HAFB 2003

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 49TH FIGHTER WING (ACC)
HOLLOMAN AIR FORCE BASE, NEW MEXICO

18 APR 2003

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MEMORANDUM FOR NEW MEXICO ENVIRONMENT DEPARTMENT
Attn: Mr. James Bearzi
Hazardous Waste Bureau
2905 Rodeo Park Drive, East Bldg 1
Santa Fe NM 87505-6303

FROM: 49 CES/CD
550 Tabosa Ave
Holloman AFB, NM 88330-8458

SUBJECT: Submittal of Fourth Quarter 2001 Monitoring Report, 20,000-Pound Open Detonation Unit (ODU) and Quality Assurance/Quality Control Report

1. Attached is the Fourth Quarter 2001 20,000-pound ODU Monitoring Report and the Fourth Quarter 2001 Monitoring Report Quality Assurance/Quality Control (Atchs 1 and 2, respectively).

2. The monitoring reports contain the results of soil sampling following the detonation events of 20 Oct 01. These results were compared to decision criteria specified in Atch J of the Operating Permit. Results from these analyses show that the ODU operations are effective.

3. If you have any questions or require additional information, please contact Ms. Debbie Hartell or Mr. Darvin St. John at (505) 572-3931.

Howard E. Moffitt
HOWARD E. MOFFITT
Deputy Base Civil Engineer

Attachments:
1. Fourth Quarter 2001 Monitoring Report 20,000-Pound Open Detonation Unit
2. Fourth Quarter 2001 Monitoring Report Quality Assurance/Quality Control Results

cc w/Atchs:
Mr. Cornelius Amindyas
New Mexico Environment Department
Hazardous waste Bureau
4131 Montgomery Blvd NE
Albuquerque, New Mexico 87109

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Final

Fourth Quarter 2001 Monitoring Report
20,000-Pound Open Detonation Unit

Holloman Air Force Base,
New Mexico

April 2003

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49 CES/CEV
Holloman Air Force Base,
New Mexico

FINAL
FOURTH QUARTER 2001 MONITORING REPORT
20,000-POUND OPEN DETONATION UNIT

Prepared for:

Holloman Air Force Base
49 CES/CEV
550 Tabosa Avenue
Holloman AFB, New Mexico 88330

Prepared by:

Foster Wheeler Environmental Corporation
143 Union Boulevard, Suite 1010
Lakewood, CO 80228

Under Contract No. DACW45-94-D-0003

Delivery Order 37, Work Authorization Directive 7

U.S. Army Corps of Engineers
Omaha District
Omaha, Nebraska

April 2003

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LIST OF ACRONYMS

AFB	Air Force Base
DQO	data quality objective
EOD	explosive ordnance disposal
EPA	United States Environmental Protection Agency
HMX	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/kg	milligrams per kilogram
NCP	National Contingency Plan
OD	open detonation
QA	quality assurance
QC	quality control
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
USAF	United States Air Force
UTL	upper tolerance limit
Work Plan	Final Work Plan Addendum

1.0 INTRODUCTION

During the fourth quarter of 2001, Holloman Air Force Base (AFB) performed the 14th quarterly sampling event at the 20,000-Pound Open Detonation (OD) Unit in accordance with Attachment J of the operating permit Sampling and Analysis Plan (USAF, 1996). Twelve locations were sampled for metals and explosive compounds and the analytical results were compared to the decision criteria outlined on page 33 of Attachment J of the operating permit. No sample results exceeded the decision criteria, and therefore, no changes to operations at the 20,000-Pound OD Unit are recommended. The following report summarizes the field operations, analytical results, potential risk, and conclusions from the 14th quarterly sampling event.

2.0 FIELD OPERATIONS

The fourth quarter 2001 detonation event occurred on October 18, and sampling was conducted on October 20, 2001. A total of 12 soil samples and one field duplicate were collected from 3 different strata within the boundaries of the 20,000-Pound OD Unit. Field and quality assurance/quality control (QA/QC) samples were obtained following the procedures outlined in the Final Work Plan Addendum for the 20,000-Pound Open Detonation Unit (Work Plan) (Foster Wheeler, 1999). Samples were analyzed for metals and explosive compounds as specified in the Work Plan.

During the field operations, the dimensions of each stratum were measured and recorded, and a grid was developed based on these measurements. Random sampling locations were determined following the guidelines established in the Work Plan. Sample locations are listed in Table 2-1.

Samples were labeled according to the following number sequence: OD-SO-s-x, where

OD = open detonation
SO = soil
s = stratum (A, B, or C)
x = sequential sample number within each stratum (01, 02, 03, 04)

Table 2-1. Fourth Quarter 2001 Sample Locations

Stratum: A
Number of Samples: 4
Number of Potential
Sampling Locations (n): 16
Scale Factor (n-1): 15

Sample Number	Random Number	Scaled Random Number	Grid-to-Node Sample
1	0.942	14.1	A14
2	0.888	13.3	A13
3	0.188	2.8	A3
4	0.610	9.1	A9

Stratum: B
Number of Samples: 4
Number of Potential
Sampling Locations (n): 20
Scale Factor (n-1): 19

Sample Number	Random Number	Scaled Random Number	Grid-to-Node Sample
1	0.975	18.5	B19
2	0.146	2.8	B3
3	0.397	7.5	B8
4	0.476	9.0	B9

Stratum: C
Number of Samples: 4
Number of Potential
Sampling Locations (n): 24
Scale Factor (n-1): 23

Sample Number	Random Number	Scaled Random Number	Grid-to-Node Sample
1	0.250	5.8	C6
2	0.776	17.8	C18
3	0.974	22.4	C22
4	0.592	13.6	C14

The area sampled was based on wind data recorded at the time of the August 10, September 21, September 25, and October 18, 2001 detonations. The assumption was made that any small particles from the detonation events would settle downwind of the detonation location. Figure 2-1 illustrates the strata layout and the sample locations associated with the October 20, 2001 sampling event. The wind data are presented below:

- August 10, 2001 (11:45)—wind direction 300 degrees/wind speed 9 knots
- September 21, 2001 (21:11)—wind direction 190 degrees/wind speed 8 knots
- September 25, 2001 (11:20)—wind direction variable/wind speed 5 knots
- October 18, 2001 (11:43)—wind direction variable/wind speed 3 knots

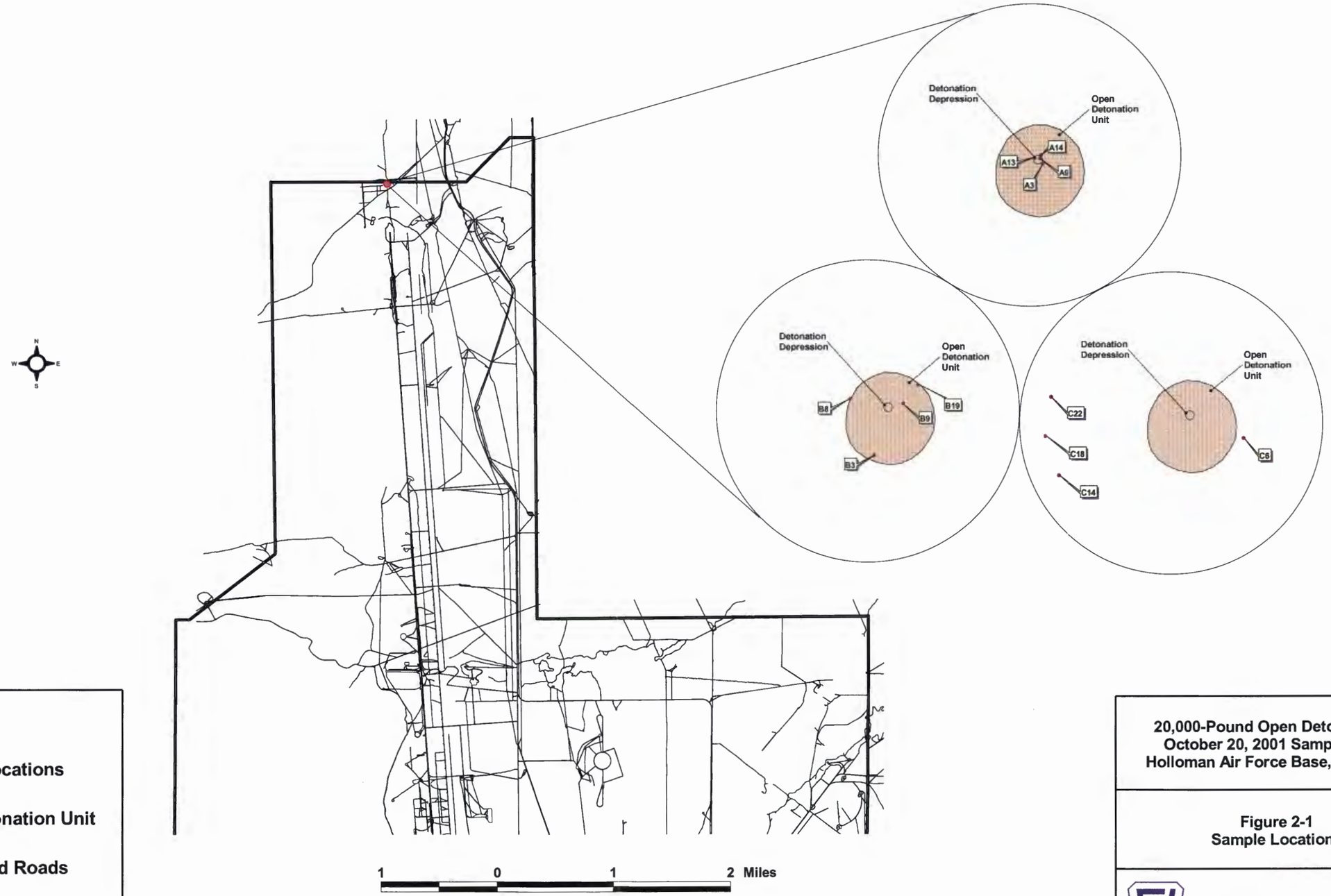
3.0 ANALYTICAL RESULTS

This section presents an evaluation of the QA/QC data associated with the analytical results for the fourth quarter 2001 monitoring event. Analytical methods for chemical analysis were taken from the latest revision of United States Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste, SW-846, Third Edition and Updates (EPA, 1986).

3.1 QUALITY ASSURANCE/QUALITY CONTROL SUMMARY

The QC data were reviewed to determine usability and achievement of project data quality objectives (DQOs). The review focused on laboratory method blanks, matrix and control sample spikes, surrogate recoveries, and holding times. Overall, QC data associated with this sampling event indicate that project measurement data are reliable and fulfill project DQOs.

The explosives data (EPA SW-846 Methods 8330 and 8332) for this monitoring event are reported to the method detection limit. A "J" qualifier signifying an estimated concentration was assigned to concentrations reported below the sample-specific detection limit and above the method detection limit. Explosive compounds that were not detected are reported with a "U" qualifier accompanying the sample detection limit.



LEGEND

- Sample Locations
- Open Detonation Unit
- Streets and Roads
- Installation Boundary

20,000-Pound Open Detonation Unit
October 20, 2001 Sampling Event
Holloman Air Force Base, New Mexico

Figure 2-1
Sample Locations

Foster Wheeler Environmental Corporation

January 2003

The reported metals results are uncensored; all instrument response measurements are reported as measured concentrations. A "B" qualifier was assigned to reported concentrations that were less than the sample detection limit and indicates that there is less confidence associated with the reported concentration (i.e., estimated quantitation). Metals that were not detected are reported with a "U" qualifier accompanying the sample detection limit.

3.2 RESULTS SUMMARY

Soil samples were collected and analyzed for the parameters specified in the operating permit and outlined in Table 3-1. Complete analytical results and the associated chain-of-custody record for the fourth quarter 2001 monitoring event are provided in Appendix A. This section summarizes the analytical results and provides a comparison of the sample results with the site-specific background values.

3.2.1 Explosives Results

Explosive compounds detected during this monitoring event were reported above and below the sample-specific detection limit. Compounds reported below the detection limit were assigned a "J" qualifier. The following explosive compounds were detected:

- Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) in one sample above the sample detection limit (sample OD-SO-B-04)
- Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) in two samples above the sample detection limit (samples OD-SO-B-03 and OD-SO-B-04)
- Nitrobenzene in one sample above the sample detection limit (OD-SO-B-04) and in one sample below the sample detection limit (OD-SO-A-03)
- 2,4-Dinitrotoluene in one sample above the sample detection limit (OD-SO-B-04)
- Nitroglycerine in two samples above the sample detection limit (OD-SO-A-04 and OD-SO-B-04)

Because no site-specific background upper tolerance limits (UTLs) exist for explosives at this site (Radian, 1997), the detected compounds were carried forward to the risk evaluation phase. The maximum detected concentrations of explosive compounds for the fourth quarter 2001

monitoring event are presented in Table 3-2. The risk evaluation is described in Section 4.0 of this report.

Table 3-1. Analytical Methods and Parameters

EPA SW-846 Method 6010B (Metals)
Antimony
Arsenic
Barium
Beryllium
Cadmium
Chromium (total)
Copper
Lead
Nickel
Selenium
Silver
EPA SW-846 Method 7471A
Mercury
EPA SW-846 Method 8330 (Explosives)
2-Amino-4,6-dinitrotoluene
4-Amino-2,6-dinitrotoluene
1,3,5-Trinitrobenzene
1,3-Dinitrobenzene
2,4,6-Trinitrotoluene
2,4-Dinitrotoluene
2,6-Dinitrotoluene
2-Nitrotoluene
3-Nitrotoluene
4-Nitrotoluene
HMX
Nitrobenzene
RDX
Tetryl
PETN
EPA SW-846 Method 8332 (Nitroamine Explosives)
Nitroglycerine

Notes:

EPA	United States Environmental Protection Agency
HMX	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
PETN	pentaerythritol tetranitrate
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
Tetryl	methyl-2,4,6-trinitrophenylnitramine

Table 3-2. Maximum Detected Concentrations, Frequency of Detections, and UTLs for Explosives and Metals

Constituent	Maximum Detected Concentration	Frequency of Detections	Site-Specific Background UTLs[1]
Metals	**mg/kg**		**mg/kg**
Antimony	4.4	2/12	7.3
Arsenic	2.3B	8/12	37
Barium	47.3	12/12	84
Beryllium	0.21	12/12	0.40
Cadmium	**2.0**	8/12	**1.0**
Chromium	**7.3**	12/12	**6.6**
Copper	**7.1**	12/12	**4.8**
Lead [2]	19.0	12/12	na
Nickel	3.8	12/12	5.6
Selenium	0.54B	4/12	10.5
Silver	**2.4**	3/12	**0.7**
Explosives	**µg/kg**		**µg/kg**
2,4-Dinitrotoluene	110	1/12	NA
HMX	3,100	1/12	NA
Nitrobenzene	150	2/12	NA
Nitroglycerine	321,000	2/12	NA
RDX	2,700	2/12	NA

Notes:

[1] UTLs are taken from 20,000-Pound Open Detonation Unit Background Study and Quarterly Monitoring Work Plan, Part II—Background Study (Radian, 1997).

[2] A discussion of the lead screening level is included in the text.

µg/kg micrograms per kilogram

mg/kg milligrams per kilogram

na Background value not available in Background Study (Radian, 1997)

NA Background values not applicable to organic constituents

Bolded values indicate exceedance of the Site-Specific Background UTLs

3.2.2 Metals Results

Metals detected for this monitoring event were reported above the sample-specific detection limit (no laboratory qualifier) and below the sample-specific detection limit, but above the method detection limit ("B" qualifier). Metals that were not detected were reported at the sample detection limit accompanied by a "U" qualifier, signifying a nondetect value. The following metals were detected:

- Arsenic in eight samples below the sample detection limit (samples OD-SO-A-01, OD-SO-B-01, -02, -04, OD-SO-C-01, -02, -03, -04)

- Barium and chromium in all samples above the sample detection limit (all sample IDs)
- Beryllium in 11 samples below the sample detection limit and in 1 sample above the sample detection limit (all sample IDs)
- Cadmium in two samples above the sample detection limit and in six samples below the sample detection limit (samples OD-SO-A-01, -04, OD-SO-B-02, -04, OD-SO-C-01, -02, -03, -04)
- Copper in one sample below the sample detection limit and in eleven samples above the sample detection limit (all sample IDs)
- Lead in five samples below the sample detection limit and in seven samples above the sample detection limit (all sample IDs)
- Nickel in 2 samples below the sample detection limit and in 10 samples above the sample detection limit (all sample IDs)
- Selenium in four samples below the sample detection limit (OD-SO-A-04, OD-SO-B-03, -04, OD-SO-C-04)
- Silver in three samples above the sample detection limit (OD-SO-A-04, OD-SO-B-04, OD-SO-C-02)

The metals analytical results were compared to the site-specific background UTLs listed in the table (Radium, 1997). The maximum detected concentrations for cadmium, chromium, copper, and silver exceeded the UTLs. Because no UTL or toxicity values exist for lead, detections of lead were compared to the EPA Region 6 Human Health Medium-Specific Screening Levels (EPA, 2001). The maximum detected concentrations for metals during the fourth quarter 2001 monitoring event are presented in Table 3-2.

