DTIC FILE COPY

INSTALLATION RESTORATION PROGRAM

2

REMEDIAL INVESTIGATION REPORT

MINNESOTA AIR NATIONAL GUARD BASE
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA
VOLUME 3

AD-A231 745

DTIC
ELECTE
FEB 20 1991
S D
D

DISTRIBUTION STATEMENT A
Approved for public release
Distribution Unlimited

HAZWRAP SUPPORT CONTRACTOR OFFICE
Oak Ridge, Tennessee 37831
Operated by MARTIN MARIETTA ENERGY SYSTEMS, INC.
For the U.S. DEPARTMENT OF ENERGY under contract DE-AC05-840R21400

91 2 11 054

"This report has been prepared for the Martin Marietta Energy Systems, Inc. by Engineering-Science, Inc. for the purpose of aiding in the implementation of the Department of Defense Installation Restoration Program. It is not an endorsement of any product. The views expressed herein are those of the Contractor and do not necessarily reflect the official views of the publishing agency, the United States Air National Guard, nor the Department of Defense."

REPORT DOCUMENTATION PAGE

Public reporting burden for this collection of information is estimated to average ... hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for information Operations and Reports, 1215 Jefferson ...

AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	January 1990	Final Remedial Investigation Report

4. TITLE AND SUBTITLE Remedial Investigation Report
Minnesota Air National Guard Base
Duluth International Airport
Duluth, Minnesota Volume 1-final report

5. FUNDING NUMBERS

6. AUTHOR(S)
N/A

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Engineering-Science
710 South Illinois Ave., Suite F-103
Oak Ridge, TN

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Hazardous Waste Remedial Actions Program
Oak Ridge, TN

Air National Guard Bureau
Andrews Air Force Base, Maryland 20331

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES
Volume 2 -Appendices Volume 3 -Appendices Volume 4-Appendices
Volume 5-Appendices Volume 6-Appendices Volume 7-Appendices

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release;
distribution is unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

The report describes the remedial actions performed on sites confirmed to contain hazardous waste contamination which endangers the human health. The actions performed are described and the potential for future problems. The study was conducted under the Air National Guard's Installation Restoration Program.

14. SUBJECT TERMS
Installation Restoration Program
Remedial Investigation Report
Minnesota Air National Guard

15. NUMBER OF PAGES

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified			

REMEDIAL INVESTIGATION REPORT

MINNESOTA AIR NATIONAL GUARD BASE
DULUTH INTERATIONAL AIRPORT
Duluth, Minnesota

VOLUME 3

JANUARY 1990

Accesion For	
NTIS CRA&I	☑
DTIC TAB	☐
Unannounced	☐
Justification	
By	
Distribution /	
Availability Codes	
Dist	Avail and / or Special
A-1	

Prepared By

ENGINEERING-SCIENCE
710 South Illinois Ave., Suite F-103
Oak Ridge, Tennessee

Prepared For

HAZARDOUS WASTE
REMEDIAL ACTIONS PROGRAM
Oak Ridge, Tennessee

Submitted To

MINNESOTA AIR NATIONAL GUARD
Duluth International Airport
Duluth, Minnesota

This page intentionally left blank.

PREFACE

Engineering-Science (ES) entered into an agreement with the HAZWRAP Support Contractor office operated by Martin Marietta Energy Systems, Inc. for the U.S. Department of Energy (DOE) to perform a Remedial Investigation at the Minnesota Air National Guard Base, Duluth International Airport, Duluth, Minnesota, to be submitted to the National Guard Bureau, Andrews Air Force Base, Maryland. This investigation was initiated in July, 1988 under Task Order Y02, General Order 18B-97387C, which is under DOE contract DE-AC05-84OR21400, with Martin Marietta Energy Systems under Interagency Agreement 1489-1489-A1. The overall objectives of this effort were to define the magnitude, extent, direction, and rate of movement of identified contaminants and to summarize the need for remedial actions based on an assessment of risks to human health and the environment.

This investigation was performed by Engineering-Science personnel from the Oak Ridge, Tennessee office with oversight provided by Martin Marietta Energy Systems. Mr. Larry Janssen, of Martin Marietta Energy Systems was the Technical Monitor for Lt. Col. Michael Washeleski of the National Guard Bureau. Major Joel D. Manns, Minnesota Air National Guard Base, Duluth, Minnesota, provided field support. Engineering-Science personnel included Mr. Robert S. McLeod, P.E., P.G., who served as Project Manager and Mr. John D. Hardeman, P.G., who served as the Field Team Leader. Mr. Robert L. Thoem, P.E. was the ES Technical Director for the project.

Engineering-Science wishes to acknowledge North Star Drilling, Little Falls, Minnesota as the drilling and well installation subcontractor. Salo Engineering, Duluth, Minnesota, provided professional surveying services. ES Berkeley Laboratory, Berkeley, California; ES Atlanta Laboratory, Atlanta, Georgia; MetaTrace, Inc., St. Louis, Missouri; NUS Corporation, Pittsburgh, Pennsylvania; and IT Radiological Sciences Laboratory, Oak Ridge, TN provided analytical laboratory services for sample analyses.

This work was accomplished between July 1988 and March 1989.

This page intentionally left blank.

TABLE OF CONTENTS
VOLUME I

		Page
LIST OF FIGURES		xvii
LIST OF TABLES		xxvii
EXECUTIVE SUMMARY		ES-1
SECTION 1 INTRODUCTION		1-1
1.1	PURPOSE OF REPORT	1-4
1.1.1	Description of Installation Restoration Program	1-4
1.1.2	Report Organization	1-6
1.2	BACKGROUND OF DULUTH AIR NATIONAL GUARD BASE	1-7
1.2.1	Description of Duluth Air National Guard Base	1-7
1.2.1.1	Physiography, Climate and Drainage	1-10
1.2.1.2	Demography and Land Use	1-13
1.2.1.3	Geology	1-16
1.2.1.4	Hydrogeology	1-17
1.2.1.5	Water Quality	1-18
1.2.1.6	Water Use	1-18
1.2.2	History of Duluth Air National Guard Base	1-26
1.2.3	Previous Investigations	1-26
1.2.4	Description and History of Site 2	1-30
1.2.4.1	Description	1-30
1.2.4.2	History	1-31
1.2.4.3	Previous Investigations	1-33
1.2.5	Description and History of Site 3	1-37
1.2.5.1	Description	1-37
1.2.5.2	History	1-43
1.2.5.3	Previous Investigations	1-43
1.2.6	Description and History of Site 4	1-45
1.2.6.1	Description	1-53
1.2.6.2	History	1-53
1.2.6.3	Previous Investigations	1-53
1.2.7	Description and History of Site 8	1-62
1.2.7.1	Description	1-62
1.2.7.2	History	1-62
1.2.7.3	Previous Investigations	1-62

TABLE OF CONTENTS (continued)
VOLUME 1 (continued)

		Page
1.2.8	Description and History of Site 10	1-68
1.2.8.1	Description	1-68
1.2.8.2	History	1-72
1.2.8.3	Previous Investigations	1-72
SECTION 2	REMEDIAL INVESTIGATION DESCRIPTION	2-1
2.1	AREA LOCATIONS	2-3
2.1.1	Surface Feature Investigation	2-9
2.1.2	Surface Water and Sediment Investigations	2-9
2.1.2.1	Background Surface Drainage Location	2-9
2.1.2.2	Airport Surface Drainage Locations	2-9
2.1.3	Geological Investigation	2-12
2.1.4	Soil Investigation	2-12
2.1.5	Ground-Water Investigation	2-12
2.1.5.1	Water Level Investigation	2-12
2.1.5.2	Ground-Water Sampling Investigation	2-15
2.2	SITE 2	2-15
2.2.1	Surface Feature Investigation	2-20
2.2.2	Surface Water and Sediment Investigations	2-20
2.2.3	Geologic Investigation	2-20
2.2.4	Soil Investigation	2-20
2.2.5	Ground-Water Investigation	2-23
2.2.5.1	Aquifer Investigation	2-23
2.2.5.2	Ground-Water Sampling Investigation	2-25
2.3	SITE 3	2-25
2.3.1	Surface Feature Investigation	2-31
2.3.2	Surface Water and Sediment Investigations	2-31
2.3.3	Geologic Investigation	2-36
2.3.4	Soil Investigations	2-36

TABLE OF CONTENTS (continued)

VOLUME 1 (continued)

		Page
2.3.5	Ground-Water Investigation	2-38
2.3.5.1	Aquifer Investigation	2-38
2.3.5.2	Ground-Water Sampling Investigation	2-41
2.4	SITE 4	2-41
2.4.1	Surface Feature Investigation	2-47
2.4.2	Surface Water and Sediment Investigations	2-47
2.4.3	Geologic Investigation	2-47
2.4.4	Soil Investigation	2-50
2.4.5	Ground-Water Investigation	2-50
2.4.5.1	Aquifer Investigation	2-50
2.4.5.2	Ground-Water Sampling Investigation	2-50
2.5	SITE 8	2-53
2.5.1	Surface Feature Investigation	2-60
2.5.2	Surface Water and Sediment Investigations	2-60
2.5.3	Geologic Investigation	2-60
2.5.4	Soil Investigations	2-63
2.5.5	Ground-Water Investigation	2-63
2.5.5.1	Aquifer Investigation	2-63
2.5.5.2	Ground-Water Sampling Investigation	2-66
2.6	SITE 10	2-66
2.6.1	Surface Feature Investigation	2-66
2.6.2	Ground-Water Investigation	2-66
2.6.2.1	Aquifer Investigation	2-69
2.6.2.2	Ground-Water Sampling Investigation	2-69
SECTION 3	INVESTIGATION RESULTS	3-1
3.1	AREA LOCATIONS	3-3
3.1.1	Surface Features	3-3
3.1.2	Surface Water Hydrology	3-3

TABLE OF CONTENTS (continued)
VOLUME 1 (continued)

		Page
3.1.3	Geology	3-7
3.1.4	Hydrogeology	3-11
3.2 SITE 2		3-11
3.2.1	Surface Features	3-11
3.2.2	Surface Water Hydrology	3-18
3.2.3	Geology	3-21
3.2.4	Hydrogeology	3-22
3.3 SITE 3		3-29
3.3.1	Surface Features	3-29
3.3.2	Surface Water Hydrology	3-30
3.3.3	Geology	3-30
3.3.4	Hydrogeology	3-32
3.4 SITE 4		3-41
3.4.1	Surface Features	3-41
3.4.2	Surface Water Hydrology	3-41
3.4.3	Geology	3-43
3.4.4	Hydrogeology	3-44
3.5 SITE 8		3-48
3.5.1	Surface Features	3-50
3.5.2	Surface Water Hydrology	3-50
3.5.3	Geology	3-50
3.5.4	Hydrogeology	3-53
3.6 SITES 3, 4, 8		3-56
3.6.1	Surface Features	3-56
3.6.2	Surface Water Hydrology	3-56

TABLE OF CONTENTS (continued)
VOLUME 1 (continued)

		Page
3.6.3	Geology	3-65
3.6.4	Hydrogeology	3-67
3.7	SITE 10	3-72
3.7.1	Surface Features	3-72
3.7.2	Surface Water Hydrology	3-78
3.7.3	Geology	3-78
3.7.4	Hydrogeology	3-78
SECTION 4	NATURE AND EXTENT OF CONTAMINATION	4-1
4.1	DEFINITION OF BACKGROUND CONDITIONS	4-3
4.1.1	Surface Water and Sediment Quality	4-4
4.1.2	Soil Quality	4-4
4.1.3	Ground-Water Quality	4-4
4.2	AIRPORT AREA SURFACE WATER AND SEDIMENT SAMPLES	4-8
4.2.1	Airport Area Surface Water and Sediment Quality	4-8
4.2.2	Extent of Airport Area Contamination	4-11
4.3	NATURE AND EXTENT OF CONTAMINATION AT SITE 2	4-11
4.3.1	Source of Contamination	4-14
4.3.2	Surface Water and Sediment Contamination	4-14
4.3.2.1	Surface Water and Sediment Quality	4-14
4.3.2.2	Extent of Surface Water and Sediment Contamination	4-14
4.3.3	Soil Contamination	4-17
4.3.3.1	Soil Quality	4-17
4.3.3.2	Extent of Soil Contamination	4-21
4.3.4	Ground-Water Contamination	4-21
4.3.4.1	Ground-Water Quality	4-21
4.3.4.2	Extent of Ground-water Contamination	4-24

TABLE OF CONTENTS (continued)
VOLUME 1 (continued)

		Page
4.4	NATURE AND EXTENT OF CONTAMINATION AT SITE 3	4-29
4.4.1	Source of Contamination	4-29
4.4.2	Soil Gas Survey Results	4-29
4.4.3	Surface Water and Sediment Contamination	4-29
4.4.3.1	Surface Water and Sediment Quality	4-30
4.4.3.2	Extent of Surface Water and Sediment Contamination	4-35
4.4.4	Soil Contamination	4-35
4.4.4.1	Soil Quality	4-35
4.4.4.2	Extent of Soil Contamination	4-43
4.4.5	Ground-Water Contamination	4-44
4.4.5.1	Ground-Water Quality	4-44
4.4.5.2	Extent of Ground-Water Contamination	4-46
4.5	NATURE AND EXTENT OF CONTAMINATION AT SITE 4	4-51
4.5.1	Source of Contaminanation	4-51
4.5.2	Surface Water and Sediment Contamination	4-51
4.5.2.1	Surface Water and Sediment Quality	4-51
4.5.2.2	Extent of Sediment and Surface Water Contamination	4-56
4.5.3	Soil Contamination	4-60
4.5.3.1	Soil Quality	4-60
4.5.3.2	Extent of Soil Contamination	4-60
4.5.4	Ground-Water Contamination	4-60
4.5.4.1	Ground-Water Quality	4-62
4.5.4.2	Extent of Ground-Water Contamination	4-62
4.6	NATURE AND EXTENT OF CONTAMINATION AT SITE 8	4-62
4.6.1	Source of Contamination	4-64
4.6.2	Surface Water and Sediment Contamination	4-64
4.6.2.1	Surface Water and Sediment Quality	4-64
4.6.2.2	Extent of Surface Water and Sediment Contamination	4-64

TABLE OF CONTENTS (continued)

VOLUME 1 (continued)

		Page
4.6.3	Soil Contamination	4-64
4.6.3.1	Soil Quality	4-64
4.6.3.2	Extent of Soil Contamination	4-69
4.6.4	Ground-Water Contamination	4-69
4.6.4.1	Ground-Water Quality	4-69
4.6.4.2	Extent of Ground-Water Contamination	4-69
4.7	NATURE AND EXTENT OF CONTAMINATION AT SITE 10	4-72
4.7.1	Source of Contamination	4-72
4.7.2	Ground-Water Contamination	4-72
4.7.2.1	Ground-Water Quality	4-72
4.7.2.2	Extent of Ground-Water Contamination	4-75
SECTION 5	CONTAMINANT FATE AND TRANSPORT	5-1
5.1	Introduction	5-3
5.1.1	Contaminant Fate	5-3
5.1.2	Contaminant Transport	5-5
5.2	CONTAMINANT FATE AND TRANSPORT AT SITE 2	5-7
5.2.1	Summary of Contaminants	5-7
5.2.2	Potential Routes of Migration	5-7
5.2.3	Contaminant Persistence	5-8
5.2.4	Contaminant Mobility and Migration	5-9
5.2.4.1	Contaminant Migration in Surface Water	5-9
5.2.4.2	Contaminant Migration in Soil	5-9
5.2.4.3	Contaminant Migration in Ground Water	5-9
5.3	CONTAMINANT FATE AND TRANSPORT AT SITE 3	5-10
5.3.1	Summary of Contaminant	5-11
5.3.2	Potential Routes of Migration	5-11
5.3.3	Contaminant Persistence	5-12
5.3.4	Contaminant Mobility and Migration	5-13
5.3.4.1	Contaminant Migration in Surface Water	5-13
5.3.4.2	Contaminant Migration in Soil	5-13
5.3.4.3	Contaminant Migration in Ground Water	5-14

TABLE OF CONTENTS (continued)
VOLUME 1 (continued)

		Page
5.4	CONTAMINANT FATE AND TRANSPORT AT SITE 4	5-15
5.4.1	Summary of Contaminants	5-15
5.4.2	Potential Routes of Migration	5-16
5.4.3	Contaminant Persistence	5-16
5.4.4	Contaminant Migration in Surface Water and Ground Water	5-17
5.5	CONTAMINANT FATE AND TRANSPORT AT SITE 8	5-17
5.5.1	Summary of Contaminants	5-17
5.5.2	Potential Routes of Migration	5-17
5.5.3	Contaminant Persistence	5-17
5.5.4	Contaminant Mobility and Migration in Soil	5-18
5.6	CONTAMINANT FATE AND TRANSPORT AT SITE 10	5-18
5.6.1	Summary of Contaminants	5-18
5.6.2	Potential Routes of Migration	5-18
5.6.3	Contaminant Persistence	5-18
5.6.4	Contaminant Mobility and Migration	5-18
SECTION 6	RISK ASSESSMENT	6-1
6.1	EVALUATION METHODOLOGY	6-3
6.1.1	Step 1 Selection of Indicator Chemicals	6-5
6.1.2	Step 2 Estimation of Exposure Point Concentrations	6-9
6.1.2.1	Exposure Pathway Analysis	6-9
6.1.2.2	Exposure Point Concentrations	6-11
6.1.2.3	Applicable and Appropriate Requirements and Other Criteria	6-17
6.1.3	Step 3 Estimation of Chemical Intakes	6-21
6.1.3.1	Fugitive Dust Generation Resulting from Wind Erosion	6-22

TABLE OF CONTENTS (continued)

VOLUME 1 (continued)

			Page
	6.1.3.2	Volatilization of Organic Compounds from Surface Water	6-24
	6.1.3.3	Dermal Contact with Surface Water	6-27
	6.1.3.4	Ingestion of Surface Water During Recreation	6-29
	6.1.3.5	Ingestion of Ground Water as Drinking Water	6-30
	6.1.3.6	Ingestion of Soil	6-31
6.1.4		Step 4 Toxicity Assessment	6-32
6.1.5		Step 5 Risk Characterization	6-34
	6.1.5.1	Noncarcinogenic Effects	6-34
	6.1.5.2	Potential Carcinogenic Effects	6-35
6.2		SITE 2 RISK ASSESSMENT	6-36
6.2.1		Selection of Indicator Chemicals	6-36
6.2.2		Estimation of Exposure Point Concentrations or Emission Rates	6-38
	6.2.2.1	Exposure Pathway Analysis	6-38
	6.2.2.2	Exposure Point Concentrations	6-41
	6.2.2.3	Comparison of Exposure Point Concentrations to ARARs	6-42
6.2.3		Estimation of Chemical Intakes	6-44
6.2.4		Toxicity Assessment	6-44
6.2.5		Risk Characterization	6-45
	6.2.5.1	Risk Characterization of Noncarcinogenic Compounds	6-45
	6.2.5.2	Risk Characterization of Potentially Carcinogenic Compounds	6-45
6.3		SITE 3 RISK ASSESSMENT	6-50
6.3.1		Selection of Indicator Chemicals	6-50
6.3.2		Estimation of Exposure Point Concentrations or Emission Rates	6-50
	6.3.2.1	Exposure Pathway Analysis	6-52
	6.3.2.2	Exposure Point Concentrations	6-55
	6.3.2.3	Comparison of Exposure Point Concentrations to ARARs	6-56
6.3.3		Estimation of Chemical Intakes	6-58
6.3.4		Toxicity Assessment	6-58

TABLE OF CONTENTS (continued)
VOLUME 1 (continued)

			Page
6.3.5	Risk Characterization		6-59
	6.3.5.1	Risk Characterization of Noncarcinogenic Compounds	6-59
	6.3.5.2	Risk Characterization of Potentially Carcinogenic Compounds	6-59
6.4	SITE 4 RISK ASSESSMENT		6-62
6.4.1	Selection of Indicator Chemicals		6-62
6.4.2	Estimation of Exposure Point Concentrations or Emission Rates		6-62
	6.4.2.1	Exposure Pathway Analysis	6-62
	6.4.2.2	Exposure Point Concentrations	6-69
	6.4.2.3	Comparison of Exposure Point Concentrations to ARARs	6-71
6.4.3	Estimation of Chemical Intakes		6-72
6.4.4	Toxicity Assessment		6-72
6.4.5	Risk Characterization		6-72
	6.4.5.1	Risk Characterization of Noncarcinogenic Compounds	6-73
	6.4.5.2	Risk Characterization of Potentially Carcinogenic Compounds	6-73
6.5	SITE 8 RISK ASSESSMENT		6-73
6.5.1	Selection of Indicator Chemicals		6-73
6.5.2	Estimation of Exposure Point Concentrations or Emission Rates		6-73
	6.5.2.1	Exposure Pathway Analysis	6-79
	6.5.2.2	Exposure Point Concentrations	6-82
	6.5.2.3	Comparison of Exposure Point Concentrations to ARARs	6-82
6.5.3	Estimation of Chemical Intakes		6-83
6.5.4	Toxicity Assessment		6-83
6.5.5	Risk Characterization		6-84
	6.5.5.1	Risk Characterization of Noncarcinogenic Compounds	6-84
	6.5.5.2	Risk Characterization of Potentially Carcinogenic Compounds	6-86
6.6	SUMMARY AND CONCLUSIONS		6-86

TABLE OF CONTENTS (continued)
VOLUME 1 (continued)

		Page
SECTION 7	SUMMARY AND RECOMMENDATIONS	7-1
7.1	INTRODUCTION	7-1
7.2	SIGNIFICANT CONTAMINATION AT SITE 2	7-8
7.3	SIGNIFICANT CONTAMINATION AT SITE 3	7-9
7.4	SIGNIFICANT CONTAMINATION AT SITE 4	7-11
7.5	SIGNIFICANT CONTAMINATION AT SITE 8	7-12
7.6	SIGNIFICANT CONTAMINATION AT SITE 10	7-12
7.7	SUMMARY OF SIGNIFICANT CONTAMINATION AT ALL SITES	7-12
7.8	RECOMMENDATIONS	7-13
SECTION 8	REFERENCES	8-1

VOLUME 2

APPENDIX A	DEFINITIONS, NOMENCLATURE AND UNITS OF MEASUREMENT
APPENDIX B	STATEMENT OF WORK
APPENDIX C	PROJECT TEAM BIOGRAPHICAL SUMMARIES
APPENDIX D	PROCEDURES AND PROTOCOLS
APPENDIX E	DRILLING RECORDS
APPENDIX F	WELL CONSTRUCTION RECORDS
APPENDIX G	AQUIFER SLUG TEST ANALYSIS
APPENDIX H	ALTITUDE AND COORDINATE SURVEY FOR SAMPLING SITES
APPENDIX I	GROUND-WATER LEVEL MEASUREMENT SUMMARY
APPENDIX J	STREAMFLOW MEASUREMENT SUMMARY
APPENDIX K	GRAIN SIZE ANALYSES
APPENDIX L	CHEMICAL ANALYSES RESULTS FOR SOIL, GROUND WATER, SURFACE WATER AND SEDIMENT SAMPLES

VOLUME 3

APPENDIX M LABORATORY DATA AND QUALITY ASSURANCE FORMS, DATA PACKAGES #1 THROUGH #12

VOLUME 4

APPENDIX M LABORATORY DATA AND QUALITY ASSURANCE FORMS, DATA PACKAGES #13 THROUGH #25

VOLUME 5

APPENDIX M LABORATORY DATA AND QUALITY ASSURANCE FORMS, DATA PACKAGES #26 THROUGH #41

VOLUME 6

APPENDIX M LABORATORY DATA AND QUALITY ASSURANCE FORMS, DATA PACKAGES #42 THROUGH #68

VOLUME 7

APPENDIX N QA REPORT FOR SAMPLE ANALYSES RESULTS

APPENDIX O SOIL GAS RESULTS

APPENDIX P RISK ASSESSMENT TABLES

APPENDIX Q FIELD NOTEBOOKS AND DRILLING LOGS

LIST OF FIGURES

		Page
1-1	Location Map.	1-8
1-2	Site Vicinity Map.	1-9
1-3	Airport Configuration.	1-12
1-4	St. Louis River Watershed.	1-15
1-5	Location Scheme for Water Wells in the State of Minnesota.	1-20
1-6	Sites Defined and Ranked During IRP Phase I Study.	1-29
1-7	Aerial Photograph of Site 2, April 1988.	1-32
1-8	Site 2 Sampling Locations Utilized During Phase II Investigations.	1-35
1-9	Aerial Photograph of Site 3, April 1988.	1-38
1-10	Site 3 Sampling Locations Utilized During Phase II Investigations.	1-47
1-11	Aerial Photograph of Site 4, April 1988.	1-54
1-12	Site 4 Sampling Locations Utilized During Phase II Investigations.	1-57
1-13	Aerial Photograph of Site 8, April 1988.	1-64
1-14	Site 8 Sampling Locations Utilized During Phase II, Stage 2 Investigations.	1-65
1-15	Site 10 Aerial Photograph, April 1988.	1-70
1-16	Site 10 Sampling Locations Utilized During Phase II, Stage 2 Investigation.	1-73
2-1	Airport Area Sampling Locations Utilized During Remedial Investigations.	2-5
2-2	Site 2 Boreholes, Surface Locations and Trenched Area of Remedial Investigation.	2-16
2-3	Site 2 Sampling Locations Utilized During Remedial Investigation.	2-17
2-4	Site 3 Boreholes, Surface Locations, and Surveyed Soil Gas Grid Points of Remedial Investigation.	2-26
2-5	Site 3 Soil Gas and Shallow Soil Sample Locations.	2-27

LIST OF FIGURES (continued)

		Page
2-6	Site 3 Monitoring Wells Utilized During Remedial Investigation.	2-28
2-7	Site 4 Sampling Locations Established During Remedial Investigation.	2-43
2-8	Site 4 Sampling Locations Utilized During Remedial Investigation.	2-44
2-9	Site 8 Sampling Locations Established During Remedial Investigation.	2-55
2-10	Site 8 Sampling Locations Utilized During Remedial Investigation.	2-56
3-1	Aerial Photograph of the Airport Area, August 1952.	3-5
3-2	Lithologic Logs From Paired Well Points at Site 2.	3-8
3-3	Lithologic Logs From Paired Well Points at Site 8.	3-9
3-4	Bedrock Contour Map of the Airport Area.	3-10
3-5	Geologic Cross-Sections of the Airport Area.	3-13
3-6	Index to Cross-Sections of the Airport Area.	3-14
3-7	Aerial Photograph of Site 2, August 1952.	3-15
3-8	Aerial Photograph of Site 2, October 1965.	3-16
3-9	Aerial Photograph of Site 2, May 1979.	3-17
3-10	Surface Drainage of Site 2.	3-20
3-11	Index to Cross-Section Locations for Site 2.	3-23
3-12	Geologic Cross-Sections for Site 2.	3-24
3-13	Water Table and Direction of Ground Water Movement at Site 2.	3-25
3-14	Variation in Vertical Hydraulic Head in the Glacial Till at Site 2 and Generalized Direction of Ground-Water Movement.	3-26
3-15	Surface Drainage of Site 3.	3-31
3-16	Index to Cross-Sections for Sites 3, 4, and 8.	3-34
3-17	Geologic Cross-Sections for Site 3.	3-35

LIST OF FIGURES (continued)

		Page
3-18	Water Table and Direction of Ground Water Movement for Site 3.	3-38
3-19	Variation in Vertical Hydraulic Head in the Glacial Till at Site 3 and Generalized Direction of Ground-Water Movement.	3-39
3-20	Surface Drainage at Site 4.	3-42
3-21	Geologic Cross-Sections for Site 4.	3-45
3-22	Water Table and Direction of Ground Water Movement for Site 4.	3-46
3-23	Variation in Vertical Hydraulic Head in the Glacial Till at Site 4 and Generalized Direction of Ground-Water Movement.	3-47
3-24	Surface Drainage at Site 8.	3-52
3-25	Geologic Cross-Sections at Site 8.	3-55
3-26	Water Table and Direction of Ground-Water Movement for Site 8.	3-58
3-27	Variation in Vertical Hydraulic Head in the Glacial Till at Site 8 and Generalized Direction of Ground-Water Movement.	3-59
3-28	Aerial Photograph of Sites 3, 4, and 8, April 1988.	3-60
3-29	Aerial Photograph of Sites 3, 4, and 8, August 1952.	3-61
3-30	Aerial Photograph of Sites 3, 4, and 8, October 1965.	3-62
3-31	Aerial Photograph of Sites 3, 4, and 8, May 1979.	3-63
3-32	Bedrock Contour Map of Sites 3, 4, and 8.	3-66
3-33	Geologic Cross-Section for Sites 3, 4 and 8.	3-69
3-34	Water Table and Direction of Ground-Water Movement for Sites 3, 4 and 8.	3-70
3-35	Variation in Vertical Hydraulic Head in the Glacial Till at Sites 3, 4 and 8, and Generalized Direction of Ground-Water Movement.	3-71
3-36	Aerial Photograph of Site 10, August 1952.	3-74
3-37	Aerial Photograph of Site 10, October 1965.	3-75

LIST OF FIGURES (continued)

		Page
3-38	Aerial Photograph of Site 10, May 1979.	3-76
3-39	Aerial Photograph of Site 10, April 1988 Showing Surface Drainage.	3-77
3-40	Water Table and Direction of Ground Water Movement for Site 10.	3-80
4-1	Estimated Areal Extent of Trichloroethene Contamination in Ground Water at Site 2.	4-25
4-2	Estimated Areal Extent of Trans-1,2-Dichloroethene Contamination in Ground Water at Site 2.	4-26
4-3	Distribution of Near Surface Soil Pesticide and PCB Occurrences at Site 3.	4-39
4-4	Estimated Areal Extent of Trichloroethene Contamination in Ground Water at Site 3.	4-48
4-5	Estimated Areal Extent of Tetrachloroethene Contamination in Ground Water at Site 3.	4-49
4-6	Estimated Areal Extent of 1,1,1 Trichloroethane Contamination in Ground Water at Site 3.	4-50
4-7	Vertical Distribution of Trichloroethene Contamination in Ground Water at Site 3	4-52
4-8	Vertical Distribution of Tetrachloroethene Contamination in Ground Water at Site 3.	4-53
4-9	Vertical Distribution of 1,1,1 Trichloroethane Contamination in Ground Water at Site 3.	4-54
4-10	Location of Pesticide and PCB Occurrences in Surface Soils at Site 8.	4-65

LIST OF TABLES

		Page
1-1	Climatic Data for Duluth International Airport	1-14
1-2	Well Data, 1-Mile Radius of Site, Duluth IAP, Duluth, Minnesota	1-21
1-3	Phase I Priority Ranking of Potential Contamination Sources(1)	1-28
1-4	Parameters Analyzed and Detected in Site 2 Ground Water Samples During the Phase II, Stage 1 Investigation	1-36
1-5	Parameters Analyzed in Site 2 Soil Samples During the Phase II, Stage 2 Investigation	1-39
1-6	Parameters Detected in Site 2 Soil Samples During the Phase II, Stage 2 Investigation	1-40
1-7	Parameters Analyzed in Site 2 Water Samples During the Phase II, Stage 2 Study	1-41
1-8	Parameters Detected in Site 2 Water Samples During the Phase II, Stage 2 Investigation	1-42
1-9	Parameters Detected in Site 3 Soil Samples During the Phase II, Stage 1 Investigation	1-44
1-10	Parameters Analyzed in Site 3 Soil and Sediment Samples During the Phase II, Stage 2 Investigation	1-48
1-11	Parameters Detected in Site 3 Soil Samples During the Phase II, Stage 2 Investigation	1-49
1-12	Parameters Detected in Site 3 Sediment Samples During the Phase II, Stage 2 Investigation	1-50
1-13	Parameters Analyzed in Site 3 Water Samples During the Phase II, Stage 2 Investigation	1-51
1-14	Parameters Detected in Site 3 Water Samples During the Phase II, Stage 2 Investigation	1-52
1-15	Parameters Analyzed and Detected in Site 4 Water Samples During the Phase II, Stage 1 Investigation	1-58
1-16	Parameters Analyzed in Site 4 Soil Samples During the Phase II, Stage 2 Investigation	1-59
1-17	Parameters Detected in Site 4 Soil Samples During the Phase II, Stage 2 Investigation	1-60
1-18	Parameters Detected in Site 4 Water Samples During the Phase II, Stage 2 Investigation	1-61

LIST OF TABLES (continued)

		Page
1-19	Parameters Analyzed in Site 8 Soil and Water Samples During the Phase II, Stage 2 Investigation	1-66
1-20	Parameters Detected in Site 8 Soil Samples During the Phase II, Stage 2 Investigation	1-67
1-21	Parameters Detected in Site 8 Water Samples During the Phase II, Stage 2 Investigation	1-71
1-22	Parameters Analyzed and Detected in Site 10 Ground-Water Samples During the Phase II, Stage 2 Investigation	1-74
2-1	Summary of Remedial Investigation Work by Site	2-6
2-2	Drilling and Sampling Summary	2-7
2-3	Summary of Work Performed at Area Locations	2-8
2-4	Chemical Analyses Performed on Background and Airport Area Surface Water Samples	2-10
2-5	Chemical Analyses Performed on Background and Airport Area Sediment Samples	2-11
2-6	Chemical Analyses Performed on Area Background Soil Samples	2-13
2-7	Summary of Water Level Measurement Rounds at Area Background Monitoring Wells	2-14
2-8	Chemical Analysis Performed on Area Background Ground-Water Samples	2-18
2-9	Summary of Work Performed at Site 2 Locations	2-19
2-10	Chemical Analyses Performed on Site 2 Surface Water Samples	2-21
2-11	Chemical Analyses Performed on Site 2 Sediment Samples	2-22
2-12	Chemical Analyses Performed on Site 2 Soil Samples	2-24
2-13	Summary of Site 2 Water Level Measurement Rounds	2-29
2-14	Chemical Analyses Performed on Site 2 Ground-Water Samples	2-30
2-15	Summary of Work Performed at Site 3 Locations	2-32
2-16	Chemical Analyses Performed on Site 3 Surface Water Samples	2-34
2-17	Chemical Analyses Performed on Site 3 Sediment Samples	2-35

LIST OF TABLES (continued)

