervisory personnel as provided by construction contractor. Envitco/SGN will provide these persons as a supplement to the supervision personnel. The oversight presented here does not replace the supervisory function or personnel

Cold Startup and Training Support assistance will also be provided as necessary. The following is an estimate of the costs associated with providing those personnel. This does not include any costs associated with the development of a formalized training program, training materials, or other similar costs.

These estimates are provided in Table 19.1.7.3-1 below.

Table 19.1.7.3-1 System 23 (Glass Pouring Material Handling) and 24 (Disposal Package Loading) Equipment Installation Oversight and Cold Startup Oversight/Training Support Estimate

Task	Basis	Cost
Installation Oversight	15% of construction labor + expenses	$326,000
Cold Startup Oversight/Training	3 persons/2.5 months + expenses	$201,000

19.1.8 System 26: Off-Spec Product Recycle

Envitco will not provide cost detail for this system. Envitco has reviewed the off-spec product recycle approach identified by FDF in their conceptual design, and feels that this should be satisfactory for their vitrification process.

19.1.9 System 44: Dry Batch System

System 44 includes all dry additives handling steps from truck unloading through presentation of dry additives to the blend tank. System 44 materials and equipment is considered a complete system less any service connections or supplies.

Table 19.1.9-1 System 44: Dry Batch System Equipment and Construction Materials

SYSTEM	ITEM DESCRIPTION	Qty	Unit Cost	Costs	Totals
DRY BATCH SYSTEM					
44	MATERIAL & EQUIPMENT				
	DRY BATCH SUBTOTAL				
	SITE PREPARATION AND STRUCTURE				
	excavation				
	foundations				
	backfill				
	steel structure				
	internal floors				
	internal stairs				
	silo support slab				
	overhead door				
	man doors				
	insulated metal siding				
	SITE PREPARATION AND STRUCTURE SUBTOTAL				$ 213,100.00
	SILOS, SILO STRUCTURES, VALVES, PIPING				
	silos				
	silos				
	silo handrail				
	silo handrail				
	silo top platform				
	exterior stairs				
	silo top dust collector				
	silo high level detectors				
	silo pressure relief valves				
	silo pneumatic end receiver				
	silo unloading pipes				
	bin dischargers				
	silo bottom inserts				
	silo rotary vane eeders				
	silo dishcarge chutes				
	screw conveyors				
	safety shut-off valves				
	screw discharge chutes				
	conical funnel w/ support				
	funnel discharge dust skirt				
	funnel vibrator				
	misc. pipes,. Supports for pneumatic pipes				
	SILOS, SILO STRUCTURES, VALVES, PIPING SUBTOTAL				$ 349,725.00
	CONTROL ROOM/CONTROL SYSTEM				
	control room				
	control system				
	CONTROL ROOM/CONTROL SYSTEM SUBTOTAL				$ 197,000.00

Table 19.1.9-2: System 44 Dry Batch System Equipment and Construction Materials (cont.)

PNEUMATIC TRANSPORT SYSTEM					
	1	1	$ -	$ -	
pneumatic transoprter w/ inlet, discharge, vent					
flexible hose					
pneumatic transport pipe					
wear back elbows					
end receivers					
two position diverter					
couplings					
support steel					
PNEUMATIC TRANSPORT SYSTEM SUBTOTAL					$ 89,000.00
BAD BATCH BIN					
		1	$ -	$ -	
bin with manway access					
support structure					
dust collector					
dischrge valve					
flexible discharge mechanism					
pressure relief valve					
BAD BATCH BIN SUBTOTAL					$ 15,900.00
AIR RECEIVER					
	1	1	$ 4,250.00	$ 4,250.00	
BAD BATCH BIN SUBTOTAL					$ 4,250.00
SCALE SYSTEM					
load cells					
junction box					
indicator					
cables					
SCALE SYSTEM SUBTOTAL					$ 5,800.00
SUPPORT TRUSS FOR PNEUMATIC TRANSPORT PIPT					
	1	1	$ 16,000.00	$ 16,000.00	$ 16,000.00
HIGH SUPPORT BENDS					
	3	1	$ 37,500.00	$ 37,500.00	$ 37,500.00
BAD BATCH BIN HIGH LEVEL INDICATOR					
	1	1	$ 500.00	$ 500.00	$ 500.00
DESSICANT AIR DRYER					
	1	1	$ 10,000.00	$ 10,000.00	$ 10,000.00
SILO TOP JIB CRANE					
	1	1	$ 2,000.00	$ 2,000.00	$ 2,000.00

Table 19.1.9-3: System 44 Dry Batch System Equipment and Construction Materials (cont.)

	BAG DUMP UNLOAD STATION								
		bag break hopper							
		dust collector							
		rotary vane feeder							
		blower package							
		pneumatic transport pipe							
		flexible hose with end connector							
				BAG DUMP UNLOAD STATION SUBTOTAL					$ 34,950.00
	RECEIVING HOPPER								
		hopper with manway access							
		dust collector							
		pressure relleif valve							
		high/low indictors							
		support steel							
				RECEIVING HOPPER SUBTOTAL					$ 10,450.00
	rotary vane feeeder								
				1		1	$ 3,200.00	$ 3,200.00	$ 3,200.00
	check scale								
		check scale hopper							
		scale system							
		discharge gate							
		dust collector w/o fan							
				CHECK SCALE SYSTEM SUBTOTAL					$ 15,300.00
	rotary vane feeder								
				1		1	$ 3,200.00	$ 3,200.00	$ 3,200.00
	lot scale calibration								
				1		1	$ 2,500.00	$ 2,500.00	$ 2,500.00
	lot startup tech								
				1		1	$ 5,000.00	$ 5,000.00	$ 5,000.00
	lot electrical materials								
				1		1	$ 20,000.00	$ 20,000.00	$ 20,000.00
	lot compessed piping materials								
				1		1	$ 6,000.00	$ 6,000.00	$ 6,000.00
	lot epoxy paint								
				1		1	$ 50,000.00	$ 50,000.00	$ 50,000.00
	lot fasteners								
				1		1	$ 2,000.00	$ 2,000.00	$ 2,000.00
FREIGHT AND SPECIALTY EQUIPMENT									
	SUBTOTAL FREIGHT							$ 35,000.00	$ 35,000
SPARE PARTS									
	SUBTOTAL SPARE PARTS (AS 5% OF MATERIALS)							$ 65,000.00	$ 65,000
	DRY ADDITIVES MATERIAL HANDLING TOTAL							$ 1,193,375.00	

NOTE: As a designer and constructor of batch plants for glass manufacturing facilities, Envitco and it's affiliated company TECO have developed the cost estimate for the Dry Batch System as a COMPLETE SYSTEM. The cost estimate for the materials is complete, and should not require additional materials to develop the complete system cost. It is recommended that FDF not add additional materials to this estimate.

19.1.9.1 Installation

Installation is assumed to be conducted by Cincinnati Trade Union personnel under the direction of Envitco. The following level of effort and appropriate labor categories will be required for the installation based on Envitco experience.

Table 19.1.9.1-1 System 44 Installation Labor Estimate

Labor Category	Level of Effort
Iron Worker	3020 hrs
Pipe Fitter	2240 hrs
Millwright	1916 hrs
Electrical	2016 hrs

19.1.9.2 System 44 Dry Batch System Installation Oversight and Cold Startup Oversight/ Training Support

Envitco/SGN will provide the personnel necessary to conduct oversight and construction consulting services to the skilled trades personnel and associated supervisory personnel as provided by construction contractor. Envitco/SGN will provide these persons as a supplement to the supervision personnel. The oversight presented here does not replace the supervisory function or personnel

Cold Startup and Training Support assistance will also be provided as necessary. The following is an estimate of the costs associated with providing those personnel. This does not include any costs associated with the development of a formalized training program, training materials, or other similar costs.

These estimates are provided in Table 19.1.9.2-1 below.

Table 19.1.9.2-1 System 44 Dry Batch System Installation Oversight and Cold Startup/Training Support

Task	Basis	Cost
Installation Oversight	20% of construction labor + expenses	$151,000
Cold Startup Oversight/Training	2 persons/2 months + expenses	$82,000

19.1.10 System 45: Liquid Materials

Envitco will not provide cost detail for this system, since the tankage, pumping and related piping is felt to be common to all technology providers. Envitco has supplied tank and pump sizing for scaling purposes.

19.2 Operating Costs: Supplies and Expendable Items

The following section addresses supplies and expendable items that will be required to operate the melter/melter process. This section addresses those items that will be used in the regular operation, or will be replaced on a periodic basis. This does not include standard spare parts inventories that may be replaced over the life the treatment program. Spare parts have been included in the equipment estimates above.

The following estimates are based on the Material Balance presented in Section 6.3.2, which assumes the processing of 1280 kg/hr of 30% solids waste material at a waste loading of 83.5% (based on the calculation method provided in the Contract).

19.2.1 Consumables

The following additives are required to convert the waste to glass in accordance with the Material Balance for the full-scale facility.

Table 19.2.1-1- Consumables: Glass Additives

Additive	kg/hr	MT/day	$/MT	$/day	$/yr
NaOH (dry basis)	1.17	0.028	$ 400.00	$ 11.23	$ 4,100
Sucrose (dry basis)	1.11	0.027	$ 704.00	$ 18.75	$ 6,845
Al2O3*3H2O	25.9	0.622	$ 450.00	$ 279.72	$ 102,098
CaCO3	42.5	1.020	$ 216.00	$ 220.32	$ 80,417
R_2O additives	56.8	1.36	$ 2400.00	$ 2154.24	$ 786,269
RO additives	5.51	0.132	$ 600.00	$ 79.34	$ 28,961

NOTE: R_2O additives contribute the highest value of the glass additives package, but account for less than 45% of the total mass. Special R_2O selection was used to ensure that the glasses would perform significantly better than the 50% TCLP benchmark. Glasses were produced during the development program that required 50-60% less of the specialty R_2O additives, yet still performed better than the 50% TCLP requirements stated in the contract. Lead leachate concentrations of 2.2-2.5 ppm could be expected at these levels. Changing the R_2O mix to reduce the specialty additives would eliminate $375,000-$450,000 in raw material costs.

Alternatively, the specialty R_2O could be eliminated while still producing a glass that conformed to the full RCRA standards for lead. This was also demonstrated during the glass formulation development program. Elimination of the specialty additives would eliminate $600,000-700,000/year in raw material costs.

Envitco strongly recommends that any cost assessments utilize the lower cost additive package and decrease or eliminate the cost allocation for the specialty additives.

Table 19.2.1-2: Consumables: Nitrogen

Consumable	m3/hr	m3/day	$/100 m3	$/day	$/yr
N2	40	960	$ 10.78	$ 103.50	$ 37,778
Tank Rental					$ 9,000

NOTE: The nitrogen tank and vaporizer will be provided and maintained by the nitrogen supplier. The tank was not included in the melter equipment cost, as noted in Section 19.1.3 above.

Table 19.2.1-3: Consumables: Molybdenum

Consumable		kg/day	$/kg	$/day	$/yr
molybdenum electrode		8	$ 50.00	$ 400.00	$ 146,000

Table 19.2.1-4: Consumables: Subcontainers

Consumable		subcontainers/ day	$/subcontainer	$/day	$/yr
subcontainers		9.86	$ 160.00	$ 1578.00	$ 575,240

Note: Glass will be poured into carbon steel subcontainers. Once cooled, the subcontainers will be loaded the SEG-style disposal container. The boxes measure 0.5m x 0.75m x 1m, and will be loaded four per disposal container.

Note: The use of subcontainers and proper design of the loading system for the disposal container can mitigate the container contamination issue, thereby permitting reuse of the disposal container. This leads to an avoidance of purchase and disposal of approximately 2500 containers (assuming 200 containers 'in-process'). This approach also avoids disposal of 5,400 m3 of disposal container volume, and 14,725 MT of disposal container mass.

Table 19.2.1-5: Consumables: Filter Elements

Consumable		units/month	$/unit	$/day	$/yr
Prefilter Elements		2	50	3.27	$ 1,200
HEPA filter elements		2	600	39.34	$ 14,400

19.3 Other Miscellaneous Costs

Laboratory Equipment: The process control scheme and quality assurance testing will require an on-site laboratory capable of conducting digestions and inorganic

analysis, as well as carbon and sulfur determinations. The key equipment requirements are as follows:

Table 19.3-1: Analytical Laboratory Equipment

Equipment	Cost	Requirements
microwave digestion system	$ 22,000	waste, feed, glass digestion
flame atomic absorption	$ 52,000	waste, feed and glass analysis; raw material qualification; TCLP
inductively coupled plasma spectroscopy	$ 110,000	waste, feed, and glass analysis; raw material qualification; TCLP
C/H/N/S Analyzer	$ 47,000	waste, feed analysis; raw material qualification

19.4 Staffing and Personnel

Based on commercial melter experience, and experience with operation of the TVS, the following observations can be made regarding staffing:

a) Steady state operations require only monitoring of the melter to insure proper function, and periodic monitoring of the batching process. Automated process monitoring supplements the function of the operating staff. Melter operations require minimal staffing.

b) Maintenance operations are typically preventative maintenance or planned maintenance events. These activities will require additional personnel which should be arranged on a temporary basis, and not included in the full-time maintenance staffing pool.

c) Automation of batching functions eliminates the necessity for dedicated personnel specifically for this activity. Cross training of melter operators permits feed preparation without additional manpower.

The staffing estimates are based on the following assumptions:

1) All major maintenance activities will be conducted on first shift.

2) Maintenance tasks that require personnel in excess of the baseline staffing will be supplemented through the use of subcontractors (e.g. major pump or tank maintenance, melter drain replacement, etc.). Baseline staffing will be sufficient for traditional maintenance of services, utilities, peripheral systems, and typical electrical/mechanical type activities.

3) All laboratory analytical work will be conducted on first and second shift. No third shift is required.

4) Operations, analytical, health physics, and maintenance functions will be required to meet seven day/24 hour schedule.

Table 19.4-1: Process Staffing Requirements

Category/Skill	1st Shift	2nd Shift	3rd Shift
Shift Superintendent	1	0	0
Lead Engineer	1	1	1
Melter Operator	3	2	2
Analytical Laboratory Technician	2	1	0
QA/QC	1	1	1
Maintenance (General)	2	2	1
Handlers	2	1	1
Shipping Manager	1		
Shipping Clerk	1	1	
Health Physics	by FDF	by FDF	by FDF

Functions

Shift Superintendent: Report to corporate management. Responsible for oversight of facilities operations, including personnel issues, operations management, and day to day production management activities. Responsible for facility performance against quality, safety, productivity objectives.

Lead Engineer: Familiarity with design, operation and function of all systems. Responsible for providing technical assistance to maintenance services on an as-

needed basis. Responsible for review of waste composition analysis and glass batch requirements as determined by automated batching program. Responsible for review of glass analysis data to confirm proper glass composition based on predictions. Provide oversight for melter operations.

Melter Operator: Responsible for melter operations based on control output data, observations, and control alarm system. Confirms automated batching processes/sequencing, monitors melter performance through data acquisition and visual observations (CCTV monitoring), maintains operator log of process observations and upsets. Reports unsatisfactory conditions beyond operator control to Lead Engineer.

Analytical Laboratory Technician: Responsible for conducting standardized analytical methods on raw materials, waste, glass and residues. Analytical data will be fed to glass formulation model for development of batch and feed formulations. Conducts periodic checks on wasteform to confirm performance. Conduct sampling of raw materials, waste, glass, feed, and other residues periodically or as needed. Maintain sample analysis data, generate sample analysis files. Conduct periodic QA checks and calibrations on analytical equipment. Conduct waste/wastewater analyses on an as needed basis. Support HP for radiological inspections/surveys/analyses.

QA/QC: Maintain testing and analytical documentation files in accordance with NTS documentation requirements. Generate QA related documents for shipments of treated waste prior to transfer to NTS. Conduct or contract for periodic calibrations of equipment, tools, and other systems that require validation of accuracy or performance. Provide review of methods and procedures to confirm that quality objectives are identified and achievable. Provide quality training to operations and staff personnel.

Maintenance: Responsible for general maintenance of electromechanical systems that will be present in the facility. A mixture of disciplines will be required to maintain conveyance systems, cranes, airlocks, HVAC, compressors, cooling towers, pumps/blowers, offgas treatment system components, and other services/systems as necessary. NOTE: It is assumed that larger repair or modification tasks will require outside mechanical or electrical contracting assistance. Facility maintenance staffing will not be sufficient for all repair or maintenance activities.

Handlers: Responsible for maintaining supply of subcontainers in front of the melter. Responsible for loading of cooled subcontainers into the disposal container, accumulation and staging of secondary waste, loading and unloading of subcontainers and disposal containers (empty or full), etc.

Shipping Manager/Shipping Clerk: Responsible for arranging shipping of treated wastes, and receipt of raw materials, subcontainers and disposal containers, and other deliveries or shipments to and from the facility.