4.0 EVALUATION OF POTENTIAL RISK

Inorganic constituents that exceeded site-specific background UTLs and all detected organic constituents were evaluated to determine if the constituent concentrations at the site pose a potential risk to human health. This section describes the methodology that was used for this evaluation, as well as the results of the noncarcinogenic and carcinogenic risk evaluations.

4.1 METHODOLOGY

The 20,000-Pound OD Unit is located in an isolated area of Holloman AFB. Access to the area is restricted to authorized explosive ordnance disposal (EOD) personnel working at the site during a detonation, and unauthorized entry is prevented by security fences and continuous surveillance in addition to warning signs. The evaluation of potential risk was based on the

amount of soil incidentally ingested by the EOD personnel in a realistic, but conservative, exposure scenario. This exposure scenario considered the frequency of detonations, the amount of time spent at the 20,000-Pound OD Unit for each detonation, and the length of time personnel would be assigned to this duty.

It was assumed that a maximum of 20 detonations would be conducted in 1 year. This is a conservative estimate because the actual number of detonations is approximately 15 per year. Typically, the site is inspected on the day after detonation, and therefore it was also assumed that EOD personnel are at the 20,000-Pound OD Unit for 2 days during each detonation. Thus, 40 days per year was used as the exposure frequency in the risk assessment calculations. This estimate of exposure is still very conservative because the personnel are only on site for a portion of the day of detonation and the day following detonation. It was therefore assumed that only half of the soil that is incidentally ingested during those 40 days is obtained at the site. Finally, the exposure scenario assumed that the same personnel attend every detonation for 5 years. Since only military personnel staff the EOD office, 5 years is a conservative estimate because military personnel are frequently reassigned to different units or duties. The exposure scenario is further defined in the Risk Evaluation Calculation Sheet in Appendix B.

The maximum detected concentrations of antimony, arsenic, barium, beryllium, nickel, and selenium did not exceed the site-specific background UTLs, so these analytes were not carried forward to the risk evaluation phase (see Table 3-2). Cadmium, chromium, copper, and silver exceeded the site-specific background UTLs; therefore, these metals were evaluated in the risk evaluation phase. Lead does not have a background UTL or toxicity value and is not quantitatively evaluated in the risk evaluation phase; however a qualitative discussion is presented in Section 4.2. The explosive compounds 2,4-dinitrotoluene, HMX, nitrobenzene, nitroglycerine, and RDX were also detected and therefore were included in the risk evaluation.

The maximum detected concentrations of cadmium, chromium, copper, silver, 2,4-dinitrotoluene, HMX, nitrobenzene, nitroglycerine, and RDX (listed in Table 3-2) were used to calculate risk. It was conservatively assumed that personnel are exposed to the maximum concentration of these constituents throughout the length of the exposure scenario described above.

4.2 RESULTS OF RISK EVALUATION

Table 4-1 presents the noncancer risk (i.e., hazard quotient) and cancer risk estimates for each of the constituents that were carried forward to the risk assessment phase, as well as the hazard index (sum of the hazard quotients) and the total cancer risk. The hazard index is a conservative estimate because it assumes that the toxic effects of the different chemicals are additive. The National Contingency Plan (NCP) risk range goal is a hazard index of less than 1.0 and a cancer risk estimate less than 1×10^{-6} (Title 40 of the Code of Federal Regulations, Part 300). Below these levels, no significant adverse effects are anticipated. At the 20,000-Pound OD Unit, all of the hazard quotients and the hazard index are well below 1.0; the hazard index is 0.0005 (see Table 4-1). The total cancer risk for the site of 3×10^{-8} is well below the NCP goal of 1×10^{-6}. The total cancer risk is based on the individual cancer risks for 2,4-dinitrotoluene, nitroglycerine, and RDX, which are the only constituents classified as oral carcinogens or have carcinogenic toxicity data.

The maximum detection of lead was compared to the EPA Region 6 Human Health Medium-Specific Screening Level (EPA, 2001) value for the industrial worker exposure scenario (1,400 milligrams per kilogram [mg/kg]). Because the maximum detected concentration of 19 mg/kg is considerably less than 1,400 mg/kg, no risk attributed to lead exposure is anticipated at this site.

All constituents met the decision criteria specified in Attachment J of the operating permit. All inorganic constituents were either below site-specific background levels or the calculated site-specific risk estimates were well below the NCP goals. The calculated site-specific risk estimates for the five detected organic constituents (2,4-dinitrotoluene, HMX, nitrobenzene, nitroglycerine, and RDX) were also well below the NCP goals. The results of the site-specific risk estimates indicate that no adverse effects are anticipated from exposure during detonation events at the 20,000-Pound OD Unit.

5.0 CONCLUSION

The results of comparing the fourth quarter 2001 monitoring data (14th quarterly event) with the decision criteria specified in Attachment J of the operating permit indicate that the treatment operations at the 20,000-Pound OD Unit are effective. A statistical analysis will be performed on

the risk evaluation results from the first eight quarterly monitoring events to determine whether further quarterly monitoring at the 20,000-Pound OD Unit will be recommended.

Table 4-1. Hazard Index and Cancer Risk

Constituent	Non-carcinogenic Intake (mg/kg/day)	Carcinogenic Intake (mg/kg/day)	Oral RfD (mg/kg/day)	Oral RfD Source	Oral Slope Factor $(mg/kg/day)^{-1}$	Oral Slope Factor Source	Hazard Quotient[1]	Cancer Risk
Metals								
Cadmium	1.6E-07	1.1E-08	0.001	IRIS	NA[2]	IRIS	0.00016	NC
Chromium[3]	5.7E-07	4.1E-08	0.003	IRIS	NAP	IRIS	0.00019	NC
Copper	5.6E-07	4.0E-08	0.037	EPA R6	NAP	IRIS	0.000015	NC
Silver	1.9E-07	1.3E-08	0.005	IRIS	NAP	IRIS	0.000038	NC
Explosives								
2,4-Dinitrotoluene [4]	8.6E-09	6.2E-10	0.002	IRIS	0.68	IRIS	0.0000043	4.2E-10
HMX	2.4E-07	1.7E-08	0.05	IRIS	NAP	IRIS	0.0000049	NC
Nitrobenzene	1.2E-08	8.4E-10	0.0005	IRIS	NAP	IRIS	0.00002	NC
Nitroglycerine	2.5E-05	1.8E-06	NA	NA	0.014	NCEA	NC	2.5E-08
RDX	2.1E-07	1.5E-08	0.003	IRIS	0.11	IRIS	0.000071	1.7E-09
						Total =	0.0005	3E-08

Notes:

1	The sum of the hazard quotients is the hazard index.
2	No oral slope factor developed, however IRIS lists as B1 probable human carcinogen – based on limited evidence of carcinogenicity. Seven studies in rats and mice wherein cadmium salts (acetate, sulfate, chloride) were administered orally have shown no evidence of carcinogenic response.
3	The toxicity value for hexavalent chromium was conservatively used.
4	The oral slope factor for 2,4/2,6-dinitrotoluene mixture was used.
1.0E-03	The designation of 1.0E-03 is equivalent to 1.0×10^{-3} or 0.001.
EPA R6	EPA Region 6. Human Health Medium-Specific Screening Levels. Last updated, November 2001.
HMX	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
IRIS	EPA Integrated Risk Information System. Online. Accessed November 21, 2002.
mg/kg/day	milligrams per kilogram per day
NA	carcinogenic data not available
NAP	Not applicable, constituent is a Class "D" carcinogen (not known to be carcinogenic to humans).
NC	Not calculated; constituent is non-carcinogenic or no toxicity data exist
NCEA	National Center for Environmental Assessment
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
RfD	reference dose

6.0 REFERENCES

EPA (United States Environmental Protection Agency)

1986 SW-846, Test Methods for Evaluating Solid Waste, Third Edition and Updates.

1997 Health Effects Assessment Summary Tables.

2001 (November). Region 6. Human Health Medium-Specific Screening Levels.

Foster Wheeler (Foster Wheeler Environmental Corporation)

1999 (January). Final Work Plan Addendum for the 20,000-Pound Open Detonation Unit, Holloman Air Force Base, New Mexico.

Radian (Radian Corporation)

1997 (December). 20,000-Pound Open Detonation Unit Background Study and Quarterly Monitoring Work Plan. Part II—Background Study, Holloman Air Force Base, New Mexico.

USAF (United States Air Force)

1996. Holloman Air Force Base Open Detonation Treatment Unit Permit Attachment J, Sampling and Analysis Plan.

APPENDIX A

Analytical Results

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-A-01	10/20/2001	CLP_SOLIDS	Percent Solids		89.2	%	
		SW6010B	Antimony	U	1	mg/kg	
			Arsenic	B	0.68	mg/kg	
			Barium		23.5	mg/kg	
			Beryllium	B	0.04	mg/kg	
			Cadmium	B	0.06	mg/kg	
			Chromium		1.9	mg/kg	
			Copper	B	1	mg/kg	
			Lead	B	1	mg/kg	
			Nickel	B	0.83	mg/kg	
			Selenium	U	0.26	mg/kg	
			Silver	U	0.25	mg/kg	
			Thallium	U	0.7	mg/kg	
			Zinc		3.8	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	5600	ug/kg	
OD-SO-A-02		CLP_SOLIDS	Percent Solids		89.9	%	
		SW6010B	Antimony	U	1	mg/kg	
			Arsenic	U	0.57	mg/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-A-02	10/20/2001	SW6010B	Barium		22.7	mg/kg	
			Beryllium	B	0.03	mg/kg	
			Cadmium	U	0.05	mg/kg	
			Chromium		2.1	mg/kg	
			Copper		1.2	mg/kg	
			Lead	B	0.97	mg/kg	
			Nickel	B	0.87	mg/kg	
			Selenium	U	0.26	mg/kg	
			Silver	U	0.25	mg/kg	
			Thallium	U	0.7	mg/kg	
			Zinc		4.1	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	5600	ug/kg	
OD-SO-A-03		CLP_SOLIDS	Percent Solids		88	%	
		SW6010B	Antimony	U	1	mg/kg	
			Arsenic	U	0.57	mg/kg	
			Barium		23	mg/kg	
			Beryllium	B	0.03	mg/kg	
			Cadmium	U	0.05	mg/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-A-03	10/20/2001	SW6010B	Chromium		2.2	mg/kg	
			Copper		1.8	mg/kg	
			Lead	B	1	mg/kg	
			Nickel		1.1	mg/kg	
			Selenium	U	0.26	mg/kg	
			Silver	U	0.25	mg/kg	
			Thallium	U	0.71	mg/kg	
			Zinc		5.2	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	J	85	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	5700	ug/kg	
OD-SO-A-04		CLP_SOLIDS	Percent Solids		85.8	%	
		SW6010B	Antimony		4.4	mg/kg	
			Arsenic	U	0.6	mg/kg	
			Barium		26.7	mg/kg	
			Beryllium	B	0.04	mg/kg	
			Cadmium		2	mg/kg	
			Chromium		7.3	mg/kg	
			Copper		2.4	mg/kg	
			Lead		19	mg/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-A-04	10/20/2001	SW6010B	Nickel		2.6	mg/kg	
			Selenium	B	0.41	mg/kg	
			Silver		2.4	mg/kg	
			Thallium	U	0.74	mg/kg	
			Zinc		6.1	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	UJ
			1,3-Dinitrobenzene	U	100	ug/kg	UJ
			2,4,6-Trinitrotoluene	U	100	ug/kg	UJ
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	UJ
			HMX	U	200	ug/kg	UJ
			m-Nitrotoluene	U	200	ug/kg	UJ
			Nitrobenzene	U	100	ug/kg	UJ
			o-Nitrotoluene	U	200	ug/kg	UJ
			p-Nitrotoluene	U	200	ug/kg	UJ
			Pentaerythritol Tetranitrate	U	500	ug/kg	UJ
			RDX	U	200	ug/kg	UJ
			Tetryl	U	200	ug/kg	UJ
		SW8332	Nitroglycerine		55000	ug/kg	
OD-SO-B-01		CLP_SOLIDS	Percent Solids		83.1	%	
		SW6010B	Antimony	U	1.1	mg/kg	
			Arsenic	B	0.67	mg/kg	
			Barium		28.3	mg/kg	
			Beryllium	B	0.04	mg/kg	
			Cadmium	U	0.06	mg/kg	
			Chromium		2.7	mg/kg	
			Copper		2.6	mg/kg	
			Lead	B	1.1	mg/kg	
			Nickel		1.5	mg/kg	
			Selenium	U	0.28	mg/kg	
			Silver	U	0.27	mg/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-B-01	10/20/2001	SW6010B	Thallium	U	0.75	mg/kg	
			Zinc		6.5	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	6000	ug/kg	
OD-SO-B-02		CLP_SOLIDS	Percent Solids		83.2	%	
		SW6010B	Antimony	U	1.1	mg/kg	
			Arsenic	B	1.2	mg/kg	
			Barium		42.1	mg/kg	
			Beryllium	B	0.11	mg/kg	
			Cadmium	B	0.11	mg/kg	
			Chromium		4.2	mg/kg	
			Copper		4.1	mg/kg	
			Lead		2.6	mg/kg	
			Nickel		2.7	mg/kg	
			Selenium	U	0.28	mg/kg	
			Silver	U	0.27	mg/kg	
			Thallium	U	0.75	mg/kg	
			Zinc		11.9	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-B-02	10/20/2001	SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	6000	ug/kg	
OD-SO-B-02D		CLP_SOLIDS	Percent Solids		84.4	%	
		SW6010B	Antimony	U	1.1	mg/kg	
			Arsenic	B	0.75	mg/kg	
			Barium		43.1	mg/kg	
			Beryllium	B	0.12	mg/kg	
			Cadmium	B	0.11	mg/kg	
			Chromium		4.2	mg/kg	
			Copper		4.2	mg/kg	
			Lead		2.7	mg/kg	
			Nickel		2.7	mg/kg	
			Selenium	U	0.28	mg/kg	
			Silver	U	0.26	mg/kg	
			Thallium	U	0.75	mg/kg	
			Zinc		11.8	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-B-02D	10/20/2001	SW8330	2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	5900	ug/kg	
OD-SO-B-03		CLP_SOLIDS	Percent Solids		79.4	%	
		SW6010B	Antimony	U	1.2	mg/kg	
			Arsenic	U	0.64	mg/kg	
			Barium		29.9	mg/kg	
			Beryllium	B	0.03	mg/kg	
			Cadmium	U	0.06	mg/kg	
			Chromium		2.5	mg/kg	
			Copper		2.6	mg/kg	
			Lead	B	1	mg/kg	
			Nickel		1.4	mg/kg	
			Selenium	B	0.54	mg/kg	
			Silver	U	0.28	mg/kg	
			Thallium	U	0.79	mg/kg	
			Zinc		6	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-B-03	10/20/2001	SW8330	m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX		320	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	6300	ug/kg	
OD-SO-B-04		CLP_SOLIDS	Percent Solids		83.9	%	
		SW6010B	Antimony	B	1.7	mg/kg	
			Arsenic	B	2.3	mg/kg	
			Barium		47.3	mg/kg	
			Beryllium	B	0.21	mg/kg	
			Cadmium		0.36	mg/kg	
			Chromium		5.4	mg/kg	
			Copper		6.9	mg/kg	
			Lead		14.7	mg/kg	
			Nickel		3.8	mg/kg	
			Selenium	B	0.28	mg/kg	
			Silver		0.59	mg/kg	
			Thallium	U	0.75	mg/kg	
			Zinc		14.8	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene		110	ug/kg	J
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX		3100	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene		150	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-B-04	10/20/2001	SW8330	p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX		2700	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine		320000	ug/kg	
OD-SO-C-01		CLP_SOLIDS	Percent Solids		84.6	%	
		SW6010B	Antimony	U	1.1	mg/kg	
			Arsenic	B	0.67	mg/kg	
			Barium		29.6	mg/kg	
			Beryllium	B	0.06	mg/kg	
			Cadmium	B	0.2	mg/kg	
			Chromium		2.6	mg/kg	
			Copper		3.2	mg/kg	
			Lead		1.4	mg/kg	
			Nickel		1.8	mg/kg	
			Selenium	U	0.27	mg/kg	
			Silver	U	0.26	mg/kg	
			Thallium	U	0.74	mg/kg	
			Zinc		6.4	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-C-01	10/20/2001	SW8330	Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	5900	ug/kg	
OD-SO-C-02		CLP_SOLIDS	Percent Solids		92.4	%	
		SW6010B	Antimony	U	0.99	mg/kg	
			Arsenic	B	0.88	mg/kg	
			Barium		28.2	mg/kg	
			Beryllium	B	0.07	mg/kg	
			Cadmium	B	0.11	mg/kg	
			Chromium		2.4	mg/kg	
			Copper		2.7	mg/kg	
			Lead		1.8	mg/kg	
			Nickel		1.2	mg/kg	
			Selenium	U	0.25	mg/kg	
			Silver		0.33	mg/kg	
			Thallium	U	0.68	mg/kg	
			Zinc		5.2	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	5400	ug/kg	
)-SO-C-03		CLP_SOLIDS	Percent Solids		95.2	%	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-C-03	10/20/2001	SW6010B	Antimony	U	0.96	mg/kg	
			Arsenic	B	0.84	mg/kg	
			Barium		27.8	mg/kg	
			Beryllium	B	0.03	mg/kg	
			Cadmium	B	0.14	mg/kg	
			Chromium		2.4	mg/kg	
			Copper		2.4	mg/kg	
			Lead		2	mg/kg	
			Nickel		1.1	mg/kg	
			Selenium	U	0.24	mg/kg	
			Silver	U	0.23	mg/kg	
			Thallium	U	0.66	mg/kg	
			Zinc		5.7	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	5200	ug/kg	
OD-SO-C-04		CLP_SOLIDS	Percent Solids		91.2	%	
		SW6010B	Antimony	U	1	mg/kg	
			Arsenic	B	0.96	mg/kg	
			Barium		42.2	mg/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-C-04	10/20/2001	SW6010B	Beryllium	B	0.09	mg/kg	
			Cadmium	B	0.2	mg/kg	
			Chromium		4	mg/kg	
			Copper		7.1	mg/kg	
			Lead		4.4	mg/kg	
			Nickel		2.6	mg/kg	
			Selenium	B	0.36	mg/kg	
			Silver	U	0.24	mg/kg	
			Thallium	U	0.68	mg/kg	
			Zinc		13.3	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	5500	ug/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Equipment Blank Results