		Page
2-18	Targeted Compounds for Soil Gas Analysis at Site 3	2-37
2-19	Chemical Analyses Performed on Site 3 Soil Samples	2-39
2-20	Summary of Site 3 Water Level Measurement Rounds	2-40
2-21	Chemical Analysis Performed on Site 3 Ground-Water Samples	2-45
2-22	Summary of Work Performed at Site 4 Locations	2-46
2-23	Chemical Analyses Performed on Site 4 Surface Water Samples	2-48
2-24	Chemical Analyses Performed on Site 4 Sediment Samples	2-49
2-25	Chemical Analyses Performed on Site 4 Soil Samples	2-51
2-26	Summary of Site 4 Water Level Measurement Rounds	2-52
2-27	Chemical Analyses Performed on Site 4 Ground-Water Samples	2-57
2-28	Summary of Work Performed at Site 8 Locations	2-58
2-29	Chemical Analyses Performed on Site 8 Surface Water Samples	2-61
2-30	Chemical Analyses Performed on Site 8 Sediment Samples	2-62
2-31	Chemical Analyses Performed on Site 8 Soil Samples	2-64
2-32	Summary of Site 8 Water Level Measurement Rounds	2-65
2-33	Chemical Analyses Performed on Site 8 Ground-Water Samples	2-67
2-34	Summary of Work Performed at Site 10 Locations	2-68
2-35	Summary of Site 10 Water Level Measurement Rounds	2-70
2-36	Chemical Analyses Performed on Site 10 Ground-Water Samples	2-71
3-1	Streamflow at Three Airport Area Locations	3-6
3-2	Hydraulic Parameters for Site 2	3-28
3-3	Summary of Site 3 Slug Test Results	3-40
3-4	Summary of Site 4 Slug Test Results	3-49
3-5	Summary of Site 8 Slug Test Results	3-64
4-1	Metals Detected in the Background Sediment Sample	4-5
4-2	Metals Detected in Background Soil Samples	4-6

LIST OF TABLES (continued)

		Page
4-3	Metals Detected in Background Ground-Water Samples	4-7
4-4	Radiological Parameters Detected in Background Ground-Water and Surface Water Samples	4-9
4-5	Temperature, pH and Specific Conductance Measurements for Background Location Water Samples	4-10
4-6	Metals Detected in Sediment at Airport Area Locations	4-12
4-7	Temperature, pH and Specific Conductance Measurements for Airport Area Surface Water Samples	4-13
4-8	Metals Detected in Site 2 Sediment Samples	4-15
4-9	Temperature, pH and Specific Conductance Measurements for Site 2 Water Samples	4-16
4-10	Volatile Organic Compounds Detected in Site 2 Soil Samples From Soil Sampling Boreholes	4-18
4-11	Semi-Volatile Organic Compounds Detected in Site 2 Soil Samples	4-19
4-12	Petroleum Hydrocarbons Detected in Site 2 Soil Samples	4-20
4-13	Metals Detected in Site 2 Soil Samples	4-22
4-14	Volatile Organic Compounds Detected in Site 2 Ground-Water Samples	4-27
4-15	Temperature, pH and Specific Conductance Measurements For Site 2 Water Samples	4-28
4-16	Volatile and Semi-Volatile Organic Compounds Detected in Site 3 Surface Water and Sediment Samples	4-31
4-17	Petroleum Hydrocarbons Detected in Site 3 Sediment and Soil Samples	4-32
4-18	Metals Detected in Site 3 Sediment Samples	4-33
4-19	Summary of Temperature, pH and Specific Conductance Measurements For Site 3 Water Samples	4-34
4-20	Volatile Organic Compounds Detected in Site 3 Soil Samples	4-36
4-21	Organochlorine Pesticides and PCBs Detected in Site 3 Soil and Ground-Water Samples	4-40

LIST OF TABLES (continued)

		Page
4-22	Metals Detected in Site 3 Soil Samples	4-41
4-23	Volatile Organic Compounds Detected in Site 3 Ground-Water Samples	4-45
4-24	Volatile Organic Compounds Detected in Site 4 Surface Water and Sediment Samples	4-55
4-25	Petroleum Hydrocarbons Detected in Site 4 Soil Samples	4-57
4-26	Metals Detected in Site 4 Sediment Samples	4-58
4-27	Temperature, pH and Specific Conductance Measurements For Site 4 Water Samples	4-59
4-28	Metals Detected in Site 4 Soil Samples	4-61
4-29	Metals Detected in Site 4 Ground-Water Samples	4-63
4-30	Metals Detected in Site 8 Sediments Samples	4-66
4-31	Temperature, pH and Specific Conductance Measurements For Site 8 Water Samples	4-67
4-32	Organochlorine Pesticides and PCBs Detected in Site 8 Soil Samples	4-68
4-33	Metals Detected in Site 8 Soil Samples	4-70
4-34	Metals Detected in Site 8 Ground-Water Samples	4-71
4-35	Summary of Radiological Results For Ground-Water Samples Taken at Site 10	4-73
4-36	Temperature, pH and Specific Conductance Measurements For Site 10 Water Samples	4-74
5-1	Summary of Chemical and Physical Properties For Organic Compounds Detected at Duluth ANGB(1)	5-4
6-1	Severity Ratings for Noncarcinogens	6-7
6-2	Weight-of-Evidence Categories For Potential Carcinogens	6-8
6-3	Indicator Chemicals and Relevant Physical Properties - Sites 2, 3, 4 and 8	6-10
6-4	Matrix of Potential Exposure Pathways	6-12

LIST OF TABLES (continued)

		Page
6-5	Applicable, Relevant and Appropriate Requirements and Other Criteria For Indicator Chemicals at Sites 2, 3, 4 and 8	6-19
6-6	Sites 2, 3, 4 and 8 Critical Toxicity Values	6-33
6-7	Site 2 Indicator Chemical Concentrations	6-37
6-8	Pathways Contributing to Total Exposure For Each Potential Receptor at Site 2	6-39
6-9	Comparison of Exposure Point Concentrations of Site 2 Indicator Chemicals in Air	6-43
6-10	Summary of Hazard Index Values For Site 2 - Upper Bound	6-46
6-11	Summary of Hazard Index Values For Site 2 - Best Estimate	6-47
6-12	Summary of Risk From Potential Carcinogens For Site 2 - Upper Bound	6-48
6-13	Summary of Risk From Potential Carcinogens For Site 2 - Best Estimate	6-49
6-14	Site 3 Indicator Chemical Concentrations	6-51
6-15	Pathways Contributing to Total Exposure For Each Potential Receptor at Site 3	6-53
6-16	Comparison of Ambient Exposure Point Concentrations With Air Criteria - Site 3	6-57
6-17	Summary of Hazard Index Values for Site 3 - Upper Bound	6-60
6-18	Summary of Hazard Index Values for Site 3 - Best Estimate	6-61
6-19	Summary of Risk From Potential Carcinogens for Site 3 - Upper Bound	6-63
6-20	Summary of Risk From Potential Carcinogens for Site 3 - Best Estimate	6-64
6-21	Site 4 Indicator Chemical Concentrations	6-65
6-22	Pathways Contributing to Total Exposure for Each Potential Receptor at Site 4	6-67
6-23	Comparison of Ambient Exposure Point Concentrations With Air Criteria - Site 4	6-70
6-24	Summary of Hazard Index Values For Site 4 - Upper Bound	6-74

LIST OF TABLES (continued)

		Page
6-25	Summary of Hazard Index Values for Site 4 - Best Estimate	6-75
6-26	Summary of Risk From Potential Carcinogens For Site 4 - Upper Bound	6-76
6-27	Summary of Risk From Potential Carcinogens For Site 4 - Best Estimate	6-77
6-28	Site 8 Indicator Chemical Concentrations	6-78
6-29	Pathways Contributing to Total Exposure For Each Potential Receptor at Site 8	6-80
6-30	Summary of Hazard Index Values For Site 8	6-85
6-31	Summary of Risk From Potential Carcinogens For Site 8	6-87
6-32	Summary of Hazard Index Values for Sites 2, 3, 4 and 8	6-88
6-33	Summary of Risk From Potential Carcinogens For Sites 2, 3, 4 and 8	6-89
6-34	Commonplace Risks	6-91
7-1	Summary of Surface Water Contaminants by Site	7-3
7-2	Summary of Sediment Contaminants by Site	7-6
7-3	Summary of Soil Contaminants by Site	7-7
7-4	Summary of Ground-Water Contaminants by Site	7-8
7-5	Summary of Findings by Site	7-16

This page intentionally left blank.

APPENDIX M
LABORATORY DATA AND QUALITY ASSURANCE FORMS

APPENDIX M
TABLE OF CONTENTS

		Page
M.1	INTRODUCTION	M-7
M.2	DATA PACKAGES	M-11
	Data Package #1	M-13
	Data Package #2	M-
	Data Package #3	M-
	Data Package #4	M-
	Data Package #5	M-
	Data Package #6	M-
	Data Package #7	M-
	Data Package #8	M-
	Data Package #9	M-
	Data Package #10	M-
	Data Package #11	M-
	Data Package #12	M-
	Data Package #13	M-
	Data Package #14	M-
	Data Package #15	M-
	Data Package #16	M-
	Data Package #17	M-
	Data Package #18	M-
	Data Package #19	M-
	Data Package #20	M-
	Data Package #21	M-
	Data Package #22	M-
	Data Package #23	M-
	Data Package #24	M-
	Data Package #25	M-
	Data Package #26	M-
	Data Package #27	M-
	Data Package #28	M-
	Data Package #29	M-
	Data Package #30	M-

APPENDIX M

TABLE OF CONTENTS(continued)

	Page
Data Package #63	M-
Data Package #64	M-
Data Package #65	M-
Data Package #66	M-
Data Package #67	M-
Data Package #68	M-

This page intentionally left blank.

SECTION M.1
INTRODUCTION

This page intentionally left blank.

SECTION M.1
INTRODUCTION

This Appendix contains all of the original data in the form they were delivered by the laboratory that performed the analyses. The analytical data, completed chain of custody forms and required deliverable laboratory quality control forms are included. The included laboratory quality control forms are the case narratives; method blank spikes; surrogate recovery data; tuning, calibration and internal standards; and metal analysis quality control.

Tables containing the analytical results by site and media are given in Appendix L.

The quality assurance report for the analytical results is given in Appendix M.

The analytical data, completed chain of custody and required quality control forms are grouped together in Data Packages numbered 1 through 64, 67 and 68. To find the data package for a certain analysis of a specific sample, look up the sample and analysis in the appropriate table in Appendix L. The data package number is listed for each analysis performed for each sample.

This page intentionally left blank.

SECTION M.2
DATA PACKAGES

This page intentionally left blank.

DATA PACKAGE #1

This page intentionally left blank.

ENGINEERING-SCIENCE, INC.

600 BANCROFT WAY
BERKELEY, CALIFORNIA 94710
(415) 548-7970

Job No.: OR001

Client: ES Oak Ridge
Attention: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Attached are the analytical reports for the water samples received by this laboratory on 9-24-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092677	DANGB-BG-SL4-SW1	AS-F	9-23-88		10-16-88	
88092677	DANGB-BG-SL4-SW1	BA-I	9-23-88		10-13-88	
88092677	DANGB-BG-SL4-SW1	CD-F	9-23-88		10-26-88	
88092677	DANGB-BG-SL4-SW1	CR-F	9-23-88		10-19-88	
88092677	DANGB-BG-SL4-SW1	HG-C	9-23-88		10-14-88	
88092677	DANGB-BG-SL4-SW1	PB-F	9-23-88		10-21-88	
88092677	DANGB-BG-SL4-SW1	418.1	9-23-88	10-11-88	10-20-88	
88092677	DANGB-BG-SL4-SW1	8010	9-23-88		9-28-88	
88092677	DANGB-BG-SL4-SW1	8020	9-23-88		9-28-88	
88092677	DANGB-BG-SL4-SW1	8080	9-23-88	9-28-88	10-24-88	
88092677	DANGB-BG-SL4-SW1	8270	9-23-88	9-29-88	11-08-88	
88092678	DANGB-BG-SL25-SW1	AS-F	9-23-88		10-16-88	
88092678	DANGB-BG-SL25-SW1	BA-I	9-23-88		10-13-88	
88092678	DANGB-BG-SL25-SW1	CD-F	9-23-88		10-26-88	
88092678	DANGB-BG-SL25-SW1	CR-F	9-23-88		10-19-88	
88092678	DANGB-BG-SL25-SW1	HG-C	9-23-88		10-22-88	
88092678	DANGB-BG-SL25-SW1	PB-F	9-23-88		10-24-88	
88092678	DANGB-BG-SL25-SW1	418.1	9-23-88	10-11-88	10-20-88	
88092678	DANGB-BG-SL25-SW1	8010	9-23-88		9-28-88	
88092678	DANGB-BG-SL25-SW1	8020	9-23-88		9-28-88	
88092678	DANGB-BG-SL25-SW1	8080	9-23-88	9-28-88	10-24-88	
88092678	DANGB-BG-SL25-SW1	8270	9-23-88	9-29-88	11-08-88	

* If applicable

ENGINEERING-SCIENCE, INC.

600 BANCROFT WAY
BERKELEY, CALIFORNIA 94710
(415) 548-7970

Job No.: OR001

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092679	DANGB-4-SL12-SW1	BA-I	9-23-88		10-13-88	
88092679	DANGB-4-SL12-SW1	CD-F	9-23-88		10-26-88	
88092679	DANGB-4-SL12-SW1	CR-F	9-23-88		10-19-88	
88092679	DANGB-4-SL12-SW1	PB-F	9-23-88		10-24-88	
88092679	DANGB-4-SL12-SW1	418.1	9-23-88	10-08-88	10-20-88	
88092679	DANGB-4-SL12-SW1	8010	9-23-88		9-29-88	9-28-88
88092679	DANGB-4-SL12-SW1	8020	9-23-88		9-29-88	
88092680	DANGB-4-SL11-SW1	BA-I	9-23-88		10-13-88	
88092680	DANGB-4-SL11-SW1	CD-F	9-23-88		10-26-88	
88092680	DANGB-4-SL11-SW1	CR-F	9-23-88		10-19-88	
88092680	DANGB-4-SL11-SW1	PB-F	9-23-88		10-24-88	
88092680	DANGB-4-SL11-SW1	418.1	9-23-88	10-08-88	10-20-88	
88092680	DANGB-4-SL11-SW1	8010	9-23-88		9-30-88	9-28-88
88092680	DANGB-4-SL11-SW1	8020	9-23-88		9-30-88	9-28-88
88092681	DANGB-BG-SL5-SW1	AS-F	9-23-88		10-16-88	
88092681	DANGB-BG-SL5-SW1	BA-I	9-23-88		10-13-88	
88092681	DANGB-BG-SL5-SW1	CD-F	9-23-88		10-26-88	
88092681	DANGB-BG-SL5-SW1	CR-F	9-23-88		10-19-88	
88092681	DANGB-BG-SL5-SW1	HG-C	9-23-88		10-22-88	
88092681	DANGB-BG-SL5-SW1	PB-F	9-23-88		10-24-88	
88092681	DANGB-BG-SL5-SW1	418.1	9-23-88	10-08-88	10-20-88	
88092681	DANGB-BG-SL5-SW1	8010	9-23-88		9-28-88	
88092681	DANGB-BG-SL5-SW1	8020	9-23-88		9-28-88	
88092681	DANGB-BG-SL5-SW1	8080	9-23-88	9-28-88	10-24-88	
88092681	DANGB-BG-SL5-SW1	8270	9-23-88	9-29-88	11-08/23-88	

* If applicable

A SUBSIDIARY OF THE PARSONS CORPORATION

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
8270 ANALYSIS
SAMPLE NO(S).: 88092677-88092681
WORK ORDER NO.: 1037

These water samples were received at the ES Berkeley Laboratory on 9-24-88. They were received cold and intact, execpt for 1 VOA for sample DANGB-B6-SL25-SW1 (88092678) which was broken in transit.

When sample 88092681 was first analyzed, the area counts for the latest eluting internal standard were low. Re-analysis, out of holding time, resulted in sufficient area counts for all internal standards. This low internal standard area does not affect the results for target compounds, because none of the acidic target compounds use this internal standard to calculate results.

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

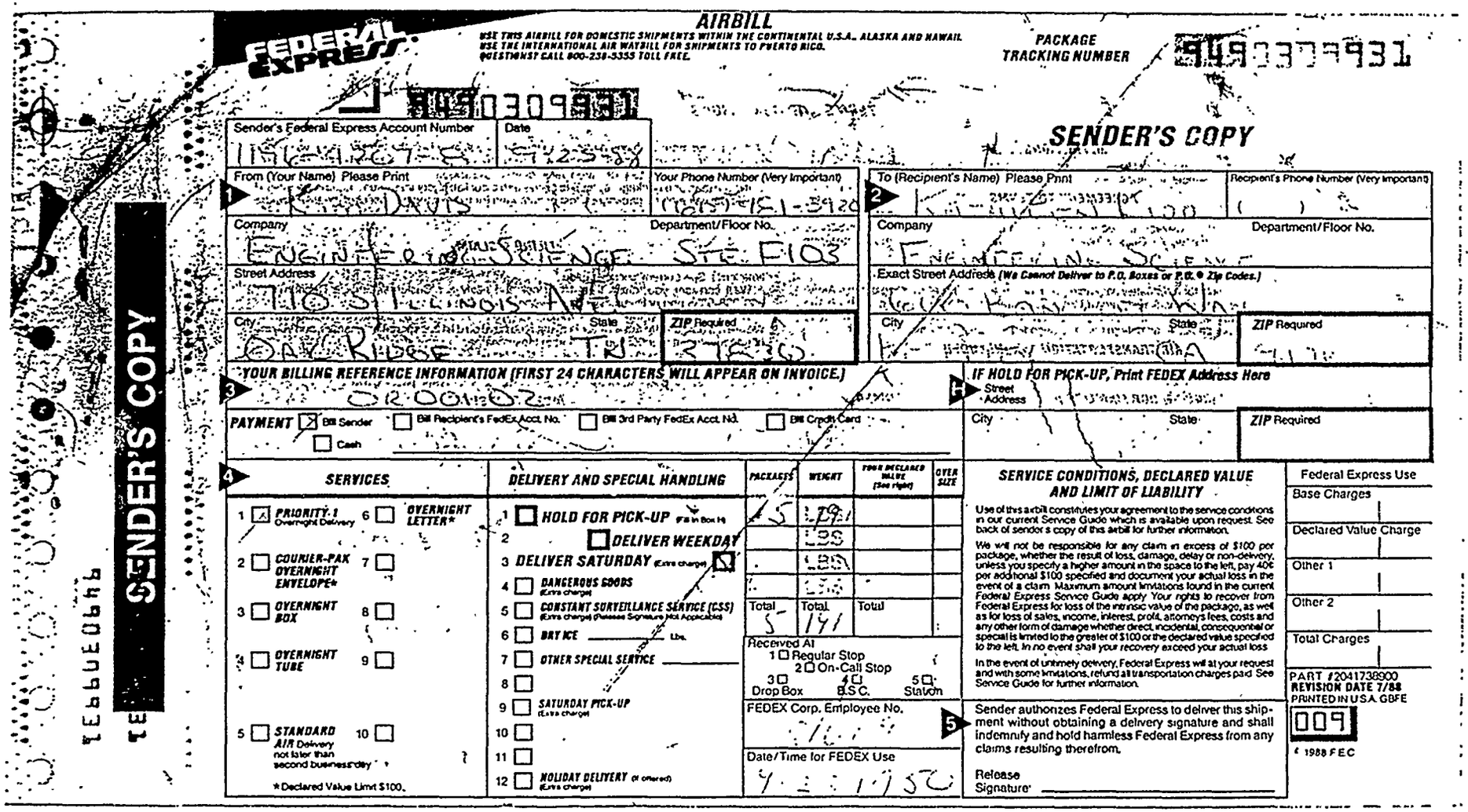
SAMPLER(S): (Signature) Kbely L. Davis

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 6010, 7060, 7131	SW7421, 7470, 7471	SW9310, 9315	SM429	REMARKS
~~9-23-88~~	~~0940~~	~~DANGB-BG-SL5-SW-1~~	2					1	1			~~1100~~
9-23-88	0945	DANGB-BG-SL4-SW-1	2					1	1			
9-23-88	1045	DANGB-4-SL11-SW-1	2					1	1			Do not analyze for SW7470 & SW7060
9-23-88	1015	DANGB-BG-SL25-SW-1	2					1	1			
9-23-88	1100	DANGB-4-SL12-SW-1	2					1	1			Do not analyze for SW7470 & SW7060

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Kbely L. Davis	9-23-88 1600	FedEx Airbill # 949030993 1			
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files



FEDERAL EXPRESS

AIRBILL

USE THIS AIRBILL FOR DOMESTIC SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 949337931

SENDER'S COPY

Sender's Federal Express Account Number: 114-1207-3 | Date: 4 12 88

1 From (Your Name) Please Print: K. DAVIS | Your Phone Number (Very Important): (615) 481-3920

Company: ENGINEERING SCIENCE | Department/Floor No.: STE. F103

Street Address: 710 S. ILLINOIS AVE.

City: OAK RIDGE | State: TN | ZIP Required: 37830

2 To (Recipient's Name) Please Print: [illegible] | Recipient's Phone Number (Very Important): ( )

Company: [illegible] | Department/Floor No.:

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): [illegible]

City: [illegible] | State: [illegible] | ZIP Required: [illegible]

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.): OR00102

H IF HOLD FOR PICK-UP, Print FEDEX Address Here
Street Address:
City: | State: | ZIP Required:

PAYMENT: [X] Bill Sender [ ] Bill Recipient's FedEx Acct. No. [ ] Bill 3rd Party FedEx Acct. No. [ ] Bill Credit Card [ ] Cash

4 SERVICES

1 [X] PRIORITY 1 Overnight Delivery
2 [ ] COURIER-PAK OVERNIGHT ENVELOPE*
3 [ ] OVERNIGHT BOX
4 [ ] OVERNIGHT TUBE
5 [ ] STANDARD AIR Delivery not later than second business day*
6 [ ] OVERNIGHT LETTER*
7 [ ]
8 [ ]
9 [ ]
10 [ ]
*Declared Value Limit $100.

DELIVERY AND SPECIAL HANDLING

1 [ ] HOLD FOR PICK-UP (Fill in Box H)
2 [ ] DELIVER WEEKDAY
3 DELIVER SATURDAY (Extra charge) [ ]
4 [ ] DANGEROUS GOODS (Extra charge)
5 [ ] CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charge) (Passport Signature Not Applicable)
6 [ ] DRY ICE ____ Lbs.
7 [ ] OTHER SPECIAL SERVICE ____
8 [ ]
9 [ ] SATURDAY PICK-UP (Extra charge)
10 [ ]
11 [ ]
12 [ ] HOLIDAY DELIVERY (If offered) (Extra charge)

PACKAGES	WEIGHT	YOUR DECLARED VALUE (See right)	OVER SIZE
1	1.9		
	1.9		
	1.9		
	1.9		
Total 5	Total 19.1	Total	

Received At
1 [ ] Regular Stop
2 [ ] On-Call Stop
3 [ ] Drop Box
4 [ ] B.S.C.
5 [ ] Station

FEDEX Corp. Employee No.:

Date/Time for FEDEX Use: 4 12 1730

SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY

Use of this airbill constitutes your agreement to the service conditions in our current Service Guide which is available upon request. See back of sender's copy of this airbill for further information.

We will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay or non-delivery, unless you specify a higher amount in the space to the left, pay 40¢ per additional $100 specified and document your actual loss in the event of a claim. Maximum amount limitations found in the current Federal Express Service Guide apply. Your rights to recover from Federal Express for loss of the intrinsic value of the package, as well as for loss of sales, income, interest, profit, attorney's fees, costs and any other form of damage whether direct, incidental, consequential or special is limited to the greater of $100 or the declared value specified to the left. In no event shall your recovery exceed your actual loss.

In the event of untimely delivery, Federal Express will at your request and with some limitations, refund all transportation charges paid. See Service Guide for further information.

5 Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.

Release Signature: _____

Federal Express Use

Base Charges	
Declared Value Charge	
Other 1	
Other 2	
Total Charges	

PART #2041738900
REVISION DATE 7/88
PRINTED IN U.S.A. GBFE
009
© 1988 FEC

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) Johanna Burke

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW 3510, 8020	EPA 608	EPA 625	EPA 420.1	SW 6010, 7060, 7131	SW 7421, 7471, 7741	SW 9315	SW 429	REMARKS
7-23-88	1100	DANGB-4-SED-SOIL	2				2					8830
7-23-88	1045	DANGB-4-SED-SOIL	2				2					8831
7-23-88	0900	DANGB-BG SED-SOIL	2			2	2	1	1			8832

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Johanna Burke		Airbill FEC 999030999920			

Relinquished by: (Signature)	Date/Time	Received for: Laboratory by: (Signature)	Date/Time	Remarks
			7-28-88 1430	Samples received cold & intact

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.			ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710
SAMPLER(S): (Signature) Johanna Bue				

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 6010, 7040, 7131	SW7421, 7473	SW9250, 9315	SM429	REMARKS
9-23-88	0900	DANGB-BG-SL5-SW1	5	5								882671
9-23-88	1100	DANGB-4-SL12	5	5								882670
9-23-88	0945	DANGB-BG-SL4-SW1	5	5								882677
9-23-88	1015	DANGB-BG-SL25-SW1	5	5								882678
9-23-88	1045	DANGB-4-SL11-SW1	5	5								882680

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Johanna Bue	9-23-88 1730	FEC AirBill # 9490.309931 9490.309931 9-23-88			
Relinquished by: (Signature)	**Date/Time**	**Received for Laboratory by: (Signature)**	**Date/Time**	**Remarks**	
			9-24-88	Samples for DANGB-BG-SL-25-SW-1 (1 liter) are to be shipped with SW8010, 8020 analyses.	

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) Johanna Beu

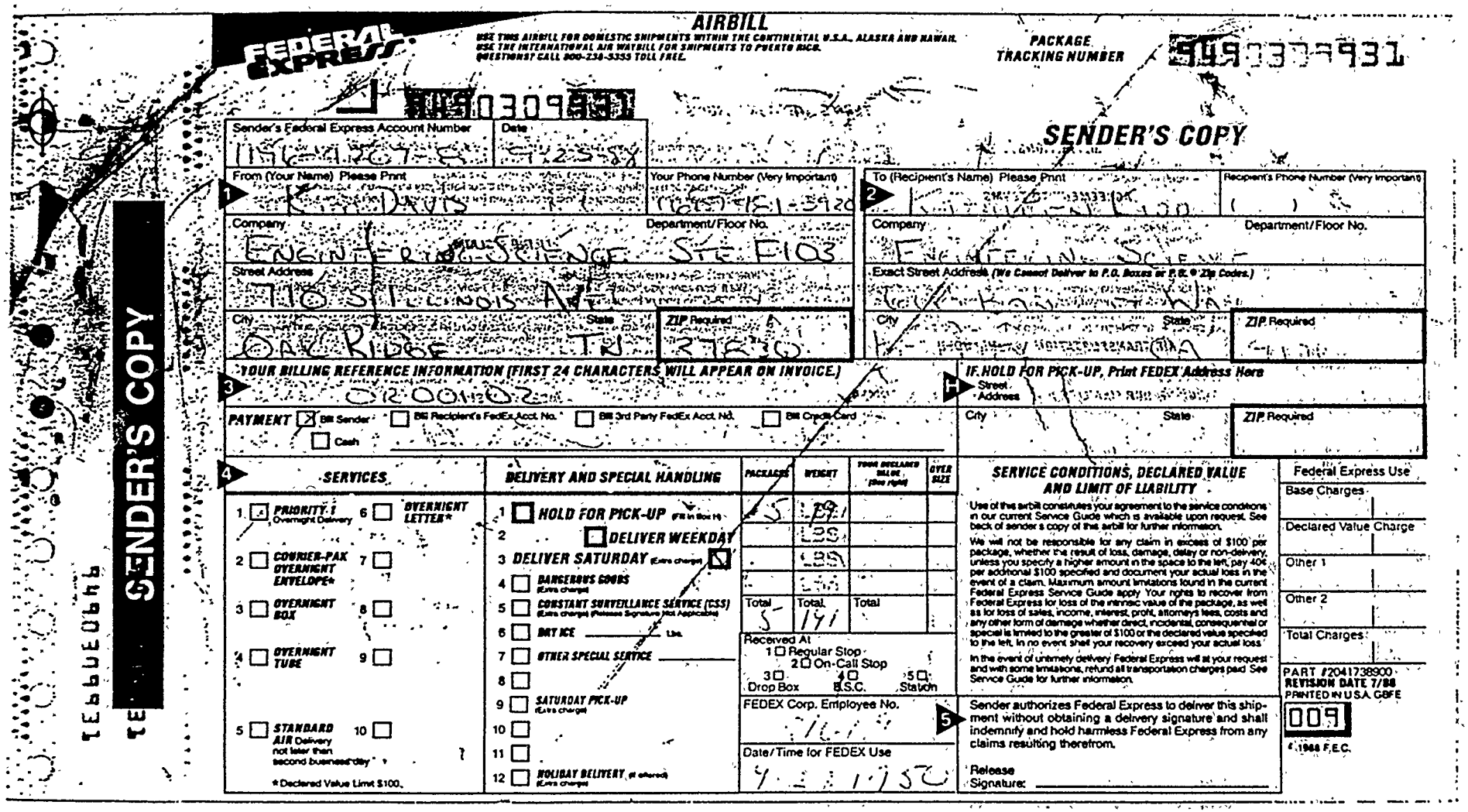
SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 601	EPA 625	EPA 418.1	SW 6010, 7040, 7131	SW7421, 7471	SW9056, 9315	SM429	REMARKS
9-23-88	0900	DANGB-BG-SL5-SW1	5	5								880971
9-23-88	1100	DANGB-4-SL12	5	5								880970
9-23-88	0945	DANGB-BG-SL4-SW1	5	5								880977
9-23-88	1015	DANGB-BG-SL25-SW1	5	5								880978
9-23-88	1045	DANGB-4-SL1-SW1	5	5								880980

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Johanna Beu	9-23-88 1730	FEC AIR BILL # 9490.309931 ~~9490305257210~~ 9-23-88			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
			9-24-88 1:15	Samples for DANGB-BG-SL25-SW-1 (QA/QC) were shipped with MC.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files



FEDERAL EXPRESS

AIRBILL

USE THIS AIRBILL FOR DOMESTIC SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 949037931

SENDER'S COPY

Sender's Federal Express Account Number: 114-1107-8 | Date: 4/25/88

1 From (Your Name) Please Print: K. DAVIS | Your Phone Number (Very Important): (615) 481-3920

Company: ENGINEERING SCIENCE | Department/Floor No.: STE. F103

Street Address: 710 S. ILLINOIS AVE.

City: OAK RIDGE | State: TN | ZIP Required: 37830

2 To (Recipient's Name) Please Print: [illegible] | Recipient's Phone Number (Very Important): ( )

Company: [illegible] | Department/Floor No.:

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): [illegible]

City: [illegible] | State: [illegible] | ZIP Required: [illegible]

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.): 012001202

PAYMENT: [X] Bill Sender [ ] Bill Recipient's FedEx Acct. No. [ ] Bill 3rd Party FedEx Acct. No. [ ] Bill Credit Card [ ] Cash

4 SERVICES

1 [X] PRIORITY 1 Overnight Delivery
2 [ ] COURIER-PAK OVERNIGHT ENVELOPE*
3 [ ] OVERNIGHT BOX
4 [ ] OVERNIGHT TUBE
5 [ ] STANDARD AIR Delivery not later than second business day*
6 [ ] OVERNIGHT LETTER*
7 [ ]
8 [ ]
9 [ ]
10 [ ]

*Declared Value Limit $100.

DELIVERY AND SPECIAL HANDLING

1 [ ] HOLD FOR PICK-UP (Fill in Box 4)
2 [ ] DELIVER WEEKDAY
3 [ ] DELIVER SATURDAY (Extra charge)
4 [ ] DANGEROUS GOODS (Extra charge)
5 [ ] CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charge) (Passport Signature Not Applicable)
6 [ ] DRY ICE ____ Lbs.
7 [ ] OTHER SPECIAL SERVICE ____
8 [ ]
9 [ ] SATURDAY PICK-UP (Extra charge)
10 [ ]
11 [ ]
12 [ ] HOLIDAY DELIVERY (If offered) (Extra charge)

PACKAGES	WEIGHT	YOUR DECLARED VALUE (See right)	OVER SIZE
1	1.0		
	1.5		
	1.5		
Total 3	Total 17.1	Total	

Received At
1 [ ] Regular Stop
2 [ ] On-Call Stop
3 [ ] Drop Box 4 [ ] B.S.C. 5 [ ] Station

FEDEX Corp. Employee No.: 1C-1

Date/Time for FEDEX Use: 4-25-88 1350

SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY

Use of this airbill constitutes your agreement to the service conditions in our current Service Guide which is available upon request. See back of sender's copy of this airbill for further information.

We will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay or non-delivery, unless you specify a higher amount in the space to the left, pay 40¢ per additional $100 specified and document your actual loss in the event of a claim. Maximum amount limitations found in the current Federal Express Service Guide apply. Your rights to recover from Federal Express for loss of the intrinsic value of the package, as well as for loss of sales, income, interest, profit, attorney's fees, costs and any other form of damage whether direct, incidental, consequential or special is limited to the greater of $100 or the declared value specified to the left. In no event shall your recovery exceed your actual loss.

In the event of untimely delivery Federal Express will at your request and with some limitations, refund all transportation charges paid. See Service Guide for further information.

5 Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.

Release Signature: _____

IF HOLD FOR PICK-UP, Print FEDEX Address Here

Street Address: [illegible]

City: [illegible] | State: [illegible] | ZIP Required: [illegible]

Federal Express Use

Base Charges	
Declared Value Charge	
Other 1	
Other 2	
Total Charges	

PART #204173890O
REVISION DATE 7/88
PRINTED IN U.S.A. GBFE
009
© 1988 F.E.C.