19.4.1 Design and Construction Schedule

Assuming a contract to design and construct the vitrification melter and associated equipment, Envitco proposes the following schedule:

ID	Task Name	Duration	Start	Finish	Q4 '01	Q1 '02	Q2 '02	Q3 '02	Q4 '02	Q1 '03	Q2 '03	Q3 '03
1	PROCESS DESIGN	262d	Wed 1/2/02	Wed 1/1/03								
2	PROCUREMENT	218d	Mon 9/2/02	Tue 7/1/03								
3	CONSTRUCTION	154d	Sat 3/1/03	Wed 10/1/03								

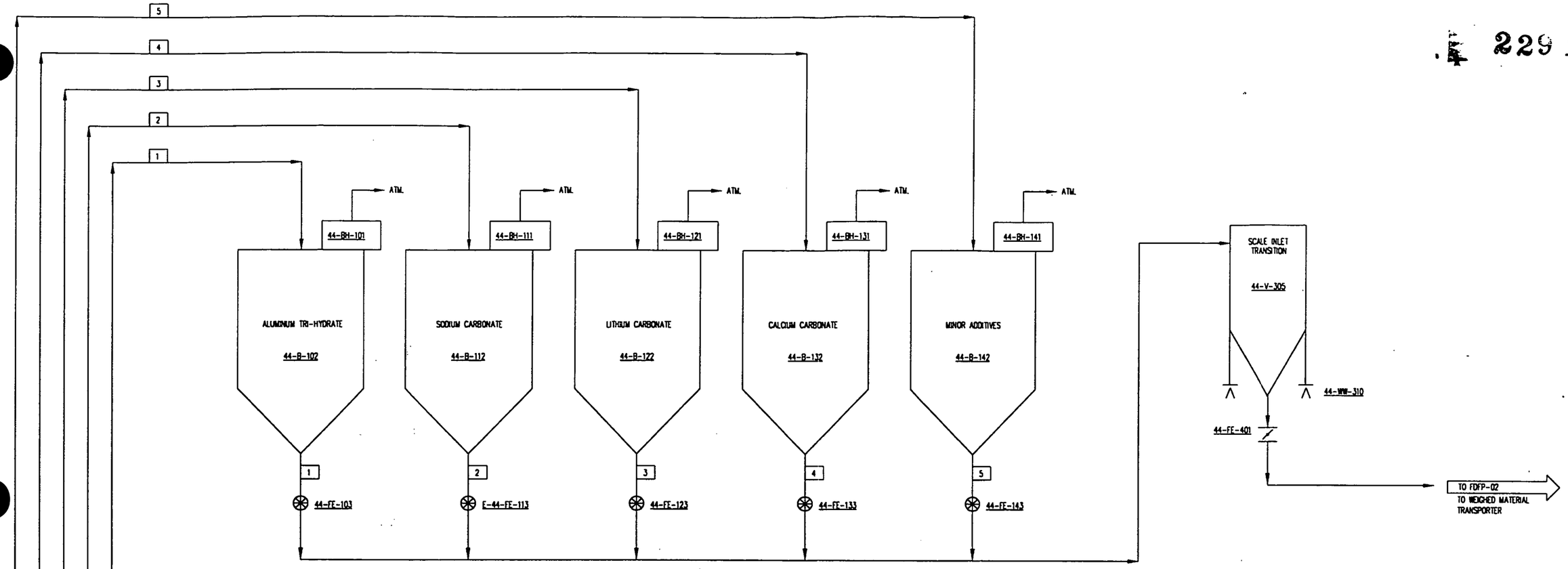
EnVitCo, Inc.
A COGEMA Group Company

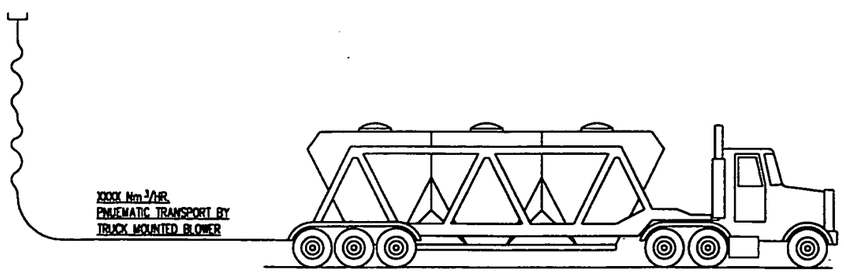
2291

SECTION 20

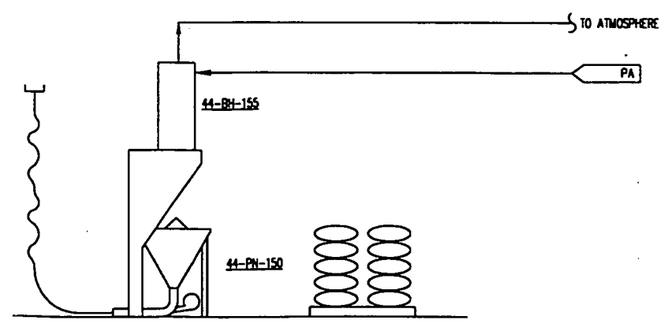
PROCESS FLOW DIAGRAMS – FULL-SCALE

2291





TRUCK PNEUMATIC FILL SYSTEM



MANUAL SILO FILL EQUIPMENT
(ALTERNATE EMERGENCY SYSTEM)

LEGEND

PA	PLANT AIR
IA	INSTRUMENT AIR
CWS	COOLING WATER SUPPLY
CWR	COOLING WATER RETURN
LPN	LOW PRESSURE NITROGEN

SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001509

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO INC.

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHK'D BY

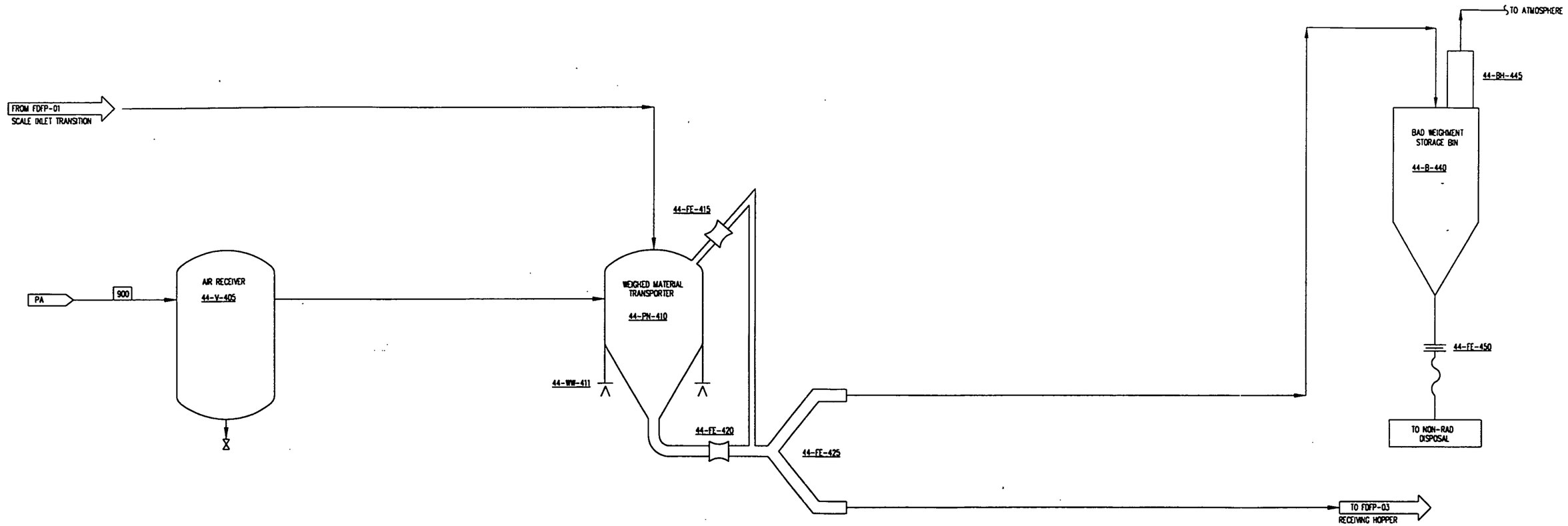
EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA

98703

TITLE: PROCESS FLOW DIAGRAM - BATCH PLANT
FOR: FERNALD POPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR. BPT	DATE: 31DEC98	SCALE: NONE	DWG. NO. FDFP-01	REVISION 0

2291



SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001510

LEGEND

PA	PLANT AIR
IA	INSTRUMENT AIR
CWS	COOLING WATER SUPPLY
CWR	COOLING WATER RETURN
LPN	LOW PRESSURE NITROGEN

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO INC.

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHK'D BY

EnVitCo, Inc. 3400 EXECUTIVE PARKWAY TOLEDO, OHIO 43606-0451 USA

98703

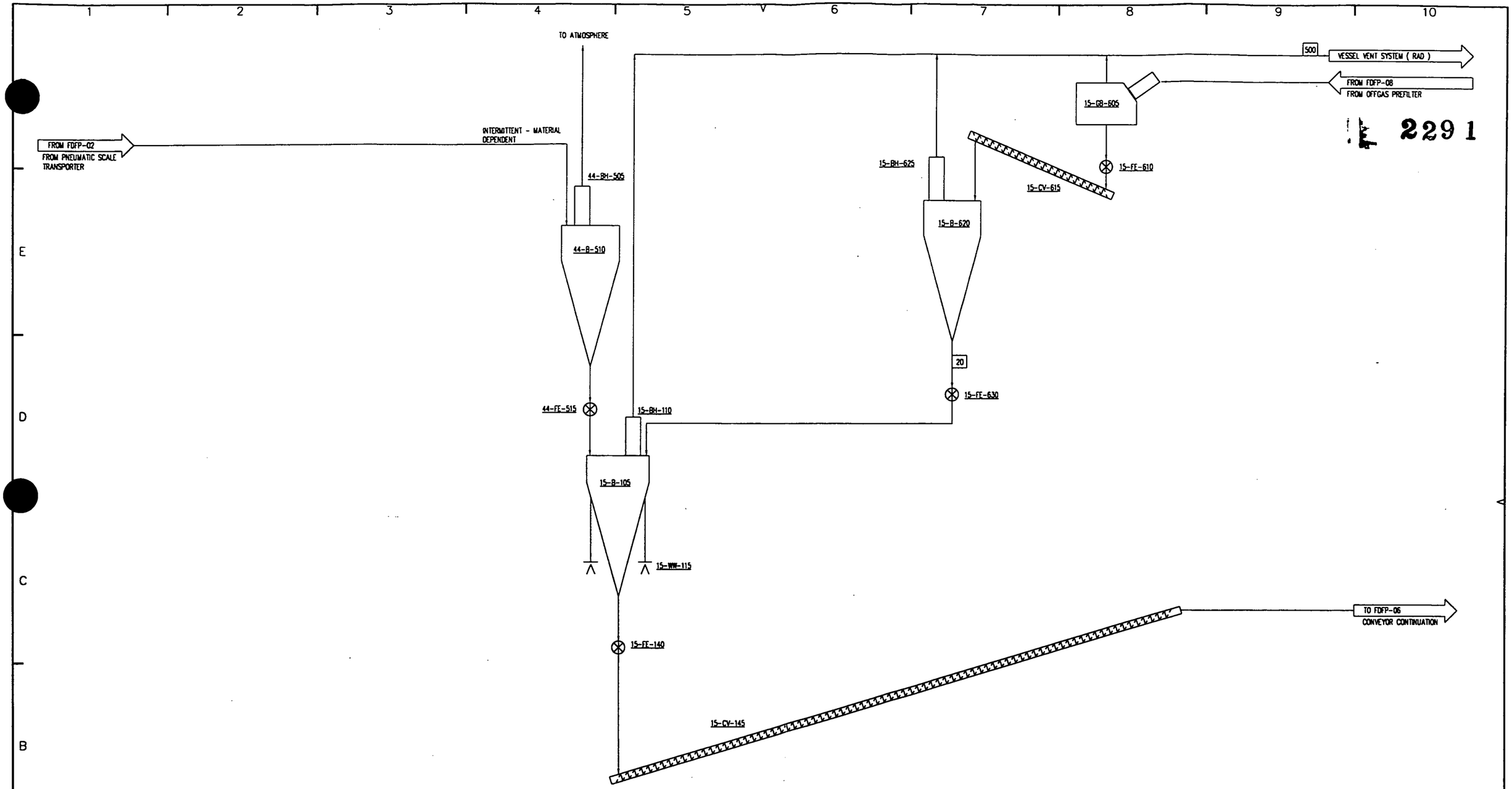
TITLE: PROCESS FLOW DIAGRAM - BATCH PLANT - TRANSPORTER

FOR: FERNALD POPT TEST PROGRAM

FLUOR DANIEL FERNALD CINCINNATI, OH

DR BY: BPT DATE: 30DEC98 SCALE: NONE DWG. NO FDFP-02 REVISION 0

CK BY: K.B.H DATE: 10MAR00



2291

SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001511

LEGEND

PA	PLANT AIR
IA	INSTRUMENT AIR
CWS	COOLING WATER SUPPLY
CWR	COOLING WATER RETURN
LPN	LOW PRESSURE NITROGEN

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHK'D BY
ISSUED						

EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA

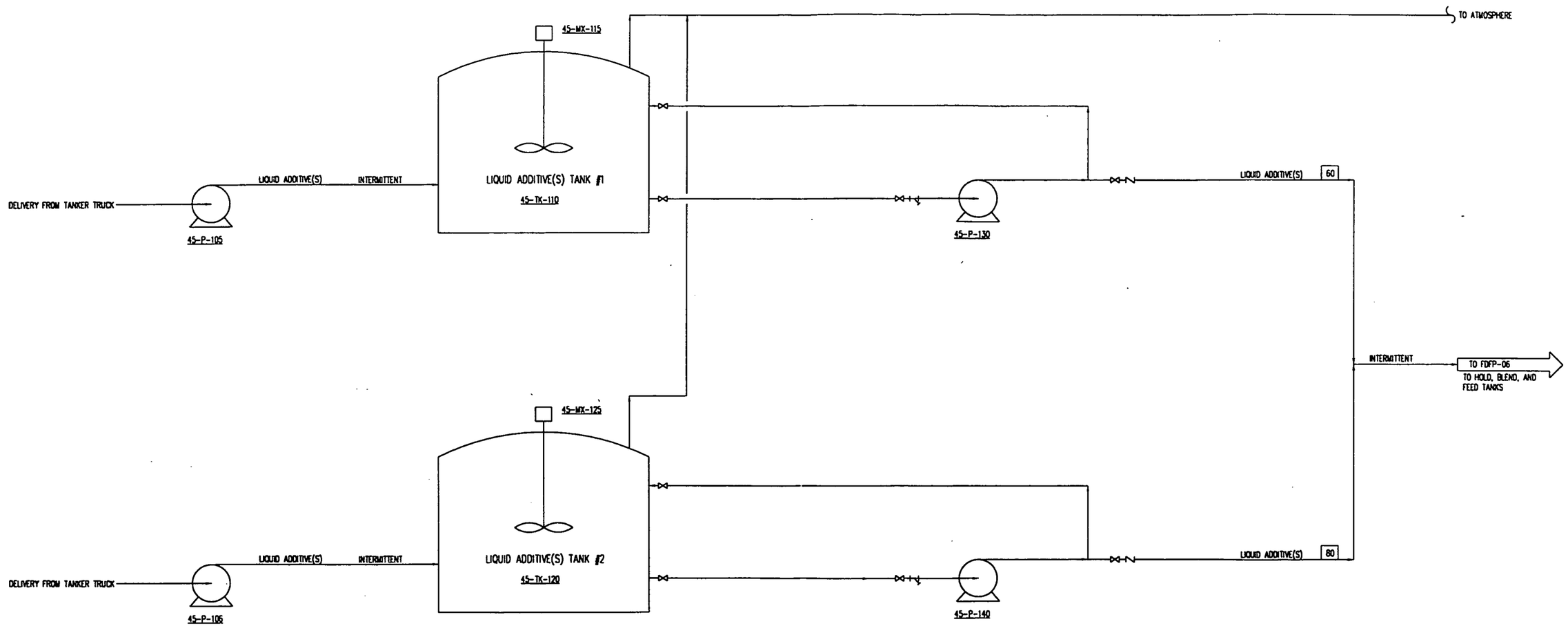
98703

TITLE: PROCESS FLOW DIAGRAM - PROCESS FACILITY BATCHING

FOR: FERNALD POPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR. BY: BPT DATE: 30DEC98
CK. BY: KJH DATE: 10MAR99
SCALE: NONE
DWG. NO. FDFP-03
REVISION 0

2291



SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001512

LEGEND

PA	PLANT AIR
IA	INSTRUMENT AIR
CWS	COOLING WATER SUPPLY
CWR	COOLING WATER RETURN
LPN	LOW PRESSURE NITROGEN

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHKD. BY

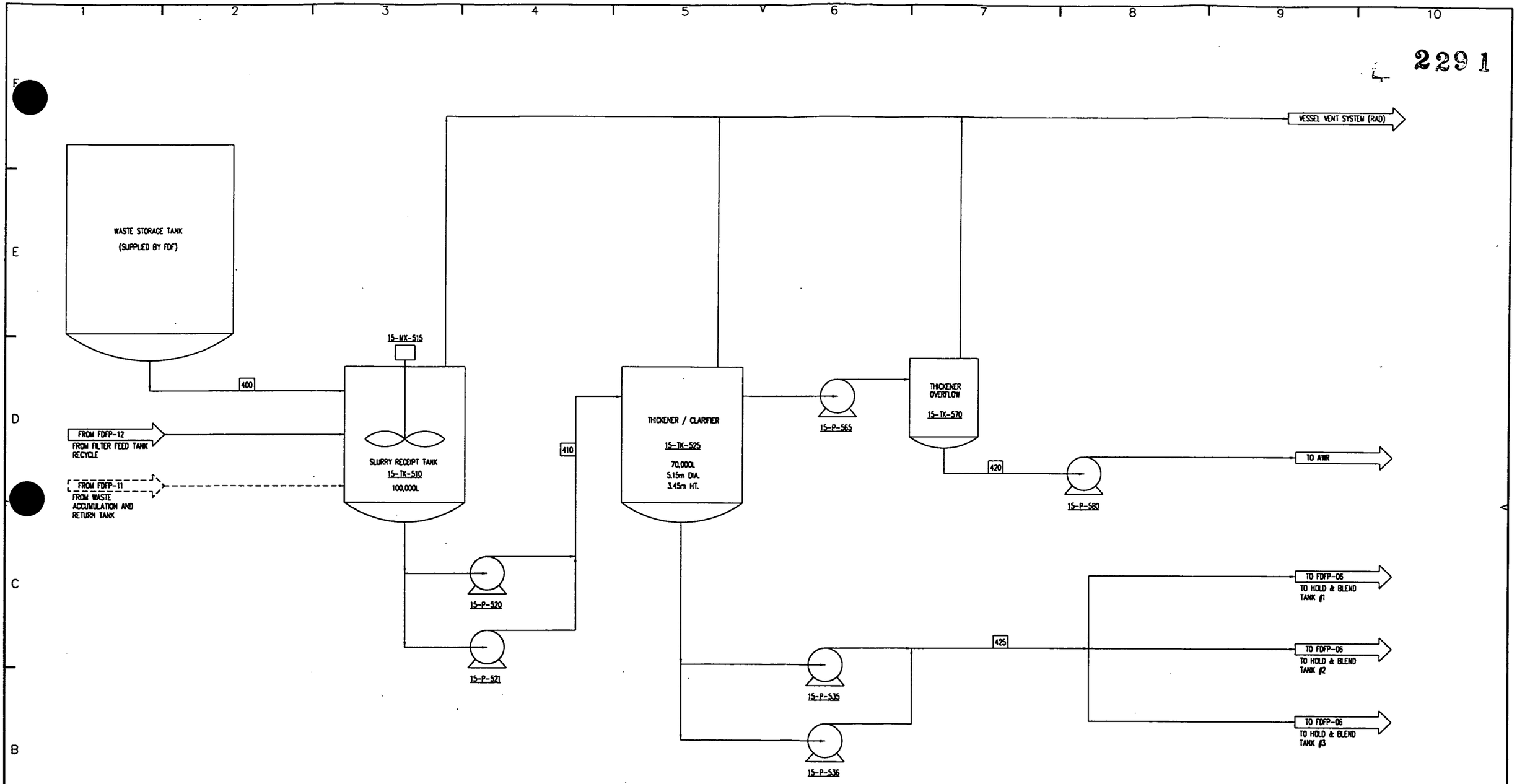
EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA

98703

TITLE: PROCESS FLOW DIAGRAM - LIQUID ADDITIVES
FOR: FERNALD PORT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR. BY: BPT DATE: 30DEC98
CK. BY: KJH DATE: 10MAR99
SCALE: NONE
DWG. NO. FDFP-04
REVISION 0

2291



SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001513

LEGEND

PA	PLANT AIR
IA	INSTRUMENT AIR
CWS	COOLING WATER SUPPLY
CWR	COOLING WATER RETURN
LPN	LOW PRESSURE NITROGEN

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHK'D BY
ISSUED						

EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA

98703

TITLE: PROCESS FLOW DIAGRAM - WASTE TRANSFER SYSTEM
FOR: FERNALD PORT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR. BPT	DATE: 28JAN99	SCALE: NONE	DWG. NO. FDFP-05	REVISION 0
CK. KJH	DATE: 10MAR99			

2291

FROM FDFP-03
DRY ADDITIVES

PW — FM — 15-FE-220

FROM FDFP-04
LIQUID ADDITIVE(S) — 65 — FM — 45-FE-430

FROM FDFP-05
THICKENER UNDERFLOW — 425 — INTERMITTENT

15-FE-200A 15-FE-200B

15-MX-205

4.75m DIA.
3.15m HT.