Location	Sample Date	Method	Parameter	Flag	Value	Units
OD-EB-01	10/20/2001	SW6010B	Antimony	U	4.5	ug/L
			Arsenic	U	4.1	ug/L
			Barium	B	0.69	ug/L
			Beryllium	U	0.2	ug/L
			Cadmium	U	0.4	ug/L
			Chromium	U	0.9	ug/L
			Copper	U	4.9	ug/L
			Lead	U	1.5	ug/L
			Nickel	U	1.1	ug/L
			Selenium	U	3.4	ug/L
			Silver	U	1.4	ug/L
			Thallium	U	5.1	ug/L
			Zinc	B	7.1	ug/L
		SW7470A	Mercury	U	0.1	ug/L
		SW8330	1,3,5-Trinitrobenzene	U	0.26	ug/L
			1,3-Dinitrobenzene	U	0.26	ug/L
			2,4,6-Trinitrotoluene	U	0.26	ug/L
			2,4-Dinitrotoluene	U	0.26	ug/L
			2,6-Dinitrotoluene	U	0.26	ug/L
			HMX	U	0.52	ug/L
			m-Nitrotoluene	U	0.52	ug/L
			Nitrobenzene	U	0.26	ug/L
			o-Nitrotoluene	U	0.52	ug/L
			p-Nitrotoluene	U	0.52	ug/L
			Pentaerythritol Tetranitrate	U	1	ug/L
			RDX	U	0.52	ug/L
			Tetryl	U	0.52	ug/L
		SW8332	Nitroglycerine	U	2000	ug/L

FOSTER WHEELER ENVIRONMENTAL CORPORATION

Chain-of-Custody Record

AFIID: Holloman AFB	Project: 20K Burn	Sample Date: 10/20/01
Samplers: Dave Rizzuto		

Location Identification	Time (Military Standard)	Samp. Type	Preservative: NONE				Analysis Required: Sampling Method	No. of Containers	See Attachment																Sample Number
OD-SO-A-01	1105	Soil	X				G	1	X																
OD-SO-A-02	1112	Soil	X				G	1	X																
OD-SO-A-03	1122	Soil	X				G	1	X																
OD-SO-A-04	1130	Soil	X				G	1	X																
OD-SO-B-01	1138	Soil	X				G	1	X																
OD-SO-B-02	1143	Soil	X				G	1	X																
OD-SO-B-03	1150	Soil	X				G	1	X																
OD-SO-B-04	1156	Soil	X				G	1	X																
OD-SO-C-01	1204	Soil	X				G	1	X																
OD-SO-C-02	1210	Soil	X				G	1	X																
OD-SO-C-03	1216	Soil	X				G	1	X																
OD-SO-C-04	1224	Soil	X				G	1	X																
OD-SO-B-02D	1229	Soil	X				G	1	X																
OD-EB-01	1030	Water	X				G	2	X																

Relinquished by: (Signature)		Received by: (Signature)	Date/Time
Dave Rizzuto	22 OCT 01 1600h		
Relinquished by: (Signature)		Received by: (Signature)	Date/Time
Relinquished by: (Signature)		Received by: (Signature)	Date/Time 10/23/01 10:30 AM

Remarks: UPS Shipper # 1Z6290W42210027644
Please Fax Results to (505) 679-2148

LABORATORY USE ONLY	Y	N
Package Received/Custody Seals Intact	✓	
Sample Labels/C-O-Cs Agree	✓	
Temperature Within Specification 2.0°C	✓	
Corrected Copy Attached	✓	
Problems or Discrepancies		✓

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APPENDIX B

Risk Evaluation Calculation Sheet

EOD Exposure Scenario

Noncarcinogenic Risk:

$$Intake\left(mg/kg/d\right)=\frac{C\cdot EF\cdot ED\cdot\frac{IRS_a}{10^6}\cdot FC}{BW_a\cdot AT_n}$$

$$HQ=\frac{Intake}{RfD_o}$$

Carcinogenic Risk:

$$Intake\left(mg/kg/d\right)=\frac{C\cdot EF\cdot ED\cdot\frac{IRS_a}{10^6}\cdot FC}{BW_a\cdot AT_c}$$

$$CR=Intake\cdot CSF_o$$

Exposure Variables	Value	Symbol
Conversion factor (mg/kg)	10^6	10^6
Body weight, adult (kg)	70	BW_a
Constituent concentration in soil (mg/kg)	Constituent-specific	C
Cancer risk	Calculated	CR
Oral Slope factor [$(mg/kg/d)^{-1}$]	Constituent-specific	CSF_o
Exposure duration, total (y)	5	ED
Exposure frequency (d/y)	40	EF
Fraction of soil ingested from contaminated area (unitless)	0.5	FC
Hazard quotient	Calculated	HQ
Ingestion rate of soil, adult (mg/d)	100	IRS_a
Oral Reference dose (mg/kg/d)	Constituent-specific	RfD_o
Averaging time carcinogens (d) (70 yrs × 365 days)	25550	AT_c
Averaging time noncarcinogens (d) (5 yrs × 365 days)	1825	AT_n

d = day
kg = kilograms
mg = milligrams
y = year

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Virginia

Final

Fourth Quarter 2001 Monitoring Report
Quality Assurance/Quality Control
20,000-Pound Open Detonation Unit

Holloman Air Force Base,
New Mexico

April 2003

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49 CES/CEV
Holloman Air Force Base,
New Mexico

FINAL
FOURTH QUARTER 2001 MONITORING REPORT
QUALITY ASSURANCE/QUALITY CONTROL RESULTS
20,000-POUND OPEN DETONATION UNIT

Prepared for:

Holloman Air Force Base
49 CES/CEV
550 Tabosa Avenue
Holloman AFB, New Mexico 88330

Prepared by:

Foster Wheeler Environmental Corporation
143 Union Boulevard, Suite 1010
Lakewood, CO 80228

Under Contract No. DACW45-94-D-0003

Delivery Order 37, Work Authorization Directive 7

U.S. Army Corps of Engineers
Omaha District
Omaha, Nebraska

April 2003

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LIST OF ACRONYMS

AFB	Air Force Base
2,4-DNT	2,4- Dinitrotoluene
DQO	data quality objective
EPA	United States Environmental Protection Agency
Foster Wheeler	Foster Wheeler Environmental Corporation
GPL	GPL Laboratories, LLLP
LCS	laboratory control sample
MDL	method detection limit
MRL	method reporting limit
MS/MSD	matrix spike/matrix spike duplicate
OD	Open Detonation
QA	quality assurance
QC	quality control
RPD	relative percent difference
USAF	United States Air Force
µg/L	micrograms per liter

EXECUTIVE SUMMARY

On October 20, 2001, the 14th quarterly sampling event was conducted at the Holloman Air Force Base (AFB) 20,000-Pound Open Detonation (OD) Unit in accordance with the Holloman AFB Open Detonation Treatment Unit Sampling and Analysis Plan, Permit Attachment J (USAF, 1996). Twelve soil samples and one field duplicate sample were collected from three different strata within the boundaries of the 20,000-Pound OD Unit and analyzed for metals and explosives by GPL Laboratories, LLLP (GPL), Gaithersburg, Maryland. Analytical methods for chemical analysis were taken from the latest revision of the United States Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste, SW-846, Third Edition and Updates (EPA, 1986). These methods included:

- Metals—EPA 6010B
- Mercury—EPA 7471A
- Explosives—EPA 8330
- Nitroamine explosives—EPA 8332

Analytical results for the metals and explosives analyses are reported below the method reporting limit (MRL) and above the method detection limit (MDL). Sample concentrations reported below the MRL are identified with a "B" (metals) or a "J" (explosives) in the "Flag" data element field in the quality control (QC) and analytical data presented in Appendices A and B.

The Foster Wheeler Environmental Corporation (Foster Wheeler) project chemist reviewed the field and laboratory QC data associated with the 13 soil samples (includes field duplicate) to determine the usability and defensibility of the 14th quarterly event analytical data. Review of the QC data indicated project measurement data were reliable and fulfilled project data quality objectives (DQOs). Sampling and analysis precision and accuracy for the 14th quarterly event analytical data were acceptable, and valid conclusions may be drawn from the field sample data.

1.0 SUMMARY OF QUALITY ASSURANCE DATA EVALUATION

The laboratory QC samples associated with the 20,000-Pound OD Unit sample analyses include method blanks, laboratory control samples (LCSs), matrix spike/matrix spike duplicate (MS/MSD) samples, and laboratory duplicate samples (metals only). The method blanks were used to assess potential contamination in the laboratory, and the other types of laboratory QC samples were used to measure the analytical method precision and accuracy. A field duplicate sample and equipment rinse blank sample were also collected and analyzed to evaluate the precision associated with the field sampling and laboratory analysis and assess potential cross-contamination of equipment during sampling. The results of the laboratory and field QC data analyses are presented in Section 1.0 of this report.

The data review procedures used for the 20,000-Pound OD Unit were performed in accordance with the Holloman AFB Final Work Plan Addendum for 20,000-Pound Open Detonation Unit (Foster Wheeler, 1999) and the EPA Contract Laboratory Program National Functional Guidelines for Organic and Inorganic Data Review (EPA, 1994a; 1994b). One hundred percent of the analytical data were reviewed for the following criteria:

- Completeness of data deliverables
- Extraction and analysis holding times
- Method blank data
- LCS recovery
- MS/MSD recovery
- System monitoring compounds
- Laboratory duplicate sample results
- Field duplicate sample results
- Equipment rinse blank sample results
- Overall data assessment and usability

The results of the data validation procedure were documented and are maintained in the project files. A summary of these results is presented in Section 2.0 of this report.

Following the data validation procedure, the appropriate validation qualifiers were appended to the project analytical database in the "EPA Qualifier" data element field. The qualifiers that may be used for the 20,000-Pound OD Unit include J, UJ, R, and B:

J—Positive value is considered to be an estimate based on associated QC data.

UJ—Nondetect value is considered to be an estimate based on associated QC data.

R—Value is considered unreliable and is unusable based on associated QC data.

B—Value is associated with method or equipment blank contamination.

Based on the QC sample data, the appropriate data qualifiers were appended to the analytical data results for the 14th quarterly sampling event. The QC data indicated the control mechanisms were effective in ensuring measurement data reliability within the expected limits of sampling and analytical error.

1.1 DATA DELIVERABLES

Data completeness is evaluated through review of the hardcopy analytical data packages in comparison with the chain-of-custody record and the electronic data file. The deliverables are reviewed for completeness to ensure that all samples submitted to the laboratory for analysis have been reported and documented. From the quality assurance (QA) review of the hardcopy data packages and the electronic data file, all project analytical documentation was determined to be complete. A data deliverable completeness objective of 100 percent was achieved.

1.2 HOLDING TIMES

Representativeness of the data is determined through review of sample extraction and analysis holding times in conjunction with review of the blank data in accordance with the EPA analytical method holding time guidelines. All extractions and analyses were performed within the holding time guidelines for the 14th quarterly sampling event.

1.3 LABORATORY METHOD BLANK SAMPLES

Laboratory method blank samples were analyzed with each batch of field samples collected for each analytical method and evaluated as part of the validation process. No detections were reported above the MRL in the method blank samples for explosives and metals for the 14th quarterly sampling event. The representativeness of the data based on method blank data results

was 100 percent for data reported above and below the MRL. Method blank data are presented in Appendix B.

1.4 LABORATORY CONTROL SAMPLES

The LCSs were analyzed with each batch of field samples for each analytical method. The LCS spike recoveries reported at concentrations above or below the method-specific control limits will result in qualification of those analytes in the associated field samples. The LCS data are used in conjunction with the MS/MSD recovery data and the system monitoring compound recoveries (explosives) to determine the accuracy of the analytical data. The LCS recoveries for all metals and explosives were within the method control limits with the exception of the 2,4-dinitrotoluene (2,4-DNT) recovery, which was below the method criteria. All detect and nondetect sample results for 2,4-DNT were J- and UJ- qualified, signifying estimated values. LCS spike recoveries indicated a high level of accuracy associated with the analytical data. LCS spike recoveries are presented in Appendix B.

1.5 MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

Laboratory MS/MSD samples were analyzed at a frequency of one per batch of field samples for the explosives methods and MS samples were analyzed at a frequency of one per batch of field samples for the metals methods. The MS/MSD sample recoveries were evaluated in conjunction with the other batch QC sample recoveries to determine the need for qualification of analytical data. The MS/MSD recoveries for explosives and the MS recoveries for metals were within the method-specific control limits with the exception of 2,4-DNT. Sample results for 2,4-DNT were already qualified as estimated values based on LCS recovery data. MS/MSD recoveries indicated no matrix interference associated with the sample analyses. MS/MSD sample recoveries are presented in Appendix B.

1.6 SYSTEM MONITORING COMPOUNDS

System monitoring compounds, also known as surrogate spike compounds, are used for the explosives analyses to monitor the performance of an individual sample during extraction and analysis. Surrogate spike recoveries were evaluated for explosives, EPA methods 8330 and 8332. The surrogate spike recovery for Method 8330, sample OD-SO-A-04, was below the acceptance criteria for both the initial sample analysis and the re-extracted sample analysis. All

nondetect analytes for this sample were UJ- qualified, signifying estimated nondetect data values. All other surrogate recoveries were within the method control limits.

1.7 LABORATORY DUPLICATE SAMPLE RESULTS

One laboratory duplicate sample was analyzed for each of the metals methods to evaluate analytical method precision. The relative percent difference (RPD) between the duplicate and the primary sample was calculated and compared to the laboratory-established method control criteria (20 percent). Based on the results of the laboratory duplicate sample, the RPDs for metals were within the 20 percent RPD criteria. The laboratory duplicate sample data indicated a high level of precision associated with the sample analyses.

