



Setting the Standards for Innovative
Environmental Solutions

December 3, 1998

Mr. David Upthegrove
Michael Pisani & Associates
1430 Energy Center
1100 Poydras Street
New Orleans, LA 70163

Dear Mr. Upthegrove:

Enclosed is the quality assurance review for the samples collected on May 19, 20, 21 and June 4, 9, 10, and 11, 1998, as part of the Gulf States Creosoting project. The samples were grouped by the laboratory into sample delivery groups (SDG) HMS01, HMS02, HMS03, HMS04, HMS05, and HMS06 and were collectively analyzed for the Target Compound List of volatile organic compounds and semivolatile organic compounds.

Overall, the data quality is acceptable (data is usable). However, a portion of the organic data have been qualified as estimated due to blank contamination, calibration issues, laboratory control sample recoveries, matrix spike/matrix spike duplicate results, low surrogate recoveries, and results reported at concentrations below the quantitation limit.

If you have any questions/comments, or if I can be of further assistance, please feel free to call.

Sincerely,

KAB
Kathleen A. Blaine
Quality Assurance Specialist/Principal

KAB:hb

Enc.

ENVIRONMENTAL STANDARDS MIDWEST, INC.
BELLEVILLE, IL

1140 Valley Forge Road, P.O. Box 911, Valley Forge, PA 19482-0911 • 610-935-5577 • Internet 00NPL@EnvStd.com
1111 Kennedy Place, Suite 2, Davis, CA 95616 • 916-758-1903 • Internet ENVSTDWEST@AOL.com
Copper Bend Centre, 956 South 59th Street, Belleville, IL 62223 • 618-257-3800 • Internet MIDWEST@EnvStd.com
World Wide Web [HTTP://www.EnvStd.com/](http://www.EnvStd.com/)



Setting the Standards for Innovative
Environmental Solutions

**QUALITY ASSURANCE REVIEW OF SAMPLES
COLLECTED FOR GULF STATES CREOSOTING**

VOLUME I

December 3, 1998

Prepared for:

MICHAEL PISANI & ASSOCIATES

1430 Energy Center
1100 Poydras Street
New Orleans, LA 70163

Prepared by:

ENVIRONMENTAL STANDARDS MIDWEST, INC.

956 South 59th Street
Suite D

Belleville, IL 62223

ENVIRONMENTAL STANDARDS MIDWEST, INC.

BELLEVILLE, IL

1140 Valley Forge Road, P.O. Box 911, Valley Forge, PA 19482-0911 • 610-935-5577 • Internet 00NPI@EnvStd.com
1111 Kennedy Place, Suite 2, Davis, CA 95616 • 916-758-1903 • Internet ENVSTDWEST@AOL.com
Copper Bend Centre, 956 South 59th Street, Belleville, IL 62223 • 618-257-3800 • Internet MIDWEST@EnvStd.com
World Wide Web [HTTP://www.EnvStd.com/](http://www.EnvStd.com/)

TABLE OF CONTENTS

VOLUME I

Introduction

Section 1 Quality Assurance Review

A. Organic Data

B. Conclusions

Section 2 Analytical Results

VOLUME II

Section 3 Organic Data Support Documentation

Section 4 Project Case Narratives and Chain-of-Custody Records

Introduction

This quality assurance (QA) review is based upon a rigorous examination of the data generated from the samples collected on May 19, 20, and 21 and June 4, 9, 10, and 11, 1998, as part of the Gulf States Creosoting project. The samples that have undergone the QA review are presented on Table 1.

This review has been performed with guidance from the "National Functional Guidelines for Organic Data Review" (United States Environmental Protection Agency [US EPA], 2/94).

The reported analytical results are presented in Section 2. Data were examined to determine the usability of the analytical results and compliance relative to requirements specified in the analytical methods. Qualifier codes have been placed next to the results so the data user can quickly assess the qualitative and/or quantitative reliability of any result. This critical QA review identifies data quality issues for specific samples and specific evaluation criteria. The data qualifications allow the data end-user to best understand the usability of the analytical results. It should be understood that data not qualified in this report should be considered valid based on the quality control (QC) criteria that have been reviewed. Details of this QA review are presented in the narrative section of this report. This report was prepared to provide a critical review of the laboratory analyses and reported analytical results. Rigorous QA reviews of laboratory-generated data routinely identify various problems associated with analytical measurements, even from the most experienced and capable laboratories.