15-TK-210
HOLD & BLEND TANK #1
55,000L

15-WW-215

VESSEL VENT SYSTEM (RAD)

15-MX-605

5.25m DIA.
3.50m HT.

FROM FDFP-07

95

15-P-225A

15-P-225B

15-TK-610
FEED TANK
75,000L

15-WW-615

PW — FM — 15-FE-320

FROM FDFP-04
LIQUID ADDITIVE(S) — FM — 45-FE-431

FROM FDFP-05
THICKENER UNDERFLOW — 425 — INTERMITTENT

15-FE-300A 15-FE-300B

15-MX-305

4.75m DIA.
3.15m HT.

15-TK-310
HOLD & BLEND TANK #2
55,000L

15-WW-315

200

TO FDFP-07
TO MELTERS

15-P-620A

15-P-620B

15-P-325A

15-P-325B

PW — FM — 15-FE-420

FROM FDFP-04
LIQUID ADDITIVE(S) — FM — 45-FE-432

FROM FDFP-05
THICKENER UNDERFLOW — 425 — INTERMITTENT

15-FE-400A 15-FE-400B

15-MX-405

4.75m DIA.
3.15m HT.

15-TK-410
HOLD & BLEND TANK #3
55,000L

15-WW-415

15-P-425B

15-P-425A

LEGEND

PA	PLANT AIR
IA	INSTRUMENT AIR
PW	PLANT WATER
CWS	COOLING WATER SUPPLY
CWR	COOLING WATER RETURN
LPN	LOW PRESSURE NITROGEN

SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER
001514

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO INC.

CODE	DATE ISSUED	REV	DESCRIPTION	DRAWN BY	DATE	CHKD BY
	27APR99	1	ADDED BACKUP PUMPS FOR H&B TANKS	BPT	27APR99	KJH
			REMOVED CWR/CWS			

EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA

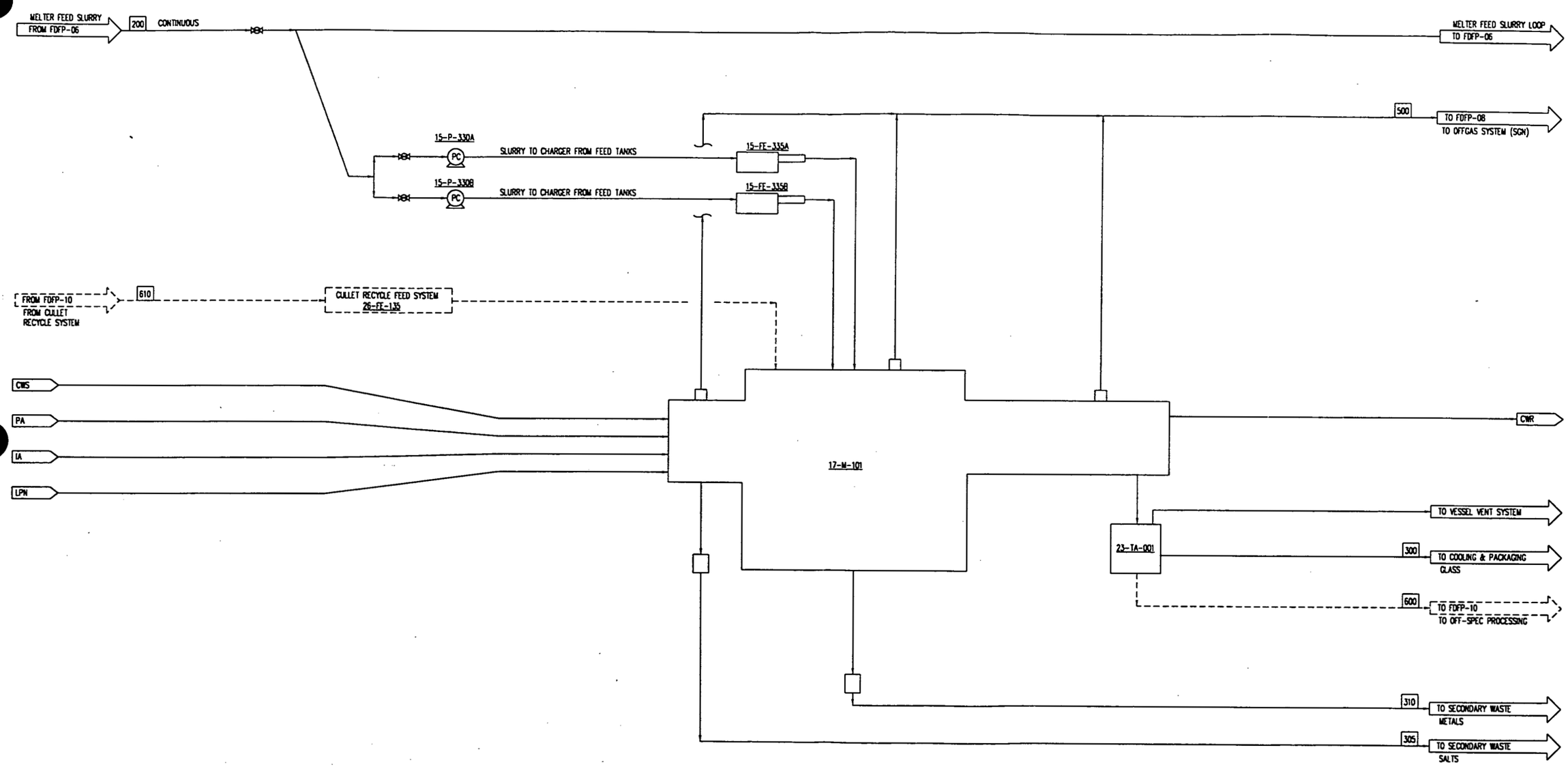
98703

TITLE: PROCESS FLOW DIAGRAM - PROCESS FACILITY BATCHING
FOR: FERNALD POPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR BY: BPT DATE: 30DEC98
CK BY: KJH DATE: 10MAR00
SCALE: NONE
DWG. NO. FDFP-06
REVISION 1

B-PLOTTED 17/JUL/1997 AT 13:29:18 BY JJH

2291



SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001515

LEGEND

- PA — PLANT AIR
- IA — INSTRUMENT AIR
- CWS — COOLING WATER SUPPLY
- CWR — COOLING WATER RETURN
- LPN — LOW PRESSURE NITROGEN

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHK'D BY
	ISSUED					

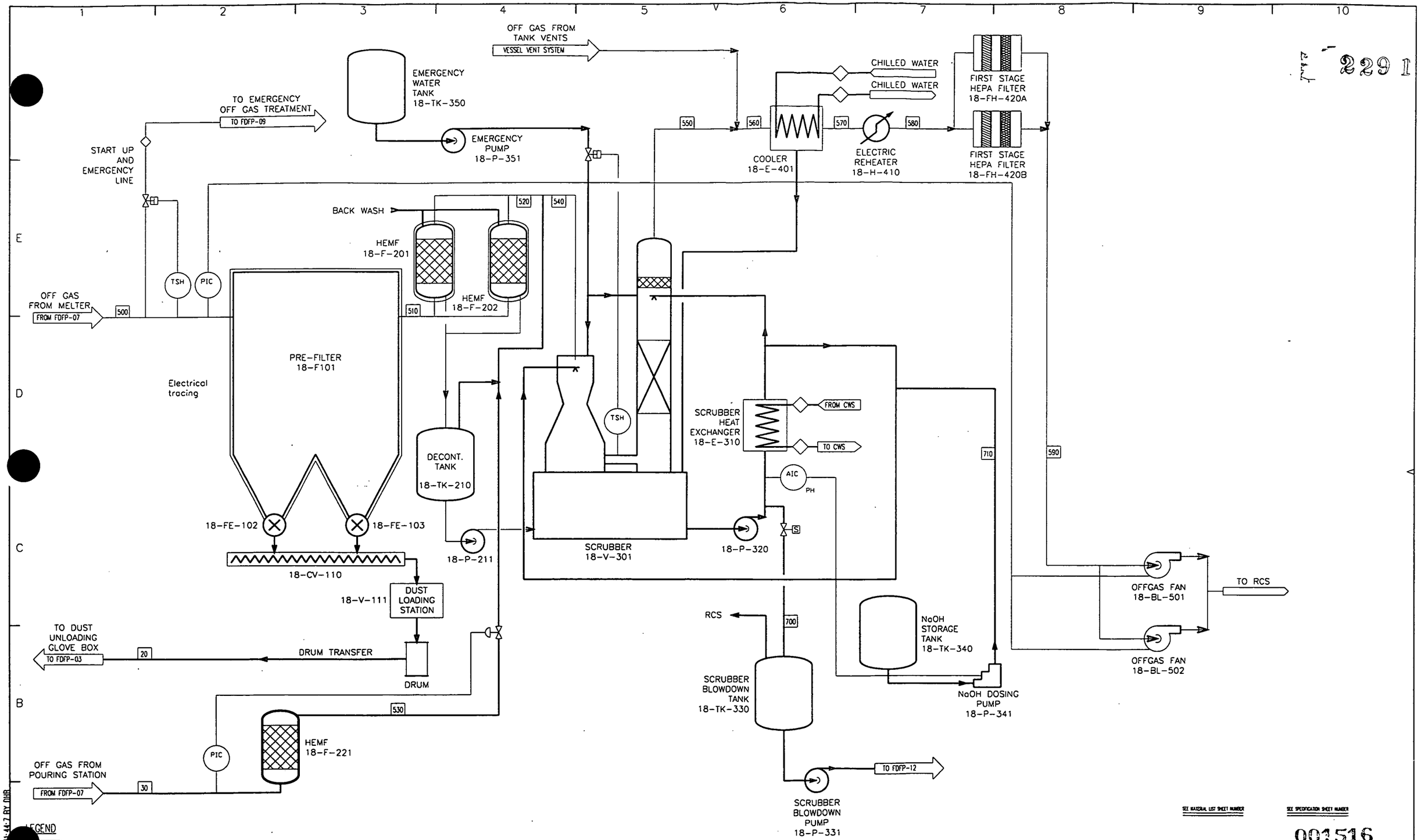
EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA

98703

TITLE: PROCESS FLOW DIAGRAM - MELTER 101

FOR: FERNALD POPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR. BY: BPT DATE: 04JAN99
CK. BY: KJH DATE: 10MAR99
SCALE: NONE
DWG. NO. FDFP-07
REVISION 0



SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001516

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE ISSUED	REV	DESCRIPTION	DRAWN BY	DATE	CHK'D BY
	27APR99	1	ADDED SECOND HEPA FILTER 18-FH-420B	BPT	27APR99	KJH
			ADDED PUMP 18-P-211			

EnVitCo, Inc. 3400 EXECUTIVE PARKWAY TOLEDO, OHIO 43606-0451 USA

98703

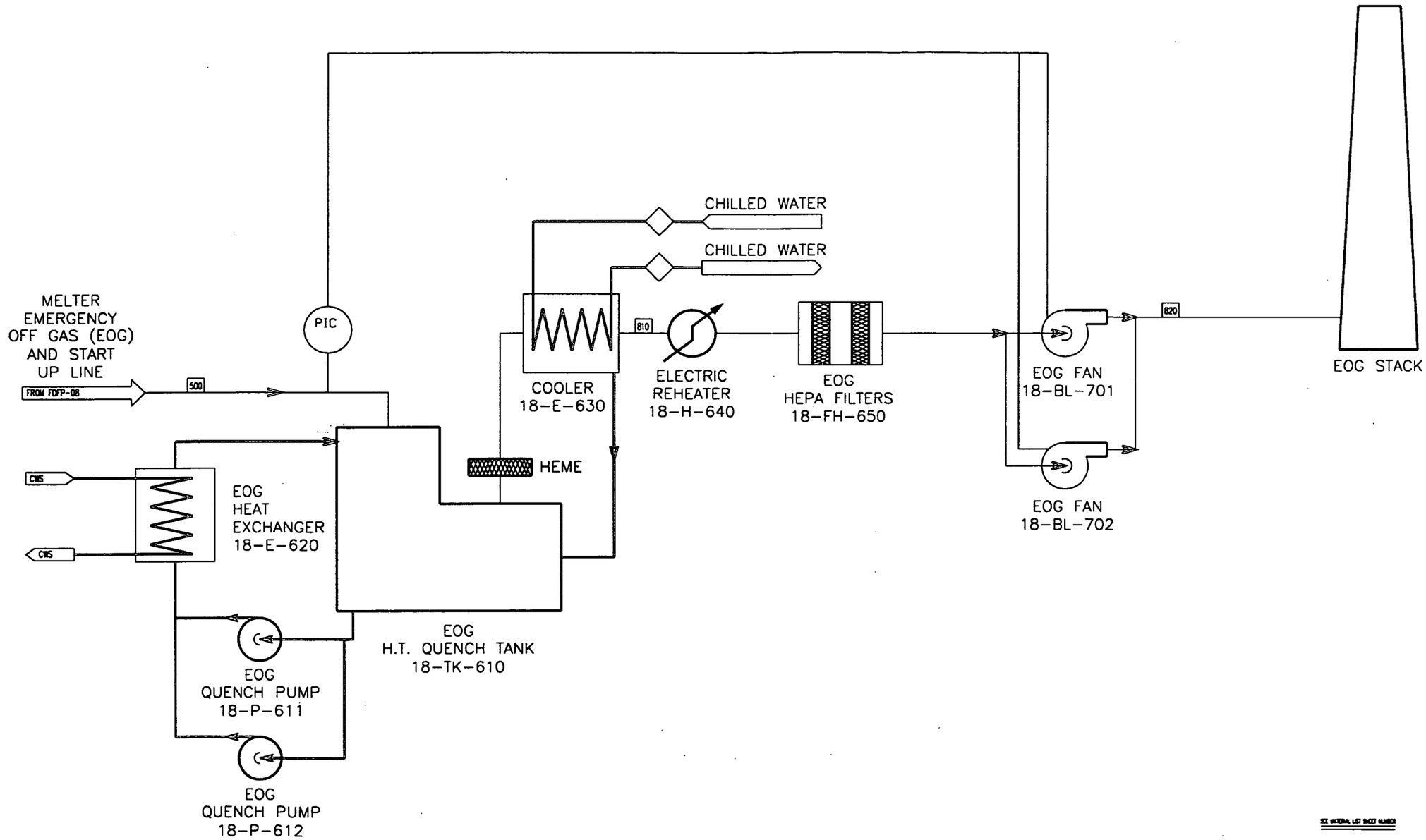
TITLE: OFFGAS SYSTEM

FOR: FERNALD POPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR. BY: SGN DATE: 02FEB99
CK. BY: KJH DATE: 10MAR99
SCALE: NONE
DWG. NO. FDFP-08
REVISION 1

PLOTTED 11/MAR/99 11:44:7 BY DMR

2291



LEGEND

PA	PLANT AIR
IA	INSTRUMENT AIR
CWS	COOLING WATER SUPPLY
CWR	COOLING WATER RETURN
LPN	LOW PRESSURE NITROGEN

SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001517

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHKD. BY

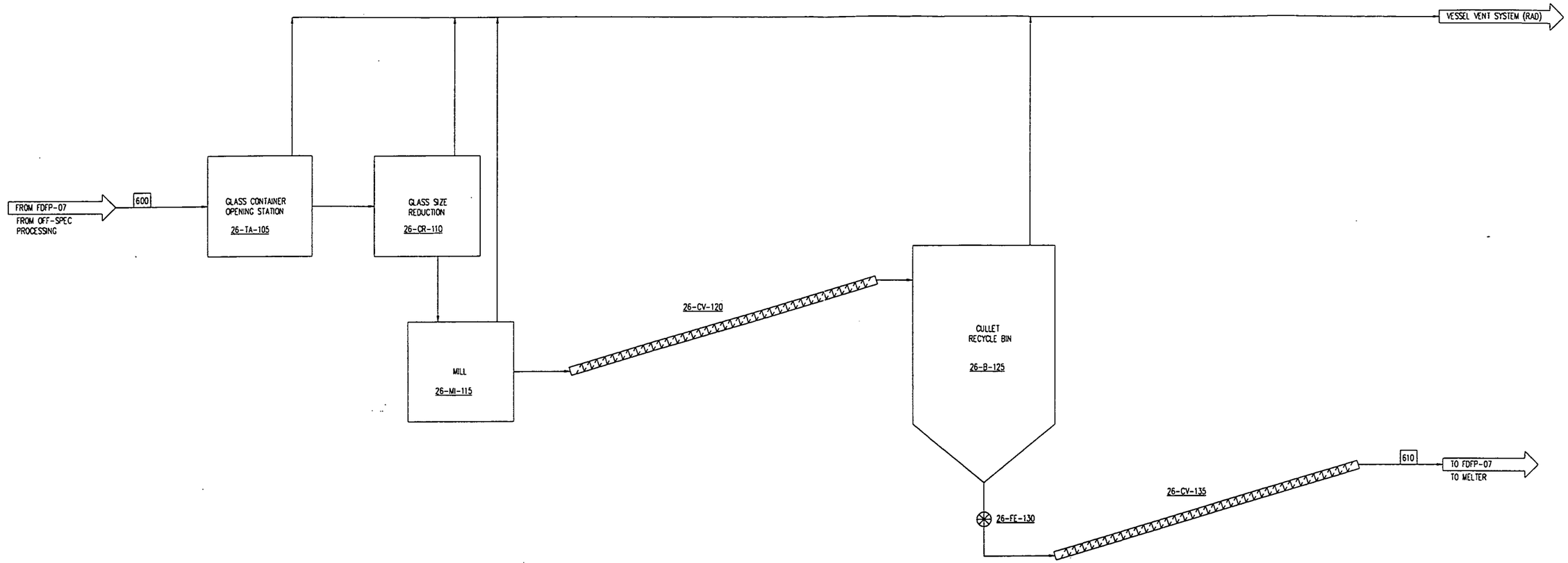
EnVitCo. Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA

98703

TITLE: EMERGENCY OFFGAS SYSTEM
FOR: FERNALD POPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR. BY: SGN DATE: 9MAR99
CK. BY: KJH DATE: 10MAR99
SCALE: NONE
DWG. NO. FDFP-09
REVISION 0

E 2291



SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001518

LEGEND

PA	PLANT AIR
IA	INSTRUMENT AIR
CWS	COOLING WATER SUPPLY
CWR	COOLING WATER RETURN
LPN	LOW PRESSURE NITROGEN

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHK'D BY
	27APR99	1	ADDED VESSEL VENT SYSTEM	BPT	27APR99	KJH

ISSUED

EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA

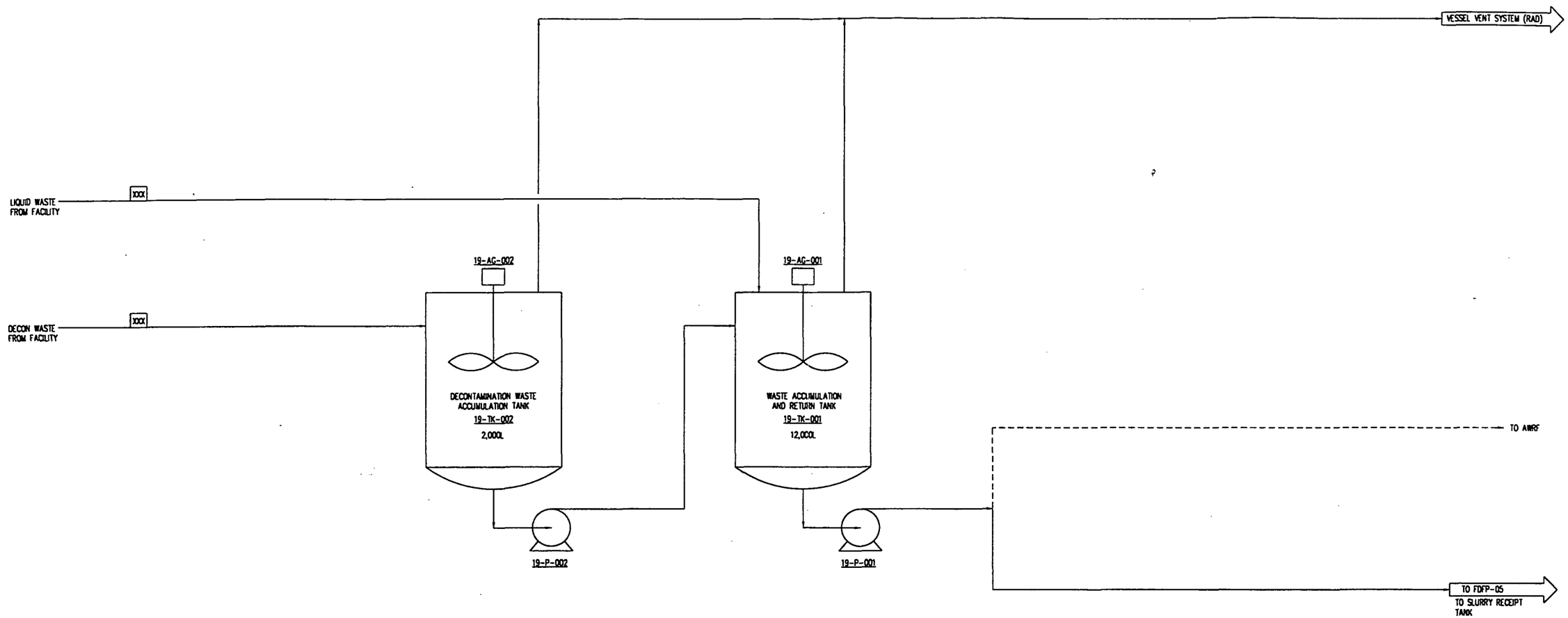
98703

TITLE: PROCESS FLOW DIAGRAM - CULLET RECYCLE SYSTEM
FOR: FERNALD POPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR BY: BPT DATE: 28JAN99
CK BY: KJH DATE: 10MAR99
SCALE: NONE
DWG. NO. FDFP-10
REVISION 1

B-PLOTTED 17/JUL/ 14:58:19 BY JTH

2291



SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001519

LEGEND

PA	PLANT AIR
IA	INSTRUMENT AIR
CWS	COOLING WATER SUPPLY
CWR	COOLING WATER RETURN
LPN	LOW PRESSURE NITROGEN

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHK'D BY
	ISSUED					

EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA

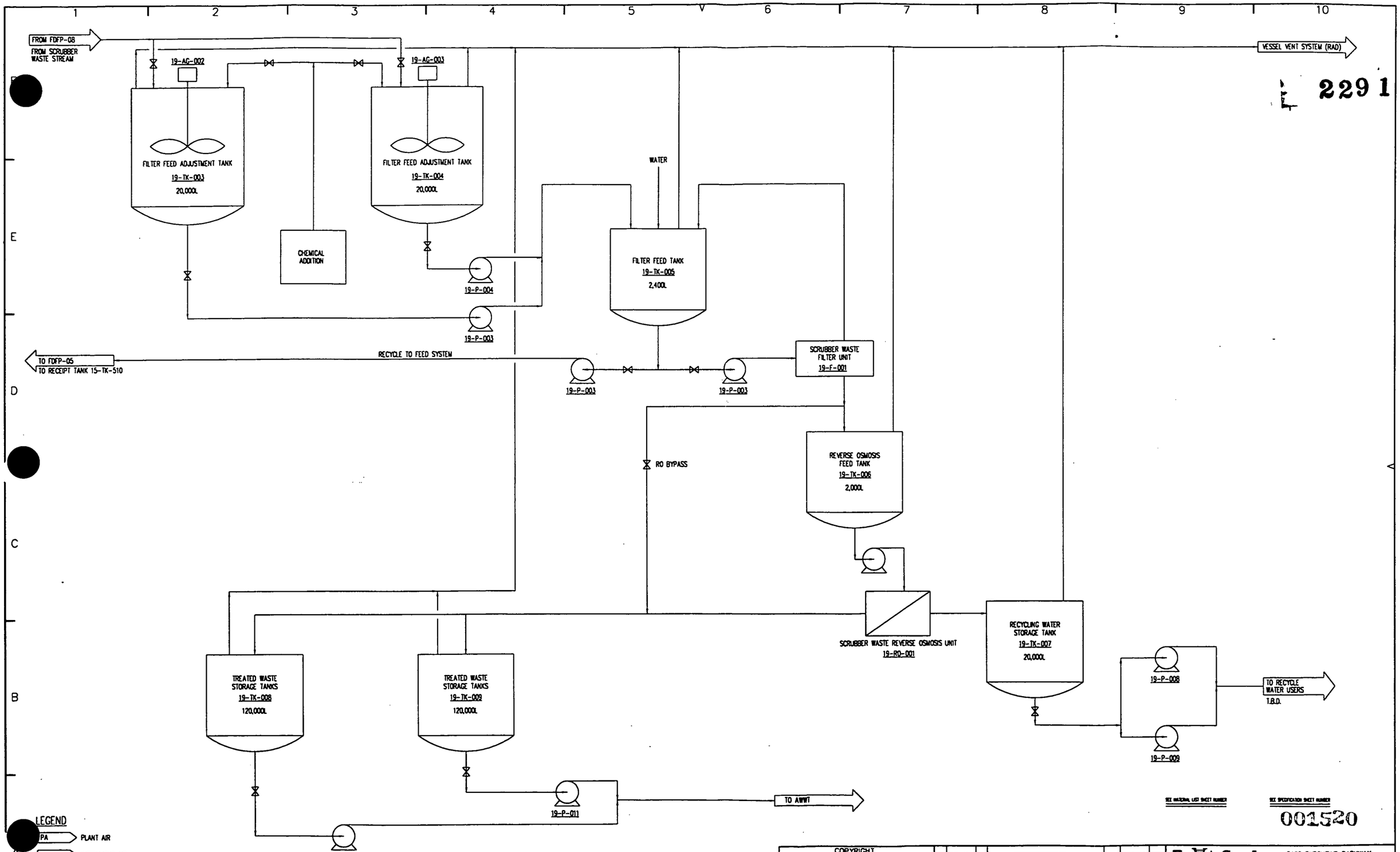
98703

TITLE: PROCESS FLOW DIAGRAM - FACILITY WASTE COLLECTION

FOR: FERNALD POPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR. CEC DATE: 04MAR99 SCALE: NONE DWG. NO. FDFP-11 REVISION 0

CK. KJH DATE: 10MAR99


FROM FDFP-08
FROM SCRUBBER WASTE STREAM
VESSEL VENT SYSTEM (RAD)
19-AC-002
19-AC-003
FILTER FEED ADJUSTMENT TANK
19-TK-003
20,000L
FILTER FEED ADJUSTMENT TANK
19-TK-004
20,000L
CHEMICAL ADDITION
WATER
FILTER FEED TANK
19-TK-005
2,400L
19-P-004
19-P-003
TO FDFP-05
TO RECEIPT TANK 15-TK-510
RECYCLE TO FEED SYSTEM
19-P-003
19-P-003
SCRUBBER WASTE FILTER UNIT
19-F-001
RO BYPASS
REVERSE OSMOSIS FEED TANK
19-TK-006
2,000L
SCRUBBER WASTE REVERSE OSMOSIS UNIT
19-RO-001
RECYCLING WATER STORAGE TANK
19-TK-007
20,000L
19-P-008
19-P-009
TO RECYCLE WATER USERS
T.B.D.
TREATED WASTE STORAGE TANKS
19-TK-008
120,000L
TREATED WASTE STORAGE TANKS
19-TK-009
120,000L
19-P-011
TO AWWT
19-P-010
LEGEND
PA PLANT AIR
IA INSTRUMENT AIR
CWS COOLING WATER SUPPLY
CWR COOLING WATER RETURN
LPN LOW PRESSURE NITROGEN
SEE MATERIAL LIST SHEET NUMBER
SEE SPECIFICATION SHEET NUMBER
001520
COPYRIGHT
© ENVITCO, INC. 1999
All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.
EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA
98703
TITLE: PROCESS FLOW DIAGRAM - OFFGAS SCRUBBER WASTE TREATMENT
FOR: FERNALD PDPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH
DR. BY CEC DATE: 04MAR99
CK. BY KJH DATE: 10MAR99
SCALE: NONE
DWG. NO. FDFP-12
REVISION 0
CODE DATE REV DESCRIPTION DRAWN BY DATE CHK'D BY
ISSUED

2291

EnVitCo, Inc.
A COGEMA Group Company

SECTION 21

MATERIAL BALANCE – FULL-SCALE

	Stream Description	Silo Waste	Total Additives	Pre-Filter Solids Recycle	Melter Feed	Vitrification Product	Salt Drain	Vitrification Offgas	Metal Sludge Drain
Component	Stream ID	425		20	200	300	305	500	310
Oxide	Units	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr
As2O5		4.69E-01		8.47E-04	4.70E-01	4.69E-01		8.64E-04	
BaO		2.40E+01		1.01E-02	2.40E+01	2.40E+01		1.02E-02	
Cr2O3		5.66E-01		3.66E-03	5.70E-01	5.66E-01		3.67E-03	
Fe2O3		1.28E+01		8.19E-03	1.28E+01	1.28E+01		8.23E-03	
MgO		5.52E+00		2.95E-03	5.53E+00	5.52E+00		2.96E-03	
NiO		1.92E+00		9.00E-04	1.92E+00	1.92E+00		9.04E-04	
P2O5		4.62E+00		1.10E-01	4.73E+00	4.62E+00		1.11E-01	
PbO		6.29E+01		3.05E-01	6.32E+01	6.29E+01		3.06E-01	
R2O		1.32E+01	4.20E+01	1.13E-01	5.54E+01	5.52E+01		1.14E-01	
Additives		2.36E+01	7.58E+01	2.98E-02	9.95E+01	9.94E+01		2.96E-02	
SO3		1.57E+01			1.57E+01	1.41E+01		1.58E+00	
SeO2		3.28E-01			3.28E-01	1.39E-01		1.89E-01	
SiO2		3.08E+02		3.77E-01	3.09E+02	3.08E+02		3.79E-01	
V2O5		4.02E-01		6.30E-05	4.02E-01	4.02E-01		9.08E-05	
TNVO		4.74E+02	1.18E+02	9.62E-01	5.93E+02	5.90E+02		2.74E+00	
VOLATILES									
NO3									
NO2		2.49E+00			2.49E+00			2.49E+00	
NH4									
TIC as CO3		6.63E+00			6.63E+00			6.63E+00	
CO3			7.71E+01		7.71E+01			7.71E+01	
TOC as C		5.69E+00	5.94E-01		6.28E+00			6.28E+00	
H2C2O4									
Vol Misc									
LIQUID									
Water		1.14E+03	1.82E+01		1.16E+03			1.16E+03	
Total		1.63E+03	2.14E+02	9.62E-01	1.85E+03	5.90E+02	0.00E+00	1.26E+03	

1) R2O Consists of the K2O, Li2O, and Na2O.
2) Additives includes contributions from Aluminum Oxide, Calcium Oxide, and Zinc Oxide.

001522

2291

FDF Prc nciple Test
Preliminai, scale Design
Summary Material Balance

	Stream Description	Silo Waste	Total Additives	Pre-Filter Solids Recycle	Melter Feed	Vitrification Product	Salt Drain	Vitrification Offgas	Metal Sludge Drain
Component	Stream ID	425		20	200	300	305	500	310
Radionuclides		Ci/hr	Ci/hr		Ci/hr	Ci/hr	Ci/hr	Ci/hr	Ci/hr
210Pb		7.88E-02		3.82E-04	7.92E-02	7.88E-02		3.84E-04	
210Po		1.16E-01		1.38E-04	1.16E-01	1.16E-01		1.39E-04	
226Ra		1.87E-01		7.89E-05	1.87E-01	1.87E-01		7.93E-05	
222Rn		1.87E-01		7.87E-05	1.87E-01	1.87E-01		7.91E-05	
227Ac		2.85E-03		3.40E-06	2.85E-03	2.85E-03		3.42E-06	
228Th		3.08E-04		3.68E-07	3.08E-04	3.08E-04		3.70E-07	
230Th		2.87E-02		3.43E-05	2.87E-02	2.87E-02		3.44E-05	
231Pa		1.12E-03		1.34E-06	1.12E-03	1.12E-03		1.35E-06	
232Th		2.03E-04		2.42E-07	2.03E-04	2.03E-04		2.43E-07	
234U		4.59E-04		5.49E-07	4.60E-04	4.59E-04		5.52E-07	
235/236U		3.49E-05		4.17E-08	3.49E-05	3.49E-05		4.19E-08	
238U		4.36E-04		5.21E-07	4.36E-04	4.36E-04		5.23E-07	

1) Material balance based on the Demonstration Surrogate (DS) composition (Contract Modificatin No. 6) submitted to Envitco by FDF on 11/25/98.
2) TNVO signifies Total Non-Volatile Oxides.
3) Partitioning to the salt phase was based on the POPT 72-hour Demonstration.
4) The frequency of the metal drain will be variable. Composition will also be variable.

Feed Rate Basis
1) The material balance is based on processing the total Feedrate quanity of Silo 1 & 2 waste at 30% solids (Bento Grout Included).
2) The feedrates of the individual elements are based on the total feedrate at the weight percentages of the Demostration Surrogate.
3) 24 hrs/day, 365 days/yr, for 3 years at an overall process availability of 70%.

001523

2291

FDF Pr[illegible]nciple Test
Prelimina[illegible]scale Design
Elemental Material Balance

	Stream Description	Silo Waste	Total Additives	Pre-Filter Solids Recycle	Melter Feed	Vitrification Product	Salt Drain	Vitrification Offgas	Metal Sludge Drain
	Stream ID	425		20	200	300	305	500	310
Component	Units	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr
As		3.06E-01		5.52E-04	3.07E-01	3.06E-01		5.63E-04	
Ba		2.15E+01		9.09E-03	2.15E+01	2.15E+01		9.13E-03	
Cr		3.87E-01		2.50E-03	3.90E-01	3.87E-01		2.51E-03	
Fe		8.95E+00		5.73E-03	8.95E+00	8.95E+00		5.76E-03	
Mg		3.33E+00		1.78E-03	3.33E+00	3.33E+00		1.79E-03	
Ni		1.51E+00		7.07E-04	1.51E+00	1.51E+00		7.11E-04	
P		2.02E+00		4.80E-02	2.06E+00	2.02E+00		4.82E-02	
Pb		5.45E+01		2.64E-01	5.48E+01	5.45E+01		2.65E-01	
R2O		1.01E+01	2.41E+01	7.85E-02	3.43E+01	3.42E+01		7.89E-02	
Additives		1.29E+01	4.92E+01	1.89E-02	6.21E+01	6.21E+01		1.87E-02	
S		6.27E+00			6.27E+00	5.64E+00		6.33E-01	
Se		2.04E-01			2.04E-01	8.64E-02		1.18E-01	
Si		1.44E+02		1.76E-01	1.44E+02	1.44E+02		1.77E-01	
U									
V		2.25E-01		3.53E-05	2.25E-01	2.25E-01		5.09E-05	
Subtotal		2.89E+02	1.47E+02	7.03E-01	4.37E+02	4.35E+02	0.00E+00	1.46E+00	
VOLATILES									
NO3									
NO2		2.49E+00			2.49E+00			2.49E+00	
NH4									
TIC as CO3		6.63E+00			6.63E+00			6.63E+00	
CO3			7.71E+01		7.71E+01			7.71E+01	
TOC as C		5.69E+00	5.94E-01		6.28E+00			6.28E+00	
H2C2O4									
Vol Misc									
LIQUID									
Water		1.14E+03	1.82E+01		1.16E+03			1.16E+03	
Total		1.45E+03	2.43E+02	7.03E-01	1.69E+03	4.35E+02	0.00E+00	1.26E+03	

1) R2O Consists of the K2O, Li2O, and Na2O.
2) Additives includes contributions from Aluminum Oxide, Calcium Oxide, and Zinc Oxide.