SENDER'S COPY

949037931

ANALYSIS REPORT

ORK ORDER NUMBER: 1037
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/24/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
S OAK RIDGE/DULUTH ANGB
10 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
ILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

ONTRACT / PO # : OR001
ONTACT : BILL HAYDEN
(615)-481-3920

ASK: 2, UNITS: mg/L

EST COMPOUND	DANGB-BG-SL4-SW-1 88092677	DANGB-BG-SL25-SW1 88092678	DANGB-4-SL12-SW1 88092679	DANGB-4-SL11-SW1 88092680	DANGB-BG-SL5-SW1 88092681
CID DIG FLAME	NA	NA	NA	NA	NA
CID DIG FURNACE	NA	NA	NA	NA	NA
RSENIC	<0.01	<0.01			<0.01
ARIUM	<0.2	<0.2	<0.2	<0.2	<0.2
ADMIUM	<0.005	<0.005	<0.005	<0.005	<0.005
HROMIUM	<0.01	<0.01	<0.01	<0.01	<0.1
ERCURY	<.0002	<.0002			<.0002
EAD	<0.005	<0.005	<0.005	<0.005	<0.005

) - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1037
OB NUMBER : ZB0000000440
WORK ORDER DATE : 09/24/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
S OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
ILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

ONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

ASK: 3, UNITS: mg/L

EST COMPOUND	DANGB-BG-SL4-SW-1 88092677	DANGB-BG-SL25-SW1 88092678	DANGB-4-SL12-SW1 88092679	DANGB-4-SL11-SW1 88092680	DANGB-BG-SL5-SW1 88092681
18.1-PETROLEUM HYDROCARBONS	<1B	<1B	<1	<1	<1

ND - Not Detected

ANALYSIS REPORT

)RK ORDER NUMBER: 1037
)B NUMBER : ZB0000000440
)RK ORDER DATE : 09/24/88

APPROVED BY _____
Lab Supervisor

:PORT DATA:
; OAK RIDGE/DULUTH ANGB
;0 S. ILLINOIS AVE. STE. S103
\K RIDGE, TN 37830
'LL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

)NTRACT / PO # : OR001
)NTACT : BILL HAYDEN
(615)-481-3920

\SK: 4, UNITS: ug/L, GROUP 8010

:ST COMPOUND	DANGB-BG-SL4-SW-1 88092677	DANGB-BG-SL25-SW1 88092678	DANGB-4-SL12-SW1 88092679	DANGB-4-SL11-SW1 88092680	DANGB-BG-SL5-SW1 88092681
:NZYL CHLORIDE	ND	ND	ND	ND	ND
:S (2-CHLOROETHOXY)METHANE	ND	ND	ND	ND	ND
.S (2-CHLOROISOPROPYL)ETHER	ND	ND	ND	ND	ND
:OMOBENZENE	ND	ND	ND	ND	ND
:OMODICHLOROMETHANE	ND	ND	ND	ND	ND
:OMOFORM	ND	ND	ND	ND	ND
:OMOETHANE	ND	ND	ND	ND	ND
\RBON TETRACHLORIDE	ND	ND	ND	ND	ND
:LORACETALDEHYDE	ND	ND	ND	ND	ND
:LORAL	ND	ND	ND	ND	ND
:LOROBENZENE	ND	ND	ND	ND	ND
:LOROETHANE	ND	ND	ND	ND	ND
:LOROFORM	ND	ND	ND	ND	ND
-CHLOROHEXANE	ND	ND	ND	ND	ND
-CHLOROETHYL VINYL ETHER	ND	ND	ND	ND	ND
:LOROMETHANE	ND	ND	ND	ND	ND
:LOROMETHYL METHYL ETHER	ND	ND	ND	ND	ND
:LOROTOLUENE	ND	ND	ND	ND	ND
'BROMOCHLOROMETHANE	ND	ND	ND	ND	ND
:BROMOMETHANE	ND	ND	ND	ND	ND
,2-DICHLOROBENZENE	ND	ND	ND	ND	ND
.3-DICHLOROBENZENE	ND	ND	ND	ND	ND
4-DICHLOROBENZENE	ND	ND	ND	ND	ND
:CHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND
.1-DICHLOROETHANE	ND	ND	ND	ND	ND
.2-DICHLOROETHANE	ND	ND	ND	ND	ND
1-DICHLOROETHYLENE	ND	ND	ND	ND	ND
:ANS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND	ND
CHLOROMETHANE	ND	ND	1.0B	1.0B	ND
2-DICHLOROPROPANE	ND	ND	ND	ND	ND

) - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1037

TEST COMPOUND	DANGB-BG-SL4-SW-1 88092677	DANGB-BG-SL25-SW1 88092678	DANGB-4-SL12-SW1 88092679	DANGB-4-SL11-SW1 88092680	DANGB-BG-SL5-SW1 88092681
,3-DICHLOROPROPYLENE	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
,1,1,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
ETRACHLOROETHYLENE	ND	ND	ND	ND	ND
,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
RICHLOROETHYLENE	ND	ND	0.23	ND	ND
RICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND
TRICHLOROPROPANE	ND	ND	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT

)RK ORDER NUMBER: 1037
)B NUMBER : ZB0000000440
)RK ORDER DATE : 09/24/88

APPROVED BY _____
Lab Supervisor

:PORT DATA:
; OAK RIDGE/DULUTH ANGB
10 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
:LL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

)NTRACT / PO # : OR001
)NTACT : BILL HAYDEN
(615)-481-3920

ASK: 4, UNITS: ug/L, GROUP 8020

:ST COMPOUND	DANGB-BG-SL4-SW-1 88092677	DANGB-BG-SL25-SW1 88092678	DANGB-4-SL12-SW1 88092679	DANGB-4-SL11-SW1 88092680	DANGB-BG-SL5-SW1 88092681
:NZENE	ND	ND	ND	14	ND
HLOROBENZENE	ND	ND	ND	ND	ND
,2-DICHLOROBENZENE	ND	ND	ND	ND	ND
,3-DICHLOROBENZENE	ND	ND	ND	ND	ND
,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
THYL BENZENE	ND	ND	ND	6.2	ND
)LUENE	ND	ND	ND	4.3	ND
/LENES	ND	ND	ND	20.7	ND

) - Not Detected

ANALYSIS REPORT

RK ORDER NUMBER: 1037
B NUMBER : ZB0000000440 APPROVED BY
WORK ORDER DATE : 09/24/88 Lab Supervisor

PORT DATA:
OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
K RIDGE, TN 37830
LL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

NTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

SK: 4, UNITS: ug/L, GROUP 8080

EST COMPOUND	DANGB-BG-SL4-SW-1 88092677	DANGB-BG-SL25-SW1 88092678	DANGB-BG-SL5-SW1 88092681
DRIN	ND	ND	ND
PHA-BHC	ND	ND	ND
BETA-BHC	ND	ND	ND
DELTA-BHC	ND	ND	ND
MMA-BHC	ND	ND	ND
LORDANE	ND	ND	ND
4,4'-DDD	ND	ND	ND
4,4'-DDE	ND	ND	ND
4'-DDT	ND	ND	ND
IELDRIN	ND	ND	ND
ENDOSULFAN I	ND	ND	ND
DOSULFAN II	ND	ND	ND
DOSULFAN SULFATE	ND	ND	ND
ENDRIN	ND	ND	ND
ENDRIN ALDEHYDE	NA	NA	NA
PTACHLOR	ND	ND	ND
EPTACHLOR EPOXIDE	ND	ND	ND
KEPONE	ND	ND	ND
METHOXYCHLOR	ND	ND	ND
OXAPHENE	ND	ND	ND
CB-1016	ND	ND	ND
PCB-1221	ND	ND	ND
CB-1232	ND	ND	ND
CB-1242	ND	ND	ND
PCB-1248	ND	ND	ND
PCB-1254	ND	ND	ND
CB-1260	ND	ND	ND

ND - Not Detected

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

ate Received: September 24, 1988
ate Reported: December 9, 1988

Work Order: 1037
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

ab Number:	88092677	88092678
ample No.:	DANGB-BG-SL4-SW1	DANGB-BG-SL25-SW1
ate Sampled:	09-23-88	09-23-88
ime Sampled:	09:45	10:15
ate Extracted:	09-29-88	09-29-88
ate Analyzed:	11-08-88	11-08-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
,3-Dichlorobenzene	10	ND	ND
,4-Dichlorobenzene	10	ND	ND
exachloroethane	10	ND	ND
is(2-chloroethyl)ether	10	ND	ND
,2-Dichlorobenzene	10	ND	ND
-Nitrosodimethylamine	10	ND	ND
is(2-chloroisopropyl)ether	10	ND	ND
-Nitrosodi-n-propylamine	10	ND	ND
exachlorobutadiene	10	ND	ND
,2,4-Trichlorobenzene	10	ND	ND
itrobenzene	10	ND	ND
sophorone	10	ND	ND
aphthalene	10	ND	ND
is(2-chloroethoxy)methane	10	ND	ND
-Chloronaphthalene	10	ND	ND
exachlorocyclopentadiene	10	ND	ND
cenaphthylene	10	ND	ND
cenaphthene	10	ND	ND
imethyl phthalate	10	ND	ND
,6-Dinitrotoluene	10	ND	ND
luorene	10	ND	ND
,4-Dinitrotoluene	10	ND	ND
iethyl phthalate	10	ND	ND
-Nitrosodiphenylamine	10	ND	ND
exachlorobenzene	10	ND	ND

= Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 24, 1988
Date Reported: December 9, 1988

Work Order: 1037
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092677	88092678
Sample No.:	DANGB-BG-SL4-SW1	DANGB-BG-SL25-SW1
Date Sampled:	09-23-88	09-23-88
Time Sampled:	09:45	10:15
Date Extracted:	09-29-88	09-29-88
Date Analyzed:	11-08-88	11-08-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
Phenanthrene	10	ND	ND
Anthracene	10	ND	ND
Dibutyl phthalate	10	ND	ND
Fluoranthene	10	ND	ND
4-Chlorophenyl phenyl ether	10	ND	ND
Pyrene	10	ND	ND
Butyl Benzyl phthalate	10	ND	ND
Bis(2-ethylhexyl) phthalate	10	ND	ND
Chrysene	10	ND	ND
4-Bromophenyl phenyl ether	10	ND	ND
Benzo(a)anthracene	10	ND	ND
Di-n-octylphthalate	10	ND	ND
Benzo(b)fluoranthene	10	ND	ND
Benzo(k)fluoranthene	10	ND	ND
Benzidine	60	ND	ND
3,3'-Dichlorobenzidine	20	ND	ND
Benzo(a)pyrene	10	ND	ND
Indeno(1,2,3-cd)pyrene	10	ND	ND
Dibenzo(a,h)anthracene	10	ND	ND
Benzo(ghi)perylene	10	ND	ND
Benzyl Alcohol	20	ND	ND

B = Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

ate Received: September 24, 1988 Work Order: 1037
ate Reported: December 9, 1988 Job Number: OR001

or: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
ddress:710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ab Number:	88092677	88092678
ample No.:	DANGB-BG-SL4-SW1	DANGB-BG-SL25-SW1
ate Sampled:	09-23-88	09-23-88
ime Sampled:	09:45	10:15
ate Extracted:	09-29-88	09-29-88
ate Analyzed:	11-08-88	11-08-88

ompound	Detection Limits ug/L	Analytical Results ug/L	ug/L
cetophenone	--*	ND	ND
niline	--*	ND	ND
-Aminobiphenyl	--*	ND	ND
-Chloroaniline	20	ND	ND
-Chloronaphthalene	--*	ND	ND
ibenzofuran	10	ND	ND
-Dimethylaminoazobenzene	--*	ND	ND
,12-Dimethylbenz(a)anthracene	--*	ND	ND
-,a-Dimethylphenethylamine	--*	ND	ND
iphenylamine	--*	ND	ND
,2-Diphenylhydrazine	--*	ND	ND
thyl methanesulfonate	--*	ND	ND
-Methylcholanthrene	--*	ND	ND
ethyl methanesulfonate	--*	ND	ND
-Methylnaphthalene	10	ND	ND
-Naphthylamine	--*	ND	ND
-Naphthylamine	--*	ND	ND
-Nitroaniline	50	ND	ND
-Nitroaniline	50	ND	ND
-Nitroaniline	50	ND	ND
-Nitroso-di-n-butylamine	--*	ND	ND
-Nitrosopiperidine	--*	ND	ND
entachlorobenzene	--*	ND	ND
entachloronitrobenzene	--*	ND	ND
henacetin	--*	ND	ND
-Picoline	--*	ND	ND
ronamide	--*	ND	ND
,2,4,5-Tetrachlorobenzene	--*	ND	ND

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

Date Received: September 24, 1988
Date Reported: December 9, 1988

Work Order: 1037
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN:Mr. Bill Hayden

Lab Number:	88092677	88092678
Sample No.:	DANGB-BG-SL4-SW1	DANGB-BG-SL25-SW1
Date Sampled:	09-23-88	09-23-88
Time Sampled:	09:45	10:15
Date Extracted:	09-29-88	09-29-88
Date Analyzed:	11-08-88	11-08-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
Alpha-BHC	--*	ND	ND
Gamma-BHC	__*	ND	ND
Beta-BHC	20	ND	ND
Heptachlor	10	ND	ND
Delta-BHC	15	ND	ND
Aldrin	10	ND	ND
Heptachlor epoxide	10	ND	ND
Endosulfan I	--*	ND	ND
Dieldrin	15	ND	ND
4,4'-DDE	30	ND	ND
Endrin	--*	ND	ND
Endosulfan II	--*	ND	ND
4,4'-DDD	15	ND	ND
4,4'-DDT	25	ND	ND
Endosulfan Sulfate	30	ND	ND
Endrin aldehyde	--*	ND	ND
Endrin Ketone	--*	ND	ND
Chlordane	60	ND	ND
Methoxychlor	--*	ND	ND
Toxaphene	60	ND	ND
Aroclor-1016	60	ND	ND
Aroclor-1221	60	ND	ND
Aroclor-1232	60	ND	ND
Aroclor-1242	60	ND	ND
Aroclor-1248	60	ND	ND
Aroclor-1254	60	ND	ND
Aroclor-1260	60	ND	ND

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

ate Received: September 24, 1988
ate Reported: December 9, 1988

Work Order: 1037
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
ddress:710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

ab Number:	88092677	88092678
ample No.:	DANGB-BG-SL4-SW1	DANGB-BG-SL25-SW1
ate Sampled:	09-23-88	09-23-88
ime Sampled:	09:45	10:15
ate Extracted:	09-29-88	09-29-88
ate Analyzed:	11-08-88	11-08-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
-Chlorophenol	10	ND	ND
-Nitrophenol	10	ND	ND
henol	10	ND	ND
,4-Dimethylphenol	10	ND	ND
,4-Dichlorophenol	10	ND	ND
,4,6-Trichlorophenol	10	ND	ND
-Chloro-3-methylphenol	20	ND	ND
,4-Dinitrophenol	50	ND	ND
,6-Dichlorophenol	--*	ND	ND
-Methyl-4,6-Dinitrophenol	50	ND	ND
entachlorophenol	50	ND	ND
-Nitrophenol	50	ND	ND
enzoic Acid	50	ND	ND
-Methylphenol	10	ND	ND
- & 4-Methylphenol	10	ND	ND
,3,4,6-Tetrachlorophenol	--*	ND	ND
,4,5-Trichlorophenol	10	ND	ND

Analyst

Laboratory Supervisor

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

OTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

Date Received: September 24, 1988
Date Reported: December 9, 1988

Work Order: 1037
Job Number: OR001

FOR: ES-Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092681
Sample No.:	DANGB-BG-SL5-SW1
Date Sampled:	09-23-88
Time Sampled:	09:00
Date Extracted:	09-29-88
Date Analyzed:	11-08-88/11-23-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L
1,3-Dichlorobenzene	10	ND
1,4-Dichlorobenzene	10	ND
Hexachloroethane	10	ND
Bis(2-chloroethyl)ether	10	ND
1,2-Dichlorobenzene	10	ND
N-Nitrosodimethylamine	10	ND
Bis(2-chloroisopropyl)ether	10	ND
N-Nitrosodi-n-propylamine	10	ND
Hexachlorobutadiene	10	ND
1,2,4-Trichlorobenzene	10	ND
Nitrobenzene	10	ND
Isophorone	10	ND
Naphthalene	10	ND
Bis(2-chloroethoxy)methane	10	ND
2-Chloronaphthalene	10	ND
Hexachlorocyclopentadiene	10	ND
Acenaphthylene	10	ND
Acenaphthene	10	ND
Dimethyl phthalate	10	ND
2,6-Dinitrotoluene	10	ND
Fluorene	10	ND
2,4-Dinitrotoluene	10	ND
Diethyl phthalate	10	ND
N-Nitrosodiphenylamine	10	ND
Hexachlorobenzene	10	ND

B = Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

ate Received: September 24, 1988 Work Order: 1037
ate Reported: December 9, 1988 Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ab Number:	88092681
ample No.:	DANGB-BG-SL5-SW1
ate Sampled:	09-23-88
ime Sampled:	09:00
ate Extracted:	09-29-88
ate Analyzed:	11-08-88/11-23-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L
henanthrene	10	ND
nthracene	10	ND
ibutyl phthalate	10	ND
luoranthene	10	ND
-Chlorophenyl phenyl ether	10	ND
yrene	10	ND
utyl Benzyl phthalate	10	ND
is(2-ethylhexyl) phthalate	10	ND
hrysene	10	ND
-Bromophenyl phenyl ether	10	ND
enzo(a)anthracene	10	ND
i-n-octylphthalate	10	ND
enzo(b)fluoranthene	10	ND
enzo(k)fluoranthene	10	ND
enzidine	60	ND
,3'-Dichlorobenzidine	20	ND
enzo(a)pyrene	10	ND
ndeno(1,2,3-cd)pyrene	10	ND
ibenzo(a,h)anthracene	10	ND
enzo(ghi)perylene	10	ND
enzyl Alcohol	20	ND

= Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals + SW 8270
Matrix: Water
(continued)

Date Received: September 24, 1988
Date Reported: December 9, 1988

Work Order: 1037
Job Number: OR001

For: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092681
Sample No.:	DANGB-BG-SL5-SW1
Date Sampled:	09-23-88
Time Sampled:	09:00
Date Extracted:	09-29-88
Date Analyzed:	11-08-88/11-23-88

Compound	Detection Limits ug/L	Analytical Results ug/L
Acetophenone	--*	ND
Aniline	--*	ND
4-Aminobiphenyl	--*	ND
4-Chloroaniline	20	ND
2-Chloronaphthalene	--*	ND
Dibenzofuran	10	ND
p-Dimethylaminoazobenzene	--*	ND
7,12-Dimethylbenz(a)anthracene	--*	ND
a-,a-Dimethylphenethylamine	--*	ND
Diphenylamine	--*	ND
1,2-Diphenylhydrazine	--*	ND
Ethyl methanesulfonate	--*	ND
3-Methylcholanthrene	--*	ND
Methyl methanesulfonate	--*	ND
2-Methylnaphthalene	10	ND
1-Naphthylamine	--*	ND
2-Naphthylamine	--*	ND
2-Nitroaniline	50	ND
3-Nitroaniline	50	ND
4-Nitroaniline	50	ND
N-Nitroso-di-n-butylamine	--*	ND
N-Nitrosopiperidine	--*	ND
Pentachlorobenzene	--*	ND
Pentachloronitrobenzene	--*	ND
Phenacetin	--*	ND
2-Picoline	--*	ND
Pronamide	--*	ND
1,2,4,5-Tetrachlorobenzene	--*	ND

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

ate Received: September 24, 1988
ate Reported: December 9, 1988

Work Order: 1037
Job Number: OR001

)R: ES:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN:Mr. Bill Hayden

ab Number:	88092681
ample No.:	DANGB-BG-SL5-SW1
ate Sampled:	09-23-88
ime Sampled:	09:00
ate Extracted:	09-29-88
ate Analyzed:	11-08-88/11-23-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L
lpha-BHC	--*	ND
amma-BHC	--*	ND
eta-BHC	20	ND
eptachlor	10	ND
elta-BHC	15	ND
ldrin	10	ND
eptachlor epoxide	10	ND
ndosulfan I	--*	ND
ieldrin	15	ND
,4'-DDE	30	ND
ndrin	--*	ND
ndosulfan II	--*	ND
,4'-DDD	15	ND
,4'-DDT	25	ND
ndosulfan Sulfate	30	ND
ndrin aldehyde	--*	ND
ndrin Ketone	--*	ND
nlordane	60	ND
ethoxychlor	--*	ND
oxaphene	60	ND
roclor-1016	60	ND
roclor-1221	60	ND
roclor-1232	60	ND
roclor-1242	60	ND
roclor-1248	60	ND
roclor-1254	60	ND
roclor-1260	60	ND

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

Date Received: September 24, 1988
Date Reported: December 9, 1988

Work Order: 1037
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address:710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092681
Sample No.:	DANGB-BG-SL5-SW1
Date Sampled:	09-23-88
Time Sampled:	09:00
Date Extracted:	09-29-88
Date Analyzed:	11-08-88/11-23-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L
-Chlorophenol	10	ND
2-Nitrophenol	10	ND
Phenol	10	ND
,4-Dimethylphenol	10	ND
2,4-Dichlorophenol	10	ND
2,4,6-Trichlorophenol	10	ND
-Chloro-3-methylphenol	20	ND
2,4-Dinitrophenol	50	ND
2,6-Dichlorophenol	--*	ND
-Methyl-4,6-Dinitrophenol	50	ND
Pentachlorophenol	50	ND
4-Nitrophenol	50	ND
Benzoic Acid	50	ND
-Methylphenol	10	ND
3- & 4-Methylphenol	10	ND
2,3,4,6-Tetrachlorophenol	--*	ND
,4,5-Trichlorophenol	10	ND

Analyst

Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

QC Report No: AAF-W-0052-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Reported: 2-27-89
Dilution Factor: NA

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092548-88092551, 88092573-88092579
88092677-88092681, 88092695, 88092612-88092614

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Arsenic	88092677	88092677	10-16-88	NA	7060	<0.01	<0.01	<0.01	NC	0.040	<0.01	0.0383	96	
Cadmium	88092677	88092677	10-26-88	NA	6010	<0.005	<0.005	<0.005	NC	0.010	<0.005	0.011	110	
Chromium	88092677	88092677	10-19-88	NA	6010	<0.01	<0.01	<0.01	NC	0.020	<0.01	0.0218	109	
Lead	88092677	88092677	10-21-88	NA	7421	<0.005	<0.005	<0.005	NC	0.020	<0.005	0.0227	114	

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092548-88092551, 88092573-88092579
88092677-88092681, 88092695, 88092612-88092614

QC Report No: ICP-W-0059-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-24-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	SA	Spike Recovery SR	Spike Recovery SSR	PR	Notes
Barium	88092677	88092677	10-13-88	NA	6010	<0.2	<0.2	<0.2	NC	2.0	<0.2	1.96	98	

41

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2}$ X 100

Percent Recovery (PR) = $\frac{SSR - SR}{SA}$ x 100

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092548-88092551, 88092573-88092579
88092677-88092681, 88092695, 88092612-88092614

QC Report No: CVM-W-0030-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Mercury	88092677	88092677	10-14-88	NA	7471	<0.0002	<0.0002	<0.0002	NC	0.0010	<0.0002	0.00087	87	

42

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092677-88092678, 88092765-88092766
88092768-88092770, 88092772, 88092777
88092694-88092695, 88092806

QC Report No: TPH-W-0062-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-24-88
Date Prepared: 10-11-88
Date Analyzed: 10-20-88
Date Reported: 10-28-88
Dilution Factor: 4

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88092677	418.1	1.1	<1B	10	6.2	62	8.1	81	27	*

43

* See Case Narrative attached.
B See Legend attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092677-88092678, 88092765-88092766
88092768-88092770, 88092772, 88092777
88092694-88092695, 88092806

QC Report No: TPH-W-0062-88B
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-10-88
Date Analyzed: 10-11-88
Date Reported: 10-28-88
Dilution Factor: 6

Laboratory Supervisor Approval:

R W Buxton

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1	<1	10	11	110	11	110	0	*

44

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO(S).: TPH-W-0062-88

Relative percent difference for the quality control sample exceed the ES Laboratory limit. A blank spike analysis shows the laboratory to be in control.

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092514, 88092679-88092681

QC Report No: TPH-W-0057-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-19-88
Date Prepared: 10-03-88
Date Analyzed: 10-05-88
Date Reported: 10-28-88
Dilution Factor: 6

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88092514	418.1	<1	<1	10	2.9	29	2.9	29	0	*

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULT SUMMARY

ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092514, 88092679-88092681

QC Report No: TPH-W-0057-88B
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-01-88
Date Analyzed: 10-05-88
Date Reported: 10-28-88
Dilution Factor: 6

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1	<1	10	7.5	75	6.8	68	10	*

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO(S).: TPH-W-0057-88
QC REPORT NO(S).: TPH-W-0057-88B

Percent recoveries for the quality control samples are lower than ES Laboratory limits. A blank spike analysis shows the laboratory to be in control.

QUALITY CONTROL RESULTS SUMMARY
VOLATILE ORGANICS
EPA 8010/8020

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092677-88092681

QC Report No: VGC-W-0045-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-24-88
Date Prepared: NA
Date Analyzed: 10-05-88
Date Reported: 10-25-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092677	1,1-Dichloroethane	10	ND	10.1	101	9.97	100	1	26	70-130
	Trichloroethene	10	ND	10.1	101	9.85	98	3	19	65-131
	Chlorobenzene	10	ND	10.3	103	10.0	100	3	40	59-137
	Aromatics: 8020									
88092677	Benzene	10	ND	10.5	105	10.3	103	2	20	56-146
	Toluene	10	ND	11.3	113	10.5	105	7	41	42-150
	Chlorobenzene	10	ND	11.0	110	10.1	101	9	36	76-133

Relative Percent Difference (PR) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Sample Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OROG1

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 10-28-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
79	9-28-88	VGC	Vocol	75-09-2	Dichloromethane	11	0.25	88092677-88092678, 88092681
				79-01-6	Trichloroethylene	0.80	0.12	
34	9-29-88	VGC	Carbopack	75-09-2	Dichloromethane	2.5	0.25	88092679-88092680
				67-66-3	Chloroform	0.65	0.05	

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No.: 02901

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No.: QCP-W-0037-88
QC Sample No.: 88092490
Level (Low/Med): Low
Date Reported: 11-11-88

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s).:
88092490, 88092488, 88092494-88092495
88092511, 88092513-88092517, 88092525-88092529
88092677-88092678, 88092681, 88092617

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	200	ND	0.195	99	56-123
Heptachlor epoxide	200	ND	0.214	105	40-131
Aldrin	200	ND	0.195	99	40-120
Dieldrin	500	ND	0.463	93	52-126
Endrin	500	ND	0.488	98	56-121
4,4'-DDT	500	ND	0.365	73	38-127

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.173	87	99	13	15	56-123
Heptachlor epoxide	0.224	112	105	6	20	40-131
Aldrin	ND	NC*	99	NC*	22	40-120
Dieldrin	0.461	92	93	1	18	52-126
Endrin	0.466	93	98	5	21	56-121
4,4'-DDT	0.401	80	73	9	27	38-127

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 1 out of 6 outside limits

Spike Recovery: 1 out of 12 outside limits

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No.: QCP-W-0037-388
QC Sample No.: Blank
Level (Low/Med): Low
Date Reported: 11-11-88

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s).:
88092490, 88092488, 88092494-88092495
88092511, 88092513-88092517, 88092525-88092528
88092677-88092678, 88092681, 88092617

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	200	ND	0.184	92	56-123
Heptachlor epoxide	200	ND	0.210	105	40-131
Aldrin	200	ND	0.186	93	40-120
Dieldrin	500	ND	0.436	87	52-126
Endrin	500	ND	0.455	91	56-121
4,4'-DDT	500	ND	0.490	98	38-127

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.211	105	92	13	15	56-123
Heptachlor epoxide	0.224	112	105	6	20	40-131
Aldrin	0.210	105	93	12	22	40-120
Dieldrin	0.551	110	87	23*	18	52-126
Endrin	0.292	58	91	44*	21	56-121
4,4'-DDT	0.461	92	98	6	27	38-127

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 2 out of 6 outside limits

Spike Recovery: 0 out of 12 outside limits

PESTICIDE METHOD BLANK SUMMARY

Job No.:	OR001	Lab Name:	Engineering Science
		Lab Sample No.:	Blank
Client:	ES Oak Ridge		
Attn:	Bill Hayden	Matrix:	Water
Address:	710 S. Illinois Avenue	Level (low/med):	Low
	Suite F-103	Extraction:	
	Oak Ridge, Tn. 37830	(SepF/Cont/Sonc):	Sonc
		Date Reported:	11-03-88
Project:	Duluth ANGB		
Date Extracted:	9-28-88		
Date Analyzed (1):	10-24-88	Date Analyzed (2):	
Time Analyzed (1):	09:09	Time Analyzed (2):	
Instrument ID (1):	5890 #2	Instrument ID (2):	
GC Column ID (1):	OV-1	GC Column ID (2):	

This Method Blank applies to the following samples, MS and MSD.

EPA Sample No.	Lab Sample ID (1)	Date Analyzed 1	Lab Sample ID (2)	Date Analyzed 2
-	88092617	10-24-88		
-	88092677	10-24-88		
-	88092678	10-24-88		
-	88092681	10-24-88		

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: OCP-W-0037-88
QC REPORT NO.: OCP-W-0037-88B

Analysis of matrix spikes resulted in a matrix interference that swamped the response for aldrin in the matrix spike duplicate. This interference was somewhat lower in the matrix spike sample, so that the response would be quantitated. Thus, the recovery of aldrin in the MSD and the RPD for aldrin could not be calculated. Analysis of spiked blanks resulted in acceptable recoveries for all spiked compounds, but the RPD was higher than EPA guidelines for endrin and diedrin. The analytical data associated with these analyses were closely examined. No errors or problems were found.

Heptachlor epoxide was inadvertently used instead of heptachlor in the matrix spiking solution.

Endrin aldehyde and Kepone were not recoverable because they were removed by the alumina column clean-up used on these samples.

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No: BNA-W-0054-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-23-88
Date Prepared: 9-28-88
Date Analyzed: 11-07-88
Date Reported: 12-28-88
Dilution Factor: 1.0

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88092612-88092617, 88092677-88092678
88092681, 88092694-88092695, 88092724, 88092762
88092765-88092766, 88092768-88092770, 88092772, 88092777

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limits RPD	EPA QC Limits RECOVERY
	1,2,4-Trichlorobenzene	100	ND	63.3	63	71.6	72	13	28	39-98
B/N	Acenaphthene	100	ND	71.2	71	73.9	74	4	31	46-118
Laboratory	2,4-Dinitrotoluene	100	ND	71.3	71	68.0	68	4	38	24-96
Sample #	Pyrene	100	ND	91.7	92	80.6	81	13	31	26-127
	N-Nitroso-di-n-Propylamine	100	ND	80.0	80	80.9	81	1	38	41-116
88092617	1,4-Dichlorobenzene	100	ND	70.4	70	76.7	77	10	28	36-97
ACID	Pentachlorophenol	200	ND	53.4	27	74.5	37	31	50	9-103
Laboratory	Phenol	200	ND	59.4	30	68.0	34	12	42	12-89
Sample #	2-Chlorophenol	200	ND	118	59	129	64	8	40	27-123
	4-Chloro-3-Methylphenol	200	ND	132	66	135	68	3	42	23-97
88092617	4-Nitrophenol	200	ND	81.1	41	88.0	44	7	50	10-80

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 12-28-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E6124	11-07-88	AC	2	-	None Detected	-	-	88092622, 88092624 88092642-88092646
E6125	11-07-88	BN	2	117-81-7	Bis(2ethylhexyl)phthalate	12	10	

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092681
WORK ORDER NO.: 1037
METHOD 8270

When sample 88092681 was first analyzed, the area counts for the latest eluting internal standard were low. Re-analysis, out of holding time, resulted in sufficient area counts for all internal standards. This low internal standard area does not affect the results for target compounds, because none of the acidic target compounds use this internal standard to calculate results.

418.1 INITIAL & CONTINUING CALIBRATION DATA

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Laboratory Sample No(s).:
88092677-88092681

Calibration Date: 10-20-88
Instrument I.D.: Perkin Elmer 257
Grating Infrared Spectrophotometer

Unit: mg/L
Date Reported: 11-09-88
R= 0.9972

Laboratory Supervisor Approval:

Standard	Concentration	Absorbance	/Continuous RF /Calibration /Verification
No. 1	0.59	0.0924	
No. 2	1.2	0.165	RF = 6.99
No. 3	1.8	0.250	
No. 4	2.4	0.350	
Cont. Cal. No. 2 (88092687-88092688) (88092679-88092681)	1.22	0.174	102%
Cont. Cal. No. 2 (88092677-88092678) (88092762)+QC	1.23	0.148	103%

SEMIVOLATILE METHOD BLANK SUMMARY

4B

Job No.:

Client:

Attn:

Address:

Project: Duluth

Work Order No.:

Lab Sample No.: 03-94195

Lab File ID: E6124/E6125

Matrix: water

Level (low/med):

Date Analyzed: 11-7-88

Time Analyzed: 22:38, 23:33

Instrument ID:

Date Reported:

This Method Blank applies to the following samples, MS and MSD.