Section 1 Quality Assurance Review

A. Organic Data

The organic analysis of 150 samples (inclusive of QC samples and sample reanalyses) was performed by Lancaster Laboratories (Lancaster) of Lancaster, Pennsylvania. These 150 samples were collectively analyzed for the Target Compound List (TCL) volatile organic compounds by SW-846 Method 8260B and TCL semivolatile organic compounds by SW-846 Method 8270C, as indicated on Table 1. The analytical results are presented in Section 2 of this report.

The findings in this report are based upon a rigorous review of sample holding times, blank analysis results, laboratory control sample (LCS) recoveries, matrix spike and matrix spike duplicate results, surrogate recoveries, gas chromatography/mass spectroscopy (GC/MS) instrument mass tuning, calibrations, sample preparation, internal standard performance, analytical sequence, and the quantitation of positive results.

In the Data Support Documentation (Section 3) of this report, the data reviewer has included copies of all relevant raw data, QC forms, and other documentation needed to support any changes made to the data package. It should be emphasized that the following items do not necessarily affect data usability. Usability issues are addressed in a subsequent section. This report has been prepared according to sections that provide information that applies to specific analyses performed on the project samples.

Correctable Deficiencies

1. The second page of the continuing calibration summary forms for the semivolatile continuing calibration analyzed on 6/26/98, instrument HP06588, and the third page of the continuing calibration summary form for the semivolatile calibration analyzed on 7/01/98, instrument HP06588, were not included in the data package supplied by the laboratory. The information was requested from the laboratory but had not been received at the time this validation was completed. The Environmental Standards data reviewer evaluated the raw data for these calibrations and found all calibration criteria to be acceptable.
2. Hexachlorobutadiene and butylbenzylphthalate were detected at 2 $\mu\text{g}/\text{L}$ in SDG HMS01 samples CPT-10-GW and CPT-21-GW. Both compounds are reported on the quantitation report and are confirmed by mass spectra but were not reported on the sample analysis summary form. The Environmental Standards data reviewer has corrected the EDD and the data tables.

Noncorrectable Deficiency

- The recoveries of several surrogate compounds in the semivolatile fraction of SDG HMS02 sample SD-12, SDG HMS03 sample SW-09, and SDG HMS04 samples GEO-22/5-6', GEO-22/5-6', and GEO-24/5-6' were outside QC limits. The laboratory appropriately reextracted and reanalyzed the semivolatile fraction of these samples. However, these reextractions were performed outside the extraction holding time. The laboratory provided the hard copy data for both extraction analyses; the results from the initial extraction analysis were reported on the EDD.

Comments

1. As noted in the laboratory Case Narrative, the volatile analysis of SDG HMS03 samples GEO-17-GW, GEO-19-GW, and GEO-21-GW were analyzed by medium level. The quantitation limits were raised accordingly.
2. Zero percent surrogate recoveries were reported for the semivolatile analysis of SDG HMS04 sample GEO-22/5-6'. In addition, the semivolatile surrogate recoveries of sample GEO-24/5-6' are approximately double that which would be expected. No interferences are apparent in either sample and reextraction/reanalysis results for target analytes are similar to the initial analysis and surrogate recoveries are acceptable. It appears that sample GEO-24/5-6' was spiked with twice the specified amount of surrogate solution. In addition, it appears that the surrogate solution was not spiked into sample GEO-22/5-6'. When the laboratory reextracted and reanalyzed the semivolatile fraction of these samples, acceptable surrogate recoveries were obtained. As a result, no qualification of the data has been performed.
3. As noted in the laboratory case narratives for both the volatile and semivolatile analyses, a number of compound concentrations were calculated using either a first or second degree quadratic fit due to a poor curve fit.
4. The data usability results for the LCS and matrix spike/matrix spike duplicate analyses were evaluated utilizing the laboratory-generated precision and accuracy limits.
5. The laboratory reported "not-detected" results down to the method detection limits (MDLs). In addition, positive results less than the quantitation limit, but greater than the MDL, were qualified by the laboratory as estimated ("J").