1.8 FIELD DUPLICATE SAMPLE RESULTS

One field duplicate soil sample (OD-SO-B-02) was collected for the 14th quarterly sampling event and analyzed for metals and explosives. There were no detections of explosives in the field sample and the corresponding duplicate sample. All metals detections above the MRL were within the 50 percent RPD criteria. The field duplicate data indicated a high level of precision associated with the field sampling and laboratory analyses. Field duplicate sample results and field sample data are presented in Appendix A.

1.9 EQUIPMENT RINSE BLANK RESULTS

Equipment rinse blank samples are collected to assess cross-contamination of equipment during sampling activities. One equipment rinse blank sample was collected for the 14th quarterly sampling event and analyzed for explosives and metals. There were no detections of explosives or metals reported above the MRL in the equipment blank sample. Detections of metals reported below the MRL included barium at 0.69 micrograms per liter (μg/L) and zinc at 7.10 μg/L. These low-level detections did not result in qualification of sample data. Equipment rinse blank data indicated cross-contamination of sampling equipment did not occur during sampling activities. Equipment rinse blank data are presented in Appendix A.

2.0 DATA ASSESSMENT AND USABILITY

As a result of the data validation procedure, it was determined that 7 percent of the analytical data for the 14th quarterly sampling event were qualified as estimated; however, these data are still usable to achieve the project DQOs. The percent of J-qualified data is based on the number

of estimated analytical values (24) compared to the total number of analytical field sample values (338) for the event. Review of the QC data associated with the field sample data indicates all analytical data for the 20,000-Pound OD Unit 14th quarterly sampling event are valid and fulfill project DQOs. Analytical data are usable to determine that operation of the 20,000-Pound OD Unit is not imposing environmental impact to soils above risk-based cleanup levels. A data completeness objective of 100 percent was achieved for the 14th quarterly sampling event.

3.0 REFERENCES

EPA (United States Environmental Protection Agency)

1986. SW-846, Test Methods for Evaluating Solid Waste, Third Edition and Updates.

1994a. Contract Laboratory Program National Functional Guidelines for Organic Data Review. EPA 540/R-94/012.

1994b. Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. EPA 540/R-94/013.

Foster Wheeler (Foster Wheeler Environmental Corporation)

1999. Holloman Air Force Base Final Work Plan Addendum for 20,000-Pound Open Detonation Unit.

USAF (United States Air Force)

1996. Holloman Air Force Base Open Detonation Treatment Unit Permit Attachment J, Sampling and Analysis Plan.

APPENDIX A

Analytical Data

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-A-01	10/20/2001	CLP_SOLIDS	Percent Solids		89.2	%	
		SW6010B	Antimony	U	1	mg/kg	
			Arsenic	B	0.68	mg/kg	
			Barium		23.5	mg/kg	
			Beryllium	B	0.04	mg/kg	
			Cadmium	B	0.06	mg/kg	
			Chromium		1.9	mg/kg	
			Copper	B	1	mg/kg	
			Lead	B	1	mg/kg	
			Nickel	B	0.83	mg/kg	
			Selenium	U	0.26	mg/kg	
			Silver	U	0.25	mg/kg	
			Thallium	U	0.7	mg/kg	
			Zinc		3.8	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	5600	ug/kg	
OD-SO-A-02		CLP_SOLIDS	Percent Solids		89.9	%	
		SW6010B	Antimony	U	1	mg/kg	
			Arsenic	U	0.57	mg/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-A-02	10/20/2001	SW6010B	Barium		22.7	mg/kg	
			Beryllium	B	0.03	mg/kg	
			Cadmium	U	0.05	mg/kg	
			Chromium		2.1	mg/kg	
			Copper		1.2	mg/kg	
			Lead	B	0.97	mg/kg	
			Nickel	B	0.87	mg/kg	
			Selenium	U	0.26	mg/kg	
			Silver	U	0.25	mg/kg	
			Thallium	U	0.7	mg/kg	
			Zinc		4.1	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	5600	ug/kg	
OD-SO-A-03		CLP_SOLIDS	Percent Solids		88	%	
		SW6010B	Antimony	U	1	mg/kg	
			Arsenic	U	0.57	mg/kg	
			Barium		23	mg/kg	
			Beryllium	B	0.03	mg/kg	
			Cadmium	U	0.05	mg/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-A-03	10/20/2001	SW6010B	Chromium		2.2	mg/kg	
			Copper		1.8	mg/kg	
			Lead	B	1	mg/kg	
			Nickel		1.1	mg/kg	
			Selenium	U	0.26	mg/kg	
			Silver	U	0.25	mg/kg	
			Thallium	U	0.71	mg/kg	
			Zinc		5.2	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	J	85	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	5700	ug/kg	
OD-SO-A-04		CLP_SOLIDS	Percent Solids		85.8	%	
		SW6010B	Antimony		4.4	mg/kg	
			Arsenic	U	0.6	mg/kg	
			Barium		26.7	mg/kg	
			Beryllium	B	0.04	mg/kg	
			Cadmium		2	mg/kg	
			Chromium		7.3	mg/kg	
			Copper		2.4	mg/kg	
			Lead		19	mg/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-A-04	10/20/2001	SW6010B	Nickel		2.6	mg/kg	
			Selenium	B	0.41	mg/kg	
			Silver		2.4	mg/kg	
			Thallium	U	0.74	mg/kg	
			Zinc		6.1	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	UJ
			1,3-Dinitrobenzene	U	100	ug/kg	UJ
			2,4,6-Trinitrotoluene	U	100	ug/kg	UJ
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	UJ
			HMX	U	200	ug/kg	UJ
			m-Nitrotoluene	U	200	ug/kg	UJ
			Nitrobenzene	U	100	ug/kg	UJ
			o-Nitrotoluene	U	200	ug/kg	UJ
			p-Nitrotoluene	U	200	ug/kg	UJ
			Pentaerythritol Tetranitrate	U	500	ug/kg	UJ
			RDX	U	200	ug/kg	UJ
			Tetryl	U	200	ug/kg	UJ
		SW8332	Nitroglycerine		55000	ug/kg	
OD-SO-B-01		CLP_SOLIDS	Percent Solids		83.1	%	
		SW6010B	Antimony	U	1.1	mg/kg	
			Arsenic	B	0.67	mg/kg	
			Barium		28.3	mg/kg	
			Beryllium	B	0.04	mg/kg	
			Cadmium	U	0.06	mg/kg	
			Chromium		2.7	mg/kg	
			Copper		2.6	mg/kg	
			Lead	B	1.1	mg/kg	
			Nickel		1.5	mg/kg	
			Selenium	U	0.28	mg/kg	
			Silver	U	0.27	mg/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-B-01	10/20/2001	SW6010B	Thallium	U	0.75	mg/kg	
			Zinc		6.5	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	6000	ug/kg	
OD-SO-B-02		CLP_SOLIDS	Percent Solids		83.2	%	
		SW6010B	Antimony	U	1.1	mg/kg	
			Arsenic	B	1.2	mg/kg	
			Barium		42.1	mg/kg	
			Beryllium	B	0.11	mg/kg	
			Cadmium	B	0.11	mg/kg	
			Chromium		4.2	mg/kg	
			Copper		4.1	mg/kg	
			Lead		2.6	mg/kg	
			Nickel		2.7	mg/kg	
			Selenium	U	0.28	mg/kg	
			Silver	U	0.27	mg/kg	
			Thallium	U	0.75	mg/kg	
			Zinc		11.9	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-B-02	10/20/2001	SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	6000	ug/kg	
OD-SO-B-02D		CLP_SOLIDS	Percent Solids		84.4	%	
		SW6010B	Antimony	U	1.1	mg/kg	
			Arsenic	B	0.75	mg/kg	
			Barium		43.1	mg/kg	
			Beryllium	B	0.12	mg/kg	
			Cadmium	B	0.11	mg/kg	
			Chromium		4.2	mg/kg	
			Copper		4.2	mg/kg	
			Lead		2.7	mg/kg	
			Nickel		2.7	mg/kg	
			Selenium	U	0.28	mg/kg	
			Silver	U	0.26	mg/kg	
			Thallium	U	0.75	mg/kg	
			Zinc		11.8	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-B-02D	10/20/2001	SW8330	2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	5900	ug/kg	
OD-SO-B-03		CLP_SOLIDS	Percent Solids		79.4	%	
		SW6010B	Antimony	U	1.2	mg/kg	
			Arsenic	U	0.64	mg/kg	
			Barium		29.9	mg/kg	
			Beryllium	B	0.03	mg/kg	
			Cadmium	U	0.06	mg/kg	
			Chromium		2.5	mg/kg	
			Copper		2.6	mg/kg	
			Lead	B	1	mg/kg	
			Nickel		1.4	mg/kg	
			Selenium	B	0.54	mg/kg	
			Silver	U	0.28	mg/kg	
			Thallium	U	0.79	mg/kg	
			Zinc		6	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-B-03	10/20/2001	SW8330	m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX		320	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	6300	ug/kg	
OD-SO-B-04		CLP_SOLIDS	Percent Solids		83.9	%	
		SW6010B	Antimony	B	1.7	mg/kg	
			Arsenic	B	2.3	mg/kg	
			Barium		47.3	mg/kg	
			Beryllium	B	0.21	mg/kg	
			Cadmium		0.36	mg/kg	
			Chromium		5.4	mg/kg	
			Copper		6.9	mg/kg	
			Lead		14.7	mg/kg	
			Nickel		3.8	mg/kg	
			Selenium	B	0.28	mg/kg	
			Silver		0.59	mg/kg	
			Thallium	U	0.75	mg/kg	
			Zinc		14.8	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene		110	ug/kg	J
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX		3100	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene		150	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-B-04	10/20/2001	SW8330	p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX		2700	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine		320000	ug/kg	
OD-SO-C-01		CLP_SOLIDS	Percent Solids		84.6	%	
		SW6010B	Antimony	U	1.1	mg/kg	
			Arsenic	B	0.67	mg/kg	
			Barium		29.6	mg/kg	
			Beryllium	B	0.06	mg/kg	
			Cadmium	B	0.2	mg/kg	
			Chromium		2.6	mg/kg	
			Copper		3.2	mg/kg	
			Lead		1.4	mg/kg	
			Nickel		1.8	mg/kg	
			Selenium	U	0.27	mg/kg	
			Silver	U	0.26	mg/kg	
			Thallium	U	0.74	mg/kg	
			Zinc		6.4	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-C-01	10/20/2001	SW8330	Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	5900	ug/kg	
OD-SO-C-02		CLP_SOLIDS	Percent Solids		92.4	%	
		SW6010B	Antimony	U	0.99	mg/kg	
			Arsenic	B	0.88	mg/kg	
			Barium		28.2	mg/kg	
			Beryllium	B	0.07	mg/kg	
			Cadmium	B	0.11	mg/kg	
			Chromium		2.4	mg/kg	
			Copper		2.7	mg/kg	
			Lead		1.8	mg/kg	
			Nickel		1.2	mg/kg	
			Selenium	U	0.25	mg/kg	
			Silver		0.33	mg/kg	
			Thallium	U	0.68	mg/kg	
			Zinc		5.2	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	5400	ug/kg	
OD-SO-C-03		CLP_SOLIDS	Percent Solids		95.2	%	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-C-03	10/20/2001	SW6010B	Antimony	U	0.96	mg/kg	
			Arsenic	B	0.84	mg/kg	
			Barium		27.8	mg/kg	
			Beryllium	B	0.03	mg/kg	
			Cadmium	B	0.14	mg/kg	
			Chromium		2.4	mg/kg	
			Copper		2.4	mg/kg	
			Lead		2	mg/kg	
			Nickel		1.1	mg/kg	
			Selenium	U	0.24	mg/kg	
			Silver	U	0.23	mg/kg	
			Thallium	U	0.66	mg/kg	
			Zinc		5.7	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	5200	ug/kg	
OD-SO-C-04		CLP_SOLIDS	Percent Solids		91.2	%	
		SW6010B	Antimony	U	1	mg/kg	
			Arsenic	B	0.96	mg/kg	
			Barium		42.2	mg/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Analytical Sample Results

Location	Sample Date	Method	Parameter	Flag	Value	Units	EPA Qualifier
OD-SO-C-04	10/20/2001	SW6010B	Beryllium	B	0.09	mg/kg	
			Cadmium	B	0.2	mg/kg	
			Chromium		4	mg/kg	
			Copper		7.1	mg/kg	
			Lead		4.4	mg/kg	
			Nickel		2.6	mg/kg	
			Selenium	B	0.36	mg/kg	
			Silver	U	0.24	mg/kg	
			Thallium	U	0.68	mg/kg	
			Zinc		13.3	mg/kg	
		SW7471A	Mercury	U	0.02	mg/kg	
		SW8330	1,3,5-Trinitrobenzene	U	100	ug/kg	
			1,3-Dinitrobenzene	U	100	ug/kg	
			2,4,6-Trinitrotoluene	U	100	ug/kg	
			2,4-Dinitrotoluene	U	100	ug/kg	UJ
			2,6-Dinitrotoluene	U	100	ug/kg	
			HMX	U	200	ug/kg	
			m-Nitrotoluene	U	200	ug/kg	
			Nitrobenzene	U	100	ug/kg	
			o-Nitrotoluene	U	200	ug/kg	
			p-Nitrotoluene	U	200	ug/kg	
			Pentaerythritol Tetranitrate	U	500	ug/kg	
			RDX	U	200	ug/kg	
			Tetryl	U	200	ug/kg	
		SW8332	Nitroglycerine	U	5500	ug/kg	

EPA Qualifier J = estimated detect based on QC criteria

EPA Qualifier UJ = estimated non-detect based on QC criteria

Holloman Air Force Base
20,000-Pound Open Detonation Unit
Fourth Quarter 2001
Equipment Blank Results

Location	Sample Date	Method	Parameter	Flag	Value	Units
OD-EB-01	10/20/2001	SW6010B	Antimony	U	4.5	ug/L
			Arsenic	U	4.1	ug/L
			Barium	B	0.69	ug/L
			Beryllium	U	0.2	ug/L
			Cadmium	U	0.4	ug/L
			Chromium	U	0.9	ug/L
			Copper	U	4.9	ug/L
			Lead	U	1.5	ug/L
			Nickel	U	1.1	ug/L
			Selenium	U	3.4	ug/L
			Silver	U	1.4	ug/L
			Thallium	U	5.1	ug/L
			Zinc	B	7.1	ug/L
		SW7470A	Mercury	U	0.1	ug/L
		SW8330	1,3,5-Trinitrobenzene	U	0.26	ug/L
			1,3-Dinitrobenzene	U	0.26	ug/L
			2,4,6-Trinitrotoluene	U	0.26	ug/L
			2,4-Dinitrotoluene	U	0.26	ug/L
			2,6-Dinitrotoluene	U	0.26	ug/L
			HMX	U	0.52	ug/L
			m-Nitrotoluene	U	0.52	ug/L
			Nitrobenzene	U	0.26	ug/L
			o-Nitrotoluene	U	0.52	ug/L
			p-Nitrotoluene	U	0.52	ug/L
			Pentaerythritol Tetranitrate	U	1	ug/L
			RDX	U	0.52	ug/L
			Tetryl	U	0.52	ug/L
		SW8332	Nitroglycerine	U	2000	ug/L

APPENDIX B

Quality Control Data

Analytical Report For 110116

for

Foster Wheeler Environmental Corp.

Project Manager: Pam Moss

Project Name : Holliman AFB 20000 lb

November 7, 2001

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Daryl R. Hartman
Reviewed by,
Project Manager

Approved by,
Laboratory Director

202 Perry Parkway Gaithersburg, MD 20877 Phone (301) 926-6802 Fax: (301) 840-1209
www.gplab.com

TOTAL # OF PAGES : 94

CASE NARRATIVE

CLIENT: FOSTER WHEELER ENVIRONMENTAL INC
PROJECT/SITE: HOLLIMAN AFB 20000 LB
WORK ORDER(S): 110116
REVIEW DATE: 11/7/2001

The Case Narrative, Chain of Custody, Sample Receipt Checklist, and the cover page of the Analytical Report are integral parts of GPL Laboratories' report package. If you did not receive all of these documents please contact GPL immediately.