Sample Number	Lab Sample ID	Lab File ID	Date of Analysis
DANGB-BG-SL4-SW1	88092677	E6130, E6132	11-8-88
-BG-SL25-SW1	88092678	S0423, S0425	11-8-88
-BG-SL5-SW1	88092681	S0421/22, E6317	11-8-88, 11-23-88

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092514, 88092679-88092681

QC Report No: TPH-W-0057-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-19-88
Date Prepared: 10-03-88
Date Analyzed: 10-05-88
Date Reported: 10-28-88
Dilution Factor: 6

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88092516	418.1	<1	<1	10	2.9	29	2.9	29	0	*

09

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092514, 88092679-88092681

QC Report No: TPH-W-0057-88B
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-01-88
Date Analyzed: 10-05-88
Date Reported: 10-28-88
Dilution Factor: 6

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1	<1	10	7.5	75	6.8	68	10	*

61

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 11/08/88 8:55

Lab ID >D1108::D3 Data Release Authorized By: Laura Kuck

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	53.34 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	68.30	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	43.43 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	6.04 OK	
275	10.0 - 30.0% of mass 198	20.06 OK	
365	greater than 1.00% of mass 198	1.78 OK	
441	present, but less than mass 443	10.66 OK	
442	greater than 40.0% of mass 198	74.91 OK	
443	17.0 - 23.0% of mass 442	13.96 OK	(18.64) #2

5 point 10/12/88

all SS good, all IS good

THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

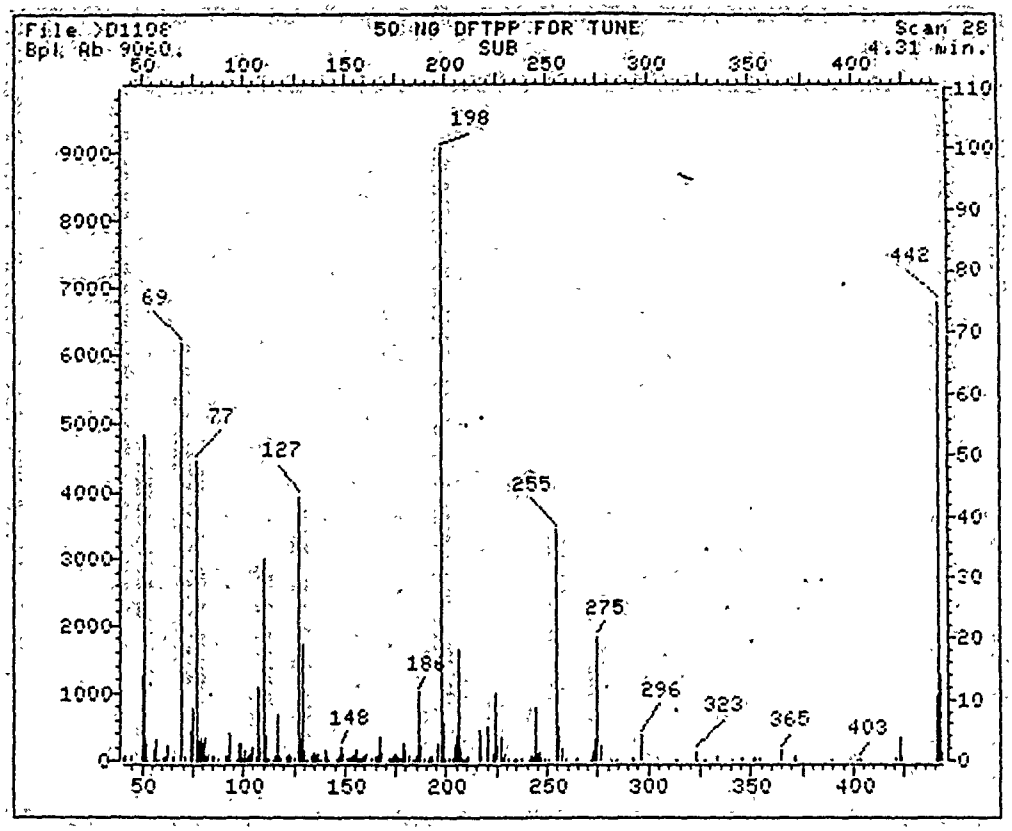
#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS
50 NG DFTPP FOR TU	>D1108	11/08/88	8:55
40ng/1L std	E6129		9:17
8809677AC	E6130		10:20
8809677AC	E6131		11:15
8809677BN	E6132		12:10
8809625AC	E6133		13:05
8809625BN	E6134		14:00
BLK AC	E6135		14:59
BLK BN	E6136		16:02
8809663AC	E6137		16:57
8809663BN	E6138		17:52
8809664AC	E6139		18:47
8809664BN	E6140		19:42

use + delete

another project

RUN 2:1



File: >D1108 Scan #: 28 Retn. time: 4.31

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.10	.331	102.95	.872	153.00	.497	201.30	.508	261.95	.541
42.00	.891	103.95	1.093	153.95	.751	203.00	.552	271.85	.121
45.00	.905	104.95	2.219	154.95	1.126	203.90	2.318	272.95	1.336
50.00	13.808	106.05	.541	155.95	1.623	204.90	4.238	273.95	3.355
51.00	53.341	106.95	12.053	157.05	.430	206.00	17.892	274.95	20.055
52.00	2.704	108.05	2.241	157.95	.309	207.00	2.263	276.05	2.351
53.10	.022	109.90	33.102	159.05	.331	208.00	.574	276.95	1.523
56.00	1.854	111.00	3.985	159.95	.596	208.90	.177	282.05	.066
57.00	3.433	112.10	.375	161.05	.993	210.10	.419	284.15	.044
58.10	.243	113.00	.497	163.05	.585	211.10	.740	284.90	.177
59.20	.132	115.00	.110	164.95	.751	213.00	.088	293.00	.287
61.10	.486	116.00	.817	165.95	.596	216.90	4.923	296.00	4.117
62.00	.740	116.90	7.395	166.95	3.709	217.90	.640	296.90	.563
63.00	2.373	118.00	.762	167.85	1.325	220.90	5.442	313.80	.166
65.10	.762	119.00	.508	171.95	.287	222.90	.938	314.40	.143
65.90	.188	122.00	.795	173.05	.375	224.00	10.328	321.00	.177
68.95	68.300	122.90	1.170	173.95	.751	225.00	2.561	323.00	1.490
71.05	.695	124.00	.640	174.95	1.203	226.90	3.753	324.00	.243
73.95	1.746	125.00	.353	175.95	.618	227.90	.486	326.80	.210
74.95	8.411	126.90	43.433	176.95	.497	228.90	1.170	327.95	.254
77.05	49.084	128.00	3.510	177.95	.375	230.90	.508	333.95	.740
77.95	3.068	129.00	19.073	178.15	.375	233.70	.132	340.95	.210
79.05	3.852	129.90	1.843	178.95	2.925	235.00	.419	345.95	.309
79.95	2.715	130.90	.210	179.95	1.854	236.00	.143	351.95	.430
80.95	3.885	131.90	.143	181.05	.927	237.10	.419	352.95	.342

83.05	1.236	135.00	1.600	183.05	.254	242.05	.640	361.95	1.777
85.05	.850	136.00	.740	183.95	.177	242.95	.574	372.00	.662
85.95	.905	137.00	1.060	184.25	.166	243.95	8.576	372.80	.132
86.95	.298	137.90	.232	184.95	.795	244.95	1.181	389.90	.132
88.95	.055	138.10	.243	185.95	11.071	245.95	1.302	401.70	.221
90.95	.916	139.10	.210	187.05	2.318	246.95	.309	403.00	.342
92.15	.817	141.00	1.645	189.05	.530	248.95	.298	403.90	.166
92.95	1.492	142.00	.706	190.85	.099	250.85	.166	420.85	.430
94.05	.177	143.00	.199	191.95	.784	252.85	.088	422.95	3.775
97.05	.044	146.00	.375	192.95	.717	254.95	37.837	423.95	.817
98.05	2.914	147.00	.728	193.95	.254	255.95	5.530	440.95	10.662
98.95	2.837	147.90	2.174	196.05	2.627	257.05	.453	441.95	74.912
100.25	.397	149.00	.960	197.90	100.000	257.95	1.987	443.05	13.962
100.95	1.788	151.00	.298	198.90	6.038	258.95	.353	444.05	1.512
101.85	.265	152.00	.442	200.00	.331	264.05	.210		

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/08/88

Contractor: _____ Time: 09:17

Contract No: _____ Laboratory ID:)E6129

Instrument ID: _____ Initial Calibration Date: 10/13/88

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	1.24043	1.04738	15.56		
2-Fluorophenol	1.41912	1.32954	6.31		
bis(2-Chloroethyl)ether	1.41737	1.25715	11.30		
Phenol	1.78209	1.65036	7.39	*	
Phenol-d5	1.35470	1.52054	12.24		
Aniline	.71553	.55708	25.28		
2-Chlorophenol	1.32089	1.35307	2.44		
1,3-Dichlorobenzene	1.51101	1.50490	.40		
1,4-Dichlorobenzene	1.51574	1.49125	1.62	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.56944	.45139	20.73		
1,2-Dichlorobenzene	1.45179	1.53431	5.68		
2-Methylphenol	1.42392	1.32938	6.64		
3-&-4-Methylphenol	1.58422	1.42528	10.03		
bis(2-chloroisopropyl)Ether	2.35722	2.42859	3.03		
N-Nitroso-Di-n-Propylamine	1.13410	1.28202	13.04		**
Hexachloroethane	.70056	.70797	1.06		
Dibromochloropropane	-	-	-		
Nitrobenzene	.56683	.50326	11.21		
Nitrobenzene-d5	.49938	.49439	1.00		
2-Nitrophenol	.22040	.23951	8.67	*	
Isophorone	.87207	.87957	.86		
bis(2-Chloroethoxy)methane	.58240	.58193	.08		
2,4-Dimethylphenol	.40862	.40108	1.85		
Benzoic Acid	.29595	.27397	7.43		
2,4-Dichlorophenol	.53135	.51315	3.42	*	
1,2,4-Trichlorobenzene	.31739	.32924	3.73		
Naphthalene	.98196	.97063	1.15		
4-Chloroaniline	.33116	.32065	3.17		
Hexachlorobutadiene	.18652	.18701	.27	*	
4-Chloro-3-Methylphenol	.26631	.32023	11.85	*	
2-Methylnaphthalene	.54168	.54348	.22		

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/08/88

Contractor: Time: 09:17

Contract No: Laboratory ID: XE6129

Instrument ID: Initial Calibration Date: 10/13/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.33289	.23249	30.16		**
2,4,6-Trichlorophenol	.32295	.37800	17.05	*	
2,4,5-Trichlorophenol	.49539	.36401	26.52		
2-Fluorobiphenyl	1.26699	1.15416	8.91		
2-Chloronaphthalene	1.24653	1.16127	6.84		
2-Nitroaniline	.63129	.60278	4.52		
Dimethylphthalate	1.33033	1.33936	.68		
2,6-Dinitrotoluene	.31816	.36693	15.33		
Acenaphthylene	1.65820	1.53051	7.70		
3-Nitroaniline	.63702	.60816	4.48		
2,4-Dinitrophenol	.05753	.07635	32.72		**
Acenaphthene	1.12611	1.04610	7.13	*	
Dibenzofuran	1.50204	1.53051	1.89		
2,4-Dinitrotoluene	.32099	.35727	11.30		
4-Nitrophenol	.18425	.18403	.09		**
Fluorene	1.09332	1.13403	3.73		
Diethylphthalate	1.32354	1.27757	3.47		
4-Chlorophenyl-phenylether	.16214	.16838	2.86		
4-Nitroaniline	.27495	.32613	18.62		
2,4,6-Tribromophenol	.14218	.23043	62.07		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.44983	.44386	1.33	*	
4,6-Dinitro-2-Methylphenol	.08606	-	-		
4-Bromophenyl-phenylether	.22979	.25616	11.48		
Hexachlorobenzene	.28768	.32540	13.11		
Pentachlorophenol	.11390	.14026	23.14	*	

RF - Response factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/08/88

Contractor: _____ Time: 09:17

Contract No: _____ Laboratory ID: >E6129

Instrument ID: _____ Initial Calibration Date: 10/13/88

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.07560	1.00316	7.08		
Anthracene	1.13331	1.09732	3.18		
Di-n-Butylphthalate	1.71746	1.81650	5.77		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.17568	1.15034	2.16	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.03775	.00195	94.84		
Pyrene	1.65647	1.42082	14.23		
Terphenyl-d14	1.09647	1.02040	6.94		
Butylbenzylphthalate	1.15097	1.14113	.85		
3,3'-Dichlorobenzidine	.12990	.23449	80.52		
Chrysene	1.01423	1.03079	1.63		
Benzo(a)Anthracene	1.09006	1.14190	4.76		
bis(2-Ethylhexyl)Phthalate	1.34247	1.41483	5.39		
Di-n-octylphthalate	3.72331	2.89838	22.16	*	
Benzo(a)Pyrene	1.27071	1.20003	5.56	*	
Benzo(b)Fluoranthene	1.48902	1.81686	22.02		
Indeno(1,2,3-cd)Pyrene	.82543	.64713	21.60		
Dibenzo(a,h)Anthracene	.78966	.97523	23.50		
Benzo(k)Fluoranthene	1.51900	.67223	55.75		
Benzo(g,h,i)Perylene	.74580	1.03691	39.03		

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR0001

Lab Code: _____ Case No.: _____ SAS No.: _____ Job No.: _____

Sample No. (Standard): _____ Date Analyzed: _____

Lab File ID (Standard): _____ Time Analyzed: _____

Instrument ID: 1

	IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
12 HOUR STD	113405	7.99	413878	11.50	221409	16.89
UPPER LIMIT	226810		827756		442818	
LOWER LIMIT	56702		206939		110704	
EPA SAMPLE NO.						
01 88092677 AC	105709	7.96	365421	11.46	199338	16.85
02 " BN	108499	7.96	377282	11.47	191175	16.86
03 88092625 BN	120926	7.96	427403	11.47	218506	16.87
04 AC[illegible]	123542	7.97	426426	11.46	226577	16.86
05 BLK AC	116651	7.96	408202	11.45	202450	16.85
06 BN	125340	7.96	415145	11.45	218318	16.86
07 88092663 AC	113299	7.97	398196	11.46	209559	16.86
08 BN	115245	7.97	405572	11.46	209378	16.86
09 88092664 AC	122444	7.97	420058	11.46	219892	16.86
10 BN	149043	7.97	514263	11.46	265021	16.86
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = - 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

EPA Sample No. (Standard): _____ Date Analyzed: _____

Lab File ID (Standard): _____ Time Analyzed: _____

Instrument ID: _____

	IS4 (PHN) AREA #	RT	IS5 (CRY) AREA #	RT	IS4 (PRY) AREA #	RT
12 HOUR STD	314728	21.47	236300	29.85	208505	34.78
UPPER LIMIT	629456		472600		417010	
LOWER LIMIT	157364		118150		104252	
EPA SAMPLE NO.						
01 8909267 7 AC	291097	21.44	208953	29.81	159106	34.72
02 BN	270269	21.44	187240	29.81	128929	34.71
03 8909262 5 BN	333930	21.45	262865	29.83	206603	34.76
04 AC	328397	21.44	254044	29.82	180708	34.73
05 BLK: BN	293438	21.44	210682	29.81	163420	34.74
06 BN	311590	21.44	229913	29.82	179589	34.72
07 8909266 3 AC	307161	21.45	240866	29.82	196902	34.74
08 BN	309123	21.45	231415	29.81	184763	34.73
09 8909266 4 AC	334605	21.45	255672	29.83	193937	34.74
10 BN	411036	21.45	314344	29.83	248836	34.75
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____

Instrument IDVOCAL_____ Calibration Date(s):_9/22/88

LAB FILE ID:_76,77_____ Init. Calib. Date(s):_9/22/88, 9/14/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzyl chloride	4.43	11.00	-148.31
bis (2-chloroethoxy) methane	0.12		100.00
bis (2-chloroisopropyl ether	0.12		100.00
Bromobenzene	3.08	5.00	-62.34
Bromodichloromethane	4.91	5.10	-3.87
Bromoform	3.32	3.70	-11.45
Bromomethane	0.43	0.00	100.00
Carbon tetrachloride	5.00	5.20	-4.00
Chloroacetaldehyde	0.07		100.00
Chlorobenzene	1.38	1.60	-15.94
Chloroethane	0.73	0.00	100.00
Chloroform	4.22	4.60	-9.00
1-Chorohexane	0.82	1.40	-70.73
2-Chloroethyl vinyl ether	0.12		100.00
Chloromethane	1.84	0.00	100.00
Chloromethyl methyl ether	0.02		100.00
o_,m_,& p_Chlorotoluenes	3.34	5.20	-55.69
Dibromochloromethane	4.68	5.00	-6.84
Dibromomethane	3.06	4.90	-60.13
1,2_Dichlorobenzene	2.22	2.50	-12.61
1,3_Dichlorobenzene	1.79	2.10	-17.32
1,4_Dichlorobenzene	1.83	1.90	-3.83
Dichlorodifluormethane	0.54		100.00
1,1_Dichloroethane	2.74	2.70	1.46
1,2_Dichloroethane	3.74	3.70	1.07
1,1_Dichloroethylene	1.32	1.40	-6.06
trans_1,2_dichloroethylene	2.96	2.80	5.41
Dichloromethane	4.72	2.30	51.27
1,2_Dichloropropane	3.18	3.30	-3.77
1,3_Dichloropropylene	0.47	0.83	-76.60
1,1,2,2_Tetrachloroethane	4.04	4.30	-6.44
1,1,1,2_Tetrachloroethane	4.83	7.50	-55.28
Tetrachloroethylene	5.06	5.10	-0.79
1,1,1_Trichloroethane	2.77	2.90	-4.69
1,1,2_Trichloroethane	4.42	6.90	-56.11
Trichloroethylene	4.06	4.40	-8.37
Trichlorofluormethane	0.78	0.88	-12.82
Trichloropropane	3.08	5.00	-62.34
Vinyl chloride	1.84	0.00	100.00

VOLATILE CONTINUING CALIBRATION CHECK

LabName: ENGINEERING SCIENCE Contract:

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

Instrument ID.: Voa-J Calibration Date(s): 9/29/88

LAB FILE ID: RRF 50 76

Initial calib = 9/22/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	4.45	4.00	-10.11
Chlorobenzene	4.74	4.70	-0.84
1,2_Dichlorobenzene	3.79	3.80	0.26
1,3_Dichlorobenzene	4.18	4.20	0.48
1,4_Dichorobenzene	3.35	3.40	1.49
Ethyl Benzene	3.10	3.00	-3.23
Toluene	3.55	3.60	1.41
Xylenes	10.40	10.00	-3.85

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____

Instrument IDVOCAL_____ Calibration Date(s):_9/30/88

LAB FILE ID:21,22_____ Init. Calib. Date(s):_9/22/88 9/14 SC

COMPOUND	RRF	RRF50	%D
Benzyl chloride	4.43	5.70	-28.67
bis (2-choroethoxy) methane	0.12		100.00
bis (2-choroisopropyl ether	0.12		100.00
Bromobenzene	3.08	3.00	2.60
Bromodichloromethane	4.91	4.10	16.50
Bromoform	3.32	3.00	9.64
Bromomethane	0.43	0.00	100.00
Carbon tetrachloride	5.00	4.40	12.00
Chloroacetaldehyde	0.07		100.00
Chlorobenzene	1.38	1.30	5.80
Chloroethane	0.73	0.00	100.00
Chloroform	4.22	4.00	5.21
1-Chorohexane	0.82	0.71	13.41
2-Chloroethyl vinyl ether	0.12		100.00
Chloromethane	1.84	0.00	100.00
Chloromethyl methyl ether	0.02		100.00
o_,m_,& p_Chlorotoluenes	3.34	3.10	7.19
Dibromochloromethane	4.68	4.30	8.12
Dibromomethane	3.06	2.90	5.23
1,2_Dichlorobenzene	2.22	2.00	9.91
1,3_Dichlorobenzene	1.79	1.70	5.03
1,4_Dichlorobenzene	1.83	1.70	7.10
Dichlorodifluormethane	0.54		100.00
1,1_Dichloroethane	2.74	2.60	5.11
1,2_Dichloroethane	3.74	3.20	14.44
1,1_Dichloroethylene	1.32	1.20	9.09
trans_1,2_dichloroethylene	2.96	2.60	12.16
Dichloromethane	4.72	2.30	51.27
1,2_Dichloropropane	3.18	2.60	18.24
1,3_Dichloropropylene	0.47	0.44	6.38
1,1,2,2_Tetrachloroethane	4.04	3.40	15.84
1,1,1,2_Tetrachloroethane	4.83	4.20	13.04
Tetrachloroethylene	5.06	4.40	13.04
1,1,1_Trichloroethane	2.77	2.40	13.36
1,1,2_Trichloroethane	4.42	4.50	-1.81
Trichloroethylene	4.06	3.60	11.33
Trichlorofluormethane	0.78	0.58	25.64
Trichloropropane	3.08	3.00	2.60
Vinyl chloride	1.84	0.00	100.00

VOLATILE CONTINUING CALIBRATION CHECK

LabName: ENGINEERING SCIENCE Contract:

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

Instrument ID.: Calibration Date(s): 9/30/86

LAB FILE ID: RRF 50 21 Initial cab = 9/22/86

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	4.45	4.25	-4.42
Chlorobenzene	4.74	5.04	6.24
1,2_Dichlorobenzene	3.79	4.01	5.73
1,3_Dichlorobenzene	4.18	4.42	5.68
1,4_Dichorobenzene	3.35	3.55	5.84
Ethyl Benzene	3.10	3.28	5.79
Toluene	3.55	3.87	8.90
Xylenes	10.40	10.97	9.00

VOLATILE CONTINUING CALIBRATION CHECK

LabName: Contract:

This page intentionally left blank.

DATA PACKAGE #2

This page intentionally left blank.

ENGINEERING-SCIENCE, INC.

600 BANCROFT WAY
BERKELEY, CALIFORNIA 94710
(415) 548-7970

Job No.: OR001

Client: ES Oak Ridge
Attention: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Attached are the analytical reports for the water samples received by this laboratory on 9-28-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092776	DANGB-TB16	8010	9-16-88		10-05-88	10-07-88
88092776	DANGB-TB16	8020	9-16-88		10-05-88	10-07-88
88092777	DANGB-4-SL16-SW1	BA-I	9-27-88		11-02-88	
88092777	DANGB-4-SL16-SW1	CD-F	9-27-88		10-31-88	
88092777	DANGB-4-SL16-SW1	CR-F	9-27-88		10-22-88	
88092777	DANGB-4-SL16-SW1	PB-F	9-27-88		10-22-88	
88092777	DANGB-4-SL16-SW1	418.1	9-27-88	10-12-88	10-21-88	
88092777	DANGB-4-SL16-SW1	8010	9-27-88		10-03-88	9-30-88
88092777	DANGB-4-SL16-SW1	8020	9-27-88		10-03-88	9-30-88
88092777	DANGB-4-SL16-SW1	8080	9-27-88	10-03-88	10-25-88	
88092777	DANGB-4-SL16-SW1	8270	9-27-88	10-03-88	11-11-88	
88092778	DANGB-3-SL10-SW1	AS-F	9-27-88		10-21-88	
88092778	DANGB-3-SL10-SW1	BA-I	9-27-88		11-02-88	
88092778	DANGB-3-SL10-SW1	CD-F	9-27-88		10-31-88	
88092778	DANGB-3-SL10-SW1	CR-F	9-27-88		10-21-88	
88092778	DANGB-3-SL10-SW1	HG-C	9-27-88		10-22-88	
88092778	DANGB-3-SL10-SW1	PB-F	9-27-88		10-24-88	
88092779	DANGB-3-SL9-SW1	AS-F	9-27-88		10-21-88	
88092779	DANGB-3-SL9-SW1	BA-I	9-27-88		11-02-88	
88092779	DANGB-3-SL9-SW1	CD-F	9-27-88		10-31-88	
88092779	DANGB-3-SL9-SW1	CR-F	9-27-88		10-22-88	
88092779	DANGB-3-SL9-SW1	HG-C	9-27-88		10-22-88	
88092779	DANGB-3-SL9-SW1	PB-F	9-27-88		10-24-88	
88092780	DANGB-3-SL8-SW1	AS-F	9-27-88		10-21-88	
88092780	DANGB-3-SL8-SW1	BA-I	9-27-88		11-02-88	
88092780	DANGB-3-SL8-SW1	CD-F	9-27-88		10-31-88	
88092780	DANGB-3-SL8-SW1	CR-F	9-27-88		10-21-88	
88092780	DANGB-3-SL8-SW1	HG-C	9-27-88		10-22-88	
88092780	DANGB-3-SL8-SW1	PB-F	9-27-88		10-24-88	

* If applicable

A SUBSIDIARY OF THE PARSONS CORPORATION

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092776-88092777
WORK ORDER NO.: 1056

These water samples were received at the ES Berkeley Laboratory on 9-28-88. They were received cold and intact.

ANALYSIS REPORT

WORK ORDER NUMBER: 1056
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/28/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 2, UNITS: mg/L

TEST COMPOUND	DANGB-4-SL16-SW1 88092777	DANGB-3-SL10-SW1 88092778	DANGB-3-SL9-SW1 88092779	DANGB-3-SL8-SW1 88092780
ACID DIG FLAME	NA	NA	NA	NA
ACID DIG FURNACE	NA	NA	NA	NA
ARSENIC		<0.01	<0.01	<0.01
BARIUM	<0.2	<0.2	<0.2	<0.2
CADMIUM	<0.005	<0.005	<0.005	<0.005
CHROMIUM	<0.01	<0.01	<0.01	<0.01
MERCURY		<.0002	<.0002	<.0002
LEAD	<0.005	<0.005	<0.005	<0.005

ND - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1056
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/28/88

APPROVED BY
Lab Supervisor

EPORT DATA:
OAK RIDGE/DULUTH ANGB
10 S. ILLINOIS AVE. STE. S103
K RIDGE, TN 37830
LL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

ONTRACT / PO # : OR001
ONTACT : BILL HAYDEN
(615)-481-3920

ASK: 3, UNITS: mg/L

EST COMPOUND	DANGB-4-SL16-SW1 88092777
418.1 PETROLEUM HYDROCARBONS	<1

- Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1056
OB NUMBER : ZB0000000440 APPROVED BY _____
WORK ORDER DATE : 09/28/88 Lab Supervisor

EPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
ILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

ONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

ASK: 4, UNITS: ug/L, GROUP 8010

TEST COMPOUND	DANGB-TB16 88092776	DANGB-4-SL16-SW1 88092777
ENZYL CHLORIDE	ND	ND
IS (2-CHLOROETHOXY)METHANE	ND	ND
BIS (2-CHLOROISOPROPYL)ETHER	ND	ND
BROMOBENZENE	ND	ND
ROMODICHLOROMETHANE	ND	ND
ROMOFORM	17	ND
BROMOETHANE	ND	ND
CARBON TETRACHLORIDE	ND	ND
HLORACETALDEHYDE	ND	ND
HLORAL	ND	ND
CHLOROBENZENE	ND	ND
HLOROETHANE	ND	ND
HLOROFORM	0.20	ND
1-CHLOROHEXANE	ND	ND
2-CHLOROETHYL VINYL ETHER	ND	ND
HLOROMETHANE	ND	ND
HLOROMETHYL METHYL ETHER	ND	ND
CHLOROTOLUENE	ND	ND
DIBROMOCHLOROMETHANE	2.6	ND
IBROMOMETHANE	ND	ND
,2-DICHLOROBENZENE	ND	ND
1,3-DICHLOROBENZENE	ND	ND
1,4-DICHLOROBENZENE	ND	ND
ICHLORODIFLUOROMETHANE	ND	ND
,1-DICHLOROETHANE	ND	ND
1,2-DICHLOROETHANE	ND	ND
,1-DICHLOROETHYLENE	ND	ND
RANS-1,2-DICHLOROETHYLENE	ND	5.3
DICHLOROMETHANE	4.5B	0.50B
1,2-DICHLOROPROPANE	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1056

ST COMPOUND	DANGB-TB16 88092776	DANGB-4-SL16-SW1 88092777
3-DICHLOROPROPYLENE	ND	ND
1,2,2-TETRACHLOROETHANE	ND	ND
1,1,2-TETRACHLOROETHANE	ND	ND
TRACHLOROETHYLENE	ND	ND
1,1-TRICHLOROETHANE	ND	ND
1,2-TRICHLOROETHANE	ND	ND
ICHLOROETHYLENE	ND	0.59
ICHLOROFLUOROMETHANE	ND	ND
ICHLOROPROPANE	ND	ND
NYL CHLORIDE	ND	ND

) - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1056
OB NUMBER : ZB0000000440
WORK ORDER DATE : 09/28/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
ILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

ONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

ASK: 4, UNITS: ug/L, GROUP 8020

EST COMPOUND	DANGB-TB16 88092776	DANGB-4-SL16-SW1 88092777
ENZENE	ND	1.2
HLOROBENZENE	ND	ND
1,2-DICHLOROBENZENE	ND	ND
1,3-DICHLOROBENZENE	ND	ND
,4-DICHLOROBENZENE	ND	ND
THYL BENZENE	ND	ND
TOLUENE	ND	ND
YLENES	ND	ND

ND - Not Detected

ANALYSIS REPORT

RK ORDER NUMBER: 1056
B NUMBER : ZB0000000440 APPROVED BY _____
RK ORDER DATE : 09/28/88 Lab Supervisor

PORT DATA:
OAK RIDGE/DULUTH ANGB
0 S. ILLINOIS AVE. STE. S103
K RIDGE, TN 37830
LL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

NTRACT / PO # : OR001
NTACT : BILL HAYDEN
(615)-481-3920

SK: 4, UNITS: ug/L, GROUP 8080

ST COMPOUND	DANGB-4-SL16-SW1 88092777
DRIN	ND
PHA-BHC	ND
TA-BHC	ND
LTA-BHC	ND
MMA-BHC	ND
LORDANE	ND
4'-DDD	ND
4'-DDE	ND
4'-DDT	ND
ELDRIN	ND
DOSULFAN I	ND
DOSULFAN II	ND
DOSULFAN SULFATE	ND
DRIN	ND
DRIN ALDEHYDE	NA
PTACHLOR	ND
PTACHLOR EPOXIDE	ND
PONE	ND
THOXYCHLOR	ND
XAPHENE	ND
-1016	ND
-1221	ND
-1232	ND
-1242	ND
-1248	ND
-1254	ND
-1260	ND

Not Detected

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

Date Received: September 28, 1988
Date Reported: December 9, 1988

Work Order: 1056
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092777
Sample No.:	DANGB-4-SL16-SW1
Date Sampled:	9-27-88
Time Sampled:	09:05
Date Extracted:	10-03-88
Date Analyzed:	11-11-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L
1,3-Dichlorobenzene	10	ND
1,4-Dichlorobenzene	10	ND
Hexachloroethane	10	ND
Bis(2-chloroethyl)ether	10	ND
1,2-Dichlorobenzene	10	ND
N-Nitrosodimethylamine	10	ND
Bis(2-chloroisopropyl)ether	10	ND
N-Nitrosodi-n-propylamine	10	ND
Hexachlorobutadiene	10	ND
1,2,4-Trichlorobenzene	10	ND
Nitrobenzene	10	ND
Isophorone	10	ND
Naphthalene	10	ND
Bis(2-chloroethoxy)methane	10	ND
2-Chloronaphthalene	10	ND
Hexachlorocyclopentadiene	10	ND
Acenaphthylene	10	ND
Acenaphthene	10	ND
Dimethyl phthalate	10	ND
2,6-Dinitrotoluene	10	ND
Fluorene	10	ND
2,4-Dinitrotoluene	10	ND
Diethyl phthalate	10	ND
N-Nitrosodiphenylamine	10	ND
Hexachlorobenzene	10	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 28, 1988 Work Order: 1056
Date Reported: December 9, 1988 Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

Lab Number:	88092777
Sample No.:	DANGB-4-SL16-SW1
Date Sampled:	9-27-88
Time Sampled:	09:05
Date Extracted:	10-03-88
Date Analyzed:	11-11-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L
Phenanthrene	10	ND
Anthracene	10	ND
Dibutyl phthalate	10	ND
Fluoranthene	10	ND
4-Chlorophenyl phenyl ether	10	ND
Pyrene	10	ND
Butyl Benzyl phthalate	10	19
Bis(2-ethylhexyl) phthalate	10	12 B
Chrysene	10	ND
4-Bromophenyl phenyl ether	10	ND
Benzo(a)anthracene	10	ND
Di-n-octylphthalate	10	14
Benzo(b)fluoranthene	10	ND
Benzo(k)fluoranthene	10	ND
Benzidine	60	ND
3,3'-Dichlorobenzidine	20	ND
Benzo(a)pyrene	10	ND
Indeno(1,2,3-cd)pyrene	10	ND
Dibenzo(a,h)anthracene	10	ND
Benzo(ghi)perylene	10	ND
Benzyl Alcohol	20	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 28, 1988
Date Reported: December 9, 1988

Work Order: 1056
Job Number: OR001

For: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092777
Sample No.:	DANGB-4-SL16-SW1
Date Sampled:	9-27-88
Time Sampled:	09:05
Date Extracted:	10-03-88
Date Analyzed:	11-11-88

Compound	Detection Limits ug/L	Analytical Results (dry weight) ug/L
Acetophenone	--*	ND
Aniline	--*	ND
4-Aminobiphenyl	--*	ND
4-Chloroaniline	20	ND
1-Chloronaphthalene	--*	ND
Dibenzofuran	10	ND
p-Dimethylaminoazobenzene	--*	ND
7,12-Dimethylbenz(a)anthracene	--*	ND
a-,a-Dimethylphenethylamine	--*	ND
Diphenylamine	--*	ND
1,2-Diphenylhydrazine	--*	ND
Ethyl methanesulfonate	--*	ND
3-Methylcholanthrene	--*	ND
Methyl methanesulfonate	--*	ND
2-Methylnaphthalene	10	ND
1-Naphthylamine	--*	ND
2-Naphthylamine	--*	ND
2-Nitroaniline	50	ND
3-Nitroaniline	50	ND
4-Nitroaniline	50	ND
N-Nitroso-di-n-butylamine	--*	ND
N-Nitrosopiperidine	--*	ND
Pentachlorobenzene	--*	ND
Pentachloronitrobenzene	--*	ND
Phenacetin	--*	ND
2-Picoline	--*	ND
Pronamide	--*	ND
1,2,4,5-Tetrachlorobenzene	--*	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

Date Received: September 28, 1988
Date Reported: December 9, 1988

Work Order: 1056
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN:Mr. Bill Hayden

Lab Number:	88092777
Sample No.:	DANGB-4-SL16-SW1
Date Sampled:	9-27-88
Time Sampled:	09:05
Date Extracted:	10-03-88
Date Analyzed:	11-11-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L
Alpha-BHC	--*	ND
Gamma-BHC	--*	ND
Beta-BHC	20	ND
Heptachlor	10	ND
Delta-BHC	15	ND
Aldrin	10	ND
Heptachlor epoxide	10	ND
Endosulfan I	--*	ND
Dieldrin	15	ND
4,4'-DDE	30	ND
Endrin	--*	ND
Endosulfan II	--*	ND
4,4'-DDD	15	ND
4,4'-DDT	25	ND
Endosulfan Sulfate	30	ND
Endrin aldehyde	--*	ND
Endrin Ketone	--*	ND
Chlordane	60	ND
Methoxychlor	--*	ND
Toxaphene	60	ND
Aroclor-1016	60	ND
Aroclor-1221	60	ND
Aroclor-1232	60	ND
Aroclor-1242	60	ND
Aroclor-1248	60	ND
Aroclor-1254	60	ND
Aroclor-1260	60	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

Date Received: September 28, 1988
Date Reported: December 9, 1988

Work Order: 1056
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092777
Sample No.:	DANGB-4-SL16-SW1
Date Sampled:	9-27-88
Time Sampled:	09:05
Date Extracted:	10-03-88
Date Analyzed:	11-11-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L
2-Chlorophenol	10	ND
2-Nitrophenol	10	ND
Phenol	10	ND
2,4-Dimethylphenol	10	ND
2,4-Dichlorophenol	10	ND
2,4,6-Trichlorophenol	10	ND
4-Chloro-3-methylphenol	20	ND
2,4-Dinitrophenol	50	ND
2,6-Dichlorophenol	--*	ND
2-Methyl-4,6-Dinitrophenol	50	ND
Pentachlorophenol	50	ND
4-Nitrophenol	50	ND
Benzoic Acid	50	ND
2-Methylphenol	10	ND
3- & 4-Methylphenol	10	ND
2,3,4,6-Tetrachlorophenol	--*	ND
2,4,5-Trichlorophenol	10	ND

Analyst

Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS
OR001	Duluth ANGB/Duluth, Mn.	

SAMPLER(S): (Signature) Richard Z. Dan

SHIP TO: ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 601	EPA 625	EPA 418.1	SW 6010, 7040, 7421	SW7421, 7471	SW3510, 3510	SM429	REMARKS
9-16-88	1300	DANGB - TB16	3	3								882776
9-27-88	0905	DANGB4SL16 - SW1	7	5			2					882777
9-27-88	0905	MATRIX SPIKE	6		2	2	2					Labelled "MATRIX SPIKE" and "MATRIX SPIKE DUP"

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Richard Z. Dan	9-27-88 1800	FedEx Airbill # 949030985			9/28/88 1050 hrs.

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
				Samples received cold and intact.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.		SW8010, 8020 / EPA 608 / EPA 625 / EPA 418.1 / SW8010, 7131 / SW7421, 7191 / SW9310, 9315 / SM429	ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA. 94710

SAMPLER(S): (Signature)

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW8010, 7131	SW7421, 7191	SW9310, 9315	SM429	REMARKS
9/21/96	0905	DANGB-4-SL16-SW1	2					X	X			Shipping delay late due to "difficulty in finding".