6. As noted in the laboratory case narrative, initial dilutions were required for the analysis of semivolatiles samples SD-2, SD-4, GEO-20/0-1', GEO-34/0-1', and GEO-29/0-1'. Sample detection limits have been raised accordingly for these samples.
7. It should be noted that matrix spike/matrix spike duplicate samples were not collected for SDG HMS06 samples. The laboratory included a matrix spike and matrix spike duplicate analyses for a non-project sample.
8. The laboratory analyzed the semivolatiles fraction of several samples at dilutions due to high concentrations of target analytes in the samples. The laboratory provided the hardcopy raw data for both the initial undiluted analyses and the subsequent dilution analyses for all these samples. However, the laboratory reported the results for all target analytes that exceeded the calibration range in the initial analysis from the secondary dilution analysis on the sample analysis summary forms and EDD. Furthermore, the laboratory reported the results for all other target analytes from the initial undiluted analysis on the sample analysis summary form and EDD.
9. As noted in the laboratory Case Narrative for SDG HMS04, the laboratory was not able to adequately resolve the peaks for benzo(b)fluoranthene and benzo(k)fluoranthene in samples GEO-22/2-3', GEO-23/0-1', GEO-23/2-3', GEO-25/0-1', and GEO-25/2-3'. Consequently, the reported results for benzo(b)fluoranthene and benzo(k)fluoranthene in these samples represent the sum total for both isomers.
10. As noted in the laboratory Case Narrative for SDG HMS06, the laboratory utilized 940-ml and 921-ml extraction volumes for the extraction of the semivolatiles fraction of samples RB-6-9-98 and RB-6-10-98, respectively, because insufficient sample volume was received at the laboratory.

With regard to data usability, the principal areas of concern are blank contamination, low surrogate recoveries, matrix spike/matrix spike duplicate results, laboratory control sample recoveries, calibration issues, and quantitation of results below the quantitation limit. Based upon a review of the data package provided, the following data qualifiers are offered. (It should be noted that the following data usability issues represent an interpretation of the QC results obtained for the project samples. Quite often, data qualifications address issues relating to sample matrix problems. Similarly, the validation guidelines routinely specify areas of the data that require qualification, yet the methods used for analysis do not require any corrective action by the laboratory. Accordingly, the following data usability issues should not necessarily be construed as an indication of laboratory performance.)



Organic Data Qualifiers

- Due to the trace-level presence of the following compounds in field, trip, and/or laboratory blanks, these compounds in the samples listed below should be considered "not-detected"; consequently, the reported positive results have been flagged "U*" on the data tables. Furthermore, results that were reported below the sample-specific quantitation limit were replaced with the quantitation limit and the appropriate "U*" qualifier. It should be noted that dilution factors and sample volume were taken into consideration when evaluating blank contamination.

<u>Compound</u>	<u>SDG</u>	<u>Sample(s) With Results Qualified as "Not-Detected" ("U")</u>
bis(2-ethylhexyl)phthalate	HMS01	CPT-07-GW, CPT-08-GW, CPT-09-GW, CPT-11-GW, CPT-12-GW, CPT-13-GW, CPT-18-GW, CPT-21-GW, and CPT-22-GW
	HMS02	SD-1, SD-3, SD-5, and SD-10
di-n-octylphthalate	HMS01	CPT-08-GW, CPT-11-GW, CPT-18-GW, CPT-21-GW, and CPT-22-GW
di-n-butylphthalate	HMS03	SW-02 and CFO
butylbenzylphthalate	HMS03	SW-02 and CFO

- Although there is no direct reason to qualitatively question the reported positive results for bis(2-ethylhexyl)phthalate, di-n-butylphthalate, butylbenzylphthalate, and di-n-octylphthalate in the following samples, these low-level results should be used with caution if used in a decision-making process such as risk assessment. Phthalate esters are common field and laboratory contaminants.