Sample Receipt

Thirteen soils and one water sample were received on 10/23/2001. The samples were delivered by UPS. The samples were received intact. Sample receipt conditions and temperatures are documented on the Sample Receipt Checklist.

Sample Analysis

Samples were prepared and analyzed by GPL using the analytical methodologies indicated on the Analytical Report of Analysis.

Explosives/HPLC

PETN

1. Thirteen soils and a water sample were extracted and analyzed for PETN using modified SW846 method 8330.

2. Matrix spike and matrix spike duplicate analyses for soil were performed on sample OD-SO-B-02D. All recoveries were within control limits.

3. Matrix spike and matrix spike duplicate analyses for water were not performed due to insufficient sample volume supplied by the client.

4. One laboratory control sample for soil sample batch and duplicate laboratory control samples for water sample batch were extracted and analyzed. All recoveries were within control limits.

5. Manual integration was performed on some data files when automatic integration provided by the software was inappropriate. Some forms were "hand" corrected due to software limitations.

8330

1. One water sample and thirteen soil samples were extracted and analyzed for explosive compounds using SW846 method 8330.

2. Matrix spike and matrix spike duplicate analysis for soils were performed on sample OD-SO-B-02D. MSD percent recovery for 2,4-DNT is slightly below control limits. All other target analyte recoveries were within control limits.

CASE NARRATIVE

3. MS/MSD analyses were not performed for water sample due to insufficient sample volume.

4. A laboratory control sample for soils and duplicate laboratory control samples for water were extracted and analyzed along with each sample matrix. Percent recoveries for of 2,4-DNT are outside the control limits in the soil LCS (BKS51033). Percent recovery for 2,4-DNT was slightly below control limits in the water LCSD (BSD51048). All other target analyte recoveries were within control limits.

5. Due to matrix interference, surrogate recovery for sample OD-SO-A04 was not found. Sample was re injected with similar result. Then, sample was re extracted and analyzed within holding time and similar result was found. The original data is reported, and both sets of data were submitted with the package.

6. Explosive compounds 2,4-DNT and 2,6-DNT co-elute on the primary column and the confirmation column. The mixture of 2,4-DNT and 2,6-DNT in the LCS and MS/MSD samples is quantitated and reported as 2,4-DNT. A peak detected in the retention time window of 2,4-DNT and 2,6-DNT on both columns will be reported as an isomeric pair in samples under the results for 2,4-DNT.

7. Manual integration was performed on some data files, when automatic integration provided by the software was inappropriate.

8332

1. Thirteen soil samples were extracted and analyzed for Nitroglycerine using SW846 method 8332. One water sample was also analyzed by direct injection.

2. Matrix spike and matrix spike duplicate analyses for soil were performed on sample OD-SO-B-02D. All recoveries were within control limits.

3. A laboratory control sample for soil was extracted and analyzed along with the sample batch. Duplicate laboratory control samples for water was also analyzed along with this sample batch. Percent recoveries were within control limits.

4. Manual integration was performed on some data files, when automatic integration provided by the software was inappropriate. Some forms were "hand" corrected due to software limitations.

Metals

1. One water sample and thirteen soil samples were analyzed for priority pollutant metals by EPA SW846 methods.

2. The water and soil samples were reported on separate forms.

3. A matrix spike, duplicate, and serial dilution were performed on the batch water sample 110103-001 for all required ICP analytes. They were within the control limits.

4. A matrix spike and duplicate were performed on the batch water sample 110106-005 for mercury. They were within the control limits.

CASE NARRATIVE

5. A matrix spike, duplicate, and serial dilution were performed on soil sample OD-SO-A-01 for all required ICP analytes. They were within the control limits.

6. A matrix spike and duplicate were performed on soil sample OD-SO-C-04 for mercury. They were within the control limits.

7. Calibration standards are verified against independent check standards purchased from a commercial vendor of environmental standards.

8. All GPL QA/QC criteria were met.

Darryl R. Hartman
Project Manager

Lab Director

FOSTER WHEELER ENVIRONMENTAL CORPORATION

Chain-of-Custody Record

AFIID: Holloman AFB	Project: 20K Burn	Sample Date: 10/20/01
Samplers: Dave Rizzuto		

Location Identification	Time (Military Standard)	Samp. Type	Preservative: NONE				Analysis Required: Sampling Method	No. of Containers	See Attachment															Sample Number
OD-SO-A-01	1105	Soil	X				G	1	X															
OD-SO-A-02	1112	Soil	X				G	1	X															
OD-SO-A-03	1122	Soil	X				G	1	X															
OD-SO-A-04	1130	Soil	X				G	1	X															
OD-SO-B-01	1138	Soil	X				G	1	X															
OD-SO-B-02	1143	Soil	X				G	1	X															
OD-SO-B-03	1150	Soil	X				G	1	X															
OD-SO-B-04	1156	Soil	X				G	1	X															
OD-SO-C-01	1204	Soil	X				G	1	X															
OD-SO-C-02	1210	Soil	X				G	1	X															
OD-SO-C-03	1216	Soil	X				G	1	X															
OD-SO-C-04	1224	Soil	X				G	1	X															
OD-SO-B-02D	1229	Soil	X				G	1	X															
OD-EB-01	1030	Water	X				G	2	X															

Relinquished by: (Signature)		Received by: (Signature)	Date/Time
Dave Rizzuto	22OCT01 1600h		
Relinquished by: (Signature)		Received by: (Signature)	Date/Time
Relinquished by: (Signature)		Received by: (Signature)	Date/Time
			10/23/01 1015hr

Remarks: UPS Shipper # 1Z5290W4221002 9644
Please Fax Results to (505) 679-2148

LABORATORY USE ONLY	Y	N
Package Received/Custody Seals Intact	✓	
Sample Labels/C-O-Cs Agree	✓	
Temperature Within Specification 2.0°C	✓	
Corrected Copy Attached	✓	
Problems or Discrepancies		✓

1600

SAMPLE DATA PACKAGE

EXPLOSIVE DATA

A. QC Summary

B. Sample Data

C. Standards Data

D. Raw QC Data

GPL Laboratories, LLLP

GPL Laboratories

2D
SOIL SEMIVOLATILE SURROGATE RECOVERY

Lab Na GPL Laboratories Contract:

Lab Code GPL Case No. SAS NO. : SDG NO. 110116

Level: (low/me LOW

EPA SAMPLE NO.		S1 (4NA)	S2 ()	S3 ()	S4 ()	S5 ()	S6 ()	S7 ()	S8 ()	TOT OUT
18	OD-SO-A-01	85								0
19	OD-SO-A-02	96								0
20	OD-SO-A-03	63								0
21	OD-SO-A-04	0 D *	C 11-01							1 D
22	OD-SO-B-01	85								0
23	OD-SO-B-02	96								0
24	OD-SO-B-03	80								0
25	OD-SO-B-04	58								0
26	OD-SO-C-01	101								0
27	OD-SO-C-02	84								0
28	OD-SO-C-03	96								0
29	OD-SO-C-04	102								0
30	OD-SO-B-02D	91								0
31	OD-SO-B-02D MS	98								0
32	OD-SO-B-02D MS	91								0
33	BKS51033	92								0
34	BLK51033	97								0

		QC LIMITS	
S1	(4NA) = 4-Nitroaniline	(24 - 140)	
S2		(-)	
S3		(-)	
S4		(-)	
S5		(-)	
S6		(-)	
S7		(-)	(advisory)
S8		(-)	(advisory)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogate diluted out

GPL Laboratories

2C
WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: GPL Laboratories Contract:

Lab Code GPL Case No. SAS NO. : SDG NO. 110116

	EPA SAMPLE NO.	S1 ()	S2 ()	S3 ()	S4 ()	S5 ()	S6 ()	S7 ()	S8 ()	TOT OUT
1	OD-EB-01	47								0
2	OD-EB-01									0
3	BKS51048	94								0
4	BKS51049									0
5	BLK51048	82								0
6	BLK51049									0
7	BSD51048	89								0
8	BSD51049									0

	QC LIMITS	
S1	(-) 22-100	
S2	(-)	
S3	(-)	
S4	(-)	
S5	(-)	
S6	(-)	
S7	(-)	(advisory)
S8	(-)	(advisory)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogate diluted out

3D

SOIL SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: GPL Laboratories, LLLP Contract: Foster Wheeler Evironmental Co

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: N/A

Matrix Spike - EPA Sample No.: OD-SO-B-02D Level: (low/med) LOW

COMPOUND	SPIKE ADDED (ug/Kg)	SAMPLE CONCENTRATION (ug/Kg)	MS CONCENTRATION (ug/Kg)	MS % REC #	QC LIMITS REC.
HMX	3000	0.0	2800	93	70- 113
1,3,5-TRINITROBENZENE	1500	0.0	1400	93	20- 150
TETRYL	3000	0.0	2200	73	20- 103
2,4,6-TRINITROTOLUENE	1500	0.0	1500	100	46- 150
4-AMINO-2,6-DINITROTOLU	1500	0.0	1500	100	39- 136
4-NITROTOLUENE	3000	0.0	2700	90	70- 114
RDX	3000	0.0	2600	87	70- 124
1,3-DINITROBENZENE	1500	0.0	1400	93	70- 127
NITROBENZENE	1500	0.0	1400	93	70- 120
2-AMINO-4,6-DINITROTOLU	1500	0.0	2100	140	43- 150
2,4-DINITROTOLUENE	3000	0.0	1800	60	56- 100
2-NITROTOLUENE	3000	0.0	2800	93	70- 116
3-NITROTOLUENE	3000	0.0	2800	93	70- 109

COMPOUND	SPIKE ADDED (ug/Kg)	MSD CONCENTRATION (ug/Kg)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
HMX	3000	2700	90	3	25	70- 113
1,3,5-TRINITROBENZENE	1500	1400	93	0	25	20- 150
TETRYL	3000	2300	77	5	25	20- 103
2,4,6-TRINITROTOLUENE	1500	1500	100	0	25	46- 150
4-AMINO-2,6-DINITROTOLU	1500	1400	93	7	25	39- 136
4-NITROTOLUENE	3000	2700	90	0	25	70- 114
RDX	3000	2600	87	0	25	70- 124
1,3-DINITROBENZENE	1500	1400	93	0	25	70- 127
NITROBENZENE	1500	1400	93	0	25	70- 120
2-AMINO-4,6-DINITROTOLU	1500	2200	147	5	25	43- 150
2,4-DINITROTOLUENE	3000	1600	53*	12	25	56- 100
2-NITROTOLUENE	3000	2800	93	0	25	70- 116

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 13 outside limits

Spike Recovery: 1 out of 26 outside limits

COMMENTS:

3D

SOIL SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: GPL Laboratories, LLLP Contract: Foster Wheeler Evironmental Co

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: N/A

Matrix Spike - EPA Sample No.: OD-SO-B-02D Level: (low/med) LOW

3-NITROTOLUENE	3000	2700	90	3	25	70-	109

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 0 outside limits

Spike Recovery: 0 out of 0 outside limits

COMMENTS:

GPL Laboratories

3D

SOIL SEMIVOLATILE BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY

Lab Name: **GPL Laboratories** Contract :

Lab Code : **GPL** CASE No. : SAS No. : SDG No. : **110116**

Blank Spike - EPA Sample No. **BKS51033** Level : (low / med) **MEDIUM**

COMPOUND	SPIKE ADDED (ug/kg)	BLANK CONCENTRATION (ug/kg)	BKS CONCENTRATION (ug/kg)	BKS % REC #	QC LIMITS REC.
1,3,5-Trinitrobenzene	1500	0.00	1300	87	70-118
1,3-Dinitrobenzene	1500	0.00	1400	93	70-118
2,4,6-Trinitrotoluene	1500	0.00	1400	93	70-150
2,4-Dinitrotoluene	3000	0.00	1600	53 *	64-100
2-Amino-4,6-Dinitrotoluene	1500	0.00	1800	120	69-146
4-Amino-2,6-Dinitrotoluene	1500	0.00	1400	93	60-112
HMX	3000	0.00	2700	90	70-114
Nitrobenzene	1500	0.00	1400	93	70-121
RDX	3000	0.00	2600	87	70-118
Tetryl	3000	0.00	1900	63	26-100
m-Nitrotoluene	3000	0.00	2700	90	70-111
o-Nitrotoluene	3000	0.00	2600	87	75-122
p-Nitrotoluene	3000	0.00	2900	97	70-119

Column to be used to flag recovery and RPD values with and asterisk

* Values outside of QC limits

RPD _____ out of 14 outside limit

Spike Recovery 1 out of 14 outside limit

Comments :

GPL Laboratories

3C

WATER SEMIVOLATILE BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY

Lab Name: **GPL Laboratories** Contract :

Lab Code : **GPL** CASE No. : SAS No. : SDG No. : **110116**

Blank Spike - EPA Sample No. **BKS51048**

COMPOUND	SPIKE ADDED (ug/L)	BLANK CONCENTRATION (ug/L)	BKS CONCENTRATION (ug/L)	BKS % REC #	QC LIMITS REC.
1,3,5-Trinitrobenzene	3.90	0.00	3.18	82	20-150
1,3-Dinitrobenzene	3.90	0.00	3.24	83	65-141
2,4,6-Trinitrotoluene	3.90	0.00	3.42	88	70-150
2-Amino-4,6-Dinitrotoluene	3.90	0.00	5.42	139	43-150
4-Amino-2,6-Dinitrotoluene	3.90	0.00	3.36	86	63-121
HMX	7.79	0.00	6.65	85	70-127
Nitrobenzene	3.90	0.00	3.32	85	71-134
RDX	7.79	0.00	6.38	82	70-124
Tetryl	7.79	0.00	4.73	61	20-104
m-Nitrotoluene	7.79	0.00	6.93	89	68-133
o-Nitrotoluene	7.79	0.00	6.54	84	63-132
p-Nitrotoluene	7.79	0.00	7.00	90	57-139

COMPOUND	SPIKE ADDED (ug/L)	BSD CONCENTRATION (ug/L)	BSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC
Nitrobenzene	3.90	3.09	79	7.176287	110	71-134
p-Nitrotoluene	7.79	6.51	84	7.2538861	80	57-139
o-Nitrotoluene	7.79	6.14	79	6.3091482	140	63-1321
HMX	7.79	6.16	79	7.6502732	10	70-127
1,3,5-Trinitrobenzene	3.90	2.99	77	6.158833	30	20-150
2,4,6-Trinitrotoluene	3.90	3.23	83	5.7142858	50	70-150
2,4-Dinitrotoluene	7.79	3.61	46 *	3.8043477	130	53-101
m-Nitrotoluene	7.79	6.21	80	10.9589041	150	68-133
1,3-Dinitrobenzene	3.90	3.06	79	5.7142858	100	65-141
2-Amino-4,6-Dinitrotoluene	3.90	4.73	121	13.5960591	120	43-150
4-Amino-2,6-Dinitrotoluene	3.90	3.33	85	.8968609	60	63-121
RDX	7.79	5.91	76	7.6484947	90	70-124
Tetryl	7.79	4.54	58	4.0992449	40	20-104

GPL Laboratories

3C

WATER SEMIVOLATILE BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY

Lab Name: **GPL Laboratories** Contract :

Lab Code : **GPL** CASE No. : SAS No. : SDG No. : **110116**

Blank Spike - EPA Sample No. **BKS51048**

Column to be used to flag recovery and RPD values with and asterisk

* Values outside of QC limits

RPD 0 out of 13 26 outside limit

Spike Recovery 1 out of 26 outside limit

Comments :

1069

GPL Laboratories

4B
SEMIVOLATILE METHOD BLANK SUMMARY

EPA SAMPLE NO.
BLK51033

Lab Name : **GPL Laboratories** Contract :