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	9-23-96 0900	Fed Ex Airbill # 949631404 3			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092615-88092616, 88092719-88092722
88092724-88092725, 88092763-88092764
88092768-88092771, 88092777-88092780

QC Report No: AAF-W-0054-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-27-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Arsenic	88092724	88092724	10-21-88	NA	7060	<0.01	<0.01	<0.01	NC	0.040	<0.01	0.0364	91	
Cadmium	88092724	88092724	10-27-88	NA	6010	<0.005	<0.005	<0.005	NC	0.010	<0.005	0.010	100	
Chromium	88092724	88092724	10-21-88	NA	6010	<0.01	<0.01	<0.01	NC	0.020	<0.01	0.0199	100	
Lead	88092724	88092724	10-22-88	NA	7421	<0.005	<0.0063	<0.0063	0	0.020	0.0063	0.0252	94	

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092615-88092616, 88092719-88092722
88092724-88092725, 88092763-88092764
88092768-88092771, 88092777-88092780

QC Report No: ICP-W-0061-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-27-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	Duplicate RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Barium	88092724	88092724	10-27-88	NA	6010	<0.2	<0.2	<0.2	NC	2.0	<0.2	0.190	95	

66

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092615-88092616, 88092719-88092722
88092724-88092725, 88092763-88092764
88092768-88092771, 88092777-88092780

QC Report No: CVM-W-0032-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-27-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Mercury	88092724	88092724	10-22-88	NA	245.1	<0.0002	<0.0002	<0.0002	NC	0.0010	<0.0002	0.00091	91	

16

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092677-88092678, 88092765-88092766
88092768-88092770, 88092772, 88092777
88092694-88092695, 88092806

QC Report No: TPH-W-0062-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-24-88
Date Prepared: 10-11-88
Date Analyzed: 10-20-88
Date Reported: 10-28-88
Dilution Factor: 4

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88092677	418.1	1.1	<1B	10	6.2	62	8.1	81	27	*

* See Case Narrative attached.
B See Legend attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092677-88092678, 88092765-88092766
88092768-88092770, 88092772, 88092777
88092694-88092695, 88092806

QC Report No: TPH-W-0062-88B
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-10-88
Date Analyzed: 10-11-88
Date Reported: 10-28-88
Dilution Factor: 6

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1	<1	10	11	110	11	110	0	*

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO(S).: TPH-W-0062-88

Relative percent difference for the quality control sample exceed the ES Laboratory limit. A blank spike analysis shows the laboratory to be in control.

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No.: OCP-W-0039-88
QC Sample No.: 88092694
Level (Low/Med): Low
Date Reported: 11-11-88

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s).:
88092694-88092696, 88092726-88092727
88092765-88092766, 88092772, 88092777
88092806, 88092721

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	200	ND	0.196	98	56-123
Heptachlor epoxide	200	ND	0.239	120	40-131
Aldrin	200	ND	0.253	127*	40-120
Dieldrin	500	ND	0.532	106	52-126
Endrin	500	ND	0.475	95	56-121
4,4'-DDT	500	ND	0.435	87	38-127

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.217	109	98	10	15	56-123
Heptachlor epoxide	0.256	128	120	7	20	40-131
Aldrin	0.251	126*	127*	1	22	40-120
Dieldrin	0.606	121	106	13	18	52-126
Endrin	0.543	109	95	13	21	56-121
4,4'-DDT	0.518	104	87	17	27	38-127

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 6 outside limits

Spike Recovery: 2 out of 12 outside limits

QUALITY CONTROL RESULTS SUMMARY
VOLATILE ORGANICS
EPA 8010/8020

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092747-88092749
88092765, 88092767-88092770
88092772-88092777

QC Report No: VGC-W-0055-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-28-88
Date Prepared: NA
Date Analyzed: 10-10-88
Date Reported: 10-28-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092789*	1,1-Dichloroethane	10	ND	10.5	105	9.55	96	9	26	70-130
	Trichloroethene	10	ND	11.6	116	10.6	106	9	19	65-131
	Chlorobenzene	10	ND	12.5	125	12.5	125	0	40	59-137
	Aromatics: 8020									
88092789*	Benzene	10	ND	10.5	105	10.3	103	2	20	56-146
	Toluene	10	ND	10.7	107	10.6	106	1	41	42-150
	Chlorobenzene	10	ND	10.4	104	10.5	105	1	36	76-133

* The quality control sample is from a different project.

Relative Percent Difference (PR) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Sample Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 10-31-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
31	10-3-88	VGC	Carbopack	75-09-2	Dichloromethane	1.5	0.25	88092777
				67-66-3	Chloroform	1.7	0.05	
53	10-5-88	VGC	Carbopack	75-09-2	Dichloromethane	5.4	0.25	88092776

001

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No.: OCP-W-0039-88B
QC Sample No.: Blank
Level (Low/Med): Low
Date Reported: 11-11-88

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s).:
88092694-88092696, 88092726-88092727
88092765-88092766, 88092772, 88092777, 88092806

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	200	ND	0.169	85	56-123
Heptachlor epoxide	200	ND	0.184	92	40-131
Aldrin	200	ND	0.155	78	40-120
Dieldrin	500	ND	0.419	84	52-126
Endrin	500	ND	0.193	39*	56-121
4,4'-DDT	500	ND	0.385	77	38-127

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.236	118	85	33*	15	56-123
Heptachlor epoxide	0.263	132	92	35*	20	40-131
Aldrin	0.231	116	78	39*	22	40-120
Dieldrin	0.608	122	84	37*	18	52-126
Endrin	0.522	104	39*	92*	21	56-121
4,4'-DDT	0.567	113	77	38*	27	38-127

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 6 out of 6 outside limits

Spike Recovery: 1 out of 12 outside limits

PESTICIDE METHOD BLANK SUMMARY

Job No.:	0R001	Lab Name:	Engineering Science
		Lab Sample No.:	Blank
Client:	ES Oak Ridge		
Attn:	Bill Hayden	Matrix:	Soil
Address:	710 S. Illinois Avenue	Level (low/med):	Low
	Suite F-103	Extraction:	
	Oak Ridge, Tn. 37830	(SepF/Cont/Sonc):	Sonc
		Date Reported:	11-03-88
Project:	Duluth ANGB		
Date Extracted:	10-03-88		
Date Analyzed (1):	10-25-88	Date Analyzed (2):	10-25-88
Time Analyzed (1):	03:10	Time Analyzed (2):	22:06
Instrument ID (1):	5890 #2	Instrument ID (2):	5880
GC Column ID (1):	OV-1	GC Column ID (2):	Mixed

This Method Blank applies to the following samples, MS and MSD.

EPA Sample No.	Lab Sample ID (1)	Date Analyzed 1	Lab Sample ID (2)	Date Analyzed 2
-	88092772	10-25-88	88092772	10-26-88
-	88092777	10-25-88		
-	88092806	10-25-88		

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: OCP-W-0039-88
QC REPORT NO.: OCP-W-0039-88B

Analysis of matrix spikes resulted in recoveries for aldrin that were slightly above EPA recommended limits. Subsequent analysis of spiked blanks resulted in poor precision for all spiked compounds, although the recoveries were within limits for all but endrin in one of the two spiked blanks. The analytical data associated with these analyses were closely examined. No errors or problems were found.

Heptachlor epoxide was inadvertently used instead of heptachlor in the matrix spiking solution.

Endrin aldehyde and Kepone were not recoverable because they were removed by the alumina column clean-up used on these samples.

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No: BNA-W-0054-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-23-88
Date Prepared: 9-28-88
Date Analyzed: 11-07-88
Date Reported: 12-28-88
Dilution Factor: 1.0

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88092612-88092617, 88092677-88092678
88092681, 88092694-88092695, 88092724, 88092762
88092765-88092766, 88092768-88092770, 88092772, 88092777

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limits RPD	EPA QC Limits RECOVERY
	1,2,4-Trichlorobenzene	100	ND	63.3	63	71.6	72	13	28	39-98
B/N	Acenaphthene	100	ND	71.2	71	73.9	74	4	31	46-118
Laboratory	2,4-Dinitrotoluene	100	ND	71.3	71	68.0	68	4	38	24-96
Sample #	Pyrene	100	ND	91.7	92	80.6	81	13	31	26-127
	N-Nitroso-di-n-Propylamine	100	ND	80.0	80	80.9	81	1	38	41-116
88092617	1,4-Dichlorobenzene	100	ND	70.4	70	76.7	77	10	28	36-97
ACID	Pentachlorophenol	200	ND	53.4	27	74.5	37	31	50	9-103
Laboratory	Phenol	200	ND	59.4	30	68.0	34	12	42	12-89
Sample #	2-Chlorophenol	200	ND	118	59	129	64	8	40	27-123
	4-Chloro-3-Methylphenol	200	ND	132	66	135	68	3	42	23-97
88092617	4-Nitrophenol	200	ND	81.1	41	88.0	44	7	50	10-80

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 12-28-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E6180	11-11-88	AC	2	-	None Detected	-	-	88092742-88092747 88092772, 88092777
E6183	11-11-88	BN	2	117-81-7	Bis(2ethylhexyl)phthalate	20	10	

108

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature)

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8240, 8020	EPA 601	EPA 625	EPA 418.1	SW 8015, 7951, 7121	SW7421, 7471	SW3550, 3510	SM423	REMARKS
9-16-88	1300	DANGB - TB16	3	3								882776
9-27-88	0905	DANGB4SL16 - SW1	7	5			2					882777
9-27-88	0905	MATRIX SPIKE	6		2	2	2					Labelled "MATRIX SPIKE" and "MATRIX SPIKE DUP"

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
200 Bancroft Way
Berkeley, CA 94710

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	9-27-88 1800	FedEx Airbill # 94-903098 5d			9/28/88 1330 hrs
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

5B

SEMIVOLATILE ORGANIC GC/MS TUNING AND MASS CALIBRATION - DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

Lab Name: Engineering Science Contract: _____.

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____.

Lab File ID: >T1111 DFTPP Injection Date: 11/11/88

Instrument ID: 70 1 DFTPP Injection Time: 14:18

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	54.6
68	Less than 2.0% of mass 69	0.0(0.0)1
69	Mass 69 relative abundance	68.
70	Less than 2.0% of mass 69	0.0(0.0)1
127	40.0 - 60.0% of mass 198	47.9
197	Less than 1.0% of mass 198	0.0
198	Base Peak, 100% relative abundance	100.
199	5.0 - 9.0% of mass 198	7.2
275	10.0 - 30.0% of mass 198	15.8
365	Greater than 1.00% of mass 198	1.15
441	Present, but less than mass 443	6.4
442	Greater than 40.0% of mass 198	44.1
443	17.0 - 23.0% of mass 442	8.6(19.6)2

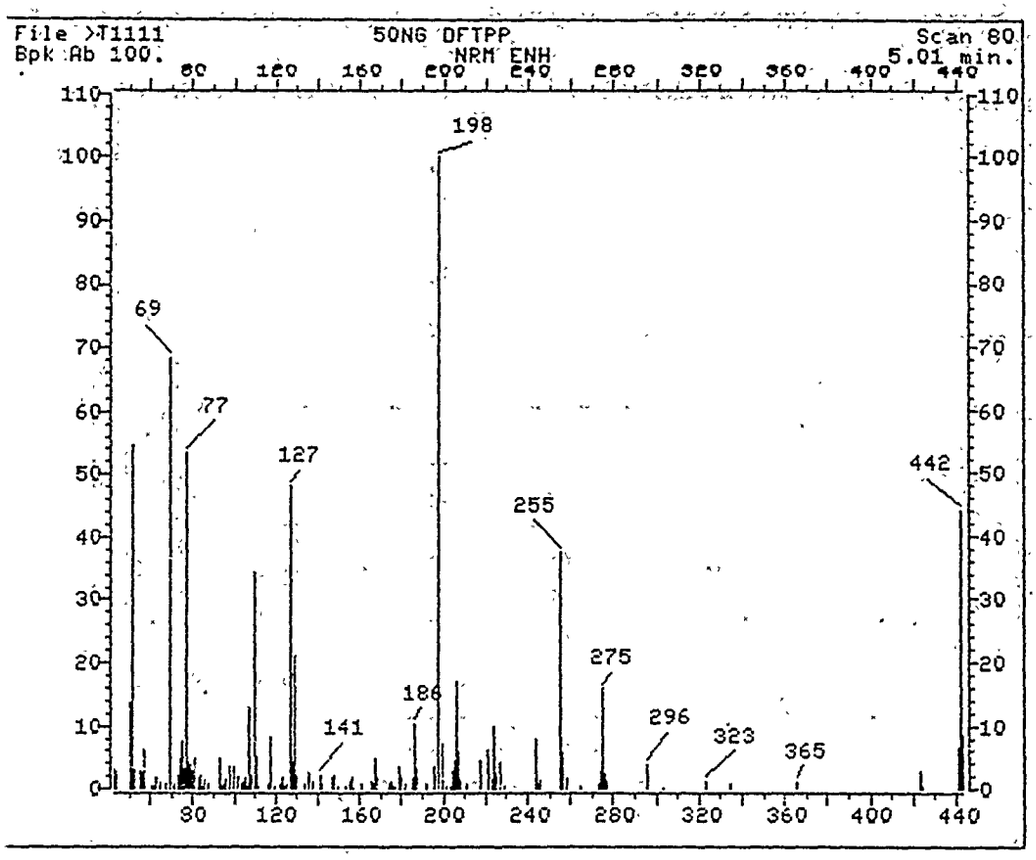
1-Value is % mass 69 2-Value is % mass 442

SPoint 10/12/88

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	60 ug/ml BNA STD	>S0484	11/11/88	14:39
02	88092777 AC 1ml	>S0485	11/11/88	16:13
03	88092777 BN 1ml	>S0486	11/11/88	17:13
04	88092806 AC MS 1ml	>S0487	11/11/88	18:11
05	88092806 BN MS 1ml	>S0488	11/11/88	19:10
06	88092806 AC MSD 1ml	>S0489	11/11/88	20:10
07	88092806 BN MSD 1ml	>S0490	11/11/88	21:09
08	88092629 1ml	>S0491	11/11/88	22:08
09	88092630 1ml	>S0492	11/11/88	23:08
10	88092631 1ml	>S0493	11/12/88	0:06
11	88092632 1ml	>S0494	11/12/88	1:05
12	88092633 1ml	>S0495	11/12/88	2:05
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

another project



File: >T1111 Scan #: 80 Retn. time: 5.01

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.10	5.032	83.10	2.259	122.95	1.790	175.05	.973	225.10	2.520
44.10	2.850	84.00	.547	124.05	.278	175.95	.582	227.00	4.170
50.10	13.510	85.10	1.338	125.05	.643	176.95	.504	229.00	.573
51.10	54.587	87.10	.626	127.05	47.932	178.95	3.319	244.00	7.715
52.10	3.067	93.00	4.813	128.05	4.301	180.05	1.833	245.10	.643
55.10	2.850	94.00	.261	129.05	21.034	181.05	.791	246.00	1.364
56.00	2.302	95.10	.782	130.05	1.972	185.05	1.746	255.00	37.472
57.10	6.090	96.10	1.607	132.95	.626	186.05	10.382	256.00	5.786
61.10	.321	97.10	.860	135.05	2.294	186.95	3.154	258.00	1.937
62.00	.313	98.00	3.475	137.05	.973	191.95	.921	264.90	.443
63.10	1.668	99.00	3.467	141.05	2.250	196.10	3.354	273.00	.860
65.00	1.173	101.00	2.085	142.05	.608	198.00	100.000	274.05	2.789
67.20	.808	102.90	.912	146.95	1.694	199.00	7.246	275.05	15.812
69.00	68.488	104.00	1.234	147.95	2.068	201.50	.304	276.05	2.415
71.10	.886	105.00	1.807	149.05	.434	203.10	.295	277.05	1.277
73.10	2.042	106.00	.565	153.05	.261	204.10	2.745	296.05	3.849
74.10	4.883	107.00	13.076	155.05	1.129	205.10	4.448	303.05	.235
75.00	7.672	108.10	2.242	156.05	1.937	206.10	16.864	323.05	1.121
76.10	3.067	110.00	34.136	157.25	.217	207.10	5.699	333.95	.617
77.10	53.414	111.00	5.239	161.05	.817	208.10	1.573	365.00	1.147
78.10	4.118	112.00	.356	165.05	1.043	211.00	.386	423.00	2.632
79.10	3.779	116.10	.652	166.05	.608	217.00	4.492	424.00	.539
80.10	2.789	117.00	8.054	167.05	4.770	221.10	6.108	441.05	6.412
81.00	4.700	118.05	.269	168.05	1.877	222.90	1.277	442.05	44.118
82.10	1.703	122.15	.660	174.05	.860	224.00	9.861	443.05	8.645

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/11/88

Contractor: ENGINEERING SCIENCE Time: 14:39

Contract No: Laboratory ID: >S0484

Instrument ID: 2 Initial Calibration Date: 10/12/88 12 DAD

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	.83865	6.99		
2-Fluorophenol	1.15802	1.37235	18.51		
bis(2-Chloroethyl)ether	1.11892	1.16123	3.78		
Phenol	1.41657	1.67480	18.23	*	
Phenol-d5	1.22488	1.32021	7.78		
Aniline	.54193	.43421	19.88		
2-Chlorophenol	1.23175	1.36217	10.59		
1,3-Dichlorobenzene	1.47535	1.44648	1.96		
1,4-Dichlorobenzene	1.40530	1.42097	1.12	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.50060	31.34		
1,2-Dichlorobenzene	1.32240	1.45594	10.10		
2-Methylphenol	1.17367	1.85489	58.04		
3-&-4-Methylphenol	1.07139	1.50118	40.12		
bis(2-chloroisopropyl)Ether	2.15627	2.76679	28.31		
N-Nitroso-Di-n-Propylamine	.84050	.94590	12.54		**
Hexachloroethane	.53840	.62120	15.38		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.43644	8.27		
Nitrobenzene-d5	.39137	.44340	13.29		
2-Nitrophenol	.24657	.26754	8.50	*	
Isophorone	.74170	.86589	16.74		
bis(2-Chloroethoxy)methane	.49386	.57438	16.31		
2,4-Dimethylphenol	.34849	.38946	11.76		
Benzoic Acid	.29725	.35468	19.32		
2,4-Dichlorophenol	.56733	.58993	3.98	*	
1,2,4-Trichlorobenzene	.36915	.34281	7.13		
Naphthalene	.94589	.92347	2.37		
4-Chloroaniline	.36309	.33540	7.63		
Hexachlorobutadiene	.20283	.17445	13.99	*	
4-Chloro-3-Methylphenol	.31360	.36109	15.14	*	
2-Methylnaphthalene	.56397	.56695	.53		

RF - Response Factor from daily standard file at 60.00 mg/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/11/88

Contractor: ENGINEERING-SCIENCE Time: 14:39

Contract No: _____ Laboratory ID: >S0484

Instrument ID: 1 Initial Calibration Date: 10/13/88 RRD

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is _____%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.33217	12.34		**
2,4,6-Trichlorophenol	.42280	.34961	17.31	*	
2,4,5-Trichlorophenol	.52897	.55226	4.40		
2-Fluorobiphenyl	1.27220	1.09379	14.02		
2-Chloronaphthalene	1.23784	1.16363	5.99		
2-Nitroaniline	.47288	.54552	15.36		
Dimethylphthalate	1.40629	1.35349	3.75		
2,6-Dinitrotoluene	.37415	.39041	4.35		
Acenaphthylene	1.68918	1.60520	4.97		
3-Nitroaniline	.44557	.50246	12.77		
2,4-Dinitrophenol	.11898	.16456	38.31		**
Acenaphthene	1.13011	.98671	12.69	*	
Dibenzofuran	1.64131	1.52070	7.35		
2,4-Dinitrotoluene	.28418	.31976	12.52		
4-Nitrophenol	.28450	.30530	7.31		**
Fluorene	1.12850	.89212	20.95		
Diethylphthalate	1.20939	1.00105	17.23		
4-Chlorophenyl-phenylether	.59183	.55115	6.87		
4-Nitroaniline	.35956	.38543	7.20		
2,4,6-Tribromophenol	.21023	.18355	12.69		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.48342	20.00	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.21403	.48		
Hexachlorobenzene	.26273	.24826	5.51		
Pentachlorophenol	.14536	.13049	10.23	*	

RF - Response Factor from daily standard file at 60.00 mg/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/11/88

Contractor: ENGINEERING-SCIENCE Time: 14:39

Contract No: _____ Laboratory ID: >S0484

Instrument ID: 1 Initial Calibration Date: 10/12/88 DAS

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	1.01533	1.84		
Anthracene	1.05155	1.12098	6.60		
Di-n-Butylphthalate	1.51956	1.73672	14.29		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.18648	.34	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.07419	84.41		
Pyrene	1.56086	1.49911	3.96		
Terphenyl-d14	1.05835	1.01758	3.85		
Butylbenzylphthalate	1.03390	1.12290	8.61		
3,3'-Dichlorobenzidine	.13689	.21808	59.31		
Chrysene	.99655	1.04078	4.44		
Benzo(a)Anthracene	1.10407	1.17226	6.18		
bis(2-Ethylhexyl)Phthalate	1.21073	1.35675	12.06		
Di-n-octylphthalate	3.40275	3.26459	4.06	*	
Benzo(a)Pyrene	1.32098	1.33341	.94	*	
Benzo(b)Fluoranthene	1.60850	1.52187	5.39		
Indeno(1,2,3-cd)Pyrene	.96800	1.20132	24.10		
Dibenzo(a,h)Anthracene	.87481	1.02348	16.99		
Benzo(k)Fluoranthene	1.44370	1.38126	4.33		
Benzo(g,h,i)Perylene	.89761	1.05445	17.47		

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: _____.

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____.

Lab File ID (Standard): >S0484 Date Analyzed: 11/11/88

Instrument ID: 70 1 Time Analyzed: 14:39

	IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
12 HOUR STD	73053.	9.17	260804.	12.79	144222.	18.25
UPPER LIMIT	146106.		521608.		288444.	
LOWER LIMIT	36526.		130402.		72111.	
SAMPLE NO.						
01 88092777 AC	64115.	9.16	231189.	12.75	119090.	18.23
02 88092777 BN	67552.	9.15	236966.	12.74	121649.	18.23
03 88092806 AC	61126.	9.16	231519.	12.75	120916.	18.23
04 88092806 BN	50892.	9.16	195610.	12.75	102465.	18.22
05 88092806 AC	51136.	9.16	188545.	12.74	98087.	18.22
06 88092806 BN	52682.	9.16	197680.	12.75	107095.	18.23
07 88092629 1ml	41013.	9.17	154446.	12.74	78279.	18.21
08 88092630 1ml	46466.	9.16	166721.	12.74	88504.	18.22
09 88092631 1ml	52526.	9.17	198634.	12.74	104904.	18.22
10 88092632 1ml	23768.*	9.17	109421.*	12.75	58660.*	18.22
11 88092633 1ml	28240.*	9.17	121354.*	12.75	64593.*	18.22
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal stansard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

FORM VIII SV-1 1/87 Rev.

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: _____.

Lab Code: ES01 Case No.: ____ SAS No.: ____ SDG No.: ____.

Lab File ID (Standard): >S0484 Date Analyzed: 11/11/88

Instrument ID: 70 1 Time Analyzed: 14:39

		IS4(PHN)		IS5(CRY)		IS3(PRY)	
		AREA #	RT	AREA #	RT	AREA #	RT
	12 HOUR STD	216225.	22.88	166449.	31.36	128688.	37.38
	UPPER LIMIT	432450.		332898.		257376.	
	LOWER LIMIT	108113.		83225.		64344.	
	EPA SAMPLE NO.						
01	88092777 AC	177835.	22.87	122938.	31.32	73989.	37.32
02	88092777 BN	189171.	22.86	136228.	31.30	78152.	37.28
03	88092806 AC	184794.	22.88	156091.	31.30	101808.	37.31
04	88092806 BN	166669.	22.87	134582.	31.31	82947.	37.29
05	88092806 AC	146007.	22.87	120624.	31.30	85667.	37.28
06	88092806 BN	168050.	22.86	130393.	31.31	74733.	37.28
07	88092629 1ml	121974.	22.85	89544.	31.31	62845.*	37.30
08	88092630 1ml	142703.	22.85	109903.	31.29	82245.	37.30
09	88092631 1ml	166261.	22.86	129522.	31.30	92814.	37.29
10	88092632 1ml	97227.*	22.86	86150.	31.30	65240.	37.32
11	88092633 1ml	105010.*	22.87	90832.	31.31	64180.*	37.32
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100%
of internal stansard area.
LOWER LIMIT = - 50%
of internal standard area.

Column used to flag internal standard area values with an asterisk

Instrument ID.:VOCAL Calibration Date(s):10/3/89 9/14/89

LAB FILE ID: RRF10=55 RRF20=56
RRF 50=57 RRF100=58 RRF200=59

COMPOUND	RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$	%RSD
Benzyl chloride	5.21	4.65	4.05	3.70	4.56	4.43	13.11
bis (2-choroethoxy) methane	0.09	0.12	0.12	0.14	0.12	0.12	15.16
bis (2-choroisopropyl ether	0.09	0.12	0.12	0.14	0.12	0.12	15.16
Bromobenzene	3.10	3.02	3.45	2.94	2.87	3.08	7.35
Bromodichloromethane	4.35	4.90	4.10	4.30	4.10	4.35	7.54
Bromoform	3.33	3.10	3.40	3.40	3.40	3.33	3.91
Bromomethane	0.70	0.64	0.28	0.29	0.25	0.43	50.65
Carbon tetrachloride	4.95	5.50	4.80	4.90	4.60	4.95	6.78
Chloroacetaldehyde	0.07	0.08	0.08	0.07	0.05	0.07	17.50
Chlorobenzene	1.25	1.20	1.30	1.30	1.20	1.25	4.00
Chloroethane	1.10	1.08	0.63	0.55	0.29	0.73	48.21
Chloroform	4.23	5.20	4.00	3.90	3.80	4.23	13.45
1-Chorohexane	0.80	0.80	0.94	0.79	0.79	0.82	7.89
2-Chloroethyl vinyl ether	0.09	0.12	0.12	0.14	0.12	0.12	15.16
Chloromethane	2.11	1.21	2.21	1.76	1.90	1.84	21.36
Chloromethyl methyl ether	0.02	0.02	0.03	0.02	0.03	0.02	22.82
o_,m_,& p_Chlorotoluenes	3.60	3.45	3.67	3.10	2.87	3.34	10.24
Dibromochloromethane	4.20	4.20	4.10	4.30	4.10	4.18	2.00
Dibromomethane	2.95	2.94	3.42	2.95	3.03	3.06	6.72
1,2_Dichlorobenzene	1.88	1.80	1.90	2.00	1.80	1.88	4.42
1,3_Dichlorobenzene	1.73	1.70	1.70	1.80	1.70	1.73	2.51
1,4_Dichlorobenzene	1.70	1.80	1.70	1.70	1.60	1.70	4.16
Dichlorodifluormethane	0.59	0.77	0.44	0.42	0.49	0.54	26.46
1,1_Dichloroethane	3.10	4.60	3.00	2.60	2.20	3.10	29.39
1,2_Dichloroethane	3.20	3.90	3.20	2.80	2.90	3.20	13.44
1,1_Dichloroethylene	2.28	2.30	2.30	2.30	2.20	2.28	1.90
trans_1,2_dichloroethylene	5.15	10.32	5.30	2.90	2.40	5.15	58.39
Dichloromethane	33.03	89.44	34.00	6.50	2.60	33.11	******
1,2_Dichloropropane	2.83	3.10	2.70	2.80	2.70	2.83	5.80
1,3_Dichloropropylene	0.48	0.47	0.54	0.45	0.43	0.47	8.77
1,1,2,2_Tetrachloroethane	3.78	4.00	3.80	3.80	3.50	3.78	4.73
1,1,1,2_Tetrachloroethane	5.32	4.93	5.25	4.40	4.25	4.83	10.08
Tetrachloroethylene	4.70	5.30	4.60	4.60	4.30	4.70	7.82
1,1,1_Trichloroethane	2.88	3.20	2.80	2.80	2.70	2.88	6.68
1,1,2_Trichloroethane	3.91	5.38	5.19	3.91	3.69	4.42	18.14
Trichloroethylene	3.80	4.10	3.70	3.80	3.60	3.80	4.92
Trichlorofluormethane	1.18	1.23	1.10	1.20	1.20	1.18	4.07
Trichloropropane	3.10	3.02	3.45	2.95	2.87	3.08	7.30
Vinyl chloride	2.11	1.21	2.21	1.76	1.90	1.84	21.36

VOLATILE ORGANICS INITIAL CALIBRATION DATA

LabName: ENGINEERING SCIENCE Contract:

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

Instrument ID.: VOCAL Calibration Date(s) 10/3/89

LAB FILE ID: RRF 10 55 RRF 20 56
RRF 50= 57 RRF100= 58 RRF200= 59

COMPOUND	RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$
Benzene	4.46	5.02	4.51	6.68	6.09	5.35
Chlorobenzene	7.32	7.84	7.12	7.54	7.04	7.37
1,2_Dichlorobenzene	4.83	6.76	5.79	6.04	5.57	5.80
1,3_Dichlorobenzene	5.47	7.39	6.55	6.90	6.50	6.56
1,4_Dichlorobenzene	4.41	5.91	5.26	5.65	5.23	5.29
Ethyl Benzene	4.01	5.48	4.90	4.95	4.71	4.81
Toluene	6.19	7.10	6.08	6.02	5.56	6.19
Xylenes	16.66	18.23	16.03	16.58	15.78	16.65

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____

Instrument IDVOCAL_____ Calibration Date(s):10/5/88

LAB FILE ID:87,88_____ Init. Calib. Date(s):10/3/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzyl chloride	4.43	6.10	-37.70
bis (2-choroethoxy) methane	0.12		100.00
bis (2-choroisopropyl ether	0.12		100.00
Bromobenzene	3.08	3.24	-5.19
Bromodichloromethane	4.35	4.10	5.75
Bromoform	3.33	3.10	6.91
Bromomethane	0.43	0.00	100.00
Carbon tetrachloride	4.95	4.10	17.17
Chloroacetaldehyde	0.07		100.00
Chlorobenzene	1.25	1.10	12.00
Chloroethane	0.73	0.00	100.00
Chloroform	4.23	3.50	17.26
1-Chorohexane	0.82	0.80	2.44
2-Chloroethyl vinyl ether	0.12		100.00
Chloromethane	1.84	0.00	100.00
Chloromethyl methyl ether	0.02		100.00
o_,m_,& p_Chlorotoluenes	3.34	3.10	7.19
Dibromochloromethane	4.18	3.90	6.70
Dibromomethane	3.06	2.96	3.27
1,2_Dichlorobenzene	1.88	1.80	4.26
1,3_Dichlorobenzene	1.73	1.60	7.51
1,4_Dichlorobenzene	1.70	1.60	5.88
Dichlorodifluormethane	0.54		100.00
1,1_Dichloroethane	3.10	2.40	22.58
1,2_Dichloroethane	3.20	3.00	6.25
1,1_Dichloroethylene	2.28	1.70	25.44
trans_1,2_dichloroethylene	5.15	3.30	35.92
Dichloromethane	4.72	14.00	-196.61
1,2_Dichloropropane	2.83	2.60	8.13
1,3_Dichloropropylene	0.47	0.46	2.13
1,1,2,2_Tetrachloroethane	3.78	3.50	7.41
1,1,1,2_Tetrachloroethane	4.83	4.10	15.11
Tetrachloroethylene	4.70	4.10	12.77
1,1,1_Trichloroethane	2.88	2.30	20.14
1,1,2_Trichloroethane	4.42	4.52	-2.19
Trichloroethylene	3.80	3.30	13.16
Trichlorofluormethane	1.18	0.70	40.68
Trichloropropane	3.08	3.24	-5.18
Vinyl chloride	1.84	0.00	100.00

VOLATILE CONTINUING CALIBRATION CHECK

LabName: ENGINEERING SCIENCE Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: ____

Instrument ID.: VOCAL Calibration Date(s) 10/5/89 _____

LAB FILE ID: RRF 50 __ 87__ Initial Cal = 10/3/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	5.35	6.58	22.92
Chlorobenzene	7.37	6.50	-11.80
1,2_Dichlorobenzene	5.80	5.30	-8.62
1,3_Dichlorobenzene	6.50	6.10	-6.15
1,4_Dichorobenzene	5.23	5.00	-4.40
Ethyl Benzene	4.71	4.30	-8.70
Toluene	5.56	5.30	-4.68
Xylenes	15.78	15.00	-4.94

This page intentionally left blank.

DATA PACKAGE #3

This page intentionally left blank.

ES
ENGINEERING-SCIENCE, INC.