<u>Compound</u>	<u>Samples With Reported Positive Results</u>
bis(2-ethylhexyl)phthalate	GEO-32/2-3', GEO-32/5-6', GEO-13/5-6', GEO-13/5-6', GEO-22/0-1', GEO-23/0-1', SD-04, SW-02, and CFO
butylbenzylphthalate	GEO-22/0-1' and CPT-21-GW
di-n-butylphthalate	CPT-07-GW, CPT-08-GW, CPT-09-GW, CPT-11-GW, CPT-12-GW, CPT-10-GW, CPT-18-GW, CPT-21-GW, and CPT-22-GW
di-n-octylphthalate	SW-09



- The analyses for the compounds in the samples listed below are unusable; consequently, the "not-detected" results have been flagged "R" on the data tables. Very low (<0.050) relative response factors (RRFs) were observed for these compounds in the associated initial multipoint calibration standards and/or continuing calibrations.

<u>Compound</u>	<u>SDG</u>	<u>Sample(s) With Unreliable Detection Limits ("R")</u>
hexachlorobenzene	HMS05	GEO-34/0-1', GEO-34/2-3', GEO-34/5-6', GEO-28/2-3', GEO-28/5-6', GEO-29/0-1', GEO-29/2-3', GEO-29/5-6', GEO-30/0-1', GEO-30/2-3', GEO-30/5-6', GEO-31/0-1', GEO-31/2-3', and GEO 28/0-1'
	HMS06	RB/6-09-98 and RB/6-10-98
2,4-dinitrophenol	HMS06	RB/6-09-98 and RB/6-10-98
hexachlorocyclopentadiene	HMS06	RB/6-09-98 and RB/6-10-98

- The actual reporting limits for the following compounds in the associated samples may be higher than reported; consequently, the "not-detected" results (not previously qualified 'R') for these compounds have been flagged "UJ" on the data tables. High percent differences (25.0% < %D ≤ 90.0%) with increases in instrument sensitivity were obtained between the average RRFs of the associated initial calibrations and the RRFs in the associated continuing calibrations. It should be noted that although the reporting limits have been qualified according to protocol, these high percent differences represent increases in instrument sensitivity; consequently, the reporting limits may be valid as reported.

<u>Compound</u>	<u>SDG</u>	<u>Sample(s) With Biased Detection Limits ("UJ")</u>
2,4-dinitrophenol	HMS06	RB/6-09-98 and RB/6-10-98
4,6-dinitro-2-methylphenol	HMS06	RB/6-10-98
pyrene	HMS06	RB/6-09-98
chrysene	HMS06	GEO-31/5-6', GEO-32/2-3', GEO-03/2-3', GEO-03/5-6', GEO-10/2-3', GEO-10/5-6', GEO-13/0-1', GEO-13/5-6', GEO-16/2-3', GEO-16/5-6', GEO-17/ 2-3', GEO-17/5-6', GEO-18/2-3, and GEO-18/5-6'



- The actual detection limits for the following compounds in the samples listed below may be higher than reported; consequently, the "not-detected" results for these compounds have been flagged "UJ" on the data tables. High percent differences ($25.0\% < \%D < 90.0\%$) coupled with decreases in instrument sensitivity were obtained between the average relative response factors of the initial calibrations and the relative response factors in the associated continuing calibrations.

<u>Compound</u>	<u>SDG</u>	<u>Sample(s) With Biased Detection Limits ("UJ")</u>
2,4-dinitrophenol	HMS01	CPT-13-GW
	HMS05	GEO-28/0-1'
	HMS06	GEO-16/5-6', GEO-17/ 2-3', GEO-17/5-6', GEO-18/2-3, GEO-18/5-6', and GEO-32/0-1'
hexachlorocyclopentadiene	HMS01	CPT-113-GW
	HMS03	GEO-16-GW, GEO-17-GW, GEO-19-GW, GEO-21-GW, and RB/6-11-98
2,2'-oxybis(1-chloropropane)	HMS04	GEO-33/5-6', GEO-20/9-10', GEO-21/0-1', GE)-20/5-6', GEO-21/2-3', GEO-21/5-6', GEO-21/9-10', GEO-22/0-1', GEO-22/2-3', and GEO-22/5-6'
	HMS05	GEO-28/0-1'
4,6-dinitro-2-methylphenol	HMS06	GEO-16/5-6', GEO-17/ 2-3', GEO-17/5-6', GEO-18/2-3, GEO-18/5-6', and GEO-32/0-1'

- The reported positive results for chrysene in SDG HMS06 samples GEO-32/0-1' and GEO-32/5-6' should be considered estimated; consequently, these results have been flagged "J" on the data tables. A high percent difference ($> 25\%$) was observed between the relative response factors for this compound in the associated continuing calibration standards and the average relative response factor from the associated multipoint calibration.
- The actual detection limits for the semivolatile acid and base/neutral compounds in the samples listed below may be higher than reported by the laboratory; consequently, these limits have been flagged "UJ" on the data tables. In addition, any reported positive results (not previously flagged "U") for semivolatile acid and base/neutral compounds in these samples should be considered estimated and have been flagged "J" on the data tables. Low recoveries were observed for two or more of the semivolatile acid and base/neutral surrogate compounds in these samples. In addition, the reextraction results did not confirm the initial analysis results.