001524

2291

FDF Pro[illegible]nciple Test
Preliminary [illegible]scale Design
Elemental Material Balance

	Stream Description	Silo Waste	Total Additives	Pre-Filter Solids Recycle	Melter Feed	Vitrification Product	Salt Drain	Vitrification Offgas	Metal Sludge Drain
	Stream ID	425		20	200	300	305	500	310
Radionuclides		Ci/hr		Ci/hr	Ci/hr	Ci/hr	Ci/hr	Ci/hr	Ci/hr
210Pb		7.88E-02		3.82E-04	7.92E-02	7.88E-02		3.84E-04	
210Po		1.16E-01		1.38E-04	1.16E-01	1.16E-01		1.39E-04	
226Ra		1.87E-01		7.89E-05	1.87E-01	1.87E-01		7.93E-05	
222Rn		1.87E-01		7.87E-05	1.87E-01	1.87E-01		7.91E-05	
227Ac		2.85E-03		3.40E-06	2.85E-03	2.85E-03		3.42E-06	
228Th		3.08E-04		3.68E-07	3.08E-04	3.08E-04		3.70E-07	
230Th		2.87E-02		3.43E-05	2.87E-02	2.87E-02		3.44E-05	
231Pa		1.12E-03		1.34E-06	1.12E-03	1.12E-03		1.35E-06	
232Th		2.03E-04		2.42E-07	2.03E-04	2.03E-04		2.43E-07	
234U		4.59E-04		5.49E-07	4.60E-04	4.59E-04		5.52E-07	
235/236U		3.49E-05		4.17E-08	3.49E-05	3.49E-05		4.19E-08	
238U		4.36E-04		5.21E-07	4.36E-04	4.36E-04		5.23E-07	

1) Material balance based on the Demonstration Surrogate (DS) composition (Contract Modificatin No. 6) submitted to Envitco by FDF on 11/25/98.
2) Partitioning to the salt phase was based on the POPT 72-hour Demonstration.
3) The frequency of the metal drain will be variable. Composition will also be variable.

Feed Rate Basis
1) The material balance is based on processing the total Feedrate quanity of Silo 1 & 2 waste at 30% solids (Bento Grout Included).
2) The feedrates of the individual elements are based on the total feedrate at the weight percentages of the Demostration Surrogate.
3) 24 hrs/day, 365 days/yr, for 3 years at an overall process availability of 70%.

001525

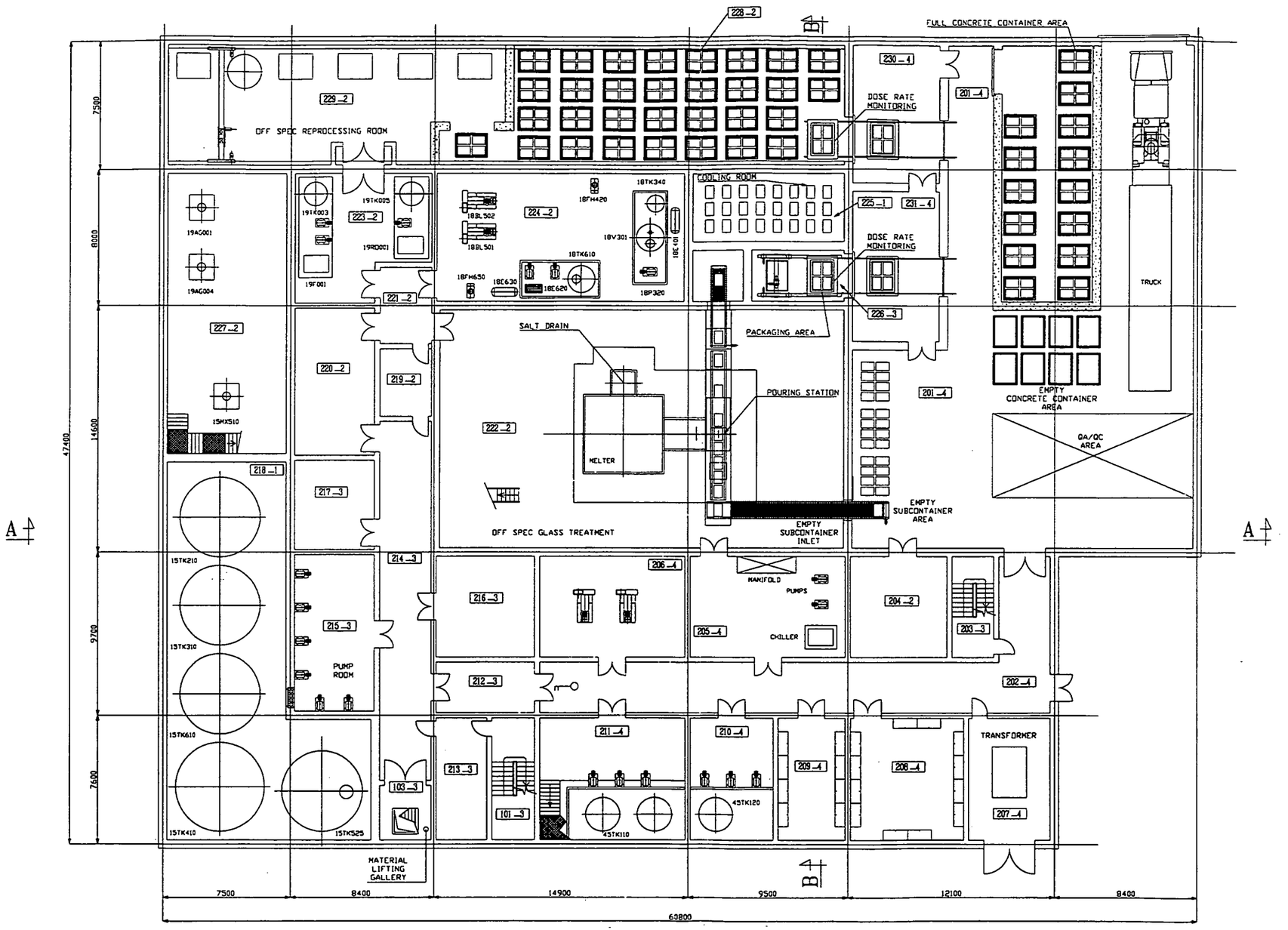
2291

EnVitCo, Inc.
A COGEMA Group Company

SECTION 22

FACILITY LAYOUTS – FULL-SCALE

2291



PLAN VIEW LEVEL +0.000

WALL HEIGHT = 3 METRES

SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER
001527

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE ISSUED	REV	DESCRIPTION	DRAWN BY	DATE	CHK'D BY
	27APR99	1	UPDATED EQUIPMENT NUMBERS ADDED ROOMS 230 & 231	BPT	27APR99	KJH

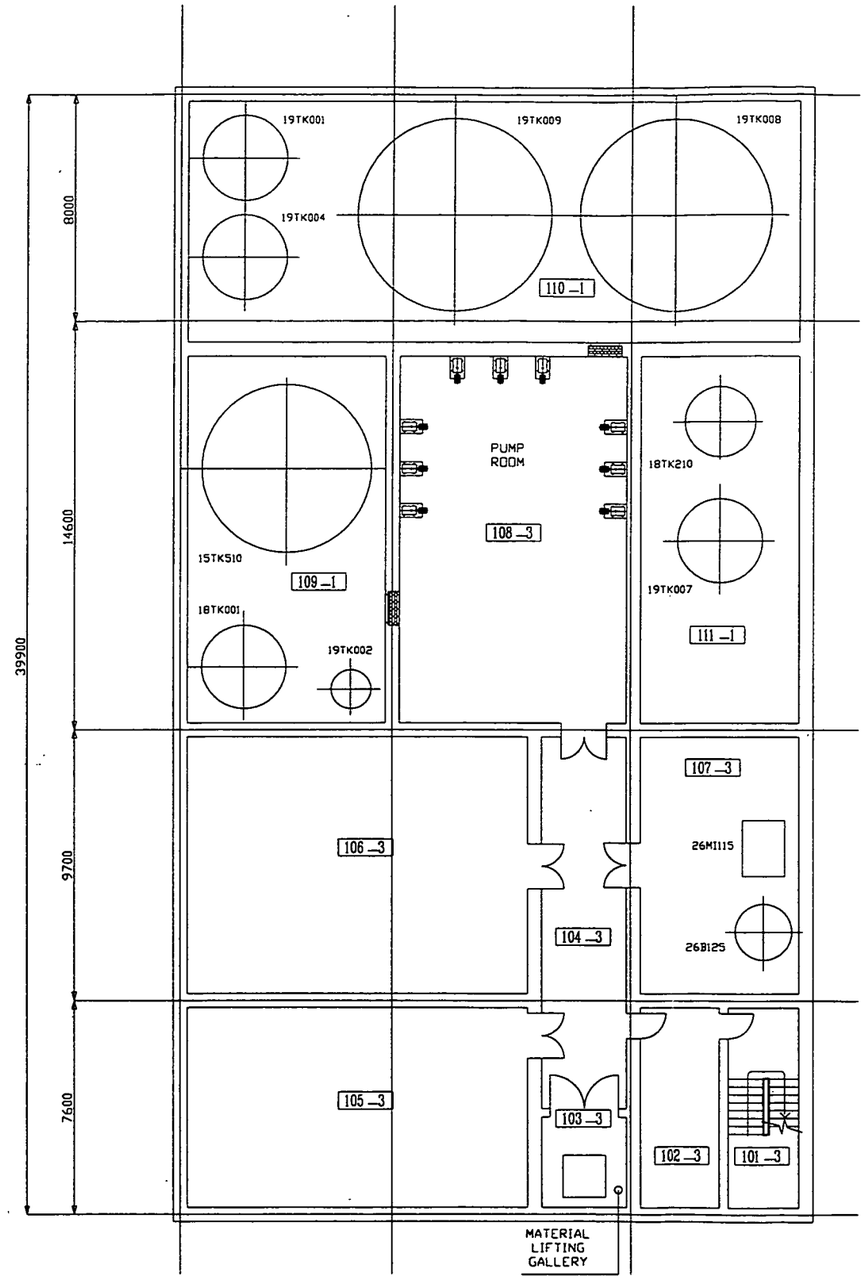
EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA
98703

TITLE: FACILITY LAYOUT
FOR: FERNALD POPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR BY SGN DATE: 10MAR99
CK'D BY KJH DATE: 10MAR99
SCALE: NONE
DWG. NO. FDFF-01
REVISION 1

B-PLOTTED 12/MAR/1999 AT 15:35:46 BY KDK

2291



PLAN VIEW LEVEL -8.500

SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001528

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHK'D BY
	27APR99	1	UPDATED EQUIPMENT NUMBERS	BPT	27APR99	KJH

ISSUED

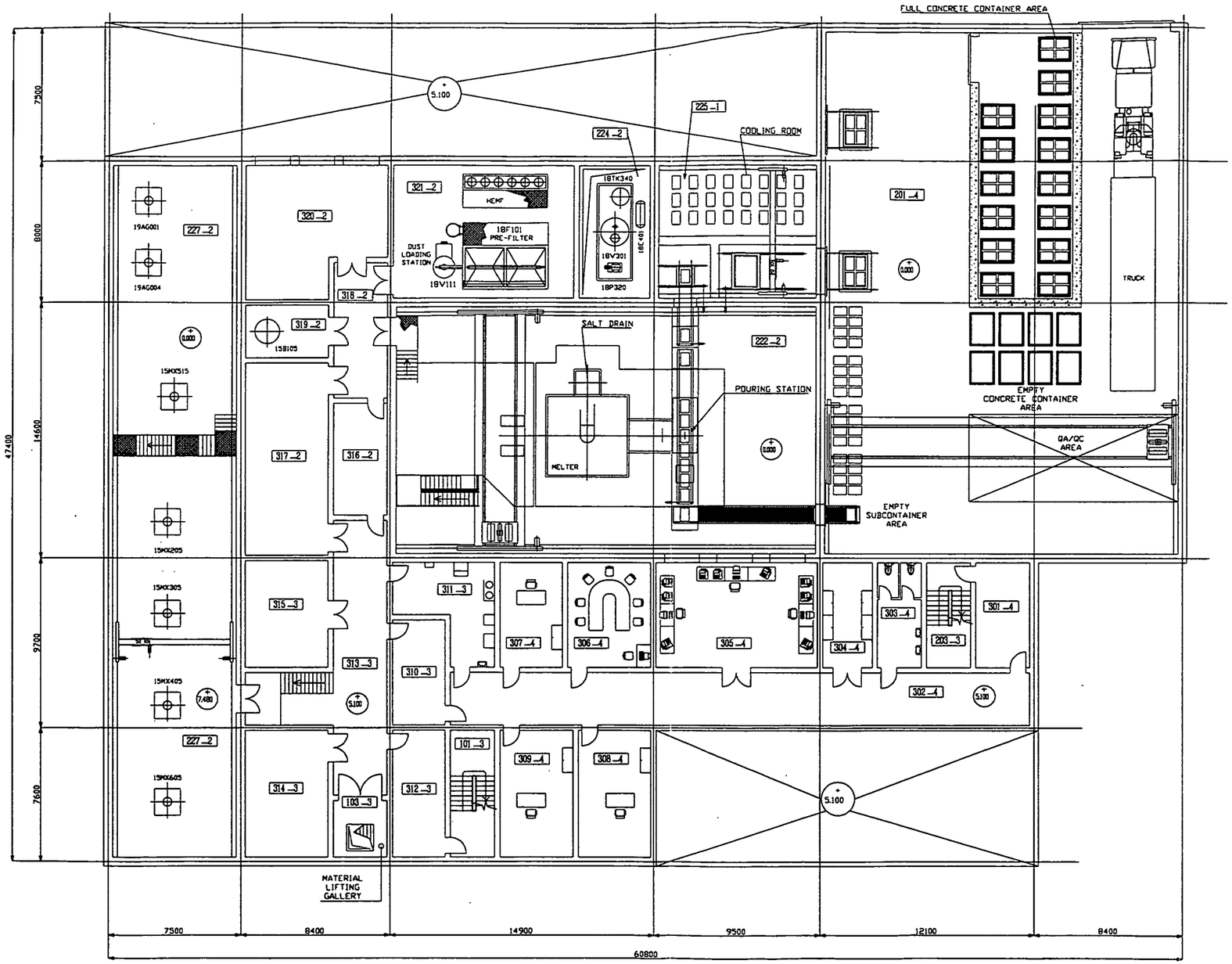
EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA
98703

TITLE: FACILITY LAYOUT
FOR: FERNALD POPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR BY SGN DATE: 10MAR99
CK BY KJH DATE: 10MAR99
SCALE NONE
DWG. NO. FDFF-02
REVISION 1

B-PLOTTED 12/MAR/ 15:38:58 BY KOK

E 2291



PLAN VIEW LEVEL +5.100

WALL HEIGHT = 3 METRES

SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001529

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHKD. BY
	27APR99	1	UPDATED EQUIPMENT NUMBERS	BPT	27APR99	KJH

ISSUED

EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA

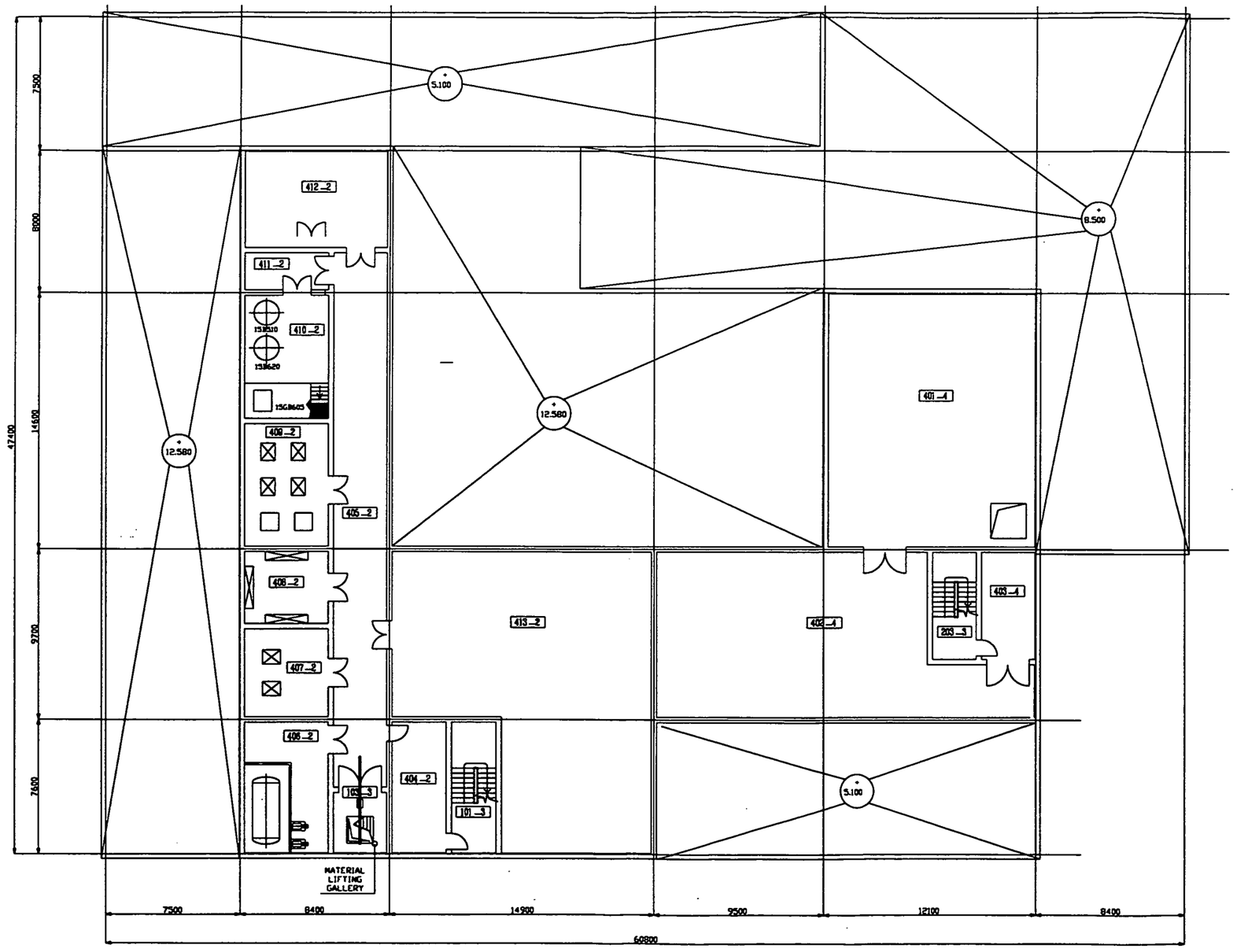
98703

TITLE: FACILITY LAYOUT
FOR: FERNALD POPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR. BY: SGN DATE: 10MAR99
CK. BY: KJH DATE: 10MAR99
SCALE: NONE
DWG. NO. FDFF-03
REVISION 1