600 BANCROFT WAY
BERKELEY, CALIFORNIA 94710
(415) 548-7970

Job No.: OR001

Work Order No.: 1055

Client: ES Oak Ridge
Attention: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Attached are the analytical reports for the water sample(s) received by this laboratory on 9-28-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092763	DANGB-BG-SL1-SW1	AS-F	9-25-88		10-21-88	
88092763	DANGB-BG-SL1-SW1	BA-I	9-25-88		10-21-88	
88092763	DANGB-BG-SL1-SW1	CD-F	9-25-88		10-27-88	
88092763	DANGB-BG-SL1-SW1	CR-F	9-25-88		10-21-88	
88092763	DANGB-BG-SL1-SW1	HG-C	9-25-88		10-22-88	
88092763	DANGB-BG-SL1-SW1	PB-F	9-25-88		10-22-88	
88092764	DANGB-BG-SL1-SW1	AS-F	9-25-88		10-21-88	
88092764	DANGB-BG-SL1-SW1	BA-I	9-25-88		10-21-88	
88092764	DANGB-BG-SL1-SW1	CD-F	9-25-88		10-27-88	
88092764	DANGB-BG-SL1-SW1	CR-F	9-25-88		10-21-88	
88092764	DANGB-BG-SL1-SW1	HG-C	9-25-88		10-22-88	
88092764	DANGB-BG-SL1-SW1	PB-F	9-25-88		10-22-88	
88092765	DANGB-3-SL28-SW1	418.1	9-26-88	10-12-88	10-21-88	
88092765	DANGB-3-SL28-SW1	8010	9-26-88		10-03-88	9-30-88
88092765	DANGB-3-SL28-SW1	8020	9-26-88		10-03-88	
88092765	DANGB-3-SL28-SW1	8080	9-26-88	9-30-88	10-24-88	
88092765	DANGB-3-SL28-SW1	8270	9-26-88	9-30-88	11-9/10-88	
88092766	DANGB-3-SL-8-SW1	418.1	9-26-88	10-12-88	10-21-88	
88092766	DANGB-3-SL-8-SW1	8080	9-26-88	9-30-88	10-24/25-88	
88092766	DANGB-3-SL-8-SW1	8270	9-26-88	9-30-88	11-09-88	
88092767	DANGB-3-SL10-SW1	8010	9-26-88		10-03-88	9-30-88
88092767	DANGB-3-SL10-SW1	8020	9-26-88		10-03-88	

* If applicable

CL-FRM01

Job No.: 0R001

Work Order No.: 1055

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
38092768	DANGB-2-SL29-SW1	BA-I	9-26-88		10-21-88	
38092768	DANGB-2-SL29-SW1	CD-F	9-26-88		10-27-88	
38092768	DANGB-2-SL29-SW1	CR-F	9-26-88		10-21-88	
38092768	DANGB-2-SL29-SW1	PB-F	9-26-88		10-22-88	
38092768	DANGB-2-SL29-SW1	418.1	9-26-88	10-12-88	10-21-88	
38092768	DANGB-2-SL29-SW1	8010	9-26-88		10-04-88	9-30-88
38092768	DANGB-2-SL29-SW1	8020	9-26-88		9-30-88	
38092768	DANGB-2-SL29-SW1	8270	9-26-88	9-30-88	11-09-88	
38092769	DANGB-2-SL-6-SW1	BA-I	9-26-88		10-21-88	
38092769	DANGB-2-SL-6-SW1	CD-F	9-26-88		10-27-88	
38092769	DANGB-2-SL-6-SW1	CR-F	9-26-88		10-21-88	
38092769	DANGB-2-SL-6-SW1	PB-F	9-26-88		10-22-88	
38092769	DANGB-2-SL-6-SW1	418.1	9-26-88	10-12-88	10-21-88	
38092769	DANGB-2-SL-6-SW1	8010	9-26-88		10-04-88	9-30-88
38092769	DANGB-2-SL-6-SW1	8020	9-26-88		9-30-88	
38092769	DANGB-2-SL-6-SW1	8270	9-26-88	9-30-88	11-09-88	
38092770	DANGB-2-SL-7-SW1	BA-I	9-26-88		10-21-88	
38092770	DANGB-2-SL-7-SW1	CD-F	9-26-88		10-27-88	
38092770	DANGB-2-SL-7-SW1	CR-F	9-26-88		10-22-88	
38092770	DANGB-2-SL-7-SW1	PB-F	9-26-88		10-22-88	
38092770	DANGB-2-SL-7-SW1	418.1	9-26-88	10-12-88	10-21-88	
38092770	DANGB-2-SL-7-SW1	8010	9-26-88		10-04-88	9-30-88
38092770	DANGB-2-SL-7-SW1	8020	9-26-88		9-30-88	
38092770	DANGB-2-SL-7-SW1	8270	9-26-88	9-30-88	11-09-88	
38092771	DANGB-4-SL14-SW1	BA-I	9-26-88		10-21-88	
38092771	DANGB-4-SL14-SW1	CD-F	9-26-88		10-31-88	
38092771	DANGB-4-SL14-SW1	CR-F	9-26-88		10-21-88	
38092771	DANGB-4-SL14-SW1	PB-F	9-26-88		10-24-88	
38092772	DANGB-3-SL-9-SW1	418.1	9-26-88	10-12-88	10-21-88	
38092772	DANGB-3-SL-9-SW1	8010	9-26-88		10-03-88	9-30-88
38092772	DANGB-3-SL-9-SW1	8020	9-26-88		09-30-88	
38092772	DANGB-3-SL-9-SW1	8080	9-26-88	10-03-88	10-24-88	
38092772	DANGB-3-SL-9-SW1	8270	9-26-88	10-03-88	11-10/23-88	
38092773	TB-14	8010	9-26-88		10-03-88	9-30-88
38092773	TB-14	8020	9-26-88		10-03-88	
38092774	DANGB-FB19	8010	9-26-88		10-03-88	10-04-88
38092774	DANGB-FB19	8020	9-26-88		10-03-88	
38092775	DANGB-FB20	8010	9-26-88		10-03-88	10-04-88
38092775	DANGB-FB20	8020	9-26-88		10-03-88	

If applicable

ANALYSIS REPORT

ORK ORDER NUMBER: 1055
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/28/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
ILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 2, UNITS: mg/L

TEST COMPOUND	DANGB-BG-SL1-SW1 88092763	DANGB-BG-SL2-SW1 88092764	DANGB-2-SL29-SW1 88092768	DANGB-2-SL6-SW1 88092769	DANGB-2-SL7-SW1 88092770	DANGB-4-SL14-SW1 88092771
CID DIG FLAME	NA	NA	NA	NA	NA	NA
CID DIG FURNACE	NA	NA	NA	NA	NA	NA
ARSENIC	<0.01	<0.01				
ARIUM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
ADMIUM	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
CHROMIUM	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MERCURY	<.0002	<.0002				
EAD	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

ND - Not Detected

ANALYSIS REPORT

RK ORDER NUMBER: 1055
B NUMBER : ZB0000000440
RK ORDER DATE : 09/28/88

APPROVED BY _____
Lab Supervisor

PORT DATA:
OAK RIDGE/DULUTH ANGB
0 S. ILLINOIS AVE. STE. S103
K RIDGE, TN 37830
LL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

NTRACT / PO # : OR001
NTACT : BILL HAYDEN
(615)-481-3920

SK: 3, UNITS: mg/L

ST COMPOUND		DANGB-3-SL28-SW1 88092765	DANGB-3-SL8-SW1 88092766	DANGB-2-SL29-SW1 88092768	DANGB-2-SL6-SW1 88092769	DANGB-2-SL7-SW1 88092770	DANGB-3-SL9-SW1 88092772
8.1	PETROLEUM HYDROCARBONS	<1	1.5	<1	<1	<1	<1

' - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1055
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/28/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
ILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

" OF REPORT COPIES: 1

CONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 4, UNITS: ug/L, GROUP 8010

TEST COMPOUND	DANGB-3-SL28-SW1 88092765	DANGB-3-SL10-SW1 88092767	DANGB-2-SL29-SW1 88092768	DANGB-2-SL6-SW1 88092769	DANGB-2-SL7-SW1 88092770	DANGB-3-SL9-SW1 88092772
ENZYL CHLORIDE	ND	ND	ND	ND	ND	ND
IS (2-CHLOROETHOXY)METHANE	ND	ND	ND	ND	ND	ND
BIS (2-CHLOROISOPROPYL)ETHER	ND	ND	ND	ND	ND	ND
ROMOBENZENE	ND	ND	ND	ND	ND	ND
ROMODICHLOROMETHANE	ND	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND	ND
BROMOETHANE	ND	ND	ND	ND	ND	ND
ARBON TETRACHLORIDE	ND	ND	ND	ND	ND	ND
HLORACETALDEHYDE	ND	ND	ND	ND	ND	ND
CHLORAL	ND	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND	ND
HLOROETHANE	ND	ND	ND	ND	ND	ND
HLOROFORM	ND	ND	ND	ND	ND	ND
1-CHLOROHEXANE	ND	ND	ND	ND	ND	ND
-CHLOROETHYL VINYL ETHER	ND	ND	ND	ND	ND	ND
HLOROMETHANE	ND	ND	ND	ND	ND	ND
CHLOROMETHYL METHYL ETHER	ND	ND	ND	ND	ND	ND
CHLOROTOLUENE	ND	ND	ND	ND	ND	ND
IBROMOCHLOROMETHANE	ND	ND	ND	ND	ND	ND
IBROMOMETHANE	ND	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
,4-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
ICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	ND	ND	ND	1.8
,2-DICHLOROETHANE	ND	ND	ND	ND	ND	ND
,1-DICHLOROETHYLENE	ND	ND	ND	ND	ND	0.56
RANS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND	ND	9.3
DICHLOROMETHANE	0.29B	ND	ND	ND	0.24B	0.58B
,2-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1055

ST COMPOUND	DANGB-3-SL28-SW1 88092765	DANGB-3-SL10-SW1 88092767	DANGB-2-SL29-SW1 88092768	DANGB-2-SL6-SW1 88092769	DANGB-2-SL7-SW1 88092770	DANGB-3-SL9-SW1 88092772
3-DICHLOROPROPYLENE	ND	ND	ND	ND	ND	ND
1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
1,1,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
TRACHLOROETHYLENE	ND	ND	ND	ND	ND	1.1
1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND	8.6
1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
ICHLOROETHYLENE	ND	ND	ND	ND	ND	110
ICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND	ND
ICHLOROPROPANE	ND	ND	ND	ND	ND	ND
NYL CHLORIDE	ND	ND	ND	ND	ND	ND

- Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1055

TASK: 4, UNITS: ug/L, GROUP 8010

TEST COMPOUND	TB-14 88092773	DANGB-FB-19 88092774	DANGB-FB-20 88092775
BENZYL CHLORIDE	ND	ND	ND
BIS (2-CHLOROETHOXY)METHANE	ND	ND	ND
BIS (2-CHLOROISOPROPYL)ETHER	ND	ND	ND
BROMOBENZENE	ND	ND	ND
BROMODICHLOROMETHANE	ND	ND	ND
BROMOFORM	24	ND	ND
BROMOETHANE	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND
CHLORACETALDEHYDE	ND	ND	ND
CHLORAL	ND	ND	ND
CHLOROBENZENE	ND	ND	ND
CHLOROETHANE	ND	ND	ND
CHLOROFORM	ND	ND	ND
1-CHLOROHEXANE	ND	ND	ND
2-CHLOROETHYL VINYL ETHER	ND	ND	ND
CHLOROMETHANE	ND	ND	ND
CHLOROMETHYL METHYL ETHER	ND	ND	ND
CHLOROTOLUENE	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND
DIBROMOMETHANE	3.6	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	ND
1,2-DICHLOROETHANE	ND	ND	ND
1,1-DICHLOROETHYLENE	ND	ND	ND
TRANS-1,2-DICHLOROETHYLENE	ND	ND	ND
DICHLOROMETHANE	1.2B	1.3B	0.96B
1,2-DICHLOROPROPANE	ND	ND	ND
1,3-DICHLOROPROPYLENE	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND
1,1,1,2-TETRACHLOROETHANE	ND	ND	ND
TETRACHLOROETHYLENE	ND	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND
TRICHLOROETHYLENE	ND	ND	ND
TRICHLOROFLUOROMETHANE	ND	ND	ND
TRICHLOROPROPANE	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT

RK ORDER NUMBER: 1055
B NUMBER : ZB0000000440
RK ORDER DATE : 09/28/88

APPROVED BY _____
Lab Supervisor

PORT DATA:
OAK RIDGE/DULUTH ANGB
0 S. ILLINOIS AVE. STE. S103
K RIDGE, TN 37830
LL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

NTRACT / PO # : OR001
NTACT : BILL HAYDEN
(615)-481-3920

SK: 4, UNITS: ug/L, GROUP 8020

ST COMPOUND	DANGB-3-SL28-SW1 88092765	DANGB-3-SL10-SW1 88092767	DANGB-2-SL29-SW1 88092768	DANGB-2-SL6-SW1 88092769	DANGB-2-SL7-SW1 88092770	DANGB-3-SL9-SW1 88092772
NZENE	ND	ND	ND	ND	ND	ND
LOROBENZENE	ND	ND	ND	ND	ND	ND
2-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
3-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
4-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
HYL BENZENE	ND	ND	ND	ND	ND	ND
LUENE	ND	ND	ND	ND	ND	ND
LENES	ND	ND	ND	ND	ND	ND

- Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1055

TASK: 4, UNITS: ug/L, GROUP 8020

TEST COMPOUND	TB-14 88092773	DANGB-FB-19 88092774	DANGB-FB-20 88092775
BENZENE	ND	ND	ND
CHLOROBENZENE	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND
ETHYL BENZENE	ND	ND	ND
TOLUENE	ND	ND	ND
XYLENES	ND	ND	ND

D - Not Detected

ANALYSIS REPORT

RK ORDER NUMBER: 1055
B NUMBER : ZB0000000440
RK ORDER DATE : 09/28/88

APPROVED BY
Lab Supervisor

PORT DATA:
OAK RIDGE/DULUTH ANGB
0 S. ILLINOIS AVE. STE. S103
K RIDGE, TN 37830
LL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

NTRACT / PO # : OR001
NTACT : BILL HAYDEN
(615)-481-3920

SK: 4, UNITS: ug/L, GROUP 8080

ST COMPOUND	DANGB-3-SL8-SW1 88092766	DANGB-3-SL9-SW1 88092772
DRIN	ND	ND
PHA-BHC	ND	ND
TA-BHC	ND	ND
LTA-BHC	ND	ND
MMA-BHC	ND	ND
LORDANE	ND	ND
4'-DDD	ND	ND
4'-DDE	ND	ND
4'-DDT	ND	ND
ELDRIN	ND	ND
DOSULFAN I	ND	ND
DOSULFAN II	ND	ND
DOSULFAN SULFATE	ND	ND
DRIN	ND	ND
DRIN ALDEHYDE	NA	NA
PTACHLOR	ND	ND
PTACHLOR EPOXIDE	ND	ND
PONE	NA	NA
THOXYCHLOR	ND	ND
XAPHENE	ND	ND
B-1016	ND	ND
B-1221	ND	ND
B-1232	ND	ND
B-1242	ND	ND
B-1248	ND	ND
B-1254	ND	ND
B-1260	ND	ND
ETHOXYCHLOR	ND	ND
- CHLORDANE	ND	ND
- CHLORDANE	ND	ND
NDRIN KETONE	ND	ND

- Not Detected

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

Date Received: September 28, 1988
Date Reported: December 9, 1988
Work Order: 1055
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830
ATTN: Mr. Bill Hayden

Lab Number:		88092765	88092766
Sample No.:		DANGB-3-SL28-SW1	DANGB-3-SL8-SW1
Date Sampled:		09-24-88	09-26-88
Time Sampled:		14:20	15:30
Date Extracted:		09-30-88	09-30-88
Date Analyzed:		11-09-88/11-10-88	11-09-88
Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
1,3-Dichlorobenzene	10	ND	ND
1,4-Dichlorobenzene	10	ND	ND
Hexachloroethane	10	ND	ND
Bis(2-chloroethyl)ether	10	ND	ND
1,2-Dichlorobenzene	10	ND	ND
N-Nitrosodimethylamine	10	ND	ND
Bis(2-chloroisopropyl)ether	10	ND	ND
N-Nitrosodi-n-propylamine	10	ND	ND
Hexachlorobutadiene	10	ND	ND
1,2,4-Trichlorobenzene	10	ND	ND
Nitrobenzene	10	ND	ND
Isophorone	10	ND	ND
Naphthalene	10	ND	ND
Bis(2-chloroethoxy)methane	10	ND	ND
2-Chloronaphthalene	10	ND	ND
Hexachlorocyclopentadiene	10	ND	ND
Acenaphthylene	10	ND	ND
Acenaphthene	10	ND	ND
Dimethyl phthalate	10	ND	ND
2,6-Dinitrotoluene	10	ND	ND
Fluorene	10	ND	ND
2,4-Dinitrotoluene	10	ND	ND
Diethyl phthalate	10	ND	ND
N-Nitrosodiphenylamine	10	ND	ND
Hexachlorobenzene	10	ND	ND

B = Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

ate Received: September 28, 1988
ate Reported: December 9, 1988

Work Order: 1055
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

ab Number:	88092765	88092766
ample No.:	DANGB-3-SL28-SW1	DANGB-3-SL8-SW1
ate Sampled:	09-24-88	09-26-88
ime Sampled:	14:20	15:30
ate Extracted:	09-30-88	09-30-88
ate Analyzed:	11-09-88/11-10-88	11-09-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
henanthrene	10	ND	ND
nthracene	10	ND	ND
ibutyl phthalate	10	ND	ND
luoranthene	10	ND	ND
-Chlorophenyl phenyl ether	10	ND	ND
yrene	10	ND	ND
utyl Benzyl phthalate	10	ND	ND
is(2-ethylhexyl) phthalate	10	10 B	ND
hrysene	10	ND	ND
-Bromophenyl phenyl ether	10	ND	ND
enzo(a)anthracene	10	ND	ND
i-n-octylphthalate	10	ND	ND
enzo(b)fluoranthene	10	ND	ND
enzo(k)fluoranthene	10	ND	ND
enzidine	60	ND	ND
,3'-Dichlorobenzidine	20	ND	ND
enzo(a)pyrene	10	ND	ND
ndeno(1,2,3-cd)pyrene	10	ND	ND
ibenzo(a,h)anthracene	10	ND	ND
enzo(ghi)perylene	10	ND	ND
enzyl Alcohol	20	ND	ND

= Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 28, 1988
Date Reported: December 9, 1988

Work Order: 1055
Job Number: OR001

For: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092765	88092766
Sample No.:	DANGB-3-SL28-SW1	DANGB-3-SL8-SW1
Date Sampled:	09-24-88	09-26-88
Time Sampled:	14:20	15:30
Date Extracted:	09-30-88	09-30-88
Date Analyzed:	11-09-88/11-10-88	11-09-88

Compound	Detection Limits ug/L	Analytical Results ug/L	ug/L
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
4-Chloroaniline	20	ND	ND
1-Chloronaphthalene	--*	ND	ND
Dibenzofuran	10	ND	ND
p-Dimethylaminoazobenzene	--*	ND	ND
7,12-Dimethylbenz(a)anthracene	--*	ND	ND
a-,a-Dimethylphenethylamine	--*	ND	ND
Diphenylamine	--*	ND	ND
1,2-Diphenylhydrazine	--*	ND	ND
Ethyl methanesulfonate	--*	ND	ND
3-Methylcholanthrene	--*	ND	ND
Methyl methanesulfonate	--*	ND	ND
2-Methylnaphthalene	10	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	50	ND	ND
3-Nitroaniline	50	ND	ND
4-Nitroaniline	50	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
2-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

ate Received: September 28, 1988
ate Reported: December 9, 1988

Work Order: 1055
Job Number: OR001

DR: ES:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN:Mr. Bill Hayden

ab Number:	88092765	88092766
ample No.:	DANGB-3-SL28-SW1	DANGB-3-SL8-SW1
ate Sampled:	09-24-88	09-26-88
ime Sampled:	14:20	15:30
ate Extracted:	09-30-88	09-30-88
ate Analyzed:	11-09-88/11-10-88	11-09-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
lpha-BHC	--*	ND	ND
amma-BHC	__*	ND	ND
eta-BHC	20	ND	ND
eptachlor	10	ND	ND
elta-BHC	15	ND	ND
ldrin	10	ND	ND
eptachlor epoxide	10	ND	ND
ndosulfan I	--*	ND	ND
ieldrin	15	ND	ND
,4'-DDE	30	ND	ND
ndrin	--*	ND	ND
ndosulfan II	--*	ND	ND
,4'-DDD	15	ND	ND
,4'-DDT	25	ND	ND
ndosulfan Sulfate	30	ND	ND
ndrin aldehyde	--*	ND	ND
ndrin Ketone	--*	ND	ND
nlordane	60	ND	ND
ethoxychlor	--*	ND	ND
oxaphene	60	ND	ND
roclor-1016	60	ND	ND
roclor-1221	60	ND	ND
roclor-1232	60	ND	ND
roclor-1242	60	ND	ND
roclor-1248	60	ND	ND
roclor-1254	60	ND	ND
roclor-1260	60	ND	ND

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

Date Received: September 28, 1988
Date Reported: December 9, 1988

Work Order: 1055
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092765	88092766
Sample No.:	DANGB-3-SL28-SW1	DANGB-3-SL8-SW1
Date Sampled:	09-24-88	09-26-88
Time Sampled:	14:20	15:30
Date Extracted:	09-30-88	09-30-88
Date Analyzed:	11-09-88/11-10-88	11-09-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
2-Chlorophenol	10	ND	ND
2-Nitrophenol	10	ND	ND
Phenol	10	ND	ND
2,4-Dimethylphenol	10	ND	ND
2,4-Dichlorophenol	10	ND	ND
2,4,6-Trichlorophenol	10	ND	ND
4-Chloro-3-methylphenol	20	ND	ND
2,4-Dinitrophenol	50	ND	ND
2,6-Dichlorophenol	--*	ND	ND
2-Methyl-4,6-Dinitrophenol	50	ND	ND
Pentachlorophenol	50	ND	ND
4-Nitrophenol	50	ND	ND
Benzoic Acid	50	ND	ND
2-Methylphenol	10	ND	ND
3- & 4-Methylphenol	10	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
2,4,5-Trichlorophenol	10	ND	ND

Analyst

Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

ate Received: September 28, 1988
ate Reported: December 9, 1988

Work Order: 1055
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

ab Number:	88092768	88092769
ample No.:	DANGB-2-SL29-SW1	DANGB-2-SL6-SW1
ate Sampled:	09-26-88	09-26-88
ime Sampled:	10:00	09:30
ate Extracted:	09-30-88	09-30-88
ate Analyzed:	11-09-88	11-09-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
,3-Dichlorobenzene	10	ND	ND
,4-Dichlorobenzene	10	ND	ND
exachloroethane	10	ND	ND
is(2-chloroethyl)ether	10	ND	ND
,2-Dichlorobenzene	10	ND	ND
-Nitrosodimethylamine	10	ND	ND
is(2-chloroisopropyl)ether	10	ND	ND
-Nitrosodi-n-propylamine	10	ND	ND
exachlorobutadiene	10	ND	ND
,2,4-Trichlorobenzene	10	ND	ND
itrobenzene	10	ND	ND
sophorone	10	ND	ND
aphthalene	10	ND	ND
is(2-chloroethoxy)methane	10	ND	ND
-Chloronaphthalene	10	ND	ND
exachlorocyclopentadiene	10	ND	ND
cenaphthylene	10	ND	ND
cenaphthene	10	ND	ND
imethyl phthalate	10	ND	ND
,6-Dinitrotoluene	10	ND	ND
luorene	10	ND	ND
,4-Dinitrotoluene	10	ND	ND
iethyl phthalate	10	ND	ND
-Nitrosodiphenylamine	10	ND	ND
exachlorobenzene	10	ND	ND

= Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 28, 1988 Work Order: 1055
Date Reported: December 9, 1988 Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

Lab Number:	88092768	88092769
Sample No.:	DANGB-2-SL29-SW1	DANGB-2-SL6-SW1
Date Sampled:	09-26-88	09-26-88
Time Sampled:	10:00	09:30
Date Extracted:	09-30-88	09-30-88
Date Analyzed:	11-09-38	11-09-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
Phenanthrene	10	ND	ND
Anthracene	10	ND	ND
Dibutyl phthalate	10	ND	ND
Fluoranthene	10	ND	ND
4-Chlorophenyl phenyl ether	10	ND	ND
Pyrene	10	ND	ND
Butyl Benzyl phthalate	10	ND	ND
Bis(2-ethylhexyl) phthalate	10	11 B	34 B
Chrysene	10	ND	ND
4-Bromophenyl phenyl ether	10	ND	ND
Benzo(a)anthracene	10	ND	ND
Di-n-octylphthalate	10	ND	ND
Benzo(b)fluoranthene	10	ND	ND
Benzo(k)fluoranthene	10	ND	ND
Benzidine	60	ND	ND
3,3'-Dichlorobenzidine	20	ND	ND
Benzo(a)pyrene	10	ND	ND
Indeno(1,2,3-cd)pyrene	10	ND	ND
Dibenzo(a,h)anthracene	10	ND	ND
Benzo(ghi)perylene	10	ND	ND
Benzyl Alcohol	20	ND	ND

B = Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

ate Received: September 28, 1988 Work Order: 1055
ate Reported: December 9, 1988 Job Number: OR001

or: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ab Number:	88092768	88092769
ample No.:	DANGB-2-SL29-SW1	DANGB-2-SL6-SW1
ate Sampled:	09-26-88	09-26-88
me Sampled:	10:00	09:30
ate Extracted:	09-30-88	09-30-88
ate Analyzed:	11-09-88	11-09-88

ompound	Detection Limits ug/L	Analytical Results ug/L	ug/L
cetophenone	--*	ND	ND
niline	--*	ND	ND
-Aminobiphenyl	--*	ND	ND
-Chloroaniline	20	ND	ND
-Chloronaphthalene	--*	ND	ND
ibenzofuran	10	ND	ND
-Dimethylaminoazobenzene	--*	ND	ND
,12-Dimethylbenz(a)anthracene	--*	ND	ND
-,a-Dimethylphenethylamine	--*	ND	ND
iphenylamine	--*	ND	ND
,2-Diphenylhydrazine	--*	ND	ND
thyl methanesulfonate	--*	ND	ND
-Methylcholanthrene	--*	ND	ND
ethyl methanesulfonate	--*	ND	ND
-Methylnaphthalene	10	ND	ND
-Naphthylamine	--*	ND	ND
-Naphthylamine	--*	ND	ND
-Nitroaniline	50	ND	ND
-Nitroaniline	50	ND	ND
-Nitroaniline	50	ND	ND
-Nitroso-di-n-butylamine	--*	ND	ND
-Nitrosopiperidine	--*	ND	ND
ntachlorobenzene	--*	ND	ND
ntachloronitrobenzene	--*	ND	ND
henacetin	--*	ND	ND
-Picoline	--*	ND	ND
conamide	--*	ND	ND
,2,4,5-Tetrachlorobenzene	--*	ND	ND

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

Date Received: September 28, 1988
Date Reported: December 9, 1988

Work Order: 1055
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN:Mr. Bill Hayden

Lab Number:	88092768	88092769
Sample No.:	DANGB-2-SL29-SW1	DANGB-2-SL6-SW1
Date Sampled:	09-26-88	09-26-88
Time Sampled:	10:00	09:30
Date Extracted:	09-30-88	09-30-88
Date Analyzed:	11-09-88	11-09-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
Alpha-BHC	--*	ND	ND
Gamma-BHC	--*	ND	ND
Beta-BHC	20	ND	ND
Heptachlor	10	ND	ND
Delta-BHC	15	ND	ND
Aldrin	10	ND	ND
Heptachlor epoxide	10	ND	ND
Endosulfan I	--*	ND	ND
Dieldrin	15	ND	ND
4,4'-DDE	30	ND	ND
Endrin	--*	ND	ND
Endosulfan II	--*	ND	ND
4,4'-DDD	15	ND	ND
4,4'-DDT	25	ND	ND
Endosulfan Sulfate	30	ND	ND
Endrin aldehyde	--*	ND	ND
Endrin Ketone	--*	ND	ND
Chlordane	60	ND	ND
Methoxychlor	--*	ND	ND
Toxaphene	60	ND	ND
Aroclor-1016	60	ND	ND
Aroclor-1221	60	ND	ND
Aroclor-1232	60	ND	ND
Aroclor-1242	60	ND	ND
Aroclor-1248	60	ND	ND
Aroclor-1254	60	ND	ND
Aroclor-1260	60	ND	ND

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

Priority Pollutant Analysis
Acid Extractables - SW 8270
Matrix: Water

ate Received: September 28, 1988
ate Reported: December 9, 1988

Work Order: 1055
Job Number: OR001

DR: ES:Oak Ridge/Duluth ANGB
ddress:710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

ab Number:	88092768	88092769
ample No.:	DANGB-2-SL29-SW1	DANGB-2-SL6-SW1
ate Sampled:	09-26-88	09-26-88
ime Sampled:	10:00	09:30
ate Extracted:	09-30-88	09-30-88
ate Analyzed:	11-09-88	11-09-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
-Chlorophenol	10	ND	ND
-Nitrophenol	10	ND	ND
henol	10	ND	ND
,4-Dimethylphenol	10	ND	ND
,4-Dichlorophenol	10	ND	ND
,4,6-Trichlorophenol	10	ND	ND
-Chloro-3-methylphenol	20	ND	ND
,4-Dinitrophenol	50	ND	ND
,6-Dichlorophenol	--*	ND	ND
-Methyl-4,6-Dinitrophenol	50	ND	ND
entachlorophenol	50	ND	ND
-Nitrophenol	50	ND	ND
enzoic Acid	50	ND	ND
-Methylphenol	10	ND	ND
- & 4-Methylphenol	10	ND	ND
,3,4,6-Tetrachlorophenol	--*	ND	ND
,4,5-Trichlorophenol	10	ND	ND

Analyst

Laboratory Supervisor

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

OTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

Date Received: September 28, 1988
Date Reported: December 9, 1988

Work Order: 1055
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092770	88092772
Sample No.:	DANGB-2-SL7-SW1	DANGB-3-SL9-SW1
Date Sampled:	09-26-88	09-26-88
Time Sampled:	10:45	16:15
Date Extracted:	09-30-88	10-03-88
Date Analyzed:	11-09-88	11-10-88/11-23-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
1,3-Dichlorobenzene	10	ND	ND
1,4-Dichlorobenzene	10	ND	ND
Hexachloroethane	10	ND	ND
Bis(2-chloroethyl)ether	10	ND	ND
1,2-Dichlorobenzene	10	ND	ND
N-Nitrosodimethylamine	10	ND	ND
Bis(2-chloroisopropyl)ether	10	ND	ND
N-Nitrosodi-n-propylamine	10	ND	ND
Hexachlorobutadiene	10	ND	ND
1,2,4-Trichlorobenzene	10	ND	ND
Nitrobenzene	10	ND	ND
Isophorone	10	ND	ND
Naphthalene	10	ND	ND
Bis(2-chloroethoxy)methane	10	ND	ND
2-Chloronaphthalene	10	ND	ND
Hexachlorocyclopentadiene	10	ND	ND
Acenaphthylene	10	ND	ND
Acenaphthene	10	ND	ND
Dimethyl phthalate	10	ND	ND
2,6-Dinitrotoluene	10	ND	ND
Fluorene	10	ND	ND
2,4-Dinitrotoluene	10	ND	ND
Diethyl phthalate	10	ND	12
N-Nitrosodiphenylamine	10	ND	ND
Hexachlorobenzene	10	ND	ND

B = Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

ate Received: September 28, 1988
ate Reported: December 9, 1988

Work Order: 1055
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

ab Number:	88092770	88092772
ample No.:	DANGB-2-SL7-SW1	DANGB-3-SL9-SW1
ate Sampled:	09-26-88	09-26-88
ime Sampled:	10:45	16:15
ate Extracted:	09-30-88	10-03-88
ate Analyzed:	11-09-88	11-10-88/11-23-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
henanthrene	10	ND	ND
nthracene	10	ND	ND
ibutyl phthalate	10	ND	ND
luoranthene	10	ND	ND
-Chlorophenyl phenyl ether	10	ND	ND
yrene	10	ND	ND
utyl Benzyl phthalate	10	ND	ND
is(2-ethylhexyl) phthalate	10	ND	ND
hrysene	10	ND	ND
-Bromophenyl phenyl ether	10	ND	ND
enzo(a)anthracene	10	ND	ND
i-n-octylphthalate	10	ND	ND
enzo(b)fluoranthene	10	ND	ND
enzo(k)fluoranthene	10	ND	ND
enzidine	60	ND	ND
,3'-Dichlorobenzidine	20	ND	ND
enzo(a)pyrene	10	ND	ND
ndeno(1,2,3-cd)pyrene	10	ND	ND
ibenzo(a,h)anthracene	10	ND	ND
enzo(ghi)perylene	10	ND	ND
enzyl Alcohol	20	ND	ND

= Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 28, 1988 Work Order: 1055
Date Reported: December 9, 1988 Job Number: OR001

For: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

Lab Number:	88092770	88092772
Sample No.:	DANGB-2-SL7-SW1	DANGB-3-SL9-SW1
Date Sampled:	09-26-88	09-26-88
Time Sampled:	10:45	16:15
Date Extracted:	09-30-88	10-03-88
Date Analyzed:	11-09-88	11-10-88/11-23-88

Compound	Detection Limits ug/L	Analytical Results ug/L	ug/L
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
4-Chloroaniline	20	ND	ND
1-Chloronaphthalene	--*	ND	ND
Dibenzofuran	10	ND	ND
p-Dimethylaminoazobenzene	--*	ND	ND
7,12-Dimethylbenz(a)anthracene	--*	ND	ND
a-,a-Dimethylphenethylamine	--*	ND	ND
Diphenylamine	--*	ND	ND
1,2-Diphenylhydrazine	--*	ND	ND
Ethyl methanesulfonate	--*	ND	ND
3-Methylcholanthrene	--*	ND	ND
Methyl methanesulfonate	--*	ND	ND
2-Methylnaphthalene	10	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	50	ND	ND
3-Nitroaniline	50	ND	ND
4-Nitroaniline	50	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
2-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

ate Received: September 28, 1988
ate Reported: December 9, 1988

Work Order: 1055
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN:Mr. Bill Hayden

ab Number:	88092770	88092772
ample No.:	DANGB-2-SL7-SW1	DANGB-3-SL9-SW1
ate Sampled:	09-26-88	09-26-88
ime Sampled:	10:45	16:15
ate Extracted:	09-30-88	10-03-88
ate Analyzed:	11-09-88	11-10-88/11-23-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
lpha-BHC	--*	ND	ND
amma-BHC	__*	ND	ND
eta-BHC	20	ND	ND
eptachlor	10	ND	ND
elta-BHC	15	ND	ND
ldrin	10	ND	ND
eptachlor epoxide	10	ND	ND
ndosulfan I	--*	ND	ND
ieldrin	15	ND	ND
,4'-DDE	30	ND	ND
ndrin	--*	ND	ND
ndosulfan II	--*	ND	ND
,4'-DDD	15	ND	ND
,4'-DDT	25	ND	ND
ndosulfan Sulfate	30	ND	ND
ndrin aldehyde	--*	ND	ND
ndrin Ketone	--*	ND	ND
hlordane	60	ND	ND
ethoxychlor	--*	ND	ND
oxaphene	60	ND	ND
roclor-1016	60	ND	ND
roclor-1221	60	ND	ND
roclor-1232	60	ND	ND
roclor-1242	60	ND	ND
roclor-1248	60	ND	ND
roclor-1254	60	ND	ND
roclor-1260	60	ND	ND

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

Date Received: September 28, 1988
Date Reported: December 9, 1988

Work Order: 1055
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092770	88092772
Sample No.:	DANGB-2-SL7-SW1	DANGB-3-SL9-SW1
Date Sampled:	09-26-88	09-26-88
Time Sampled:	10:45	16:15
Date Extracted:	09-30-88	10-03-88
Date Analyzed:	11-09-88	11-10-88/11-23-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
2-Chlorophenol	10	ND	NT
2-Nitrophenol	10	ND	NT
Phenol	10	ND	NT
2,4-Dimethylphenol	10	ND	NT
2,4-Dichlorophenol	10	ND	NT
2,4,6-Trichlorophenol	10	ND	NT
4-Chloro-3-methylphenol	20	ND	NT
2,4-Dinitrophenol	50	ND	NT
2,6-Dichlorophenol	--*	ND	NT
2-Methyl-4,6-Dinitrophenol	50	ND	NT
Pentachlorophenol	50	ND	NT
4-Nitrophenol	50	ND	NT
Benzoic Acid	50	ND	NT
2-Methylphenol	10	ND	NT
3- & 4-Methylphenol	10	ND	NT
2,3,4,6-Tetrachlorophenol	--*	ND	NT
2,4,5-Trichlorophenol	10	ND	NT

Analyst

Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092763-88092775
WORK ORDER NO.: 1055

These water samples were received at the ES Berkeley Laboratory on 9-28-88. They were received cold and intact.