Sample(s) With Biased Detection Limits ("UJ") and Estimated Positive Results ("J") for Semivolatile Base/Neutral Compounds

SDG	
HMS02	SD-12
HMS04	GEO-22/5-6'
HMS03	SW-09

- The reported positive results for the following compounds in the samples listed below should be considered estimated and have been flagged "J" on the data tables. High recoveries were observed for these compounds in the associated laboratory control sample analyses.

Compounds	SDG	Sample(s) With Estimated Positive Results ("J")
benzo(a)pyrene	HMS01	SD-01, SD-02, SD-03, SD-04, SD-05, SD-07, SD-08, SD-09, and SD-12
di-n-octylphthalate	HMS03	SW-09
chrysene	HMS06	GEO-32/0-1' and GEO-32/5-6'

- The actual detection limits for the following compounds in the samples listed below may be higher than reported; consequently, the "not-detected" results have been flagged "UJ" on the data tables. Low recoveries were observed for these compounds in the associated matrix spike or matrix spike duplicate analyses.

Compound	SDG	Sample(s) With Biased Detection Limits ("UJ")
2,4-dinitrophenol	HMS01	CPT-13-GW
1,3-dichlorobenzene, 1,2-dichlorobenzene, and hexachloroethane	HMS04	GEO-33/5-6'

- The reported positive result for phenol in SDG HMS05 sample GEO-34/0-1' should be considered estimated and has been flagged "J" on the data tables. A high relative percent



difference was observed between the recoveries for this compound in the associated matrix spike and matrix spike duplicate analyses.

- According to reporting conventions, all positive results reported below the sample-specific quantitation limits should be considered estimated and have been flagged "J" on the data tables.

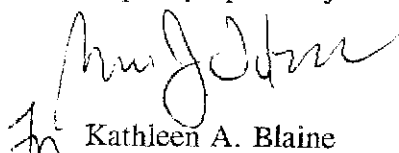
A complete support documentation of this organic data QA review is presented in Section 3 of this report.



C. Conclusions

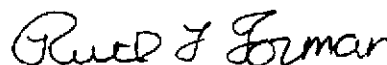
This QA review has identified several aspects of the analytical data that required qualification. The majority of the data are acceptable. However, all of the organic data has been qualified due to blank contamination, calibration issues, low surrogate recoveries, matrix spike/matrix spike duplicate results, laboratory control sample recoveries, and quantitation of results below the quantitation limit. To confidently use any of the analytical data within these sample sets, the data user should understand the qualifications and limitations of the results.

Report prepared by:



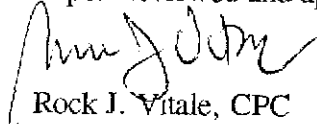
Kathleen A. Blaine
Quality Assurance Specialist/Principal

Report reviewed by:



Ruth L. Forman
Senior Quality Assurance Chemist III/
Associate Principal

Report reviewed and approved by:



Rock J. Vitale, CPC
Technical Director of Chemistry/Principal

ENVIRONMENTAL STANDARDS MIDWEST, INC.
956 South 59th Street
Suite D
Belleville, IL 62223