B-PLOTTED 12/MAR/ 15:41:0 BY KDK

2291



PLAN VIEW LEVEL +12.580

SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001530

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHKD. BY
	ISSUED					

EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA

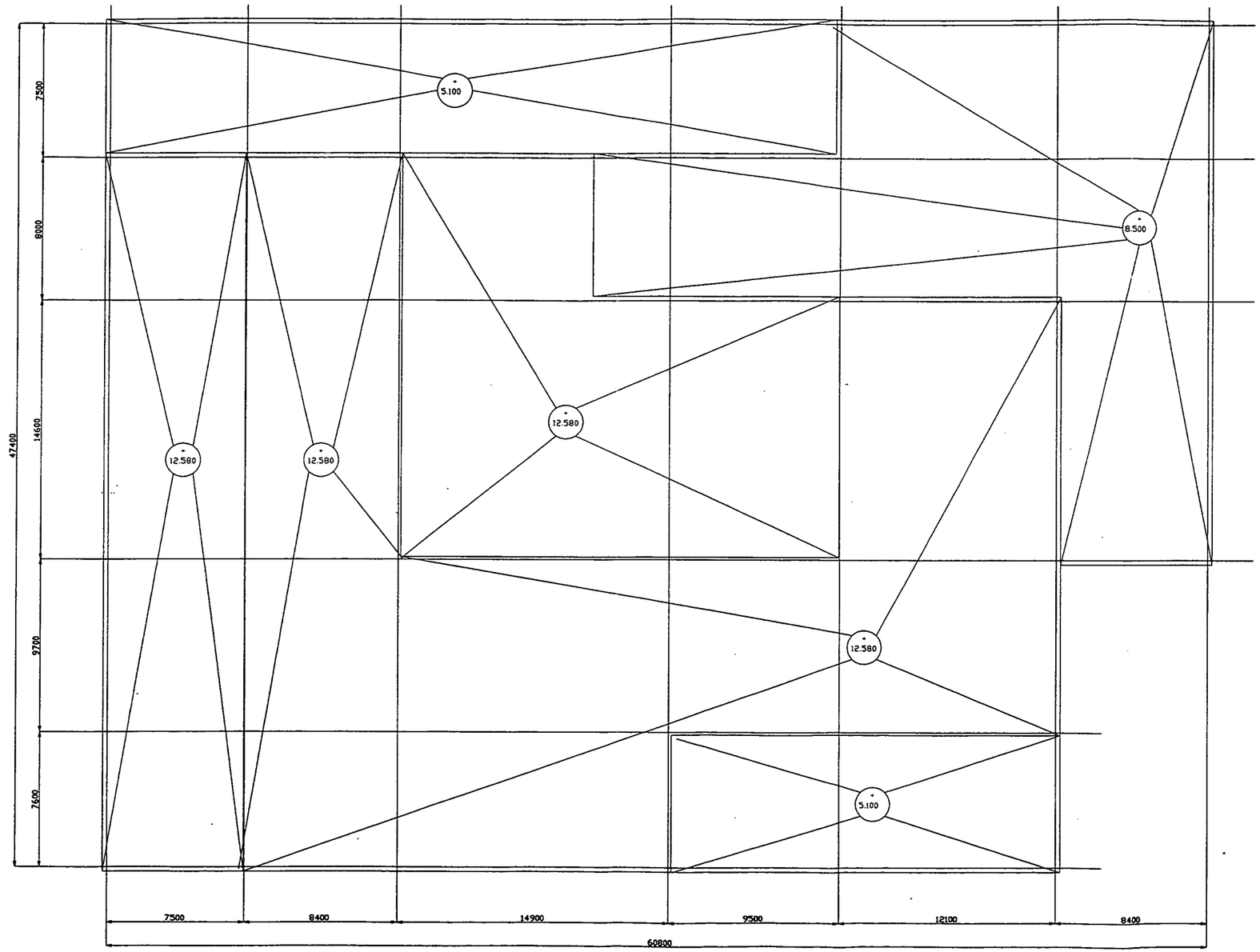
98703

TITLE: FACILITY LAYOUT
FOR: FERNALD PORT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR. BY SGN DATE: 10MAR99
CK. BY KJH DATE: 10MAR99
SCALE: NONE
DWG. NO. FDFF-04
REVISION 0

B-PLOTTED 12/MAR/1 15:42:55 BY KDK

2291



SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001531

COPYRIGHT
© ENVITCO, INC 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with

COD	DATE	REV.	DESCRIPTION	DRAWN	DATE	CHK'D

EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA

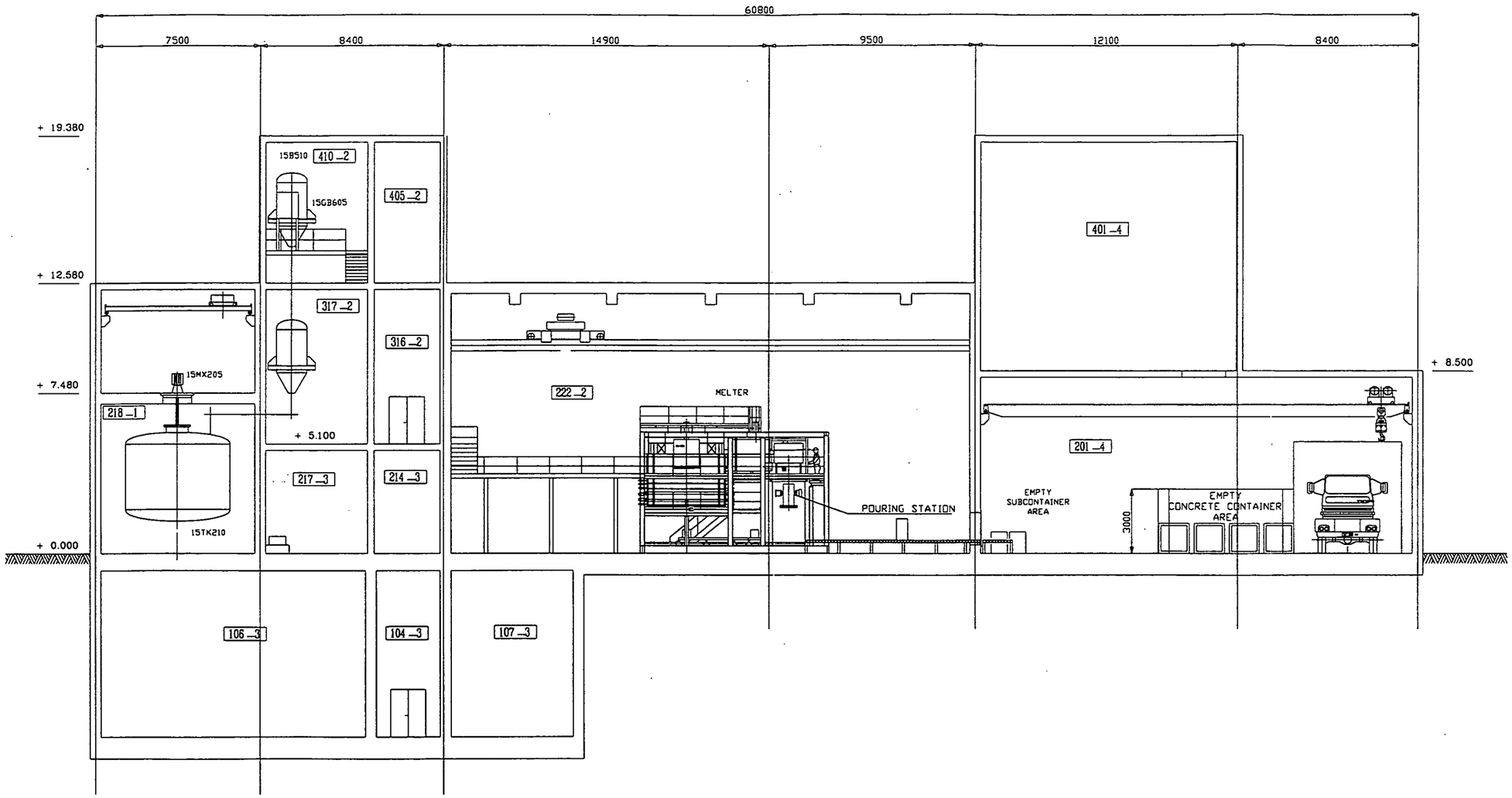
98703

TITLE: FACILITY LAYOUT
FOR: FERNALD POPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR BY: SGN DATE: 10MAR99 SCALE: NONE DWG. FDFF 05 REVISION 0

B-PLOTTED 12/MAR/1 :44:21 BY KDK

E 2291



SECTION A-A

SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001532

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHK'D BY
	27APR99	1	UPDATED AND ADDED EQUIPMENT NUMBERS	BPT	27APR99	KJH

ISSUED

EnVitCo, Inc. 3400 EXECUTIVE PARKWAY TOLEDO, OHIO 43606-0451 USA

98703

TITLE: FACILITY LAYOUT

FOR: FERNALD POPT TEST PROGRAM

FLUOR DANIEL FERNALD CINCINNATI, OH

DR. BY: SGN DATE: 10MAR99

CH. BY: KJH DATE: 10MAR99

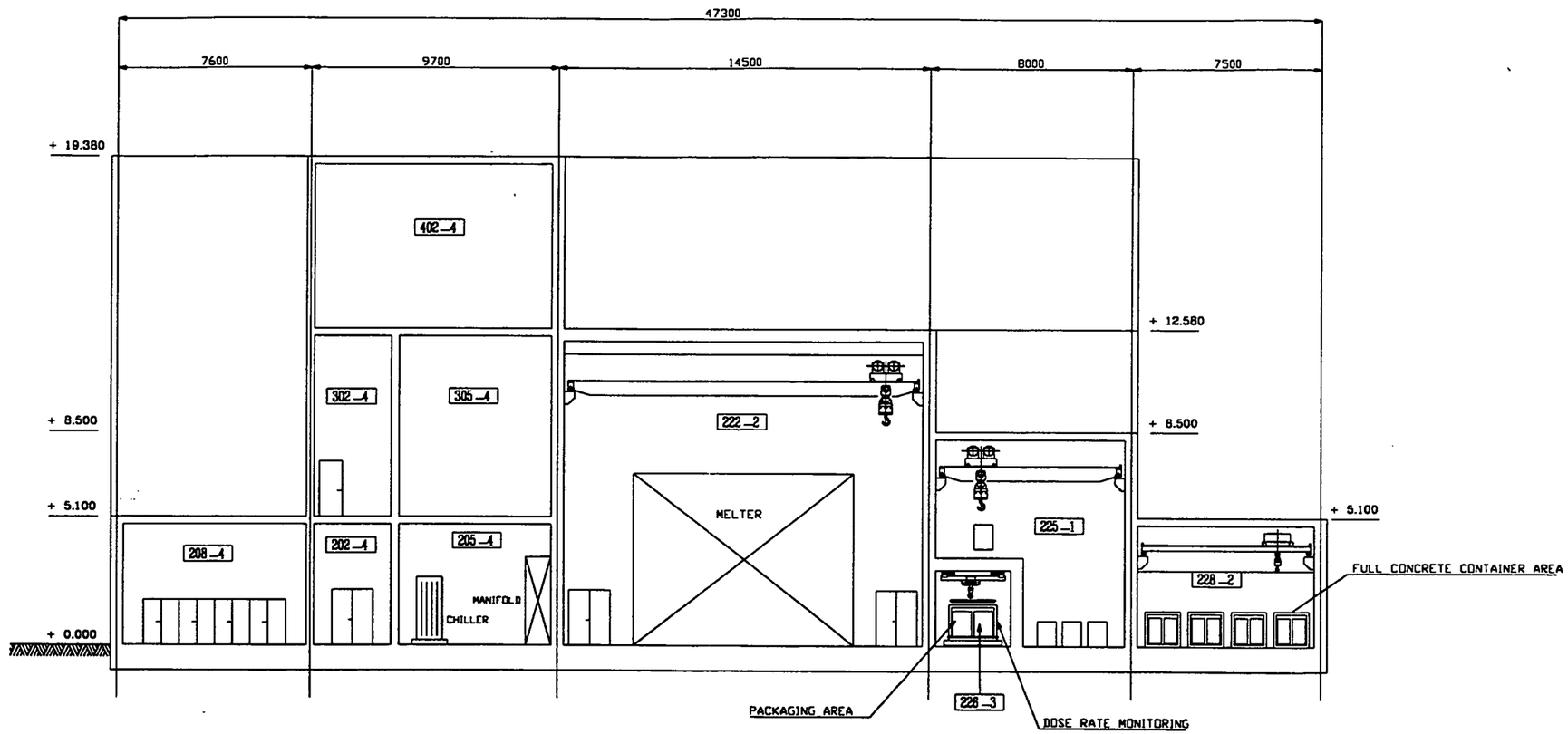
SCALE: NONE

DWG. NO. FDFF-06

REVISION 1

B-PLOTTED 12/MAR/1999 AT 15:47:15 BY KDK

2291



SECTION B-B

SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001533

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO INC.

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHKD BY
	ISSUED					

EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA
98703

TITLE: FACILITY LAYOUT
FOR: FERNALD POPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR. BY	SGN	DATE: 10MAR99	SCALE: NONE	DWG. NO. FDFF-07	REVISION 0
CK. BY	K.H	DATE: 10MAR99			

B-PLOTTED 12/A 9 AT 15:48:28 BY KDK

EnVitCo, Inc.
A COGEMA Group Company

2291

SECTION 23

EQUIPMENT DATA SHEETS

EQUIPMENT DATA SHEET	2291
EQUIPMENT NAME	Dry Additives Batch Plant
EQUIPMENT TAG	System 44

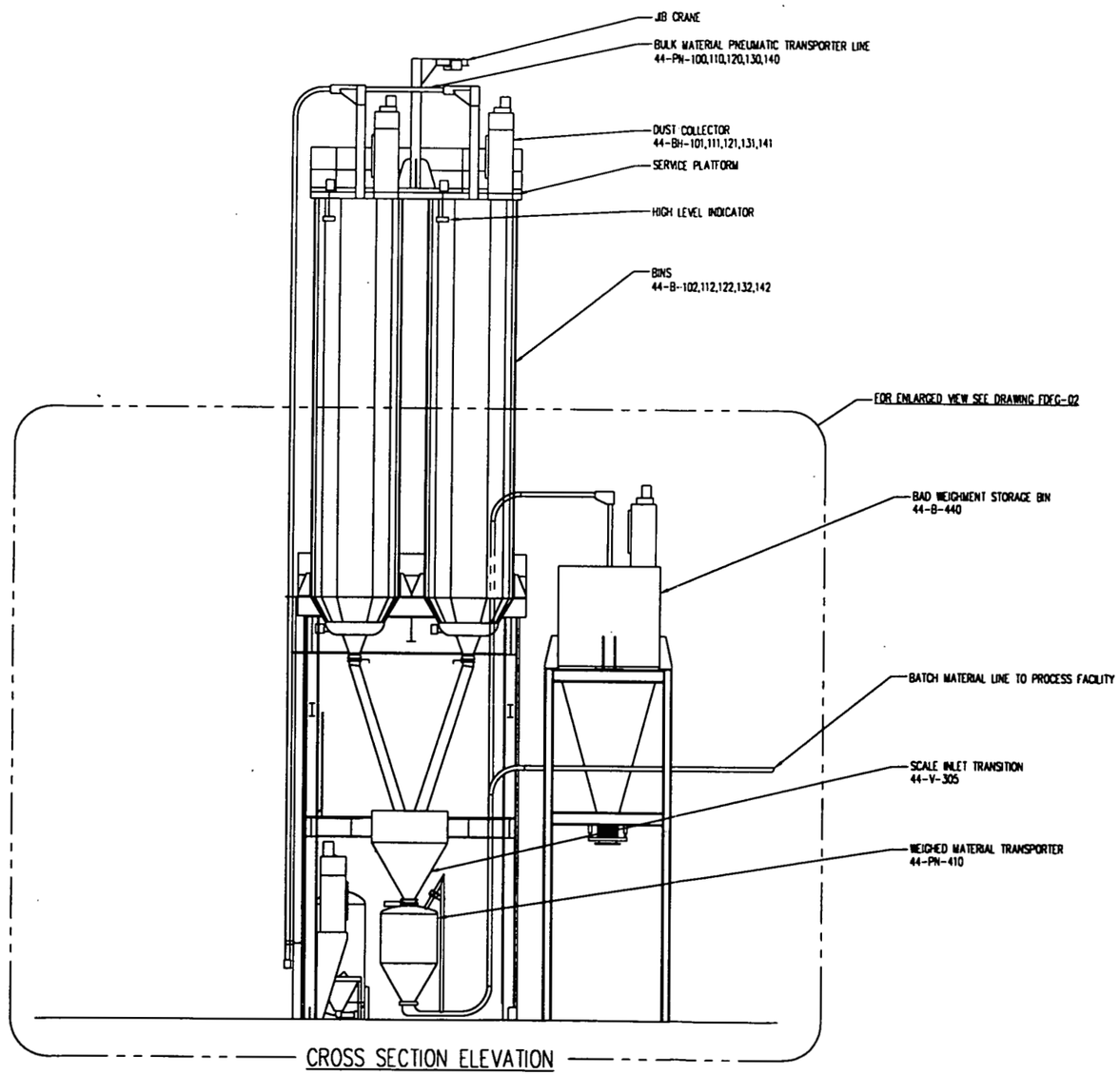
COST DATA

SOURCE / SELLER	Envitco
CONTACT(PHONE #)	Ken Hewlett
QUOTE TYPE	Historical Estimate
PRICE EACH	See Report Section 19
QUANITY (UNITS)	1

TECHNICAL INFORMATION

SIZE	10m x 11m x 28m (h)
MATERIALS	CS Silos + SS pipe
CAPACITY	280 m3 (2.5 MT/day)
POWER REQ.	20 kW (460V)
FUNCTION	store, weigh & transfer glass additives
ESSENTIAL CONTROLS	
COMMENTS	See drawings FDFG-01, 02, 03

2291



SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER 001536

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE	REV	DESCRIPTION	BY	DATE	CHK'D BY
	ISSUED					