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED	SHIP TO
OR001	Duluth ANGB/Duluth, Mn.			ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710
SAMPLER(S): (Signature)				

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 601	EPA 625	EPA 418.1	SW 6010, 7060, 7131	SW7421, 7470	SW3510, 3515	SM420	REMARKS
4-28-88	1400	DANGB-3-SL10-SW1	2					X	X			Send on day late due to d. Monthly in Title
4-28-88	1615	DANGB-3-SL9-SW1	2					X	X			" "
[illegible]	[illegible]	[illegible]	2					X	X			" "

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

FEDERAL EXPRESS

AIRBILL

USE THIS AIRBILL FOR DOMESTIC SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 949030850

949030850

SENDER'S COPY

Sender's Federal Express Account Number: 1196-4260-8 | Date: 1-27-87

From (Your Name) Please Print: Kim DAvis | **Your Phone Number (Very Important):** (415) 451-5970

Company: ES | Department/Floor No.: 1E-105

Street Address: 515 S. Illinois Ave

City: Oak Ridge | State: TN | ZIP Required: 37830

To (Recipient's Name) Please Print: Kathleen Kell | **Recipient's Phone Number (Very Important):** (415) 548-7176

Company: Engineering Science, Inc. | Department/Floor No.:

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. # Zip Codes.): 600 Bancroft Way

City: Berkeley | State: CA | ZIP Required: 94710

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.): NP-C01.02

H IF HOLD FOR PICK-UP, Print FEDEX Address Here
Street Address:
City: | State: | ZIP Required:

PAYMENT ☐ Bill Sender ☐ Bill Recipient's FedEx Acct. No. ☐ Bill 3rd Party FedEx Acct. No. ☐ Bill Credit Card ☐ Cash

4 SERVICES

1 ☒ PRIORITY 1 Overnight Delivery
2 ☐ COURIER-PAK OVERNIGHT ENVELOPE*
3 ☐ OVERNIGHT BOX
4 ☐ OVERNIGHT TUBE
5 ☐ STANDARD AIR Delivery not later than second business day
6 ☐ OVERNIGHT LETTER*
7 ☐
8 ☐
9 ☐
10 ☐
*Declared Value Limit $100.

DELIVERY AND SPECIAL HANDLING

1 ☐ HOLD FOR PICK-UP (If in Box #3)
2 ☒ DELIVER WEEKDAY
3 DELIVER SATURDAY (Extra charge) ☐
4 ☐ DANGEROUS GOODS (Extra charge)
5 ☐ CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charge) (Release Signature Not Applicable)
6 ☐ DRY ICE ____ Lbs.
7 ☐ OTHER SPECIAL SERVICE
8 ☐
9 ☐ SATURDAY PICK-UP (Extra charge)
10 ☐
11 ☐
12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)

PACKAGES	WEIGHT	YOUR DECLARED VALUE (See right)	OVER SIZE
1	1 LB		
Total	Total 1 LB	Total	

Received At
1 ☐ Regular Stop
2 ☐ On-Call Stop
3 ☐ Drop Box 4 ☐ BSC 5 ☐ Station

FEDEX Corp. Employee No.:

Date/Time for FEDEX Use: 1-27 1:30

SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY

Use of this airbill constitutes your agreement to the service conditions in our current Service Guide which is available upon request. See back of sender's copy of this airbill for further information.

We will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay or non-delivery, unless you specify a higher amount in the space to the left, pay 40¢ per additional $100 specified and document your actual loss in the event of a claim. Maximum amount limitations found in the current Federal Express Service Guide apply. Your rights to recover from Federal Express for loss of the intrinsic value of the package, as well as for loss of sales, income, interest, profit, attorneys fees, costs and any other form of damage whether direct, incidental, consequential or special is limited to the greater of $100 or the declared value specified to the left. In no event shall your recovery exceed your actual loss.

In the event of untimely delivery, Federal Express will at your request and with some limitations, refund all transportation charges paid. See Service Guide for further information.

5 Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.

Release Signature: _____

Federal Express Use

Base Charges	
Declared Value Charge	
Other 1	
Other 2	
Total Charges	

PART #2041738900
REVISION DATE 7/88
PRINTED IN U.S.A. GBFE
009

© 1988 F.E.C.

SENDER'S COPY

ENGINEERING-SCIENCE

1055

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) JoAnn Sherwin Rita Rodby

SHIP TO: ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 419.1	SW 3010, 7040, 7131	SW7421, 7470	SW9230, 9315	SM423	REMARKS
9/26	1530	DANGB-3-SL8-SW1	2			X						882766
9/26	1615	DANGB-3-SL9-~~SL28~~ SW1	2		X							882779
9/26	1615	DANGB-3-SL9-SW1	2				X					|
9/26	1615	DANGB-3-SL9-SW1	2			X						↓
9/26	1615	DANGB-3-SL9-SW1	5	X								882773
9/26	1615	TB 14*	3	X								882765
9/26	~~1530~~ 1420	DANGB-3-SL28-SW1	5	X								882771
9/26	1400	DANGB-FB-19	2	X								

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
JoAnn Sherwin	1630 9/26				9/28/85 0930 Hal Hoey
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks: Samples received cold and intact.	

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

1055

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) J. Ann Sherwin Rita Reddy

SHIP TO: ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 8010, 7060, 7131	SW 7421, 7470	SW 3510, 9315	SM429	REMARKS
9/26	10:45	DANGB-2-SL7-SW1	2			X						
9/26	10:45	DANGB-2-SL7-SW1	2				X					
9/26	10:45	DANGB-2-SL7-SW1	5	X								
9/26	10:00	DANGB-2-SL29-SW1	5	X								
9/26	9:30	DANGB-FB20	2	X								
9/26	9:30	DANGB-2-SL6-SW1	5	X								
9/26	9:30	DANGB-2-SL6-SW1	2				X					
9/26	9:30	DANGB-2-SL6-SW1	2			X						
9/16	NO TIME	DANGB ~~TB~~ - TB15										

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
J. Ann Sherwin	9/26 5:30	Fed Ex Airbill # 949030987 2			9/28/88 0900
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	
				SAMPLES RECEIVED COLD AND INTACT.	

Distribution: Original Accompanies Shipment, Copy to [illegible]

ENGINEERING-SCIENCE

1055

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) JoAnn Sherwin, Rita Rothy

SHIP TO: ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 6010, 7060, 7131	SW7421, 7470	SW3510, 9315	SM429	REMARKS
9/26	1530	DANGB-3-SL8-SW1	2			X						882766
9/26	1615	DANGB-3-SL9-~~SW2~~ SW1	2		X							882772
9/26	1615	DANGB-3-SL9-SW1	2				X					
9/26	1615	DANGB-3-SL9-SW1	2			X						
9/26	1615	DANGB-3-SL9-SW1	5	X								
9/26	1615	TB 14*	3	X								882773
9/26	~~1530~~ 1420	DANGB-3-SL28-SW1	5	X								882765
9/26	1400	DANGB-FB-19	2	X								882771

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Jo Ann Sherwin	1630 9/26				9/27/85 0900

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
				*Samples received cold and intact.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

CHAIN OF CUSTODY RECORD

1055

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) Khaly Z. Jr Rita Rodd

SHIP TO: ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 602	EPA 625	EPA 418.1	SW 8010, 7360, 7131	SW7421, 7473, 7131	SW3510, 3515	SM429	REMARKS
9-25-87	1210	DANGB-BG-SL1-SW1	2					X	X			882763 for sample sent 9-24-87 Replacement due to wrong filter size.
9-25-87	1310	DANGB-BG-SL2-SW1	2					X	X			" 882764 "
9-26-87	1420	DANGB-3-SL28-SW1	4		X	X						882765
9-26-87	1530	DANGB-3-SL8-SW1	2				X					882766
9-26-87	1530	DANGB-3-SL8-SW1	2		X							882767
9-26-87	1400	DANGB-2SL10-SW1	5	X								882768

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Khaly Z. Jr.	9-26-87 1600	FedEx Airbill # 949630 9472			Floyd Adney 9/28/87 1000

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
				SAMPLES RECEIVED COLD W/ S-PACKET

Distribution: Original Accompanies Shipment—Copy to Coordinator Field Files

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature)

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 8040, 7060, 7131	SW7421, 7470, 7195	SW9310, 9315	SM429	REMARKS
9/26	10:00	DANGB-2-SL25-SW1	2			X						
9/26	10:00	DANGB-2-SL29-SW1	2				X					
9/24/SX	1000	DANGB-1-SL29-SW1	2					X	X			
9/24/SX	0430	DANGB-1-SL6-SW1	2					X	X			
9/24/SX	1045	DANGB-2-SL7-SW1	2					X	X			
9/24/SX	1000	DANGB-4-SL4-SW1	2					X	X			
9/24/SX	1400	DANGB-4-SL4-SW1	2			X						

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	9-26-SX 1000	Fed Ex Airbill # 949030987 2			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.		SW8010, 8020 / EPA 601 / EPA 624 / EPA 418.1 / SW 6010, 7060, 7131 / SW7421, 7470 / SW8310, 8315 / SM423	ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710
SAMPLER(S): (Signature) Debra Sherman				

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	REMARKS
9/26	10:45	DANGB-2-SL7-SW1	1	NITRATES
9/26	9:30	DANGB-2-SL6-SW1	1	NITRATES
9/26	10:00	DANGB-2-SL39 SW1	1	NITRATES

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

FEDERAL EXPRESS

AIRBILL

USE THIS AIRBILL FOR DOMESTIC SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 949030[illegible]894

949030[illegible]894

SENDER'S COPY

Sender's Federal Express Account Number: [illegible] 207-8

Date: [illegible]

1 From (Your Name) Please Print: [illegible]

Your Phone Number (Very Important): ([illegible])

Company: [illegible]

Department/Floor No.: [illegible]

Street Address: [illegible]

City: Oak Ridge State: TN ZIP Required: [illegible]

2 To (Recipient's Name) Please Print: [illegible]

Recipient's Phone Number (Very Important): ( )

Company: [illegible]

Department/Floor No.:

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): [illegible]

City: [illegible] State: PA ZIP Required: [illegible]

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.)

[illegible]

4 PAYMENT [X] Bill Sender [ ] Bill Recipient's FedEx Acct. No. [ ] Bill 3rd Party FedEx Acct. No. [ ] Bill Credit Card [ ] Cash

H IF HOLD FOR PICK-UP, Print FEDEX Address Here

Street Address:

City: State: ZIP Required:

SERVICES

1 [X] PRIORITY 1 Overnight Delivery
2 [ ] COURIER-PAK OVERNIGHT ENVELOPE*
3 [ ] OVERNIGHT BOX
4 [ ] OVERNIGHT TUBE
5 [ ] STANDARD AIR Delivery not later than second business day
6 [ ] OVERNIGHT LETTER*
7 [ ]
8 [ ]
9 [ ]
10 [ ]

*Declared Value Limit $100.

DELIVERY AND SPECIAL HANDLING

1 [ ] HOLD FOR PICK-UP (If in Box H)
2 [X] DELIVER WEEKDAY
3 [ ] DELIVER SATURDAY (Extra charge)
4 [ ] DANGEROUS GOODS (Extra charge)
5 [ ] CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charge) (Release Signature Not Applicable)
6 [ ] DRY ICE ____ Lbs.
7 [ ] OTHER SPECIAL SERVICE
8 [ ]
9 [ ] SATURDAY PICK-UP (Extra charge)
10 [ ]
11 [ ]
12 [ ] HOLIDAY DELIVERY (If offered) (Extra charge)

PACKAGES	WEIGHT	YOUR DECLARED VALUE (See right)	OVER SIZE
1	LBS		
	LBS		
	LBS		
Total	Total	Total	

Received At
1 [ ] Regular Stop
2 [ ] On-Call Stop
3 [ ] Drop Box
4 [ ] B.S.C.
5 [ ] Station

FEDEX Corp. Employee No.

Date/Time for FEDEX Use

SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY

Use of this airbill constitutes your agreement to the service conditions in our current Service Guide which is available upon request. See back of sender's copy of this airbill for further information.

We will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay or non-delivery, unless you specify a higher amount in the space to the left, pay 40¢ per additional $100 specified and document your actual loss in the event of a claim. Maximum amount limitations found in the current Federal Express Service Guide apply. Your rights to recover from Federal Express for loss of the intrinsic value of the package, as well as for loss of sales, income, interest, profit, attorneys fees, costs and any other form of damage whether direct, incidental, consequential or special is limited to the greater of $100 or the declared value specified to the left. In no event shall your recovery exceed your actual loss.

In the event of untimely delivery Federal Express will at your request and with some limitations, refund all transportation charges paid. See Service Guide for further information.

5 Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.

Release Signature: _____

Federal Express Use:

Base Charges	
Declared Value Charge	
Other 1	
Other 2	
Total Charges	

PART #2041738900
REVISION DATE 7/88
PRINTED IN U.S.A. GBFE

009

© 1988 FEC.

SENDER'S COPY

WAB

155

FEDERAL EXPRESS

AIRBILL

USE THIS AIRBILL FOR DOMESTIC SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 945030850

945030850

SENDER'S COPY

Sender's Federal Express Account Number: 1146-4226-4 | Date: 4-27-88

From (Your Name) Please Print: Kim DA...
Your Phone Number (Very Important): (415) 451-5470
Company: ES
Department/Floor No.: 415-105
Street Address: 3... Fillmore Ave
City: Oakridge | State: TN | ZIP Required: 37830

To (Recipient's Name) Please Print: K. Mileen Kiel
Recipient's Phone Number (Very Important): (415) 548-7178
Company: Engineering Science Inc
Department/Floor No.:
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. # Zip Codes.): 1106 Richard Way
City: Berkeley | State: CA | ZIP Required: 94710

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.)
12-601.62

PAYMENT ☐ Bill Sender ☐ Bill Recipient's FedEx Acct. No. ☐ Bill 3rd Party FedEx Acct. No. ☐ Bill Credit Card ☐ Cash

H IF HOLD FOR PICK-UP, Print FEDEX Address Here
Street Address:
City | State | ZIP Required

4 SERVICES

1 ☒ PRIORITY 1 Overnight Delivery
2 ☐ COURIER-PAK OVERNIGHT ENVELOPE*
3 ☐ OVERNIGHT BOX
4 ☐ OVERNIGHT TUBE
5 ☐ STANDARD AIR Delivery not later than second business day
6 ☐ OVERNIGHT LETTER*
7 ☐
8 ☐
9 ☐
10 ☐

*Declared Value Limit $100.

DELIVERY AND SPECIAL HANDLING

1 ☐ HOLD FOR PICK-UP (if no Box H)
2 ☒ DELIVER WEEKDAY
3 DELIVER SATURDAY (Extra charges) ☐
4 ☐ DANGEROUS GOODS (Extra charges)
5 ☐ CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charges) (Package Signature Not Applicable)
6 ☐ DRY ICE _____ Lbs.
7 ☐ OTHER SPECIAL SERVICE _____
8 ☐
9 ☐ SATURDAY PICK-UP (Extra charges)
10 ☐
11 ☐
12 ☐ HOLIDAY DELIVERY (If offered) (Extra charges)

	PACKAGES	WEIGHT	YOUR DECLARED VALUE (See right)	OVER SIZE
	1	6/6		
	1	15		
Total	2	21	Total	

Received At
1 ☐ Regular Stop
2 ☐ On-Call Stop
3 ☐ Drop Box
4 ☐ B.S.C.
5 ☐ Station

FEDEX Corp. Employee No.:
Date/Time for FEDEX Use: 4-27-88

SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY

- Use of this airbill constitutes your agreement to the service conditions in our current Service Guide which is available upon request. See back of sender's copy of this airbill for further information.
- We will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay or non-delivery, unless you specify a higher amount in the space to the left, pay 40¢ per additional $100 specified and document your actual loss in the event of a claim. Maximum amount limitations found in the current Federal Express Service Guide apply. Your rights to recover from Federal Express for loss of the intrinsic value of the package, as well as for loss of sales, income, interest, profit, attorneys fees, costs and any other form of damage whether direct, incidental, consequential or special is limited to the greater of $100 or the declared value specified to the left. In no event shall your recovery exceed your actual loss.
- In the event of untimely delivery Federal Express will at your request and with some limitations, refund all transportation charges paid. See Service Guide for further information.

5 Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.

Release Signature: _____

Federal Express Use

Base Charges	
Declared Value Charge	
Other 1	
Other 2	
Total Charges	

PART #2041738900
REVISION DATE 7/88
PRINTED IN U.S.A. GBFE
009

© 1988 F.E.C.

SENDER'S COPY

156

FEDERAL EXPRESS

AIRBILL

USE THIS AIRBILL FOR DOMESTIC SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 949030894

949030894

SENDER'S COPY

Sender's Federal Express Account Number: 210-427-8[illegible] | Date: 9/16/[illegible]

1 From (Your Name) Please Print: K. A. Davis | Your Phone Number (Very Important): (615) 4[illegible]

Company: Engineering Technology, Inc. | Department/Floor No.:

Street Address: 710 S. Illinois Ave.

City: Oak Ridge | State: TN | ZIP Required: 37830

2 To (Recipient's Name) Please Print: [illegible] | Recipient's Phone Number (Very Important):

Company: AVS Corporation | Department/Floor No.:

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. # Zip Codes.): 5300 Wissahickon Ave. Rm. D-1

City: Philadelphia | State: PA | ZIP Required: 19144

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.): NE 001-02

H IF HOLD FOR PICK-UP, Print FEDEX Address Here
Street Address:
City: | State: | ZIP Required:

PAYMENT: [X] Bill Sender [ ] Bill Recipient's FedEx Acct. No. [ ] Bill 3rd Party FedEx Acct. No. [ ] Bill Credit Card [ ] Cash

4 SERVICES

1 [X] PRIORITY 1 Overnight Delivery
2 [ ] COURIER-PAK OVERNIGHT ENVELOPE*
3 [ ] OVERNIGHT BOX
4 [ ] OVERNIGHT TUBE
5 [ ] STANDARD AIR Delivery not later than second business day
6 [ ] OVERNIGHT LETTER*
7 [ ]
8 [ ]
9 [ ]
10 [ ]

*Declared Value Limit $100.

DELIVERY AND SPECIAL HANDLING

1 [ ] HOLD FOR PICK-UP (If no Box No.)
2 [X] DELIVER WEEKDAY
3 DELIVER SATURDAY (Extra charge) [ ]
4 [ ] DANGEROUS GOODS (Extra charge)
5 [ ] CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charge) (Passport Signature Not Applicable)
6 [ ] DRY ICE _____ Lbs.
7 [ ] OTHER SPECIAL SERVICE _____
8 [ ]
9 [ ] SATURDAY PICK-UP (Extra charge)
10 [ ]
11 [ ]
12 [ ] HOLIDAY DELIVERY (If offered) (Extra charge)

PACKAGES	WEIGHT	$ DECLARED VALUE (See right)	OVER SIZE
1	1.00		
	1.00		
	1.00		
Total	Total	Total	

Received At
1 [ ] Regular Stop
2 [ ] On-Call Stop
3 [ ] Drop Box 4 [ ] B.S.C. 5 [ ] Station

FEDEX Corp. Employee No.:

Date/Time for FEDEX Use:

SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY

Use of this airbill construes your agreement to the service conditions in our current Service Guide which is available upon request. See back of sender's copy of this airbill for further information.

We will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay or non-delivery, unless you specify a higher amount in the space to the left, pay 40¢ per additional $100 specified and document your actual loss in the event of a claim. Maximum amount limitations found in the current Federal Express Service Guide apply. Your rights to recover from Federal Express for loss of the intrinsic value of the package, as well as for loss of sales, income, interest, profit, attorneys fees, costs and any other form of damage whether direct, incidental, consequential or special is limited to the greater of $100 or the declared value specified to the left. In no event shall your recovery exceed your actual loss.

In the event of untimely delivery, Federal Express will at your request and with some limitations, refund all transportation charges paid. See Service Guide for further information.

5 Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.

Release Signature: _____

Federal Express Use

Base Charges	
Declared Value Charge	
Other 1	
Other 2	
Total Charges	

PART #2041738900
REVISION DATE 7/88
PRINTED IN U.S.A. GBFE

009

© 1988 F.E.C.

SENDER'S COPY

FEDERAL EXPRESS

AIRBILL

USE THIS AIRBILL FOR DOMESTIC SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 9490309872

9490309872

SENDER'S COPY

Sender's Federal Express Account Number: 1196-4707-4 | Date: 9-26-97

1 From (Your Name) Please Print: Kim Dacil | Your Phone Number (Very Important): (415) 481-4970

Company: ES | Department/Floor No.: 51 F-103

Street Address: 7800 E. Illinois Ave

City: Oak Ridge | State: TN | ZIP Required: 37830

2 To (Recipient's Name) Please Print: Kathleen Hall | Recipient's Phone Number (Very Important): (415) 941-7355

Company: Environ Science Inc | Department/Floor No.:

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. + Zip Codes.): 600 Townsend Ste 4

City: Tiburon | State: CA | ZIP Required: 94920

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.): EA 661.02

PAYMENT: [X] Bill Sender [ ] Bill Recipient's FedEx Acct. No. [ ] Bill 3rd Party FedEx Acct. No. [ ] Bill Credit Card [ ] Cash

H IF HOLD FOR PICK-UP, Print FEDEX Address Here
Street Address:
City: State: ZIP Required:

4 SERVICES

1 [X] PRIORITY 1 Overnight Delivery
2 [ ] COURIER-PAK OVERNIGHT ENVELOPE*
3 [ ] OVERNIGHT BOX
4 [ ] OVERNIGHT TUBE
5 [ ] STANDARD AIR Delivery not later than second business day
6 [ ] OVERNIGHT LETTER*
7 [ ]
8 [ ]
9 [ ]
10 [ ]
*Declared Value Limit $100.

DELIVERY AND SPECIAL HANDLING

1 [ ] HOLD FOR PICK-UP (If box #1)
2 [X] DELIVER WEEKDAY
3 [ ] DELIVER SATURDAY (Extra charge)
4 [ ] DANGEROUS GOODS (Extra charge)
5 [ ] CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charge; Signature Not Applicable)
6 [ ] DRY ICE ____ Lbs.
7 [ ] OTHER SPECIAL SERVICE
8 [ ]
9 [ ] SATURDAY PICK-UP (Extra charge)
10 [ ]
11 [ ]
12 [ ] HOLIDAY DELIVERY (If offered) (Extra charge)

PACKAGES	WEIGHT	YOUR DECLARED VALUE (See right)	OVER SIZE
Total	Total	Total	

Received At
1 [ ] Regular Stop
2 [ ] On-Call Stop
3 [ ] Drop Box
4 [ ] B.S.C.
5 [ ] Station

FEDEX Corp. Employee No.: 2111

Date/Time for FEDEX Use

SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY

Use of this airbill constitutes your agreement to the service conditions in our current Service Guide which is available upon request. See back of sender's copy of this airbill for further information.

We will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay or non-delivery, unless you specify a higher amount in the space to the left, pay 40¢ per additional $100 specified and document your actual loss in the event of a claim. Maximum amount limitations found in the current Federal Express Service Guide, apply. Your rights to recover from Federal Express for loss of the intrinsic value of the package, as well as for loss of sales, income, interest, profit, attorneys fees, costs and any other form of damage whether direct, incidental, consequential or special is limited to the greater of $100 or the declared value specified to the left. In no event shall your recovery exceed your actual loss.

In the event of untimely delivery, Federal Express will at your request and with some limitations, refund all transportation charges paid. See Service Guide for further information.

5 Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.

Release Signature: _____

Federal Express Use

Base Charges	
Declared Value Charge	
Other 1	
Other 2	
Total Charges	

PART #2041738900
REVISION DATE 7/88
PRINTED IN U.S.A. GBFE
009

© 1988 F.E.C.

SENDER'S COPY

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092615-88092616, 88092719-88092722
88092724-88092725, 88092763-88092764
88092768-88092771, 88092777-88092780

QC Report No: AAF-W-0054-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-27-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Arsenic	88092724	88092724	10-21-88	NA	7060	<0.01	<0.01	<0.01	NC	0.040	<0.01	0.0364	91	
Cadmium	88092724	88092724	10-27-88	NA	6010	<0.005	<0.005	<0.005	NC	0.010	<0.005	0.010	100	
Chromium	88092724	88092724	10-21-88	NA	6010	<0.01	<0.01	<0.01	NC	0.020	<0.01	0.0199	100	
Lead	88092724	88092724	10-22-88	NA	7421	<0.005	<0.0063	<0.0063	0	0.020	0.0063	0.0252	94	

659

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

QC Report No: ICP-W-0061-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-27-88
Date Reported: 2-27-89
Dilution Factor: NA

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092615-88092616, 88092719-88092722
88092724-88092725, 88092763-88092764
88092768-88092771, 88092777-88092780

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	Duplicate RPD	Duplicate SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Barium	88092724	88092724	10-27-88	NA	6010	<0.2	<0.2	<0.2	NC	2.0	<0.2	0.190	95	

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No: CVM-W-0032-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-27-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88092615-88092616, 88092719-88092722
88092724-88092725, 88092763-88092764
88092768-88092771, 88092777-88092780

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	Duplicate RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Mercury	88092724	88092724	10-22-88	NA	245.1	<0.0002	<0.0002	<0.0002	NC	0.0010	<0.0002	0.00091	91	

191

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
VOLATILE ORGANICS
EPA 8010/8020

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092747-88092749
88092765, 88092767-88092770
88092772-88092777

QC Report No: VGC-W-0055-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-28-88
Date Prepared: NA
Date Analyzed: 10-10-88
Date Reported: 10-28-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092789*	1,1-Dichloroethane	10	ND	10.5	105	9.55	96	9	26	70-130
	Trichloroethene	10	ND	11.6	116	10.6	106	9	19	65-131
	Chlorobenzene	10	ND	12.5	125	12.5	125	0	40	59-137
	Aromatics: 8020									
88092789*	Benzene	10	ND	10.5	105	10.3	103	2	20	56-146
	Toluene	10	ND	10.7	107	10.6	106	1	41	42-150
	Chlorobenzene	10	ND	10.4	104	10.5	105	1	36	76-133

* The quality control sample is from a different project.

Relative Percent Difference (PR) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Sample Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 10-28-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
1	10-4-88	VGC	Porasil	75-09-2	Dichloromethane	20	0.25	88092768-88092770
1	10-3-88	VGC	Carbopack	75-09-2	Dichloromethane	1.5	0.25	88092772-88092775
				67-66-3	Chloroform	1.7	0.05	88092765-88092766

193

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: OCP-W-0039-88
QC REPORT NO.: OCP-W-0039-88B

Analysis of matrix spikes resulted in recoveries for aldrin that were slightly above EPA recommended limits. Subsequent analysis of spiked blanks resulted in poor precision for all spiked compounds, although the recoveries were within limits for all but endrin in one of the two spiked blanks. The analytical data associated with these analyses were closely examined. No errors or problems were found.

Heptachlor epoxide was inadvertently used instead of heptachlor in the matrix spiking solution.

Endrin aldehyde and Kepone were not recoverable because they were removed by the alumina column clean-up used on these samples.

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

QC Report No.: OCP-W-0039-88
QC Sample No.: 88092694
Level (Low/Med): Low
Date Reported: 11-11-88

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s).:
88092694-88092696, 88092726-88092727
88092765-88092766, 88092772, 88092777
88092806, 88092721

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	200	ND	0.196	98	56-123
Heptachlor epoxide	200	ND	0.239	120	40-131
Aldrin	200	ND	0.253	127*	40-120
Dieldrin	500	ND	0.532	106	52-126
Endrin	500	ND	0.475	95	56-121
4,4'-DDT	500	ND	0.435	87	38-127

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.217	109	98	10	15	56-123
Heptachlor epoxide	0.256	128	120	7	20	40-131
Aldrin	0.251	126*	127*	1	22	40-120
Dieldrin	0.606	121	106	13	18	52-126
Endrin	0.543	109	95	13	21	56-121
4,4'-DDT	0.513	104	87	17	27	38-127

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 6 outside limits

Spike Recovery: 2 out of 12 outside limits

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

QC Report No.: OCP-W-0039-88B
QC Sample No.: Blank
Level (Low/Med): Low
Date Reported: 11-11-88

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s).:
88092694-88092696, 88092726-88092727
88092765-88092766, 88092772, 88092777, 88092806

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	200	ND	0.169	85	56-123
Heptachlor epoxide	200	ND	0.184	92	40-131
Aldrin	200	ND	0.155	78	40-120
Dieldrin	500	ND	0.419	84	52-126
Endrin	500	ND	0.193	39*	56-121
4,4'-DDT	500	ND	0.385	77	38-127

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.236	118	85	33*	15	56-123
Heptachlor epoxide	0.263	132	92	35*	20	40-131
Aldrin	0.231	116	78	39*	22	40-120
Dieldrin	0.608	122	84	37*	18	52-126
Endrin	0.522	104	39*	92*	21	56-121
4,4'-DDT	0.567	113	77	38*	27	38-127

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 6 out of 6 outside limits

Spike Recovery: 1 out of 12 outside limits

PESTICIDE METHOD BLANK SUMMARY

Job No.: OR001
Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite E-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Lab Name: Engineering Science
Lab Sample No.: Blank
Matrix: Water
Level (low/med): Low
Extraction:
(SepF/Cont/Sonc): Sonc
Date Reported: 11-03-88

Date Extracted: 9-30-88
Date Analyzed (1): 10-24-88
Time Analyzed (1): 20:26
Instrument ID (1): 5890 #2
GC Column ID (1): OV-1

Date Analyzed (2): 10-26-88
Time Analyzed (2): 01:29
Instrument ID (2): 5880
GC Column ID (2): Mixed

This Method Blank applies to the following samples, MS and MSD.

EPA Sample No.	Lab Sample ID (1)	Date Analyzed 1	Lab Sample ID (2)	Date Analyzed 2
-	88092726	10-24-88	88092721	10-26-88
-	88092727	10-24-88		
-	88092765	10-24-88		
-	88092766	10-24-88		
-	88092721	10-25-88		

PESTICIDE METHOD BLANK SUMMARY

Job No.:	OR001	Lab Name:	Engineering Science
		Lab Sample No.:	Blank
Client:	ES Oak Ridge		
Attn:	Bill Hayden	Matrix:	Soil
Address:	710 S. Illinois Avenue	Level (low/med):	Low
	Suite F-103	Extraction:	
	Oak Ridge, Tn. 37830	(SepF/Cont/Sonc):	Sonc
		Date Reported:	11-03-88
Project:	Duluth ANGB		
Date Extracted:	10-03-88		
Date Analyzed (1):	10-25-88	Date Analyzed (2):	10-25-88
Time Analyzed (1):	03:10	Time Analyzed (2):	22:06
Instrument ID (1):	5890 #2	Instrument ID (2):	5880
GC Column ID (1):	OV-1	GC Column ID (2):	Mixed

This Method Blank applies to the following samples, MS and MSD.

EPA Sample No.	Lab Sample ID (1)	Date Analyzed 1	Lab Sample ID (2)	Date Analyzed 2
-	88092772	10-25-88	88092772	10-26-88
-	88092777	10-25-88		
-	88092806	10-25-88		

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
WORK ORDER NO(S). 1055
EPA METHOD 8270 ANALYSIS

Samples 88092765, 88092766, 88092768, 88092769 and 88092770 were first extracted on September 30, 1988. Sample 88092772 was first extracted on October 3, 1988. The samples were first analyzed on November 9-10, 1988. Thus, all holding times were met. When sample 88092766 was first analyzed, recoveries of two base neutral surrogates were below EPA QC limits. The extract was re-analyzed. Surrogate spike recoveries met EPA QC criteria, but area counts for the sixth internal standard were low. The acid extract of sample 88092772 was lost during the extraction procedure. There was no more sample for re-extraction. When the base neutral extract of this sample was analyzed, area counts for one or more internal standards were outside of EPA QC limits. The extract was re-analyzed with the same result, suggesting a matrix effect.

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No: BNA-W-0054-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-23-88
Date Prepared: 9-28-88
Date Analyzed: 11-07-88
Date Reported: 12-28-88
Dilution Factor: 1.0

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88092612-88092617, 88092677-88092678
88092681, 88092694-88092695, 88092724,
88092765-88092766, 88092768-88092770, 88092772, 88092777

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limits RPD	EPA QC Limits RECOVERY
	1,2,4-Trichlorobenzene	100	ND	63.3	63	71.6	72	13	28	39-98
B/N	Acenaphthene	100	ND	71.2	71	73.9	74	4	31	46-118
Laboratory	2,4-Dinitrotoluene	100	ND	71.3	71	68.0	68	4	38	24-96
Sample #	Pyrene	100	ND	91.7	92	80.6	81	13	31	26-127
	N-Nitroso-di-n-Propylamine	100	ND	80.0	80	80.9	81	1	38	41-116
88092617	1,4-Dichlorobenzene	100	ND	70.4	70	76.7	77	10	28	36-97
ACID	Pentachlorophenol	200	ND	53.4	27	74.5	37	31	50	9-103
Laboratory	Phenol	200	ND	59.4	30	68.0	34	12	42	12-89
Sample #	2-Chlorophenol	200	ND	118	59	129	64	8	40	27-123
	4-Chloro-3-Methylphenol	200	ND	132	66	135	68	3	42	23-97
88092617	4-Nitrophenol	200	ND	81.1	41	88.0	44	7	50	10-80

U41

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1055

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 3-23-89

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E6135	11-08-88	AC	2	-	None Detected	-	-	88092765-88092770
E6136	11-08-88	BN	2	117-81-7	Bis(2-ethylhexyl)phthalate	59	10	88092765-88092770

141

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1055

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 3-23-89

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E6180	11-11-88	AC	2	-	None Detected	-	-	88092772, 88092777
E6183	11-11-88	BN	2	117-81-7	Bis(2-ethylhexyl)phthalate	20	10	88092772, 88092777

172, 211

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1055
Matrix: Water
Conc Unit: ug/L
Lab Sample ID: 88092663-85 Blank
88092766-70 AC
Lab File ID: E6135
Date Received: NA
Date Extracted: 09-30-88
Date Analyzed: 11-08-88
Date Reported: 04-11-89
Dilution Factor: NA
% Moisture:

TICs Found: 1

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.20	10	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1055
		Matrix:	Water
		Conc Unit:	ug/L
Client:	ES Oak Ridge	Lab Sample ID:	88092663-85 Blank
Attn:	Bill Hayden		88092766-70 BN
Address:	710 S. Illinois Avenue	Lab File ID:	E6136
	Suite F-103	Date Received:	NA
	Oak Ridge, Tn. 37830	Date Extracted:	09-30-88
		Date Analyzed:	11-08-88
		Date Reported:	04-11-89
Project:	Duluth ANGB	Dilution Factor:	NA
		% Moisture:	

TICs Found: 3

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.20	10	
-	Unknown	25.07	17	
-	Unknown	28.77	7	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1055
Matrix: Water
Conc Unit: ug/L
Lab Sample ID: 88092770 AC

Lab File ID: E6159
Date Received: 09-28-88
Date Extracted: 09-30-88
Date Analyzed: 11-09-88
Date Reported: 04-11-89
Dilution Factor: 1
% Moisture:

TICs Found: 3

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.16	11	B
-	Unknown	4.49	7	
-	Unknown	28.77	38	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1055
Matrix: Water
Conc Unit: ug/L
Lab Sample ID: 88092770 BN

Lab File ID: E6160
Date Received: 09-28-88
Date Extracted: 09-30-88
Date Analyzed: 11-09-88
Date Reported: 04-11-89
Dilution Factor: 1
% Moisture:

TICs Found: 3

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.17	15	B
-	Unknown	25.06	5	
-	Unknown	28.78	54	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1055
Matrix: Water
Conc Unit: ug/L
Lab Sample ID: 88092768 AC

Lab File ID: S0452
Date Received: 09-28-88
Date Extracted: 09-30-88
Date Analyzed: 11-09-88
Date Reported: 04-11-89
Dilution Factor: 1
% Moisture:

TICs Found: 8.