Date: 12/3/98

(618) 257-3800



TABLE 1

SAMPLES INCLUDED IN THIS QUALITY ASSURANCE REVIEW

Kerr-McGee Corporation Sample Number	Laboratory Sample Number	SDG Number	Date of Sample Collection	Parameter(s) Analyzed
CPT-07-GW	2932449	HMS01	05/20/98	S
CPT-07-GWDL (Dilution)	2932449DL	HMS01	05/20/98	S
CPT-08-GWRE (Reextraction)	2932450RE	HMS01	05/19/98	S
CPT-09-GW	2932451	HMS01	05/19/98	S
CPT-09-GWDL (Dilution)	2932451DL	HMS01	05/20/98	S
CPT-09-GWRE (Reextraction)	2932451RE	HMS01	05/20/98	S
CPT-11-GW	2932452	HMS01	05/20/98	S
CPT-12-GW	2932453	HMS01	05/20/98	S
CPT-12-GWDL (Dilution)	2932453DL	HMS01	05/20/98	S
CPT-13-GW	2932454	HMS01	05/20/98	S
CPT-13-GWMS (Matrix Spike)	2932455	HMS01	05/20/98	S
CPT-13-GWMSD (Matrix Spike Duplicate)	2932456	HMS01	05/20/98	S
CPT-10-GW	2934151	HMS01	05/21/98	S
CPT-18-GW	2934152	HMS01	05/21/98	S
CPT-21-GW	2934153	HMS01	05/21/98	S

TABLE 1 (Cont.)

Kerr-McGee Corporation Sample Number	Laboratory Sample Number	SDG Number	Date of Sample Collection	Parameter(s) Analyzed
CPT-22-GW	2934154	HMS01	05/21/98	S
RB-01-5/98 (Rinsate Blank)	2934155	HMS01	05/21/98	S
SD-01	2941671	HMS02	06/04/98	S
SD-02	2941672	HMS02	06/04/98	S
SD-02DL (Dilution)	2941672DL	HMS02	06/04/98	S
SD-03	2941673	HMS02	06/04/98	S
SD-03DL (Dilution)	2941673DL	HMS02	06/04/98	S
SD-04	2941674	HMS02	06/04/98	S
SD-04DL (Dilution)	2941674DL	HMS02	06/04/98	S
SD-05	2941675	HMS02	06/04/98	S
SD-06	2941676	HMS02	06/04/98	S
SD-07	2941677	HMS02	06/04/98	S
SD-08	2941678	HMS02	06/04/98	S
SD-09	2941679	HMS02	06/04/98	S
SD-10	2941680	HMS02	06/04/98	S
SD-11	2941681	HMS02	06/04/98	S
SD-12	2941682	HMS02	06/04/98	S
SD-12RE (Reextraction)	2941682RE	HMS02	06/04/98	S

TABLE 1 (Cont.)

Kerr-McGee Corporation Sample Number	Laboratory Sample Number	SDG Number	Date of Sample Collection	Parameter(s) Analyzed
SD-12REDL (Dilution)	2941682REDL	HMS02	06/04/98	S
GEO-02/0-2'	2943286	HMS02	06/09/98	S
GEO-02/0-2'DL (Dilution)	2943286DL	HMS02	06/09/98	S
GEO-06/5-6'	2943287	HMS02	06/09/98	S
GEO-19/0-1'	2943288	HMS02	06/09/98	S
GEO-19/0-1'DL (Dilution)	2943288DL	HMS02	06/09/98	S
GEO-19/2-3'	2943289	HMS02	06/09/98	S
GEO-19/2-3'DL (Dilution)	2943289DL	HMS02	06/09/98	S
GEO-19/5-6'	2943290	HMS02	06/09/98	S
GEO-19/5-6'DL (Dilution)	2943290DL	HMS02	06/09/98	S
GEO-20/0-1'	2943291	HMS02	06/09/98	S
GEO-20/2-3'	2943292	HMS02	06/09/98	S
GEO-27/0-1'	2943293	HMS02	06/09/98	S
GEO-27/0-1'MS (Matrix Spike)	2943294	HMS02	06/09/98	S
GEO-27/0-1'MSD (Matrix Spike Duplicate)	2943295	HMS02	06/09/98	S
SW-02	2941683	HMS03	06/04/98	S

TABLE 1 (Cont.)