Lab Code : **GPL** Case No. : SAS No. : SDG No. : **110116**

Lab File ID **LCA2005.D** Lab Sample ID : **BLK51033**

Instrument ID : **LCA** Date Extracted **10/24/01**

Matrix : (soil/ water) **SOIL** Date Analyzed **10/27/01**

Level : (low/med) **LOW** Time Analyzed : **16:33**

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD

	EPA SAMPLE NO..	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	BKS51033	BKS51033	LCA2006.D	10/27/01
2	OD-SO-A-01	110116-001-01-1/1	LCA2007.D	10/27/01
3	OD-SO-A-02	110116-002-01-1/1	LCA2008.D	10/27/01
4	OD-SO-A-03	110116-003-01-1/1	LCA2009.D	10/27/01
5	OD-SO-A-04	110116-004-01-1/1	LCA2010.D	10/27/01
6	OD-SO-B-01	110116-005-01-1/1	LCA2011.D	10/27/01
7	OD-SO-B-02	110116-006-01-1/1	LCA2012.D	10/27/01
8	OD-SO-B-03	110116-007-01-1/1	LCA2013.D	10/27/01
9	OD-SO-B-04	110116-008-01-1/1	LCA2017.D	10/27/01
10	OD-SO-C-01	110116-009-01-1/1	LCA2019.D	10/27/01
11	OD-SO-C-02	110116-010-01-1/1	LCA2020.D	10/27/01
12	OD-SO-C-03	110116-011-01-1/1	LCA2021.D	10/28/01
13	OD-SO-C-04	110116-012-01-1/1	LCA2022.D	10/28/01
14	OD-SO-B-02D	110116-013-01-1/1	LCA2023.D	10/28/01
15	OD-SO-B-02D MS	110116-013-01-1/1 MS	LCA2024.D	10/28/01
16	OD-SO-B-02D MSD	110116-013-01-1/1 MSD	LCA2025.D	10/28/01

Comments

GPL Laboratories

4B
SEMIVOLATILE METHOD BLANK
SUMMARY

EPA SAMPLE NO.
BLK51048

Lab Name : GPL Laboratories Contract :

Lab Code : GPL Case No. : SAS No. : SDG No. : 110116

Lab File ID LCA1976.D Lab Sample ID : BLK51048

Instrument ID : LCA Date Extracted 10/25/01

Matrix : (soil/ water) WATER Date Analyzed 10/26/01

Level : (low/med) LOW Time Analyzed : 15:05

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD

	EPA SAMPLE NO..	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	OD-EB-01	110116-014-01-1/1	LCA1975.D	10/26/01
2	BKS51048	BKS51048	LCA1977.D	10/26/01
3	BSD51048	BSD51048	LCA1978.D	10/26/01

Comments

SAMPLE DATA PACKAGE

NITROGLYCERIN ANALYSES DATA

A. QC Summary

B. Sample Data

C. Standards Data

D. Raw QC Data

GPL Laboratories, LLLP

GPL Laboratories

3D

SOIL SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: **GPL Laboratories** Contract :

Lab Code : **GPL** CASE No. : SAS No. : SDG No. : **110116**

Matrix Spike - EPA Sample No **OD-SO-B-02D MS** Level Type : **LOW**

COMPOUND	SPIKE ADDED ug/kg	SAMPLE CONCENTRATION ug/kg	MS CONCENTRATION ug/kg	MS % REC #	QC LIMITS REC.
Nitroglycerine	59000.00	0	58000	98	50-118

COMPOUND	SPIKE ADDED ug/kg	MSD CONCENTRATION ug/kg	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC
Nitroglycerine	59000.00	53000	89	9	25	50-118

Column to be used to flag recovery and RPD Values with and asterisk.

* Values outside of QC limits

RPD 0 Out of 1 outside Limit

Spike Recovery : 0 Out of 2 outside limit

Comments :

GPL Laboratories

3C

WATER SEMIVOLATILE BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY

Lab Name: **GPL Laboratories** Contract :

Lab Code : **GPL** CASE No. : SAS No. : SDG No. : **110116**

Blank Spike - EPA Sample No. **BKS51253**

COMPOUND	SPIKE ADDED (ug/L)	BLANK CONCENTRATION (ug/L)	BKS CONCENTRATION (ug/L)	BKS % REC #	QC LIMITS REC.
Nitroglycerine	20000	0.00	23300	117	70-120

COMPOUND	SPIKE ADDED (ug/L)	BSD CONCENTRATION (ug/L)	BSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC
Nitroglycerine	20000	23400	117	.4282655	25	70-120

Column to be used to flag recovery and RPD values with and asterisk

* Values outside of QC limits

RPD 0 out of 2 outside limit

Spike Recovery 0 out of 2 outside limit

Comments :

002004

GPL Laboratories

3D

SOIL SEMIVOLATILE BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY

Lab Name: **GPL Laboratories** Contract :

Lab Code : **GPL** CASE No. : SAS No. : SDG No. : **110116**

Blank Spike - EPA Sample No. **BKS51038** Level : (low / med) **MEDIUM**

COMPOUND	SPIKE ADDED (ug/kg)	BLANK CONCENTRATION (ug/kg)	BKS CONCENTRATION (ug/kg)	BKS % REC #	QC LIMITS REC.
Nitroglycerine	50000	0.00	40200	80	60-140

Column to be used to flag recovery and RPD values with and asterisk

* Values outside of QC limits

RPD _____ out of 1 outside limit

Spike Recovery 0 out of 1 outside limit

Comments :

GPL Laboratories

4B
SEMIVOLATILE METHOD BLANK
SUMMARY

EPA SAMPLE NO.
BLK51253

Lab Name : GPL Laboratories Contract :

Lab Code : GPL Case No. : SAS No. : SDG No. : 110116

Lab File ID LB11626.D Lab Sample ID : BLK51253

Instrument ID : A10 Date Extracted 11/04/01

Matrix : (soil/ water) WATER Date Analyzed 11/05/01

Level : (low/med) LOW Time Analyzed : 18:33

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD

	EPA SAMPLE NO..	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	BKS51253	BKS51253	LB11627.D	11/05/01
2	BSD51253	BSD51253	LB11628.D	11/05/01
3	OD-EB-01	110116-014-01-1/1	LB11631.D	11/05/01

Comments

GPL Laboratories

4B
SEMIVOLATILE METHOD BLANK SUMMARY

EPA SAMPLE NO.
BLK51038

Lab Name : **GPL Laboratories** Contract :

Lab Code : **GPL** Case No. : SAS No. : SDG No. : **110116**

Lab File ID **LB11608.D** Lab Sample ID : **BLK51038**

Instrument ID : **A10** Date Extracted **10/24/01**

Matrix : (soil/ water) **SOIL** Date Analyzed **11/05/01**

Level : (low/med) **LOW** Time Analyzed : **14:57**

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD

	EPA SAMPLE NO..	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	BKS51038	BKS51038	LB11609.D	11/05/01
2	OD-SO-A-01	110116-001-01-1/1	LB11610.D	11/05/01
3	OD-SO-A-02	110116-002-01-1/1	LB11611.D	11/05/01
4	OD-SO-A-03	110116-003-01-1/1	LB11612.D	11/05/01
5	OD-SO-A-04	110116-004-01-1/1	LB11613.D	11/05/01
6	OD-SO-B-01	110116-005-01-1/1	LB11614.D	11/05/01
7	OD-SO-B-02	110116-006-01-1/1	LB11615.D	11/05/01
8	OD-SO-B-03	110116-007-01-1/1	LB11616.D	11/05/01
9	OD-SO-C-01	110116-009-01-1/1	LB11617.D	11/05/01
10	OD-SO-C-02	110116-010-01-1/1	LB11620.D	11/05/01
11	OD-SO-C-03	110116-011-01-1/1	LB11621.D	11/05/01
12	OD-SO-C-04	110116-012-01-1/1	LB11622.D	11/05/01
13	OD-SO-B-02D	110116-013-01-1/1	LB11623.D	11/05/01
14	OD-SO-B-02D MS	110116-013-01-1/1 MS	LB11624.D	11/05/01
15	OD-SO-B-02D MSD	110116-013-01-1/1 MSD	LB11625.D	11/05/01
16	OD-SO-B-04 2X 11/07/01	110116-008-01-1/1 2X 11/01/01	LB11647.D	11/05/01

Comments

SAMPLE DATA PACKAGE

PETN ANALYSES DATA

A. QC Summary

B. Sample Data

C. Standards Data

D. Raw QC Data

GPL Laboratories, LLLP

GPL Laboratories

3D

SOIL SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: **GPL Laboratories** Contract :

Lab Code : **GPL** CASE No. : SAS No. : SDG No. : **110116**

Matrix Spike - EPA Sample No **OD-SO-B-02D MS** Level Type : **LOW**

COMPOUND	SPIKE ADDED ug/kg	SAMPLE CONCENTRATION ug/kg	MS CONCENTRATION ug/kg	MS % REC #	QC LIMITS REC.
Pentaerythritol Tetranitrate	2000.00	0	1800	89	77-150

COMPOUND	SPIKE ADDED ug/kg	MSD CONCENTRATION ug/kg	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC
Pentaerythritol Tetranitrate	2000.00	1700	86	3	25	77-150

Column to be used to flag recovery and RPD Values with and asterisk.

* Values outside of QC limits

RPD 0 Out of 1 outside Limit

Spike Recovery : 0 Out of 2 outside limit

Comments :

GPL Laboratories

3C

WATER SEMIVOLATILE BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY

Lab Name: **GPL Laboratories** Contract :

Lab Code : **GPL** CASE No. : SAS No. : SDG No. : **110116**

Blank Spike - EPA Sample No. **BKS51049**

COMPOUND	SPIKE ADDED (ug/L)	BLANK CONCENTRATION (ug/L)	BKS CONCENTRATION (ug/L)	BKS % REC #	QC LIMITS REC.
Pentaerythritol Tetranitrate	5.19	0.00	5.33	103	50-125

COMPOUND	SPIKE ADDED (ug/L)	BSD CONCENTRATION (ug/L)	BSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC
Pentaerythritol Tetranitrate	5.19	4.92	95	8	25	50-125

Column to be used to flag recovery and RPD values with and asterisk

* Values outside of QC limits

RPD 0 out of 2 outside limit

Spike Recovery 0 out of 2 outside limit

Comments :

GPL
Laboratories

3D
SOIL SEMIVOLATILE BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY

Lab Name: **GPL Laboratories** Contract :

Lab Code : **GPL** CASE No. : SAS No. : SDG No. : **110116**

Blank Spike - EPA Sample No. **BKS51033** Level : (low / med) **MEDIUM**

COMPOUND	SPIKE ADDED (ug/kg)	BLANK CONCENTRATION (ug/kg)	BKS CONCENTRATION (ug/kg)	BKS % REC #	QC LIMITS REC.
Pentaerythritol Tetranitrate	2000	0.00	1500	75	50-125

Column to be used to flag recovery and RPD values with and asterisk

* Values outside of QC limits

RPD ____ out of 1 outside limit

Spike Recovery 0 out of 1 outside limit

Comments :

003005

GPL Laboratories

4B
SEMIVOLATILE METHOD BLANK
SUMMARY

EPA SAMPLE NO.
BLK51049

Lab Name : GPL Laboratories Contract :

Lab Code : GPL Case No. : SAS No. : SDG No. : 110116

Lab File ID LB11460.D Lab Sample ID : BLK51049

Instrument ID : A10 Date Extracted 10/25/01

Matrix : (soil/ water) WATER Date Analyzed 10/29/01

Level : (low/med) LOW Time Analyzed : 12:03

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD

	EPA SAMPLE NO..	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	BKS51049	BKS51049	LB11461.D	10/29/01
2	BSD51049	BSD51049	LB11462.D	10/29/01
3	OD-EB-01	110116-014-01-1/1	LB11463.D	10/29/01

Comments

GPL Laboratories

4B
SEMIVOLATILE METHOD BLANK SUMMARY

EPA SAMPLE NO.
BLK51033

Lab Name : **GPL Laboratories** Contract :

Lab Code : **GPL** Case No. : SAS No. : SDG No. : **110116**

Lab File ID **LB11464.D** Lab Sample ID : **BLK51033**

Instrument ID : **A10** Date Extracted **10/24/01**

Matrix : (soil/ water) **SOIL** Date Analyzed **10/29/01**

Level : (low/med) **LOW** Time Analyzed : **13:20**

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD

	EPA SAMPLE NO..	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	BKS51033	BKS51033	LB11465.D	10/29/01
2	OD-SO-A-01	110116-001-01-1/1	LB11466.D	10/29/01
3	OD-SO-A-02	110116-002-01-1/1	LB11467.D	10/29/01
4	OD-SO-A-03	110116-003-01-1/1	LB11468.D	10/29/01
5	OD-SO-A-04	110116-004-01-1/1	LB11469.D	10/29/01
6	OD-SO-B-01	110116-005-01-1/1	LB11471.D	10/29/01
7	OD-SO-B-02	110116-006-01-1/1	LB11472.D	10/29/01
8	OD-SO-B-03	110116-007-01-1/1	LB11473.D	10/29/01
9	OD-SO-B-04	110116-008-01-1/1	LB11474.D	10/29/01
10	OD-SO-C-01	110116-009-01-1/1	LB11475.D	10/29/01
11	OD-SO-C-02	110116-010-01-1/1	LB11476.D	10/29/01
12	OD-SO-C-03	110116-011-01-1/1	LB11477.D	10/29/01
13	OD-SO-C-04	110116-012-01-1/1	LB11478.D	10/29/01
14	OD-SO-B-02D	110116-013-01-1/1	LB11479.D	10/29/01
15	OD-SO-B-02D MS	110116-013-01-1/1 MS	LB11481.D	10/29/01
16	OD-SO-B-02D MSD	110116-013-01-1/1 MSD	LB11482.D	10/29/01

Comments

METALS PACKAGE

GPL Laboratories, LLLP

GPL Laboratories, LLLP

TOTAL METALS
COVER PAGE - INORGANIC ANALYSIS DATA PACKAGE

ıtract: SDG No.: 110116W

Lab Code: Case No.: SAS No.:

SOW No.:

Sample No.	Lab Sample ID.
110103-001-10-1/1	110103-001-10-1/1
110103-001-10-1/1D	110103-001-10-1/1D
110103-001-10-1/1S	110103-001-10-1/1S
SW32-01-5	110106-005-06-1/1
SW32-01-5D	110106-005-06-1/1D
SW32-01-5S	110106-005-06-1/1S
OD-EB-01	110116-014-02-1/1

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.

ıature: Steve Dill Name: Steve Dill

Date: 11-1-01 Title: Metals Supervisor

TOTAL METALS

-1-

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

OD-EB-01

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116W

Matrix (soil/water): WATER Lab Sample ID: 110116-014-02-1/1

Level (low/med): LOW Date Received: 23-OCT-01

Concentration Units (ug/L or mg/kg dry weight): µG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	4.5	U		P
7440-38-2	Arsenic	4.1	U		P
7440-41-7	Beryllium	0.20	U		P
7440-43-9	Cadmium	0.40	U		P
7440-47-3	Chromium	0.90	U		P
7440-50-8	Copper	4.9	U		P
7439-92-1	Lead	1.5	U		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	1.1	U		P
7782-49-2	Selenium	3.4	U		P
7440-22-4	Silver	1.4	U		P
7440-28-0	Thallium	5.1	U		P
7440-66-6	Zinc	7.1	B		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

04003

TOTAL METALS

-2A-

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116W

Initial Calibration Source: HIGH PURITY/CPI

Continuing Calibration Source: HIGH PURITY/CPI

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Antimony	400.0	405.00	101.3	1000.0	1033.23	103.3	1015.70	101.6	P
Arsenic	400.0	407.08	101.8	1000.0	1034.84	103.5	1013.57	101.4	P
Beryllium	40.0	40.33	100.8	50.0	51.44	102.9	49.86	99.7	P
Cadmium	40.0	41.09	102.7	500.0	510.58	102.1	497.33	99.5	P
Chromium	400.0	402.35	100.6	500.0	510.24	102.0	493.89	98.8	P
Copper	400.0	397.55	99.4	500.0	513.54	102.7	503.20	100.6	P
Lead	400.0	406.16	101.5	500.0	508.05	101.6	499.18	99.8	P
Mercury	5.0	4.96	99.2	5.0	4.91	98.2	4.95	99.0	CV
Nickel	400.0	404.12	101.0	500.0	508.70	101.7	492.24	98.4	P
Selenium	400.0	411.07	102.8	1000.0	1036.30	103.6	1015.88	101.6	P
Silver	40.0	39.94	99.8	50.0	50.94	101.9	49.67	99.3	P
Thallium	400.0	405.27	101.3	1000.0	1015.95	101.6	1006.25	100.6	P
Zinc	400.0	412.00	103.0	500.0	506.86	101.4	490.67	98.1	P

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

TOTAL METALS

-2A-

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116W

Initial Calibration Source:

Continuing Calibration Source: HIGH PURITY/CPI

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Antimony				1000.0	1029.56	103.0	1036.34	103.6	P
Arsenic				1000.0	1028.75	102.9	1038.02	103.8	P
Beryllium				50.0	50.34	100.7	50.29	100.6	P
Cadmium				500.0	505.73	101.1	503.32	100.7	P
Chromium				500.0	497.52	99.5	496.98	99.4	P
Copper				500.0	506.70	101.3	513.54	102.7	P
Lead				500.0	507.47	101.5	506.11	101.2	P
Mercury				5.0	4.95	99.0	4.96	99.2	CV
Nickel				500.0	494.84	99.0	491.51	98.3	P
Selenium				1000.0	1026.65	102.7	1038.23	103.8	P
Silver				50.0	49.58	99.2	50.36	100.7	P
Thallium				1000.0	1025.99	102.6	1030.11	103.0	P
Zinc				500.0	499.55	99.9	494.51	98.9	P

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

04005

TOTAL METALS

-2A-

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116W

Initial Calibration Source:

Continuing Calibration Source: HIGH PURITY/CPI

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Antimony				1000.0	1035.16	103.5			P
Arsenic				1000.0	1031.51	103.2			P
Beryllium				50.0	50.64	101.3			P
Cadmium				500.0	509.71	101.9			P
Chromium				500.0	499.11	99.8			P
Copper				500.0	508.35	101.7			P
Lead				500.0	511.71	102.3			P
Mercury				5.0	4.92	98.4			CV
Nickel				500.0	493.33	98.7			P
Selenium				1000.0	1028.71	102.9			P
Silver				50.0	49.97	99.9			P
Thallium				1000.0	1031.44	103.1			P
Zinc				500.0	504.55	100.9			P

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

0406

TOTAL METALS
-2B-
CRDL STANDARD FOR AA AND ICP

Contract:

Lab Code: Case No.: SAS No.: SDG No.: 110116W

AA CRDL Standard Source:

ICP CRDL Standard Source: HIGH PURITY

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
				Initial			Final	
	True	Found	%R	True	Found	%R	Found	%R
Antimony				120.0	126.63	105.5		
Arsenic				20.0	23.39	116.9		
Beryllium				10.0	10.26	102.6		
Cadmium				10.0	10.83	108.3		
Chromium				20.0	20.41	102.1		
Copper				50.0	51.69	103.4		
Lead				6.0	7.07	117.8		
Mercury	0.2	0.20	100.0					
Nickel				80.0	83.23	104.0		
Selenium				10.0	13.39	133.9		
Silver				20.0	19.66	98.3		
Thallium				20.0	19.02	95.1		
Zinc				40.0	44.21	110.5		

04007

TOTAL METALS

-3-

BLANKS

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116W

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Preparation Blank	C	M
Antimony	4.5	U	4.5	U	4.5	U	4.5	U	4.500	U	P
Arsenic	4.1	U	4.1	U	4.1	U	4.1	U	4.100	U	P
Beryllium	0.2	U	0.2	U	0.2	U	-0.2	B	-0.313	B	P
Cadmium	0.4	U	0.4	U	0.4	U	0.4	U	0.400	U	P
Chromium	0.9	U	0.9	U	0.9	U	0.9	U	1.009	B	P
Copper	4.9	U	4.9	U	4.9	U	4.9	U	4.900	U	P
Lead	1.5	U	1.5	U	1.5	U	1.5	U	1.500	U	P
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.100	U	CV
Nickel	-1.2	B	1.1	U	1.1	U	1.1	U	1.100	U	P
Selenium	3.4	U	3.4	U	3.4	U	3.4	U	3.400	U	P
Silver	1.4	U	1.4	U	1.4	U	1.4	U	1.400	U	P
Thallium	5.1	U	5.1	U	5.1	U	5.1	U	-7.433	B	P
Zinc	5.6	U	5.6	U	5.6	U	5.6	U	6.926	B	P

04008

TOTAL METALS

-3-

BLANKS

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116W

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C		Preparation Blank	C		M
Antimony			4.5	U	4.5	U							P
Arsenic			4.1	U	4.1	U							P
Beryllium			-0.3	B	-0.4	B							P
Cadmium			0.4	U	0.4	U							P
Chromium			0.9	U	0.9	U							P
Copper			4.9	U	4.9	U							P
Lead			1.5	U	1.5	U							P
Mercury			0.1	U	0.1	U							CV
Nickel			1.1	U	1.1	U							P
Selenium			3.4	U	3.4	U							P
Silver			1.4	U	1.4	U							P
Thallium			5.1	U	5.1	U							P
Zinc			5.6	U	5.6	U							P

04009

TOTAL METALS
- 4 -
ICP INTERFERENCE CHECK SAMPLE

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116W

ICP ID Number: TJA61 ICP ICS Source: HIGH PURITY

Concentration Units): ug/L

Analyte	True		Initial Found			Final Found		
	Sol.A	Sol.AB	Sol.A	Sol.AB	%R	Sol.A	Sol.AB	%R
Antimony		600	-2	616.5	102.8			
Arsenic		100	2	101.0	101.0			
Beryllium		500	0	508.4	101.7			
Cadmium		1000	1	971.1	97.1			
Chromium		500	0	491.9	98.4			
Copper		500	0	523.9	104.8			
Lead		50	-4	44.2	88.4			
Nickel		1000	-1	961.3	96.1			
Selenium		50	-1	45.9	91.8			
Silver		200	0	206.3	103.2			
Thallium		100	7	108.0	107.9			
Zinc		1000	27	976.3	97.6			

114010

GPL Laboratories, LLLP

TOTAL METALS
-5A-
SPIKE SAMPLE RECOVERY

SAMPLE NO.

110103-001-10-1/1S

Contract:

Lab Code: Case No.: SAS SDG NO.: 110116W

Matrix (soil/water): WATER Level (low/med): LOW

% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): µG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Antimony	75 - 125	46.6798		4.5000	U	50.00	93.4		P
Arsenic	75 - 125	49.1747		4.1000	U	50.00	98.3		P
Beryllium	75 - 125	23.3299		0.4184	B	25.00	91.6		P
Cadmium	75 - 125	46.3511		0.4000	U	50.00	92.7		P
Chromium	75 - 125	233.2086		3.6080	B	250.00	91.8		P
Copper	75 - 125	234.5639		4.9000	U	250.00	93.8		P
Lead	75 - 125	467.3080		1.5000	U	500.00	93.5		P
Nickel	75 - 125	256.8132		29.8229		250.00	90.8		P
Selenium	75 - 125	45.2269		3.4000	U	50.00	90.5		P
Silver	75 - 125	46.1250		1.4000	U	50.00	92.3		P
Thallium	75 - 125	46.5054		5.1000	U	50.00	93.0		P
Zinc	75 - 125	529.8383		61.6420		500.00	93.6		P

ments:

04011

TOTAL METALS
-5A-
SPIKE SAMPLE RECOVERY

SAMPLE NO.

SW32-01-5S

Contract:

Lab Code: Case No.: SAS SDG NO.: 110116W

Matrix (soil/water): WATER Level (low/med): LOW

% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): µG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Mercury	75 - 125	1.0200		0.1000	U	1.00	102.0		CV

ments:

04012

TOTAL METALS

-6-

DUPLICATES

SAMPLE NO.

110103-001-10-1/1D

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116W

Matrix (soil/water): WATER Level (low/med): LOW

% Solids for Sample: 0.0 % Solids for Duplicate:

Concentration Units (ug/L or mg/kg dry weight): µG/L

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Antimony		4.5000	U	4.5000	U			P
Arsenic		4.1000	U	4.1000	U			P
Beryllium		0.4184	B	0.2410	B	53.8		P
Cadmium		0.4000	U	0.4000	U			P
Chromium	5.0	3.6080	B	5.0217		32.8		P
Copper		4.9000	U	4.9000	U			P
Lead		1.5000	U	2.1549	B	200.0		P
Nickel	10.0	29.8229		33.0626		10.3		P
Selenium		3.4000	U	3.8081	B	200.0		P
Silver		1.4000	U	1.4000	U			P
Thallium		5.1000	U	5.1000	U			P
Zinc	20.0	61.6420		69.4388		11.9		P

04013

SW-846

TOTAL METALS

-6-

DUPLICATES

SAMPLE NO.

SW32-01-5D

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116W

Matrix (soil/water): WATER Level (low/med): LOW

% Solids for Sample: 0.0 % Solids for Duplicate:

Concentration Units (ug/L or mg/kg dry weight): µG/L

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Mercury		0.1000	U	0.1000	U			CV

04014

TOTAL METALS

-7-

LABORATORY CONTROL SAMPLE

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116W

Solid LCS Source:

Aqueous LCS Source: HIGH PURITY

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits	%R
Antimony	50.0	48.09	96.2					
Arsenic	50.0	49.45	98.9					
Beryllium	25.0	24.90	99.6					
Cadmium	50.0	51.56	103.1					
Chromium	250.0	252.88	101.2					
Copper	250.0	253.29	101.3					
Lead	500.0	518.39	103.7					
Mercury	1.0	1.00	100.0					
Nickel	250.0	251.80	100.7					
Selenium	50.0	50.65	101.3					
Silver	50.0	48.55	97.1					
Thallium	50.0	46.42	92.8					
Zinc	500.0	523.43	104.7					

TOTAL METALS

-9-

ICP SERIAL DILUTIONS

SAMPLE NO.

110103-001-10-1/1L

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116W

Matrix (soil/water): WATER Level (low/med): LOW

Concentration Units: ug/L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	M
Antimony	4.50	U	22.50	U			P
Arsenic	4.10	U	20.50	U			P
Beryllium	0.42	B	1.00	U	100.0		P
Cadmium	0.40	U	2.00	U			P
Chromium	3.61	B	7.68	B	113.3		P
Copper	4.90	U	24.50	U			P
Lead	1.50	U	7.50	U			P
Nickel	29.82		40.29	B	35.1		P
Selenium	3.40	U	17.00	U			P
Silver	1.40	U	7.00	U			P
Thallium	5.10	U	25.50	U			P
Zinc	61.64		71.11	B	15.3		P

4016

TOTAL METALS
-10-
METHOD DETECTION LIMITS

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116W

ICP ID Number: Date: 04/02/01

Flame AA ID Number: Leeman CVAA

Furnace AA ID Number:

Analyte	Wave-length	Back-ground	PQL (ug/L)	MDL (ug/L)	M
Mercury	253.70		0.2	0.1	CV

Comments

TOTAL METALS
-10-
METHOD DETECTION LIMITS

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116W

ICP ID Number: TJA61 ICP Date: 04/02/01

Flame AA ID Number:

Furnace AA ID Number:

Analyte	Wave-length	Back-ground	PQL (ug/L)	MDL (ug/L)	M
Antimony	206.84		20.0	4.5	P
Arsenic	189.04		20.0	4.1	P
Beryllium	313.04		2.0	0.2	P
Cadmium	226.50		3.0	0.4	P
Chromium	267.72		5.0	0.9	P
Copper	324.75		10.0	4.9	P
Lead	220.35		10.0	1.5	P
Nickel	231.60		10.0	1.1	P
Selenium	196.02		20.0	3.4	P
Silver	328.07		3.0	1.4	P
Thallium	190.86		30.0	5.1	P
Zinc	206.20		20.0	5.6	P

Comments

04018

GPL Laboratories, LLLP

TOTAL METALS
COVER PAGE - INORGANIC ANALYSIS DATA PACKAGE

ıtract: SDG No.: 110116S

Lab Code: Case No.: SAS No.:

SOW No.:

Sample No.	Lab Sample ID.
OD-SO-A-01	110116-001-01-1/1
OD-SO-A-01D	110116-001-01-1/1D
OD-SO-A-01S	110116-001-01-1/1S
OD-SO-A-02	110116-002-01-1/1
OD-SO-A-03	110116-003-01-1/1
OD-SO-A-04	110116-004-01-1/1
OD-SO-B-01	110116-005-01-1/1
OD-SO-B-02	110116-006-01-1/1
OD-SO-B-03	110116-007-01-1/1
OD-SO-B-04	110116-008-01-1/1
OD-SO-C-01	110116-009-01-1/1
OD-SO-C-02	110116-010-01-1/1
OD-SO-C-03	110116-011-01-1/1
OD-SO-C-04	110116-012-01-1/1
OD-SO-C-04D	110116-012-01-1/1D
OD-SO-C-04S	110116-012-01-1/1S
OD-SO-B-02D	110116-013-01-1/1

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.

ɡnature: Name: Steve Dill

Date: 11-01-01 Title: Metals Supervisor

TOTAL METALS
-2B-
CRDL STANDARD FOR AA AND ICP

Contract:

Lab Code: Case No.: SAS No.: SDG No.: 110116S

AA CRDL Standard Source:

ICP CRDL Standard Source: HIGH PURITY

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
				Initial			Final	
	True	Found	%R	True	Found	%R	Found	%R
Antimony				120.0	126.63	105.5	126.71	105.6
Arsenic				20.0	23.39	116.9	20.41	102.1
Beryllium				10.0	10.26	102.6	9.76	97.6
Cadmium				10.0	10.83	108.3	10.47	104.7
Chromium				20.0	20.41	102.1	19.58	97.9
Copper				50.0	51.69	103.4	52.71	105.4
Lead				6.0	7.07	117.8	6.84	114.0
Mercury	0.2	0.19	95.0					
Nickel				80.0	83.23	104.0	78.88	98.6
Selenium				10.0	13.39	133.9	12.67	126.7
Silver				20.0	19.66	98.3	19.15	95.8
Thallium				20.0	19.02	95.1	18.93	94.7
Zinc				40.0	44.21	110.5	42.01	105.0

004047

TOTAL METALS

-3-

BLANKS

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116S

Preparation Blank Matrix (soil/water): SOIL

Preparation Blank Concentration Units (ug/L or mg/kg): MG/KG

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Preparation Blank	C	M
Antimony	9.5	U	9.5	U	9.5	U	9.5	U	0.950	U	P
Arsenic	5.3	U	5.3	U	5.3	U	5.3	U	0.530	U	P
Beryllium	0.2	U	0.2	U	0.2	U	-0.2	B	-0.033	B	P
Cadmium	0.5	U	0.5	U	0.5	U	0.5	U	0.050	U	P
Chromium	0.9	U	0.9	U	0.9	U	0.9	U	0.187	B	P
Copper	1.6	U	1.6	U	1.6	U	1.6	U	0.540	B	P
Lead	1.5	U	1.5	U	1.5	U	1.5	U	0.150	U	P
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.017	U	CV
Nickel	-1.2	B	1.1	U	1.1	U	1.1	U	-0.335	B	P
Selenium	2.4	U	2.4	U	2.4	U	2.4	U	0.283	B	P
Silver	2.3	U	2.3	U	2.3	U	2.3	U	0.230	U	P
Thallium	6.5	U	6.5	U	6.5	U	6.5	U	-0.754	B	P
Zinc	1.9	U	1.9	U	1.9	U	1.9	U	0.336	B	P

004048

TOTAL METALS

-3-

BLANKS

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116S

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C		Preparation Blank	C		M
Antimony			9.5	U	9.5	U	9.5	U					P
Arsenic			5.3	U	5.3	U	5.3	U					P
Beryllium			-0.3	B	-0.4	B	-0.3	B					P
Cadmium			0.5	U	0.5	U	0.5	U					P
Chromium			0.9	U	0.9	U	0.9	U					P
Copper			1.6	U	1.6	U	1.6	U					P
Lead			1.5	U	1.5	U	1.5	U					P
Mercury			0.1	U									CV
Nickel			1.1	U	1.1	U	1.1	U					P
Selenium			2.4	U	3.0	B	2.4	U					P
Silver			2.3	U	2.3	U	2.3	U					P
Thallium			6.5	U	6.5	U	6.5	U					P
Zinc			1.9	U	1.9	U	1.9	U					P

004049

TOTAL METALS

-3-

BLANKS

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116S

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C		Preparation Blank	C		M
Antimony			9.5	U									P
Arsenic			5.3	U									P
Beryllium			-0.4	B									P
Cadmium			0.5	U									P
Chromium			0.9	U									P
Copper			1.6	U									P
Lead			1.5	U									P
Nickel			1.1	U									P
Selenium			2.4	U									P
Silver			2.3	U									P
Thallium			6.5	U									P
Zinc			1.9	U									P

004050

TOTAL METALS
- 4 -
ICP INTERFERENCE CHECK SAMPLE

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116S

ICP ID Number: TJA61 ICP ICS Source: HIGH PURITY

Concentration Units): ug/L

Analyte	True		Initial Found			Final Found		
	Sol.A	Sol.AB	Sol.A	Sol.AB	%R	Sol.A	Sol.AB	%R
Antimony		600	-2	616.5	102.8	-4	623.3	103.9
Arsenic		100	2	101.0	101.0	0	103.5	103.5
Beryllium		500	0	508.4	101.7	0	498.4	99.7
Cadmium		1000	1	971.1	97.1	3	944.1	94.4
Chromium		500	0	491.9	98.4	0	476.8	95.4
Copper		500	0	523.9	104.8	1	539.5	107.9
Lead		50	-4	44.2	88.4	-3	44.5	88.8
Nickel		1000	-1	961.3	96.1	-1	919.6	92.0
Selenium		50	-1	45.9	91.8	-3	47.7	95.4
Silver		200	0	206.3	103.2	0	206.7	103.3
Thallium		100	7	108.0	107.9	7	101.7	101.7
Zinc		1000	27	976.3	97.6	26	926.5	92.7

004051

TOTAL METALS
-5A-
SPIKE SAMPLE RECOVERY

SAMPLE NO.