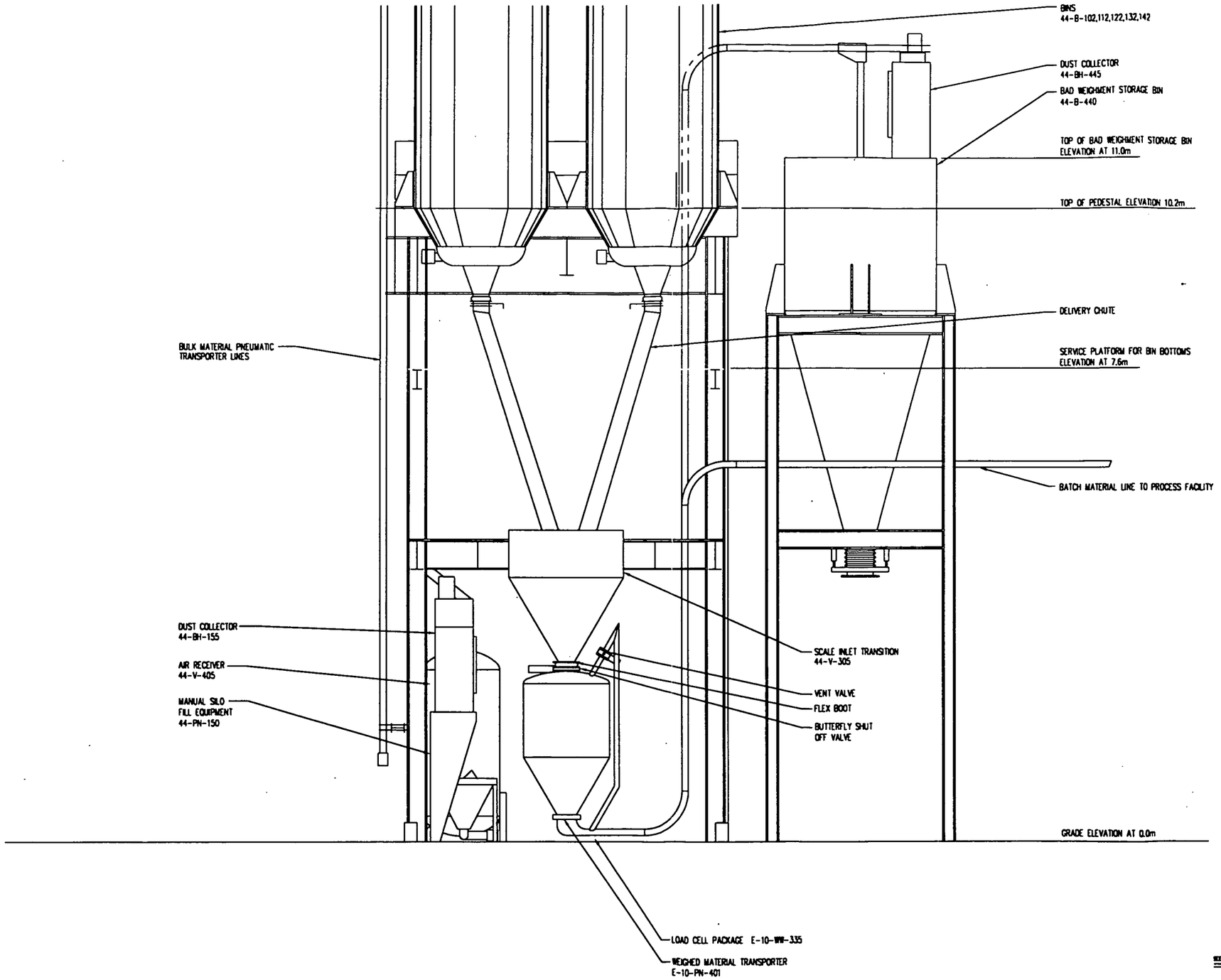
EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA

98703

TITLE: BATCH PLANT ELEVATION CROSS SECTION
FOR: FERNALD POPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR. BPT DATE: 02FEB99
CK. KJH DATE: 10MAR99
SCALE: 3/16"=1'-0"
DWG. NO. FDFG-01
REVISION

229 1



SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER
001537

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHK'D BY

EnVitCo, Inc. 3400 EXECUTIVE PARKWAY TOLEDO, OHIO 43606-0451 USA

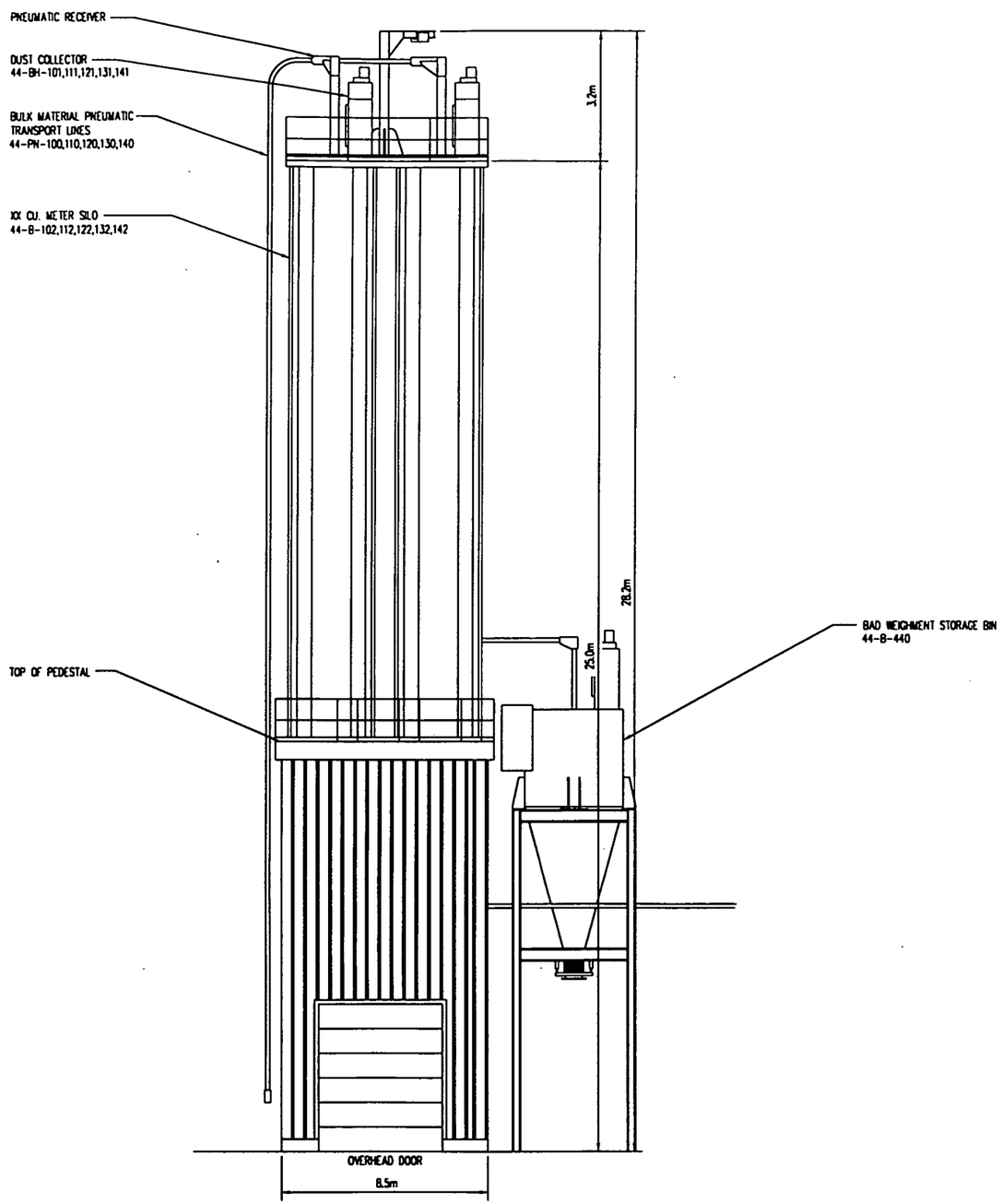
98703

TITLE: BATCH PLANT ELEVATION - ENLARGED CROSS SECTION
FOR: FERNALD POPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

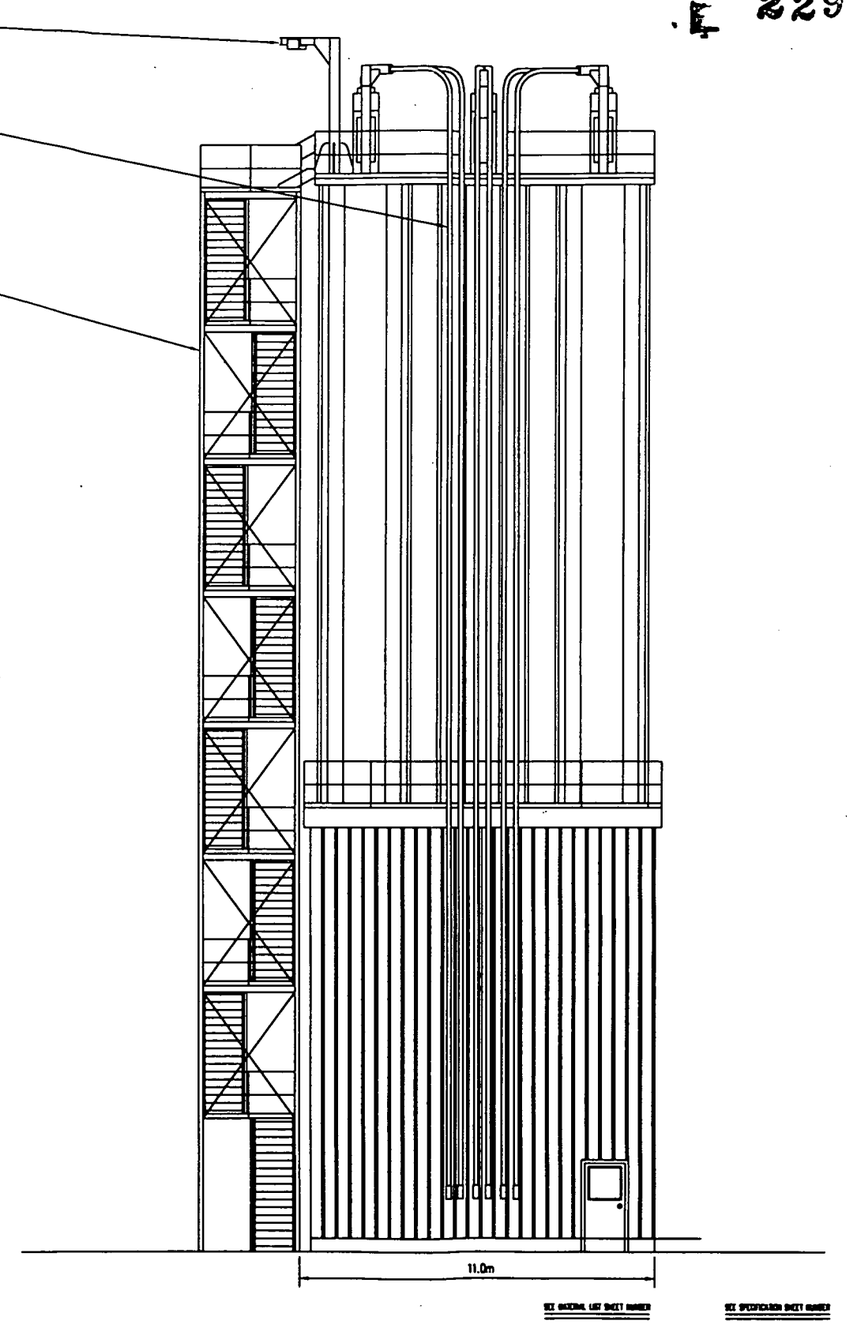
DR. BY: BPT DATE: 02FEB99
CK. BY: KJH DATE: 10MAR99
SCALE: 3/16"=1'-0"
DWG. NO. FDFG-02
REVISION

B-PLOTTED 11/MAR/1999 AT 11:18:50 BY DKB

229



FRONT ELEVATION



SIDE ELEVATION

001538

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHK'D BY
	ISSUED					

EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA

98703

TITLE: BATCH PLANT FRONT AND SIDE ELEVATION
FOR: FERNALD POPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR. BY: BPT DATE: 02FEB99
CK. BY: KJH DATE: 10MAR99
SCALE: 3/16"=1'-0"
DWG. NO. FDFG-03
REVISION

EQUIPMENT DATA SHEET

2291

EQUIPMENT NAME	Vitrification Melter
EQUIPMENT TAG	17-M-101

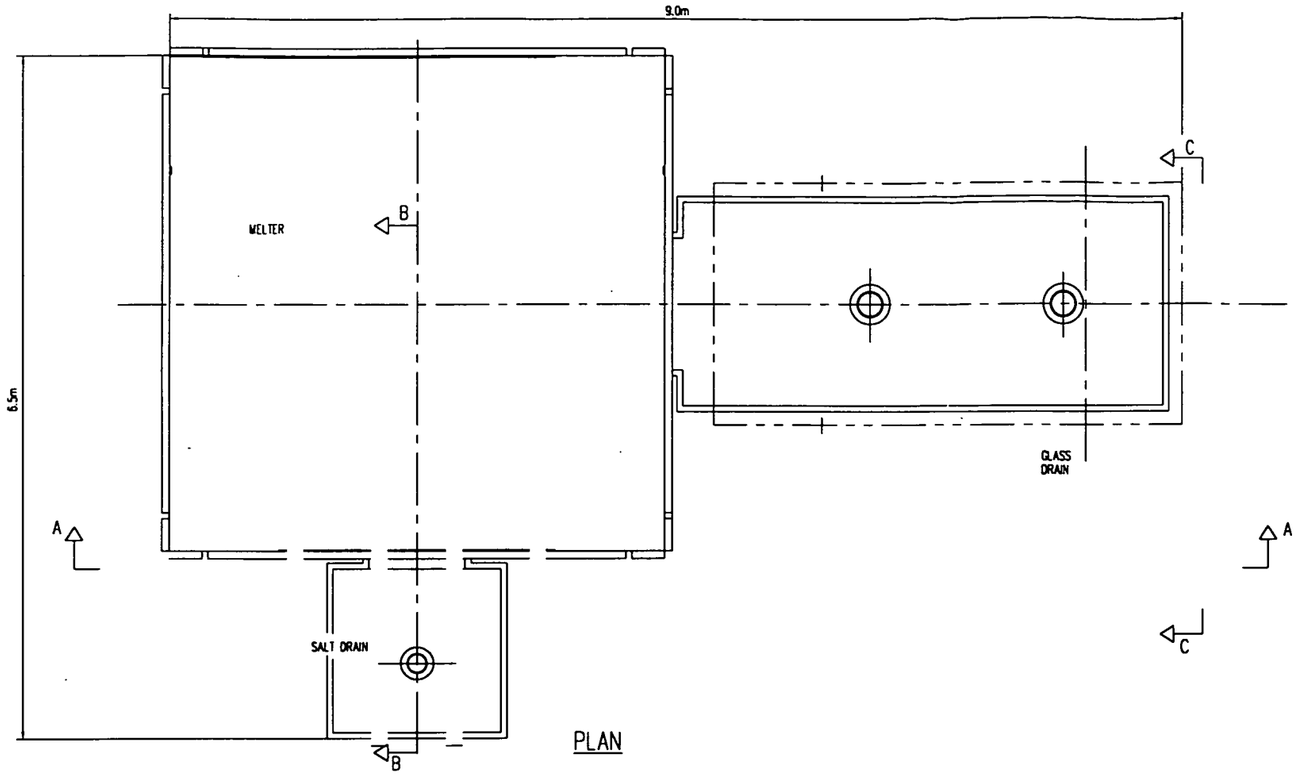
COST DATA

SOURCE / SELLER	Envitco
CONTACT(PHONE #)	Ken Hewlett
QUOTE TYPE	Historical & Vendor Quotes
PRICE EACH	See Report Section 19
QUANITY (UNITS)	1

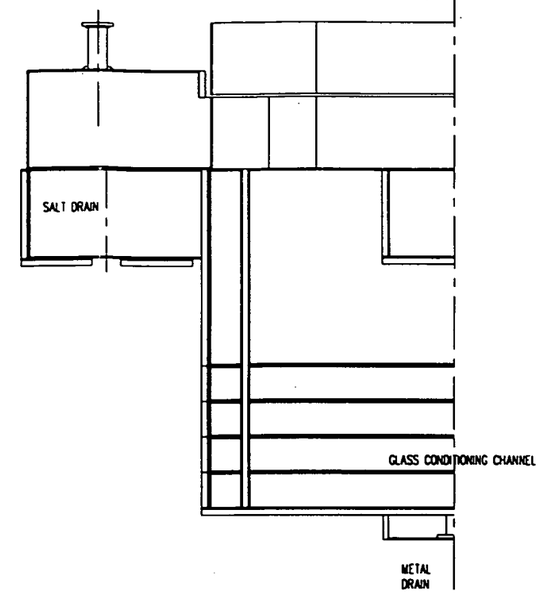
TECHNICAL INFORMATION

SIZE	6.5m (w) x 11.3m (l) x 8.6m (h)
MATERIALS	SS + CS + refractory
CAPACITY	11.0 MTPD
POWER REQ.	2 MW (4160 V)
FUNCTION	vitrify Silos Residue
ESSENTIAL CONTROLS	
COMMENTS	see Drawings FDFG-04 & 05