Kerr-McGee Corporation Sample Number	Laboratory Sample Number	SDG Number	Date of Sample Collection	Parameter(s) Analyzed
SW-03	2941684	HMS03	06/04/98	S
SW-04	2941685	HMS03	06/04/98	S
SW-06	2941686	HMS03	06/04/98	S
SW-07	2941687	HMS03	06/04/98	S
SW-08	2941688	HMS03	06/04/98	S
SW-09	2941689	HMS03	06/04/98	S
SW-09RE (Reextraction)	2941689RE	HMS03	06/04/98	S
SW-10	2941690	HMS03	06/04/98	S
SW-11	2941691	HMS03	06/04/98	S
SW-12	2941692	HMS03	06/04/98	S
CFO	2941693	HMS03	06/04/98	S
RB/6-4-98 (Rinsate Blank)	2941695	HMS03	06/04/98	S
GEO-16-GW	2946085	HMS03	06/11/98	V, S
GEO-17-GW	2946086	HMS03	06/11/98	V, S
GEO-17-GWDL (Dilution)	2946086DL	HMS03	06/11/98	S
GEO-18-GW	2946087	HMS03	06/11/98	V
GEO-19-GW	2946088	HMS03	06/11/98	V, S
GEO-19-GWDL (Dilution)	2946088DL	HMS03	06/11/98	S

TABLE 1 (Cont.)

Kerr-McGee Corporation Sample Number	Laboratory Sample Number	SDG Number	Date of Sample Collection	Parameter(s) Analyzed
GEO-20-GW	2946089	HMS03	06/11/98	V, S
GEO-20-GWMS (Matrix Spike)	2946090	HMS03	06/11/98	V, S
GEO-20-GWMSD (Matrix Spike Duplicate)	2946091	HMS03	06/11/98	V, S
GEO-21-GW	2946092	HMS03	06/11/98	V, S
GEO-21-GWDL (Dilution)	2946092DL	HMS03	06/11/98	S
RB/6-11-98 (Rinsate Blank)	2946093	HMS03	06/11/98	V, S
TB/6-11-98 (Trip Blank)	2946094	HMS03	06/11/98	V
GEO-20/5-6'	2943338	HMS04	06/09/98	S
GEO-20/5-6'DL (Dilution)	2943338DL	HMS04	06/09/98	S
GEO-20/9-10'	2943339	HMS04	06/09/98	S
GEO-20/9-10'DL (Dilution)	2943339DL	HMS04	06/09/98	S
GEO-21/0-1'	2943340	HMS04	06/09/98	S
GEO-21/0-1'DL (Dilution)	2943340DL	HMS04	06/09/98	S
GEO-21/2-3'	2943341	HMS04	06/09/98	S
GEO-21/2-3'DL (Dilution)	2943341DL	HMS04	06/09/98	S

TABLE 1 (Cont.)

Kerr-McGee Corporation Sample Number	Laboratory Sample Number	SDG Number	Date of Sample Collection	Parameter(s) Analyzed
GEO-21/5-6'	2943342	HMS04	06/09/98	S
GEO-21/9-10'	2943343	HMS04	06/09/98	S
GEO-22/0-1'	2943344	HMS04	06/09/98	S
GEO-22/2-3'	2943345	HMS04	06/09/98	S
GEO-22/2-3'DL (Dilution)	2943345DL	HMS04	06/09/98	S
GEO-22/5-6'	2943346	HMS04	06/09/98	S
GEO-22/5-6'RE (Reextraction)	2943346RE	HMS04	06/09/98	S
GEO-23/0-1'	2943347	HMS04	06/09/98	S
GEO-23/2-3'	2943348	HMS04	06/09/98	S
GEO-23/5-6'	2943349	HMS04	06/09/98	S
GEO-24/0-1'	2943350	HMS04	06/09/98	S
GEO-24/0-1'RE (Reextraction)	2943350RE	HMS04	06/09/98	S
GEO-24/2-3'	2943351	HMS04	06/09/98	S
GEO-24/5-6'	2943352	HMS04	06/09/98	S
GEO-24/5-6'RE (Reextraction)	2943352RE	HMS04	06/09/98	S
GEO-25/0-1'	2943353	HMS04	06/09/98	S
GEO-25/2-3'	2943354	HMS04	06/09/98	S
GEO-25/5-6'	2943355	HMS04	06/09/98	S

TABLE 1 (Cont.)