OD-SO-A-01S

Contract:

Lab Code: Case No.: SAS SDG NO.: 110116S

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids for Sample: 89.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Antimony	75 - 125	9.4865		1.0278	U	10.80	87.9		P
Arsenic	75 - 125	10.9032		0.6816	B	10.80	94.6		P
Beryllium	75 - 125	5.2168		0.0387	B	5.40	95.9		P
Cadmium	75 - 125	10.2309		0.0614	B	10.80	94.2		P
Chromium	75 - 125	54.0549		1.9474		53.99	96.5		P
Copper	75 - 125	56.7506		1.0380	B	53.99	103.2		P
Lead	75 - 125	105.6684		1.0066	B	107.98	96.9		P
Nickel	75 - 125	51.7756		0.8306	B	53.99	94.4		P
Selenium	75 - 125	10.3473		0.2597	U	10.80	95.8		P
Silver	75 - 125	10.6340		0.2488	U	10.80	98.5		P
Thallium	75 - 125	9.9880		0.7032	U	10.80	92.5		P
Zinc	75 - 125	105.1953		3.7854		107.98	93.9		P

ments:

004052

TOTAL METALS
-5A-
SPIKE SAMPLE RECOVERY

SAMPLE NO.

OD-SO-C-04S

Contract:

Lab Code: Case No.: SAS SDG NO.: 110116S

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids for Sample: 91.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Mercury	75 - 125	0.4867		0.0162	U	0.49	100.3		CV

ments:

004053

TOTAL METALS

-6-

DUPLICATES

SAMPLE NO.

OD-SO-A-01D

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116S

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids for Sample: 89.2 % Solids for Duplicate: 89.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Antimony		1.0278	U	1.0268	U			P
Arsenic		0.6816	B	0.5728	U	200.0		P
Beryllium		0.0387	B	0.0216	U	200.0		P
Cadmium		0.0614	B	0.0540	U	200.0		P
Chromium	0.5	1.9474		1.9414		0.3		P
Copper		1.0380	B	1.0123	B	2.5		P
Lead		1.0066	B	1.0509	B	4.3		P
Nickel		0.8306	B	0.8065	B	2.9		P
Selenium		0.2597	U	0.2594	U			P
Silver		0.2488	U	0.2486	U			P
Thallium		0.7032	U	0.7025	U			P
Zinc	2.2	3.7854		3.8721		2.3		P

004054

TOTAL METALS

-6-

DUPLICATES

SAMPLE NO.

OD-SO-C-04D

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116S

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids for Sample: 91.2 % Solids for Duplicate: 91.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Mercury		0.0162	U	0.0161	U			CV

004055

TOTAL METALS

-7-

LABORATORY CONTROL SAMPLE

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116S

Solid LCS Source: HIGH PURITY

Aqueous LCS Source:

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Antimony				10.0	9.1		8.0	12.0	90.8
Arsenic				10.0	8.8		8.0	12.0	88.1
Beryllium				5.0	4.6		4.0	6.0	92.7
Cadmium				10.0	9.4		8.0	12.0	94.3
Chromium				50.0	46.8		40.0	60.0	93.6
Copper				50.0	47.5		40.0	60.0	95.0
Lead				100.0	95.5		80.0	120.0	95.5
Mercury				0.5	0.5		0.4	0.6	100.7
Nickel				50.0	45.9		40.0	60.0	91.8
Selenium				10.0	8.7		8.0	12.0	87.4
Silver				10.0	9.1		8.0	12.0	90.6
Thallium				10.0	9.1		8.0	12.0	91.4
Zinc				100.0	95.5		80.0	120.0	95.5

004056

TOTAL METALS

-9-

ICP SERIAL DILUTIONS

SAMPLE NO.

OD-SO-A-01L

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116S

Matrix (soil/water): SOIL Level (low/med): LOW

Concentration Units: ug/L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	M
Antimony	9.50	U	47.50	U			P
Arsenic	6.30	B	26.50	U	100.0		P
Beryllium	0.36	B	1.00	U	100.0		P
Cadmium	0.57	B	2.50	U	100.0		P
Chromium	18.00		33.65		86.9		P
Copper	9.59	B	11.87	B	23.6		P
Lead	9.30	B	7.50	U	100.0		P
Nickel	7.68	B	5.99	B	21.9		P
Selenium	2.40	U	12.00	U			P
Silver	2.30	U	11.50	U			P
Thallium	6.50	U	32.50	U			P
Zinc	34.99		42.36	B	21.0		P

01057

TOTAL METALS
-10-
METHOD DETECTION LIMITS

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116S

ICP ID Number: Date: 04/06/01

Flame AA ID Number: Leeman CVAA

Furnace AA ID Number:

Analyte	Wave-length	Back-ground	PQL (ug/L)	MDL (ug/L)	M
Mercury	253.70		0.2	0.1	CV

Comments

004059

TOTAL METALS
-10-
METHOD DETECTION LIMITS

Contract:

Lab Code: Case No.: SAS No.: SDG NO.: 110116S

ICP ID Number: TJA61 ICP Date: 04/06/01

Flame AA ID Number:

Furnace AA ID Number:

Analyte	Wave-length	Back-ground	PQL (ug/L)	MDL (ug/L)	M
Antimony	206.84		20.0	9.5	P
Arsenic	189.04		20.0	5.3	P
Beryllium	313.04		2.0	0.2	P
Cadmium	226.50		3.0	0.5	P
Chromium	267.72		5.0	0.9	P
Copper	324.75		10.0	1.6	P
Lead	220.35		10.0	1.5	P
Nickel	231.60		10.0	1.1	P
Selenium	196.02		20.0	2.4	P
Silver	328.07		3.0	2.3	P
Thallium	190.86		30.0	6.5	P
Zinc	206.20		20.0	1.9	P

Comments

004053

SW-846

WET CHEMISTRY:
% SOLIDS SUMMARY

GPL Laboratories, LLLP

	Samp'	Clas	Method	Q	Anal Date	Tech	SEQ No.	Multip	M	Prep	R		A	B	C	Calculate	Meth	Col	Col	C	Perce	L	Sample
1																							
2																							
3																							
4	110106-008-03-	SMP	CLP_SOLIDS		10-24-01 14:00	1300-06	50222	000000	S		Y	SED32-	0.98610	10.14940	7.14190	67.1789	1.0000			1			
5	110106-009-03-	SMP	CLP_SOLIDS		10-24-01 14:00	1300-06	50222	000000	S	0	Y	SED32-	0.97200	10.14320	7.55800	71.8118	1.0000			1			
6	110106-010-03-	SMP	CLP_SOLIDS		10-24-01 14:00	1300-06	50222	000000	S	0	Y	SED32-	0.97410	10.26700	7.22870	67.3051	1.0000			1			
7	110106-011-03-	SMP	CLP_SOLIDS		10-24-01 14:00	1300-06	50222	000000	S	0	Y	01-OC-	0.97400	10.09750	6.75940	63.4121	1.0000			1			
8	110116-001-01-	SMP	CLP_SOLIDS		10-24-01 14:00	1300-06	50222	000000	S		Y	OD-SO-	0.97860	10.71220	9.66310	89.2219	1.0000			1			
9	110116-002-01-	SMP	CLP_SOLIDS		10-24-01 14:00	1300-06	50222	000000	S		Y	OD-SO-	0.98460	10.25000	9.31070	89.8623	1.0000			1			
10	110116-003-01-	SMP	CLP_SOLIDS		10-24-01 14:00	1300-06	50222	000000	S		Y	OD-SO-	0.96810	10.26260	9.15090	88.0392	1.0000			1			
11	110116-004-01-	SMP	CLP_SOLIDS		10-24-01 14:00	1300-06	50222	000000	S		Y	OD-SO-	0.98050	10.64580	9.27670	85.8349	1.0000			1			
12	110116-005-01-	SMP	CLP_SOLIDS		10-24-01 14:00	1300-06	50222	000000	S		Y	OD-SO-	0.98310	10.05740	8.52100	83.0687	1.0000			1			
13	110116-006-01-	SMP	CLP_SOLIDS		10-24-01 14:00	1300-06	50222	000000	S		Y	OD-SO-	0.97280	10.51430	8.91450	83.2332	1.0000			1			
14	110116-007-01-	SMP	CLP_SOLIDS		10-24-01 14:00	1300-06	50222	000000	S		Y	OD-SO-	0.99100	10.26600	8.35700	79.4178	1.0000			1			
15	110116-008-01-	SMP	CLP_SOLIDS		10-24-01 14:00	1300-06	50222	000000	S		Y	OD-SO-	0.98590	10.21790	8.73370	83.9233	1.0000			1			
16	110116-009-01-	SMP	CLP_SOLIDS		10-24-01 14:00	1300-06	50222	000000	S		Y	OD-SO-	0.97070	10.02870	8.63280	84.5893	1.0000			1			
17	110116-010-01-	SMP	CLP_SOLIDS		10-24-01 14:00	1300-06	50222	000000	S		Y	OD-SO-	0.96620	10.11220	9.41350	92.3606	1.0000			1			
18	110116-010-01-	MD	CLP_SOLIDS		10-24-01 14:00	1300-06	50222	000000	S		Y	OD-SO-	0.98320	10.15140	9.45980	92.4565	1.0000			1			
19	110116-011-01-	SMP	CLP_SOLIDS		10-24-01 14:00	1300-06	50222	000000	S		Y	OD-SO-	0.98840	10.45170	10.00130	95.2406	1.0000			1			
20	110116-012-01-	SMP	CLP_SOLIDS		10-24-01 14:00	1300-06	50222	000000	S		Y	OD-SO-	0.97600	10.12670	9.32330	91.2203	1.0000			1			
21	110116-013-01-	SMP	CLP_SOLIDS		10-24-01 14:00	1300-06	50222	000000	S		Y	OD-SO-	0.98810	10.34010	8.87990	84.3862	1.0000			1			

Y13 10/26/01

005002

	Desc n	A	Sample Id	ST	Method	Results	RL Raw	R	Ra	Multiplie	Reporti	Raw	nFinal	Sort	spk	%	Final
1																	
2																	
3																	
4	Percent Solids	AN	110106-008-0	SMP /	CLP_SOLID	67.2			67.1789	.00000000	PER	PER	67.2000	0	0.0000	0.00	67.1789
5	Percent Solids	AN	110106-009-0	SMP /	CLP_SOLID	71.8			71.8118	.00000000	PER	PER	71.8000	0	0.0000	0.00	71.8118
6	Percent Solids	AN	110106-010-0	SMP /	CLP_SOLID	67.3			67.3051	.00000000	PER	PER	67.3000	0	0.0000	0.00	67.3051
7	Percent Solids	AN	110106-011-0	SMP /	CLP_SOLID	63.4			63.4121	.00000000	PER	PER	63.4000	0	0.0000	0.00	63.4121
8	Percent Solids	AN	110116-001-0	SMP /	CLP_SOLID	89.2			89.2219	.00000000	PER	PER	89.2000	0	0.0000	0.00	89.2219
9	Percent Solids	AN	110116-002-0	SMP /	CLP_SOLID	89.9			89.8623	.00000000	PER	PER	89.9000	0	0.0000	0.00	89.8623
10	Percent Solids	AN	110116-003-0	SMP /	CLP_SOLID	88			88.0392	.00000000	PER	PER	88.0000	0	0.0000	0.00	88.0392
11	Percent Solids	AN	110116-004-0	SMP /	CLP_SOLID	85.8			85.8349	.00000000	PER	PER	85.8000	0	0.0000	0.00	85.8349
12	Percent Solids	AN	110116-005-0	SMP /	CLP_SOLID	83.1			83.0687	.00000000	PER	PER	83.1000	0	0.0000	0.00	83.0687
13	Percent Solids	AN	110116-006-0	SMP /	CLP_SOLID	83.2			83.2332	.00000000	PER	PER	83.2000	0	0.0000	0.00	83.2332
14	Percent Solids	AN	110116-007-0	SMP /	CLP_SOLID	79.4			79.4178	.00000000	PER	PER	79.4000	0	0.0000	0.00	79.4178
15	Percent Solids	AN	110116-008-0	SMP /	CLP_SOLID	83.9			83.9233	.00000000	PER	PER	83.9000	0	0.0000	0.00	83.9233
16	Percent Solids	AN	110116-009-0	SMP /	CLP_SOLID	84.6			84.5893	.00000000	PER	PER	84.6000	0	0.0000	0.00	84.5893
17	Percent Solids	AN	110116-010-0	SMP /	CLP_SOLID	92.4			92.3606	.00000000	PER	PER	92.4000	0	0.0000	0.00	92.3606
18	Percent Solids	AN	110116-010-0	MD /	CLP_SOLID	92.5			92.4565	.00000000	PER	PER	92.5000	0	0.0000	0.00	92.4565
19	Percent Solids	AN	110116-011-0	SMP /	CLP_SOLID	95.2			95.2406	.00000000	PER	PER	95.2000	0	0.0000	0.00	95.2406
20	Percent Solids	AN	110116-012-0	SMP /	CLP_SOLID	91.2			91.2203	.00000000	PER	PER	91.2000	0	0.0000	0.00	91.2203
21	Percent Solids	AN	110116-013-0	SMP /	CLP_SOLID	84.4			84.3862	.00000000	PER	PER	84.4000	0	0.0000	0.00	84.3862

YB 10/26/01

PERCENT SOLIDS DETERMINATION LOG

Method Title: %Solids
Method Reference: OLMO4.1 / ASTM D2216

Analyst: R.S
Reviewed By / Date: YB 10/26/01
(Seq#50222)

Analytical Balance ID: Mettler AE 240
Drying Oven Temp Maintained at 103-105C:
Time In (Oven): 2:00pm Temp 103°C Date: 10-24-01
Time Out (Oven): 9:30Am Temp 103°C Date: 10-25-01
Dessicator Temp: 22°C Dessicator % Humidity (<20%): 16%

W.O.#	Frac.	Client ID	Weight of Dish	Weight of wet Sample + Dish	Weight of dry Sample +Dish	DUP RPD <15%
110106	008	SED32-01-3	0.9861	10.1494	7.1419	
~~110~~	009	SED32-01-4	0.9720	10.1432	7.5580	
	010	SED32-01-5	0.9741	10.2670	7.2287	
	011	~~SED02~~ R.S 10-24-01 -0C-18-DP	0.9740	10.0975	6.7594	
110116	001	OD-SO-A-01	0.9786	10.7122	9.6631	
	002	OD-SO-A-02	0.9846	10.2500	9.3107	
	003	OD-SO-A-03	0.9681	10.2626	9.1509	
	004	OD-SO-A-04	0.9805	10.6458	9.2767	
	005	OD-SO-B-01	0.9831	10.0574	8.5210	
	006	OD-SO-B-02	0.9728	10.5143	8.9145	
	007	OD-SO-B-03	0.9910	10.2660	8.3570	
	008	OD-SO-B-04	0.9859	10.2179	8.7337	
	009	OD-SO-C-01	0.9707	10.0287	8.6328	
	010	OD-SO-C-02	0.9662	10.1122	9.4135	
	011 (DUP)	↓	0.9832	10.1514	9.4598	0.9
	011	OD-SO-C-03	0.9884	10.4517	10.0013	
	012	OD-SO-C-04	0.9760	10.1267	9.3233	
	013	OD-SO-B-02D	0.9881	10.3401	8.8799	

R.S 10-24-01

Comments:

005004