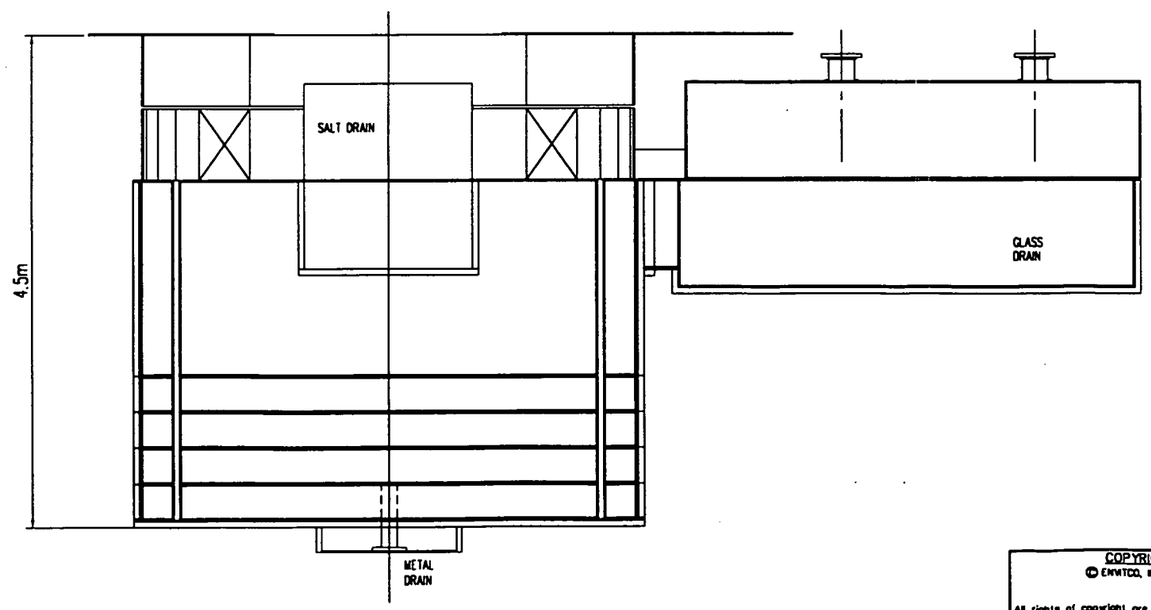
229 1



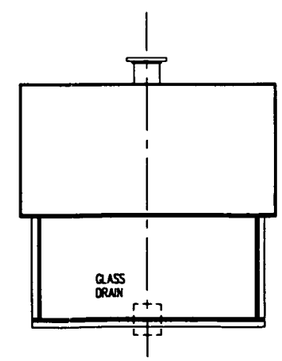
PLAN



SECTION B - B



VIEW A - A



VIEW C- C

SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001540

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHK'D BY

EnVitCo, Inc. 3400 EXECUTIVE PARKWAY TOLEDO, OHIO 43606-0451 USA

98703

TITLE: FURNACE PLAN AND ELEVATION

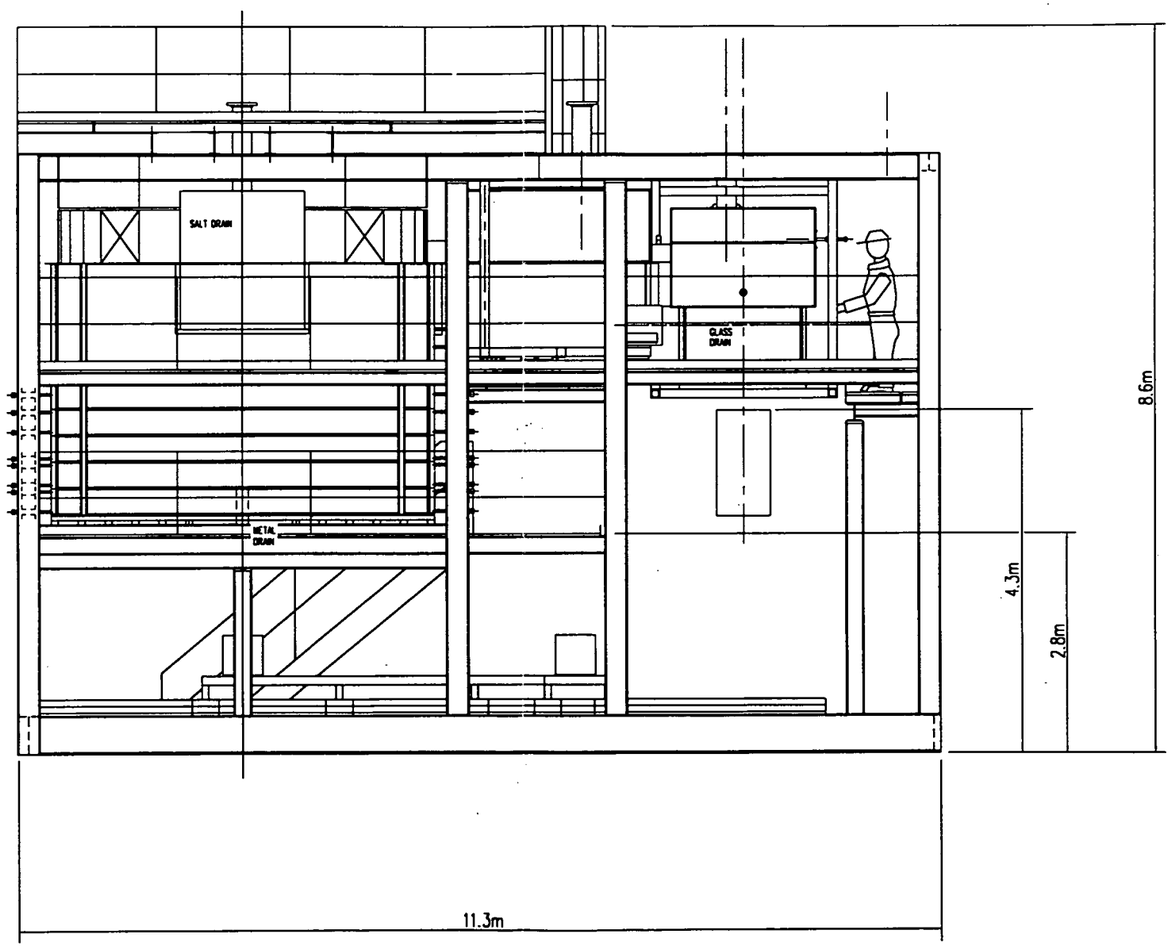
FOR: FERNALD POPT TEST PROGRAM

FLUOR DANIEL FERNALD CINCINNATI, OH

DR. BY: BPT DATE: 02FEB99 SCALE: 1/2"=1'-0" DWG. NO. FDFG-04 REVISION 0

CHK'D BY: KJH DATE: 10MAR99

2291



FURNACE ELEVATION

SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001541

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHK'D BY

EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA

98703

TITLE: FURNACE ELEVATION
FOR: FERNALD POPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR. BPT DATE: 02FEB99
CK. KJH DATE: 10MAR99
SCALE: 3/8"=1'-0"
DWG. NO. FDFG-05
REVISION

EQUIPMENT DATA SHEET

2291

EQUIPMENT NAME	High Efficiency Metal Filter
EQUIPMENT TAG	18-F-221

COST DATA

SOURCE / SELLER	Envitco
CONTACT(PHONE #)	Ken Hewlett
QUOTE TYPE	Vendor Budget Estimate
PRICE EACH	See Report Section 19
QUANITY (UNITS)	1

TECHNICAL INFORMATION

SIZE	
MATERIALS	316L SS
CAPACITY	300 m3/hr
POWER REQ.	
FUNCTION	glass pouring vapor filter 99.9%
ESSENTIAL CONTROLS	differential pressure
COMMENTS	Operating T = 150 - 200 C

EQUIPMENT DATA SHEET

2291

EQUIPMENT NAME	High Efficiency Metal Filter
EQUIPMENT TAG	18-F-201

COST DATA

SOURCE / SELLER	Envitco
CONTACT(PHONE #)	Ken Hewlett
QUOTE TYPE	Vendor Budget Estimate
PRICE EACH	See Report Section 19
QUANITY (UNITS)	2

TECHNICAL INFORMATION

SIZE	
MATERIALS	316L SS
CAPACITY	4000 m3/hr
POWER REQ.	
FUNCTION	high eff. 99.9% filter
ESSENTIAL CONTROLS	differential pressure
COMMENTS	Operating T = 350 - 400 C; same as filter 18-F-202

EQUIPMENT DATA SHEET

2291

EQUIPMENT NAME	Scrubber
EQUIPMENT TAG	18-V-301

COST DATA

SOURCE / SELLER	Envitco
CONTACT(PHONE #)	Ken Hewlett
QUOTE TYPE	Vendor Budget Estimate
PRICE EACH	See Report Section 19
QUANITY (UNITS)	1

TECHNICAL INFORMATION

SIZE	3m x 1.6m x 6.1m (h)
MATERIALS	316L
CAPACITY	3 m3
POWER REQ.	
FUNCTION	quench and scrub melter offgas
ESSENTIAL CONTROLS	
COMMENTS	

EQUIPMENT DATA SHEET

229

EQUIPMENT NAME	Pouring Conveyor Station
EQUIPMENT TAG	23-TA-001

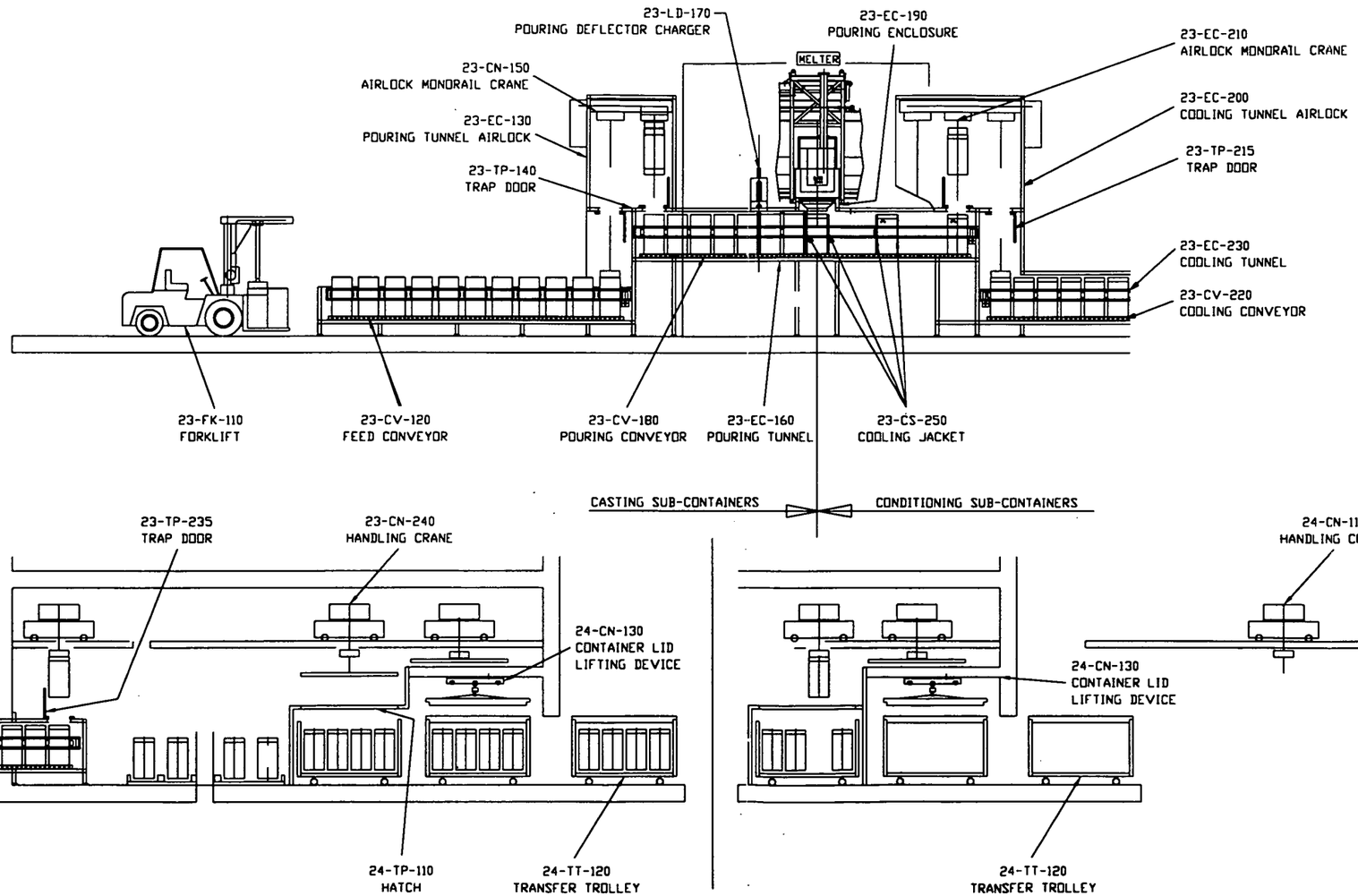
COST DATA

SOURCE / SELLER	Envitco
CONTACT(PHONE #)	Ken Hewlett
QUOTE TYPE	Historical Estimates
PRICE EACH	See Report Section 19
QUANITY (UNITS)	1

TECHNICAL INFORMATION

SIZE	2m x 10m x 2m (h)
MATERIALS	CS + SS rollers
CAPACITY	
POWER REQ.	5 hp
FUNCTION	containment & positioning of subcontainers
ESSENTIAL CONTROLS	
COMMENTS	See attached Drawings FDFG-06 & 07 - includes System 23

2291



SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001546

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE	REV	DESCRIPTION	DRAWN BY	DATE	CHK'D BY
	ISSUED					

EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA

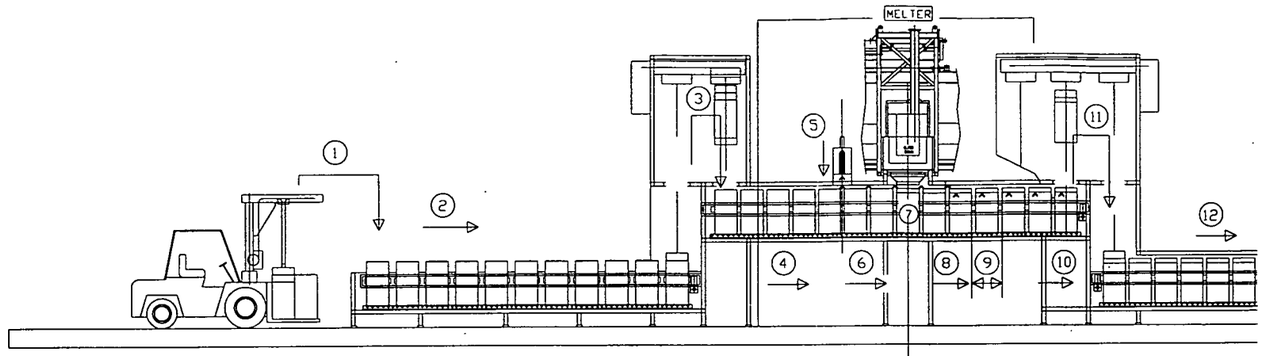
98703

TITLE: CASTING AND CONDITIONING SUB-CONTAINERS
FOR: FERNALD PORT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR. BY: SCN	DATE: 23MAR99	SCALE: NONE	DWG. NO. FDFG-06	REVISION 0
DES. BY: KJH	DATE: 23MAR99			

B-PLOTTED 25/MAR/1999 AT 11:28:9 BY KDK

229 1



EMPTY SUB-CONTAINERS
12 SUB-CONTAINERS/DAY

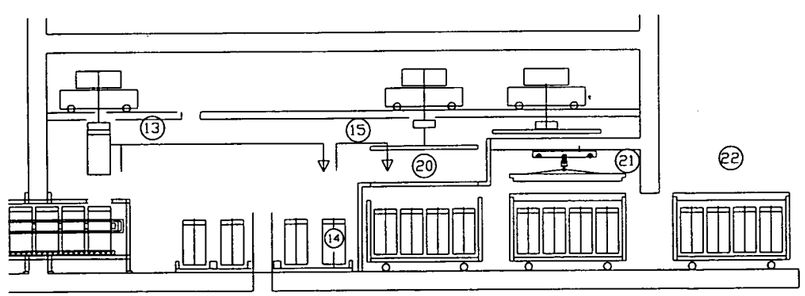
POURING DEFLECTOR
14 / DAY

GLASS
14MT / DAY

1. PLACING OF SUB-CONTAINER ON FEED CONVEYOR
2. TRANSFER OF SUB-CONTAINER INTO POURING ZONE AIR-LOCK
3. TRANSFER OF SUB-CONTAINER ONTO POURING ZONE CONVEYOR
4. TRANSFER OF SUB-CONTAINER TO POURING DEFLECTOR INSTALLATION STATION
5. POURING DEFLECTOR
6. TRANSFER OF SUB-CONTAINER TO POURING STATION
7. POURING SUB-CONTAINER COOLING
8. TRANSFER OF SUB-CONTAINER INTO COOLING ZONE AND FALL OF POURING DEFLECTOR INTO SUB-CONTAINER
9. SUB-CONTAINER COOLING
10. TRANSFER AUTO AIRLOCK
11. TRANSFER OF SUB-CONTAINER ONTO COOLING ZONE CONVEYOR
12. COOLING/TRANSFER OF SUB-CONTAINER TO CONTROLLED COOLING HALL

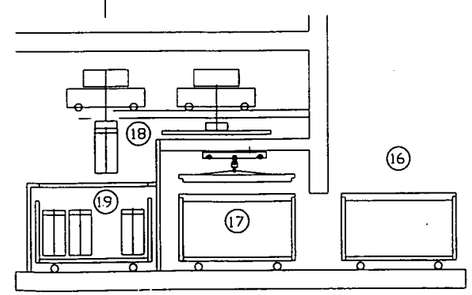
CASTING SUB-CONTAINERS

CONDITIONING SUB-CONTAINERS



SUB-CONTAINER COOLING AND CHECKING

13. TRANSFER OF SUB-CONTAINER INTO CONTROLLED COOLING ROOM
14. SUB-CONTAINER CONTROLLED COOLING
15. TRANSFER OF SUB-CONTAINER ONTO EXIT CONVEYOR
20. HATCH CLOSING
21. REPOSITIONING THE TROLLEY LID
22. TRANSFER TO THE STORAGE AREA



19. POSITIONING 4 SUB-CONTAINERS INTO THE CONCRETE CONTAINER
18. HATCH OPENING
17. REMOVAL OF TROLLEY LID
16. ARRIVAL OF TROLLEY AND CONTAINER

SEE MATERIAL LIST SHEET NUMBER

SEE SPECIFICATION SHEET NUMBER

001547

COPYRIGHT
© ENVITCO, INC. 1999

All rights of copyright are vested in ENVITCO INC. The drawing is supplied on condition that it will be kept in conditions of security and that no part of the drawing or of any information included thereon may be reproduced, used, disclosed or shown to any person except in accordance with the terms of any express written authority given by ENVITCO, INC.

CODE	DATE ISSUED	REV	DESCRIPTION	DRAWN BY	DATE	CHK'D BY

EnVitCo, Inc.
3400 EXECUTIVE PARKWAY
TOLEDO, OHIO 43606-0451 USA
98703

TITLE: CASTING AND CONDITIONING SUB-CONTAINERS
FOR: FERNALD POPT TEST PROGRAM
FLUOR DANIEL FERNALD CINCINNATI, OH

DR BY SGN	DATE: 23MAR99	SCALE NONE	DWG. NO. FDFG-07	REVISION 0
CK BY KJH	DATE: 23MAR99			

EQUIPMENT DATA SHEET

2291

EQUIPMENT NAME	High Temperature Pre-filter
EQUIPMENT TAG	18-F-101

COST DATA

SOURCE / SELLER	Envitco
CONTACT(PHONE #)	Ken Hewlett
QUOTE TYPE	Vendor Budget Estimate
PRICE EACH	See Report Section 19
QUANITY (UNITS)	1

TECHNICAL INFORMATION

SIZE	1.5 x 0.6 x 1.5m (h)
MATERIALS	316L SS
CAPACITY	4000 m3/hr
POWER REQ.	
FUNCTION	offgas solids filter 99%
ESSENTIAL CONTROLS	differential pressure
COMMENTS	Operating T = 400 C

EQUIPMENT DATA SHEET

2291

EQUIPMENT NAME	Scrubber Waste Reverse Osmosis Unit
EQUIPMENT TAG	19-RO-001

COST DATA

SOURCE / SELLER	Envitco
CONTACT(PHONE #)	Ken Hewlett
QUOTE TYPE	Vendor Estimate
PRICE EACH	See Report Section 19
QUANITY (UNITS)	1

TECHNICAL INFORMATION

SIZE	6 m (l) x 2.1 m (w) x 1.8 m (h)
MATERIALS	
CAPACITY	700 L/hour (3 GPM) permeate from 1,400 L/hr (6 GPM) feed
POWER REQ.	
FUNCTION	Reduce scrubber waste volume by removing water
ESSENTIAL CONTROLS	
COMMENTS	Vendor-supplied package unit, including reverse osmosis membranes, feed tank, pumps, and controls

EQUIPMENT DATA SHEET

2291

EQUIPMENT NAME	Scrubber Waste Filter Unit
EQUIPMENT TAG	19-F-001

COST DATA

SOURCE / SELLER	Envitco
CONTACT(PHONE #)	Ken Hewlett
QUOTE TYPE	Vendor Estimate
PRICE EACH	See Report Section 19
QUANITY (UNITS)	1

TECHNICAL INFORMATION

SIZE	2.5 m(l) x 3.7 m(w) x 1.8 m(h)
MATERIALS	
CAPACITY	1750 L/hour (7.7 GPM) filtrate
POWER REQ.	
FUNCTION	Remove solids from scrubber solution. Return solids slurry to melter feed preparation
ESSENTIAL CONTROLS	
COMMENTS	Vendor-supplied package unit, including filter, feed tank, pumps, and controls