Kerr-McGee Corporation Sample Number	Laboratory Sample Number	SDG Number	Date of Sample Collection	Parameter(s) Analyzed
GEO-26/0-1'	2943356	HMS04	06/09/98	S
GEO-33/5-6'	2943357	HMS04	06/09/98	S
GEO-33/5-6' MS (Matrix Spike)	2943358	HMS04	06/09/98	S
GEO-33/5-6' MSD (Matrix Spike Duplicate)	2943359	HMS04	06/09/98	S
GEO-26/2-3'	2943380	HMS05	06/09/98	S
GEO-26/5-6'	2943381	HMS05	06/09/98	S
GEO-27/2-3'	2943382	HMS05	06/09/98	S
GEO-27/5-6'	2943383	HMS05	06/09/98	S
GEO-33/0-1'	2943384	HMS05	06/09/98	S
GEO-33/0-1' DL (Dilution)	2943384DL	HMS05	06/09/98	S
GEO-33/2-3'	2943385	HMS05	06/09/98	S
GEO-33/2-3' DL (Dilution)	2943385DL	HMS05	06/09/98	S
GEO-34/0-1'	2945101	HMS05	06/10/98	S
GEO-34/0-1' MS (Matrix Spike)	2945101MS	HMS05	06/10/98	S
GEO-34/0-1' MSD (Matrix Spike Duplicate)	2945101MSD	HMS05	06/10/98	S
GEO-34/2-3'	2945102	HMS05	06/10/98	S
GEO-34/5-6'	2945103	HMS05	06/10/98	S

TABLE 1 (Cont.)

Kerr-McGee Corporation Sample Number	Laboratory Sample Number	SDG Number	Date of Sample Collection	Parameter(s) Analyzed
GEO-28/0-1'	2945104	HMS05	06/10/98	S
GEO-28/0-1'RE (Reextraction)	2945104RE	HMS05	06/10/98	S
GEO-28/2-3'	2945105	HMS05	06/10/98	S
GEO-28/5-6'	2945106	HMS05	06/10/98	S
GEO-29/0-1'	2945107	HMS05	06/10/98	S
GEO-29/2-3'	2945108	HMS05	06/10/98	S
GEO-29/5-6'	2945109	HMS05	06/10/98	S
GEO-30/0-1'	2945110	HMS05	06/10/98	S
GEO-30/0-1'DL (Dilution)	2945110DL	HMS05	06/10/98	S
GEO-30/2-3'	2945111	HMS05	06/10/98	S
GEO-30/5-6'	2945112	HMS05	06/10/98	S
GEO-31/0-1'	2945113	HMS05	06/10/98	S
GEO-31/2-3'	2945114	HMS05	06/10/98	S
GEO-31/5-6'	2945135	HMS06	06/10/98	S
GEO-32/0-1'	2945136	HMS06	06/10/98	S
GEO-32/2-3'	2945137	HMS06	06/10/98	S
GEO-32/5-6'	2945138	HMS06	06/10/98	S
GEO-03/2-3'	2945139	HMS06	06/10/98	S
GEO-03/5-6'	2945140	HMS06	06/10/98	S

TABLE 1 (Cont.)

Kerr-McGee Corporation Sample Number	Laboratory Sample Number	SDG Number	Date of Sample Collection	Parameter(s) Analyzed
GEO-10/2-3'	2945141	HMS06	06/10/98	S
GEO-10/5-6'	2945142	HMS06	06/10/98	S
GEO-16/2-3'	2945143	HMS06	06/10/98	S
GEO-16/5-6'	2945144	HMS06	06/10/98	S
GEO-17/2-3'	2945145	HMS06	06/10/98	S
GEO-17/5-6'	2945146	HMS06	06/10/98	S
GEO-18/2-3'	2945147	HMS06	06/10/98	S
GEO-18/5-6'	2945148	HMS06	06/10/98	S
RB-6-9-98 (Rinsate Blank)	2945149	HMS06	06/09/98	S
RB-6-10-98 (Rinsate Blank)	2945150	HMS06	06/10/98	S
GEO-13/0-1'	2946082	HMS06	06/11/98	S
GEO-13/0-1'DL (Dilution)	2946082DL	HMS06	06/11/98	S
GEO-13/2-3'	2946083	HMS06	06/11/98	S
GEO-13/5-6'	2946084	HMS06	06/11/98	S

NOTES:

SVOA - TCL Semivolatile Organic Compounds by SW-846 Method 8270C.

VOA - TCL Volatile Organic Compounds by SW-846 Method 8260B.