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.28	81	
-	Unknown	3.33	110	
79-01-6	Trichloroethene	3.44	11	
-	Unknown	4.86	10	
127-18-4	Tetrachloroethene	5.10	18	B
-	Unknown	5.42	7	
79-34-5	1,1,2,2-Tetrachloroethane	7.07	4	
-	Unknown	26.74	5	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1055
Matrix: Water
Conc Unit: ug/L
Lab Sample ID: 88092768 BN

Lab File ID: S0453
Date Received: 09-28-88
Date Extracted: 09-30-88
Date Analyzed: 11-09-88
Date Reported: 04-11-89
Dilution Factor: 1
% Moisture:

TICs Found: 13

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	4.00	4	
-	Unknown	4.86	15	
127-18-4	Tetrachloroethene	5.07	13	B
-	Unknown	5.44	13	
79-34-5	1,1,2,2-Trichloroethane	7.07	9	
-	Unknown	25.07	14	
-	Unknown	26.46	53	
-	Unknown	29.18	9	
-	Unknown	29.82	18	
-	Unknown	30.13	15	
-	Unknown	31.15	4	
-	Unknown Saturated Aliphatic	32.23	4	
-	Unknown	34.76	20	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1055
Matrix: Water
Conc Unit: ug/L
Lab Sample ID: 88092769 AC

Lab File ID: S0454
Date Received: 09-28-88
Date Extracted: 09-30-88
Date Analyzed: 11-09-88
Date Reported: 04-11-89
Dilution Factor: 1
% Moisture:

TICs Found: 9

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.24	19	
-	Unknown	3.35	7	
79-01-6	Trichloroethene	3.43	13	
-	Unknown	4.88	39	
127-18-4	Tetrachloroethene	5.09	17	B
-	Unknown	5.45	34	
-	Unknown	7.08	11	
-	Unknown	8.12	12	
-	Unknown	30.12	16	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1055
Matrix: Water
Conc Unit: ug/L
Lab Sample ID: 88092769 BN

Lab File ID: S0455
Date Received: 09-28-88
Date Extracted: 09-30-88
Date Analyzed: 11-09-88
Date Reported: 04-11-89
Dilution Factor: 1
% Moisture:

TICs Found: 7

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.28	90	
79-01-6	Trichloroethene	3.42	10	
-	Unknown	4.88	45	
127-18-4	Tetrachloroethene	5.08	18	B
-	Unknown	5.46	38	
79-34-5	1,1,2,2-Tetrachloroethane	7.07	25	
-	Unknown	26.70	12	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1055
Matrix: Water
Conc Unit: ug/L
Lab Sample ID: 88092765 AC

Lab File ID: E6155
Date Received: 09-28-88
Date Extracted: 09-30-88
Date Analyzed: 11-09-88
Date Reported: 04-11-89
Dilution Factor: 1
% Moisture:

TICs Found: 4

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.16	13	B
-	Unknown	4.20	12	
-	Unknown	4.50	16	
-	Unknown	25.03	8	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1055
Matrix: Water
Conc Unit: ug/L
Lab Sample ID: 88092765 BN

Lab File ID: S0469
Date Received: 09-28-88
Date Extracted: 09-30-88
Date Analyzed: 11-10-88
Date Reported: 04-11-89
Dilution Factor: 1
% Moisture:

TICs Found: 14

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.27	39	
-	Unknown	3.35	120	
79-01-6	Trichloroethene	3.45	9	
-	Unknown	4.87	26	
127-18-4	Tetrachloroethene	5.10	12	B
-	Unknown	5.43	18	
79-34-5	1,1,2,2-Trichloroethane	7.06	15	
-	Unknown	26.75	6	
-	Unknown	29.57	6	
-	Unknown	29.82	21	
-	Unknown	30.13	8	
-	Unknown	34.76	36	
-	Unknown	39.63	35	
-	Unknown	40.17	13	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1055
Matrix: Water
Conc Unit: ug/L
Lab Sample ID: 88092766 AC

Lab File ID: S0450
Date Received: 09-28-88
Date Extracted: 09-30-88
Date Analyzed: 11-09-88
Date Reported: 04-11-89
Dilution Factor: 1
% Moisture:

TICs Found: 5

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	4.90	68	
127-18-4	Tetrachloroethene	5.06	11	B
-	Unknown	5.47	55	
79-34-5	1,1,2,2-Tetrachloroethane	7.07	40	
-	Unknown	26.66	6	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1055
Matrix: Water
Conc Unit: ug/L
Lab Sample ID: 88092766 BN

Lab File ID: S0451
Date Received: 09-28-88
Date Extracted: 09-30-88
Date Analyzed: 11-09-88
Date Reported: 04-11-89
Dilution Factor: 1
% Moisture:

TICs Found: 21

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.25	31	
-	Unknown	3.30	75	
-	Unknown	4.22	8	
-	Unknown	5.07	390	
-	Unknown	5.25	11	
-	Unknown	5.62	230	
-	Unknown	6.01	11	
-	Unknown	7.00	11	
-	Unknown	7.14	79	
-	Unknown	7.29	69	
-	Unknown	7.54	11	
-	Chlorinated Unknown	8.10	11	
-	Chlorinated Unknown	8.38	14	
-	Unknown	8.45	17	
-	Unknown	9.95	13	
-	Unknown	10.01	38	
-	Chlorinated Unknown	12.29	5	
-	Unknown	25.04	11	
-	Unknown	26.46	15	
-	Unknown	29.82	8	
-	Unknown	34.75	18	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1055
Matrix: Water
Conc Unit: ug/L
Lab Sample ID: 88092766 BN
Re-analysis
Lab File ID: S0613
Date Received: 09-28-88
Date Extracted: 09-30-88
Date Analyzed: 11-30-88
Date Reported: 04-11-89
Dilution Factor: 1
% Moisture:

TICs Found: 22

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.26	110	
-	Unknown	3.94	27	
-	Unknown	4.01	15	
-	Unknown	4.16	64	
-	Unknown	4.22	13	
-	Unknown	4.27	12	
-	Unknown	4.62	210	
-	Unknown	4.66	33	
-	Unknown	4.87	88	
-	Unknown	4.98	23	
127-18-4	Tetrachloroethene	5.02	16	B
-	Unknown	5.09	15	
-	Unknown	5.21	15	
-	Unknown	5.41	51	
-	Unknown	5.45	53	
-	Unknown	6.01	150	
-	Unknown	6.57	15	
79-34-5	1,1,2,2-Tetrachloroethane	7.01	36	
-	Unknown	7.43	14	
-	Unknown	8.81	25	
-	Unknown	24.94	13	
-	Unknown	26.38	14	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1055
Matrix: Water
Conc Unit: ug/L
Lab Sample ID: 88092742-47 Blank
88092772-77 AC
Lab File ID: E6180
Date Received: NA
Date Extracted: 10-03-88
Date Analyzed: 11-10-88
Date Reported: 04-11-89
Dilution Factor: NA
% Moisture:

TICs Found: 2

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.14	19	
-	Unknown	28.68	17	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1055
		Matrix:	Water
		Conc Unit:	ug/L
Client:	ES Oak Ridge	Lab Sample ID:	88092742-47 Blank
Attn:	Bill Hayden		88092772-77 BN
Address:	710 S. Illinois Avenue	Lab File ID:	E6183
	Suite F-103	Date Received:	NA
	Oak Ridge, Tn. 37830	Date Extracted:	10-03-88
		Date Analyzed:	11-11-88
		Date Reported:	04-11-89
Project:	Duluth ANGB	Dilution Factor:	NA
		% Moisture:	

TICs Found: 3

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.99	20	
127-18-4	Tetrachloroethene	4.16	21	
-	Unknown	4.49	12	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1055
Matrix: Water
Conc Unit: ug/L
Lab Sample ID: 88092772 BN
Re-analysis
Lab File ID: E6320
Date Received: 09-28-88
Date Extracted: 10-03-88
Date Analyzed: 11-23-88
Date Reported: 04-11-89
Dilution Factor: 1
% Moisture:

TICs Found: 8

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.73	4	
-	Unknown	3.94	66	
127-18-4	Tetrachloroethene	4.08	25	B
-	Unknown	4.46	55	
79-34-5	1,1,2,2-Tetrachloroethane	5.88	9	
-	Unknown	28.64	120	
-	Unknown	31.20	4	
-	Unknown	34.01	4	

418.1 INITIAL & CONTINUING CALIBRATION DATA

Job No.:	OR001	Calibration Date:	10-21-88
		Instrument I.D.:	Bausch & Lomb Spectronic 270 IR
Client:	ES Oak Ridge		
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue Suite F-103 Oak Ridge, Tn. 37830	Unit: Date Reported: R=	mg/L 11-09-88 0.9986
Project:	Duluth ANGB	Laboratory Supervisor Approval:	

Laboratory Sample No(s).:
88092765-88092766, 88092768-88092770
88092772, 88092777, 88092806

Standard	Concentration	Absorbance	/Continuous RF /Calibration /Verification
No. 1	0.59	0.079	
No. 2	1.2	0.146	RF = 8.15
No. 3	1.8	0.218	
No. 4	2.4	0.301	
Cont. Cal. No. 2	1.3	0.148	CCV = 108%

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 03-96/98
Lab File ID: E6135/E6136
Matrix: water
Level (low/med):
Date Analyzed: 11-8-88
Time Analyzed: 14:59, 16:02
Instrument ID:
Date Reported:

Project: Duluth

This Method Blank applies to the following samples, MS and MSD.

Sample Number	Lab Sample ID	Lab File ID	Date of Analysis
DANGB-BG-SL1-SW1	88092694	S0443, S0444	11-9-88
-BG-SL2-SW1	88092695	S0445, S0446	11-9-88
-BG-SL3-SW1	88092724	S0447/49 E6318	11-9-88, 11-23-88
-3-SL28-SW1	88092765	E6155, S0469	11-9-88, 11-10-88
-3-SL8-SW1	88092766	S0450/51, S0613	11-9-88 11-30-88
-2-SL29-SW1	88092768	S0452, S0453	11-9-88
-2-SL7-SW1	88092770	E6159, E6160	11-9-88
-2-SL6-SW1	88092769	S0454, S0455	11-9-88

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Project: Duluth

Work Order No.:
Lab Sample No.: 03-150/04-1
Lab File ID: E6180/E6183
Matrix: water
Level (low/med):
Date Analyzed: 11-10-88, 11-11-88
Time Analyzed: 22:26, 01:11
Instrument ID:
Date Reported:

This Method Blank applies to the following samples, MS and MSD.

Sample Number	Lab Sample ID	Lab File ID	Date of Analysis
DANGB-3-SL9-SW1	8809277 2	E6189, E6320	11-11-88, 11-23-88
↓ -4-SL16-SW1	8809277 7	50485, 50486	11-11-88

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092677-88092678, 88092765-88092766
88092768-88092770, 88092772, 88092777
88092694-88092695, 88092806

QC Report No: TPH-W-0062-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-24-88
Date Prepared: 10-11-88
Date Analyzed: 10-20-88
Date Reported: 10-28-88
Dilution Factor: 4

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88092677	418.1	1.1	<1B	10	6.2	62	8.1	81	27	*

192

* See Case Narrative attached.
B See Legend attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

ob No.: OR001

lient: ES Oak Ridge
ttn: Bill Hayden
ddress: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

roject: Duluth ANGB

C Report for Laboratory Sample No(s):
88092677-88092678, 88092765-88092766
88092768-88092770, 88092772, 88092777
88092694-88092695, 88092806

QC Report No: TPH-W-0062-88B
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-10-88
Date Analyzed: 10-11-88
Date Reported: 10-28-88
Dilution Factor: 6

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1	<1	10	11	110	11	110	0	*

193

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 12345[illegible] Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 11/09/86 11:32

Lab ID >01109[illegible] Data Release Authorized By: Dana Kuck

M/E	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	54.75 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	75.11	
70	less than 2.0% of mass 69	1.32 OK	(1.76%) #1
127	40.0 - 60.0% of mass 198	43.86 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	6.62 OK	
275	10.0 - 30.0% of mass 198	17.33 OK	
365	greater than 1.00% of mass 198	1.27 OK	
441	present, but less than mass 443	9.65 OK	
442	greater than 40.0% of mass 198	69.59 OK	
443	17.0 - 23.0% of mass 442	12.95 OK	(18.58) #2

5 point 10/12/88

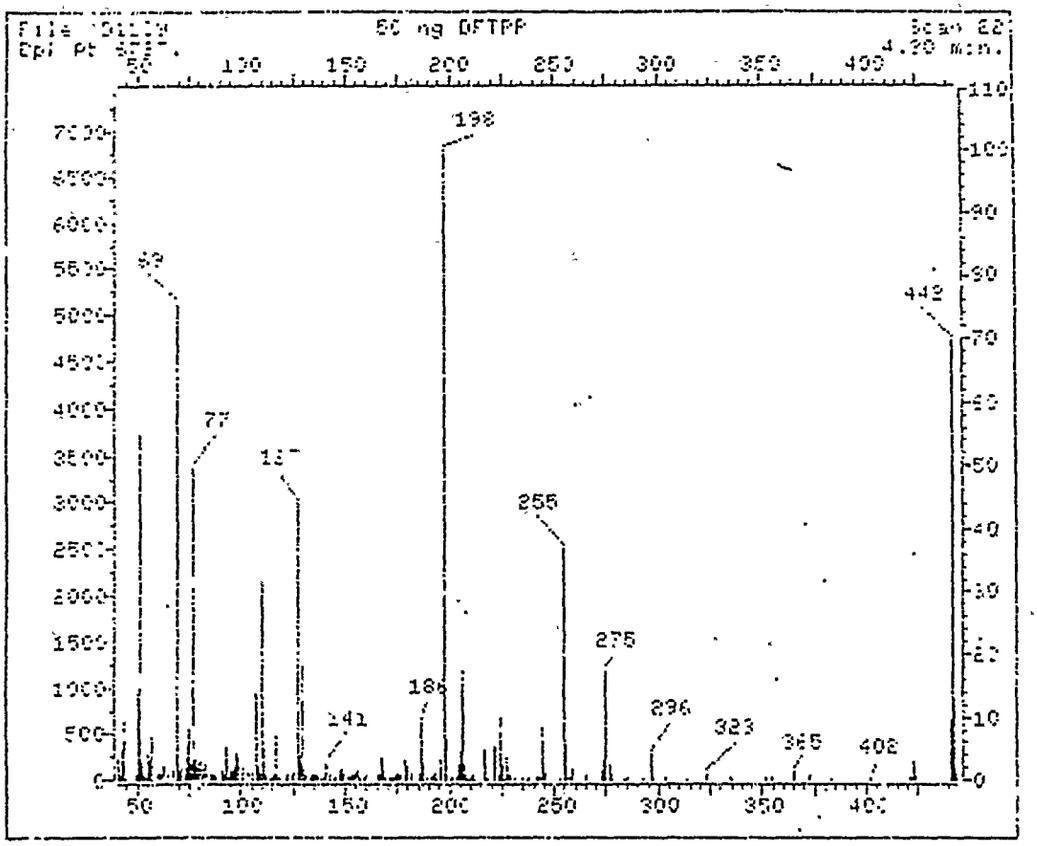
all DS ✓

THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS	
50 ng DFTPP	>01109	11/09/86	11:32	
60ng/ul std	E6152		11:50	
88092685 AC	E6153		12.44	
BN	E6154		13.39	SS out, reext
88092765 AC	E6155		14:59	- good - use
BN	E6156		15:54	- actually AC 4
88092762 AC	E6157		16:49	
BN	E6158		17:45	
88092770 AC	E6159		18:40	use
BN	E6160		19.35	use
88092601 lnd	E6161		20:30	
" MS	E6162		21:25	
" MSD	E6163		22.20	
88092602 lnd	E6164		23:15	SS out, reext

another project



File: >E3103 Scan #: 22 Retn time: 4.30

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.00	3.358	91.95	.925	140.00	.442	191.05	.471	246.85	.206
42.10	.665	92.95	5.549	141.05	2.328	192.05	.869	252.95	23:
43.10	4.715	94.05	.589	142.10	.825	193.05	1.179	254.95	36.850
44.00	9.695	95.05	1.400	142.80	.457	193.85	.206	255.95	5.696
45.00	.589	96.05	1.400	144.00	.221	196.05	3.227	256.85	.339
49.00	.614	97.05	1.960	145.00	.265	197.90	100.000	257.15	.354
50.00	13.762	98.05	3.978	147.00	1.429	198.90	6.616	257.95	1.798
51.00	54.752	99.05	3.418	148.00	1.812	200.10	.309	258.85	.354
52.00	2.853	100.95	1.936	149.00	.972	201.50	.530	264.95	.855
55.00	.604	103.95	.943	151.00	.457	203.10	.398	272.85	1.341
54.10	.515	104.95	1.532	152.10	.575	204.00	2.446	274.05	3.094
55.10	5.214	105.75	.280	153.00	.751	204.90	4.361	274.95	17.327
56.00	3.006	107.05	13.467	153.95	.619	206.00	17.180	276.05	2.446
57.10	7.615	108.05	2.078	155.05	1.031	207.00	2.947	276.95	1.046
58.00	.575	109.05	1.120	155.95	1.577	207.90	.840	277.95	.206
58.50	.398	109.90	31.663	157.05	.530	208.90	.162	280.95	.295
60.00	.884	110.90	4.759	157.95	.575	210.40	.413	283.15	.236
61.00	1.002	111.90	.693	158.95	.545	211.00	.678	284.15	.177
62.10	.767	114.05	.236	159.95	.678	211.80	.162	285.00	.324
63.60	2.155	114.50	324	161.05	1.002	216.90	4.700	292.80	.250
65.00	1.149	115.30	.678	161.85	.236	218.00	.589	296.00	3.978
67.05	1.591	116.90	7.028	164.95	.840	218.90	.192	297.00	.560

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.797	221.00	5.186	307.00	.516
[illegible]	1 [illegible]	[illegible]	.421	[illegible]	3 9e6	222 90	.869	314 00	.221
[illegible]	1 [illegible]	[illegible]	.192	[illegible]	1.473	224 00	9.975	325.10	.846
[illegible]	1.89e	[illegible]	.561	1e8.95	.324	225.00	2.549	334.05	.589
[illegible]	5 e83	122.00	.26°	170 95	.280	226.00	.206	334.95	.250
[illegible]	8.24e	122 50	1.724	171.85	.369	227 00	3.610	351.95	.398
[illegible]	1 490	124.00	.781	173.05	.457	228.00	.604	354.05	.501
[illegible]	43 757	125.00	1.002	173.95	.855	229.00	.869	364.95	1.262
[illegible]	3 485	127.00	43.863	175.05	1.208	231.90	.457	372.00	.648
[illegible]	4 495	128.00	3.669	175.95	.604	234.90	.295	385.00	.221
[illegible]	2.588	129.00	18.771	176.95	.610	236.10	.221	401.90	.309
[illegible]	5.010	[illegible]	1.842	178.95	3.065	237.10	.383	420.95	.516
[illegible]	1.827	131.00	.634	179.95	2.092	240.85	.309	421.95	.413
[illegible]	2.844	133.00	.427	180.95	1.105	241.95	.545	423.05	3.138
[illegible]	1.149	134.00	.604	183.05	.162	243.05	.471	424.05	.619
[illegible]	1 915	135 00	1.901	185.05	1.209	243.95	8.060	441.05	9.651
[illegible]	693	176.00	.619	185 95	9.887	245.05	1.105	442.05	69 692
[illegible]	.722	137 10	.928	187.05	2.858	245.95	1.135	443.05	12 951
[illegible]	.383	138.10	.383	189 05	.722	246.e5	.192	444.05	1.164
[illegible]	1.356	139 00	.192						

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/03/88

Contractor: _____ Time: 11:50

Contract No: _____ Laboratory ID: XE6152

Instrument ID: _____ Initial Calibration Date: 10/13/88

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is _____ %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	1.24043	.92526	25.41		
2-Fluorophenol	1.41912	1.23959	12.65		
bis(2-Chloroethyl)ether	1.41737	1.24523	12.14		
Phenol	1.78206	1.62342	8.90	*	
Phenol-d5	1.35470	1.47515	6.69		
Aniline	.74553	.49980	32.96		
2-Chlorophenol	1.32063	1.33762	1.27		
1,3-Dichlorobenzene	1.51101	1.46533	1.70		
1,4-Dichlorobenzene	1.51571	1.43829	1.15	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.56944	.85395	49.96		
1,2-Dichlorobenzene	1.45179	1.53620	5.81		
2-Methylphenol	1.42392	1.34726	5.36		
3-&-4-Methylphenol	1.59422	1.45965	7.86		
bis(2-chloroisopropyl)Ether	2.35722	2.35625	.04		
N-Nitroso-Di-n-Propylamine	1.13410	1.29596	14.27		**
Hexachloroethane	.76056	.74281	6.03		
Dibromochloropropane	-	-	-		
Nitrobenzene	.56685	.54310	4.19		
Nitrobenzene-d5	.49938	.51361	2.86		
2-Nitrophenol	.22040	.24909	13.02	*	
Isophorone	.87207	.89464	2.59		
bis(2-Chloroethoxy)methane	.58240	.63407	8.87		
2,4-Dimethylphenol	.40662	.41961	2.69		
Benzoic Acid	.29595	.29961	1.24		
2,4-Dichlorophenol	.53135	.52311	1.55	*	
1,2,4-Trichlorobenzene	.31739	.33678	6.11		
Naphthalene	.98196	1.02428	4.31		
4-Chloroaniline	.33116	.33075	.12		
Hexachlorobutadiene	.16652	.16741	.48	*	
4-Chloro-3-Methylphenol	.28631	.32713	14.28	*	
2-Methylnaphthalene	.54166	.56614	3.94		

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/05/88

Contractor: Time: 11:50

Contract No: Laboratory ID: XE6152

Instrument ID: Initial Calibration Date: 10/13/88

Minimum $\overline{RF}$ for SPCC is Maximum %Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.33285	.33525	.71		**
2,4,6-Trichlorophenol	.32295	.37133	14.96	*	
2,4,5-Trichlorophenol	.49539	.50162	1.30		
2-Fluorobiphenyl	1.26699	1.20680	4.75		
2-Chloronaphthalene	1.24653	1.16370	6.64		
2-Nitroaniline	.63125	.66122	4.29		
Dimethylphthalate	1.33033	1.39300	4.71		
2,6-Dinitrotoluene	.31616	.36631	15.76		
Acenaphthylene	1.65820	1.56122	4.46		
3-Nitroaniline	.63702	.57762	9.32		
2,4-Dinitrophenol	.05753	.06607	16.33		**
Acenaphthene	1.12644	1.08007	4.12	*	
Dibenzofuran	1.50204	1.53049	1.89		
2,4-Dinitrotoluene	.32059	.36943	15.09		
4-Nitrophenol	.18425	.20147	9.35		**
Fluorene	1.05332	1.12300	2.71		
Diethylphthalate	1.32354	1.35267	2.20		
4-Chlorophenyl-phenylether	.48214	.47069	2.37		
4-Nitroaniline	.27495	.30776	11.94		
2,4,6-Tribromophenol	.14218	.20631	46.52		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.44563	.45736	1.67	*	
4,6-Dinitro-2-Methylphenol	.08606	-	-		
4-Bromophenyl-phenylether	.22979	.25454	10.77		
Hexachlorobenzene	.28768	.31323	8.86		
Pentachlorophenol	.11550	.13924	22.25	*	

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/03/88

Contractor: Time: 11:50

Contract No: Laboratory ID: XE6152

Instrument ID: Initial Calibration Date: 10/13/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.07960	.99650	7.51		
Anthracene	1.13354	1.13045	.26		
Di-n-butylphthalate	1.71746	1.93331	12.57		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.17568	1.13368	3.56	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.03775	.10303	172.96		
Pyrene	1.65647	1.62563	1.86		
Terphenyl-d14	1.09647	1.18297	7.89		
Butylbenzylphthalate	1.15097	1.32276	14.93		
3,3'-Dichlorobenzidine	.12950	.24054	85.17		
Chrysene	1.01423	1.03242	1.79		
Benzo(a)Anthracene	1.09006	1.20197	10.27		
bis(2-Ethylhexyl)Phthalate	1.34247	1.67855	25.05		
Di-n-octylphthalate	3.72331	3.30508	11.23	*	
Benzo(a)Pyrene	1.27071	1.25535	1.21	*	
Benzo(b)Fluoranthene	1.48302	1.72796	16.05		
Indeno(1,2,3-cd)Pyrene	.82543	1.25637	52.21		
Dibenzo(a,h)Anthracene	.78566	1.00151	27.21		
Benzo(k)Fluoranthene	1.51900	.92062	39.39		
Benzo(g,h,i)Perylene	.74580	.99587	33.53		

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name:_____ Contract:_____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

EPA Sample No.(Standard):_____ Date Analyzed:_____

Lab File ID (Standard): _____ Time Analyzed:_____

Instrument ID:_____

	IS1(DCB) AREA	#	RT	IS2(NPT) AREA	#	RT	IS3(ANT) AREA	#	RT
12 HOUR STD	109017		7.97	378492		11.50	203479		16.88
UPPER LIMIT	218034			756984			406958		
LOWER LIMIT	54508			189246			101739		
EPA SAMPLE NO.									
01 8809268SAC	112127		7.95	394951		11.44	204956		16.83
02 BN	117554		7.93	457733		11.44	239914		16.88
03 8809276SAC	116035		7.96	412237		11.45	207109		16.85
04 (acidAC) BN	110330		7.92	389667		11.44	199494		16.86
05 8809276ZAC	116248		7.96	408374		11.45	217893		16.85
06 BN	117745		7.95	413133		11.44	205366		16.85
07 8809277SAC	111901		7.95	379748		11.44	190155		16.84
08 BN	112428		7.96	395475		11.45	195320		16.85
09 8809260I Inl	83539		7.96	300928		11.44	155756		16.84
10 " MS	79962		7.97	294036		11.44	147279		16.84
11 " MSD	83420		7.97	304060		11.44	157939		16.84
12 8804260Z Inl	81496		7.94	294980		11.42	150034		16.82
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name:_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____ SDG No.:_____

EPA Sample No.(Standard):_____ Date Analyzed:_____

Lab File ID (Standard):_____ Time Analyzed:_____

Instrument ID:_____

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS4(PRY) AREA #	RT
12 HOUR STD	278100	21.47	179911	29.84	153308	34.73
UPPER LIMIT	556200		359622		306616	
LOWER LIMIT	139050		89905		76654	
EPA SAMPLE NO.						
01 8809268SAC	294041	21.42	226921	29.79	172734	34.69
02 BN	342693	21.47	265574	29.86	221123	34.78
03 8809276SAC	291828	21.43	223496	29.80	153452	34.70
04 (a vailA) BN	286028	21.43	231143	29.80	144518	34.69
05 8809272 AC	307328	21.44	218171	29.80	155284	34.70
06 BN	289691	21.43	214851	29.79	146441	34.70
07 8809270AC	265877	21.43	203632	29.80	148032	34.68
08 BN	274548	21.44	201784	29.82	145818	34.71
09 8809260 1mL	223521	21.42	175285	29.79	138342	34.71
10 " MS	209608	21.45	160083	29.80	122125	34.69
11 " MSD	238783	21.45	172724	29.79	132293	34.70
12 8809262 1mL	215542	21.41	146619	29.80	101954	34.68
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

page __ of __

file: CONTCAL
24 Oct 88 2719; 2720, 2765 50.d Continuing Calibration Check
2767; 2772; 2773; 2774; 2775; 2777 Run 79 10/3/88

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____ SDG No.:_____

Instrument ID.:_____ Calibration Date(s): 10/3/88 _____

LAB FILE ID: 79, 80 Init. Calib. Date(s): 9/19/88 9/23/88

COMPOUND	$\overline{RRF}$	RRF50	%D
		0.36	
Benzyl chloride	0.32	~~0.32~~	~~0~~ 12
bis (2-chloroethoxy methane			
bis (2-chloroisopropyl ether			
Bromobenzene	1.4	1.1	21
Bromodichloromethane	3.7	3.4	8
Bromoform	1.7	1.6	6
Bromomethane	0.40	0.16	60
Carbon tetrachloride	4.2	3.8	10
Chloroacetaldehyde			
Chlorobenzene	1.4	1.2	14
Chloroethane	0.72	0.36	50
Chloroform	3.9	3.7	5
1-Chorohexane	1.2	0.90	25
2-Chloroethyl vinyl ether			
Chloromethane	0.46	0.32	30
Chloromethyl methyl ether			
o_,m_,& p_Chlorotoluenes	4.6	3.6	22
Dibromochloromethane	3.7	3.5	5
Dibromomethane	3.2	2.4	25
1,2_Dichlorobenzene	2.5	2.1	16
1,3_Dichlorobenzene	2.1	1.9	10
1,4_Dichlorobenzene	2.3	1.9	17
Dichlorodifluormethane			
1,1_Dichloroethane	2.4	2.0	17
1,2_Dichloroethane	2.6	2.2	15
1,1_Dichloroethylene	2.6	2.7	4
trans_1,2_dichloroethylene	2.4	2.1	12
Dichloromethane	4.1	4.5	10
1,2_Dichloropropane	2.5	2.0	20
1,3_Dichloropropylene	5.9	4.4	25
1,1,2,2_Tetrachloroethane	7.5	6.2	17
1,1,1,2_Tetrachloroethane	5.2	3.8	27
Tetrachloroethylene	7.5	6.2	17
1,1,1_Trichloroethane	3.0	2.7	10
1,1,2_Trichloroethane	5.9	4.4	25
Trichloroethylene	4.0	3.3	18
Trichlorofluormethane	2.3	2.0	13
Trichloropropane	2.1	1.4	33
Vinyl chloride	0.94	0.67	29

50.d Continuing Calibration Check

10/3/88
D.79

file: 8020CONT
3 Nov 88

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____ SDG No.:_____

Instrument ID.: CAR Calibration Date(s): 10/3/88 _____

LAB FILE ID: 79 Init. Calib. Date(s): 9/19/88 _____

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	4.9	4.1	16
Chlorobenzene	5.3	5.2	2
1,2_Dichlorobenzene	4.4	3.4	23
1,3_Dichlorobenzene	5.0	4.1	18
1,4_Dichorobanzene	4.1	3.4	17
Ethyl Bezene	4.4	3.7	16
Toluene	3.9	3.8	2
Xylenes	13	11	15

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____

Instrument IDVOCAL_____ Calibration Date(s):10/4/88

LAB FILE ID:70,71_____ Init. Calib. Date(s)10/3/88, 9/14/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzyl chloride	4.43	2.20	50.34
bis (2-choroethoxy) methane	0.12		100.00
bis (2-choroisopropyl ether	0.12		100.00
Bromobenzene	3.08	3.32	-7.80
Bromodichloromethane	4.35	3.75	13.84
Bromoform	3.33	2.68	19.40
Bromomethane	0.43	0.00	100.00
Carbon tetrachloride	4.95	4.30	13.04
Chloroacetaldehyde	0.07		100.00
Chlorobenzene	1.25	1.10	12.30
Chloroethane	0.73	0.00	100.00
Chloroform	4.23	3.47	17.88
1-Chorohexane	0.82	0.86	-5.07
2-Chloroethyl vinyl ether	0.12		100.00
Chloromethane	1.84	0.00	100.00
Chloromethyl methyl ether	0.02		100.00
o_,m_,& p_Chlorotoluenes	3.34	3.37	-0.80
Dibromochloromethane	4.18	3.68	11.87
Dibromomethane	3.06	2.90	5.24
1,2_Dichlorobenzene	1.88	1.62	14.09
1,3_Dichlorobenzene	1.73	1.45	16.23
1,4_Dichlorobenzene	1.70	1.49	12.14
Dichlorodifluormethane	0.54		100.00
1,1_Dichloroethane	3.10	2.35	24.23
1,2_Dichloroethane	3.20	2.94	8.15
1,1_Dichloroethylene	2.28	1.90	16.55
trans_1,2_dichloroethylene	5.15	2.75	46.55
Dichloromethane	4.72	6.48	-37.21
1,2_Dichloropropane	2.83	2.42	14.55
1,3_Dichloropropylene	0.47	0.48	-1.14
1,1,2,2_Tetrachloroethane	3.78	3.33	11.87
1,1,1,2_Tetrachloroethane	4.83	4.33	10.28
Tetrachloroethylene	4.70	4.09	13.02
1,1,1_Trichloroethane	2.88	2.50	13.21
1,1,2_Trichloroethane	4.42	4.74	-7.21
Trichloroethylene	3.80	3.29	13.47
Trichlorofluormethane	1.18	1.18	-0.22
Trichloropropane	3.08	3.32	-7.80
Vinyl chloride	1.84	0.00	100.00

VOLATILE CONTINUING CALIBRATION CHECK

LabName: ENGINEERING SCIENCE Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Instrument ID.: VOCAL Calibration Date(s) 10/4/89 _____

LAB FILE ID: RRF 50 70 Initial calibration = 10/3/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	5.35	3.90	-27.10
Chlorobenzene	7.37	6.30	-14.52
1,2_Dichlorobenzene	5.80	4.90	-15.52
1,3_Dichlorobenzene	6.50	5.70	-12.31
1,4_Dichorobenzene	5.23	4.60	-12.05
Ethyl Benzene	4.71	4.30	-8.70
Toluene	5.56	4.90	-11.87
Xylenes	15.78	14.00	-11.28

This page intentionally left blank.

DATA PACKAGE #4

This page intentionally left blank.

ES
ENGINEERING-SCIENCE, INC.

600 BANCROFT WAY
BERKELEY, CALIFORNIA 94710
(415) 548-7970

Job No.: OR001

Work Order No.: 1064

Client: ES Oak Ridge
Attention: Bill Havden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Attached are the analytical reports for the water sample(s) received by this laboratory on 9-28-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092806	DANGB-3-SL10-SW1	418.1	9-26-88	10-12-88	10-21-88	
88092806	DANGB-3-SL10-SW1	8080	9-26-88	10-03-88	10-25-88	
88092806	DANGB-3-SL10-SW1	8270	9-26-88	10-04-88	11-11-88	
88092807	DANGB-3-SL8-SW1	8010	9-26-88		9-30-88	10-04-88
88092807	DANGB-3-SL8-SW1	8020	9-26-88		9-30-88	

* If applicable

ANALYSIS REPORT

WORK ORDER NUMBER: 1064
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/28/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 3, UNITS: mg/L

TEST COMPOUND	DANGB-3-SL10-SW1 88092806
418.1 PETROLEUM HYDROCARBONS	<1

ND - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 1064
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/28/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 4, UNITS: ug/L, GROUP 8010

TEST COMPOUND	DANGB-3-SL8-SW1 88092807
BENZYL CHLORIDE	ND
BIS (2-CHLOROETHOXY)METHANE	ND
BIS (2-CHLOROISOPROPYL)ETHER	ND
BROMOBENZENE	ND
BROMODICHLOROMETHANE	ND
BROMOFORM	ND
BROMOETHANE	ND
CARBON TETRACHLORIDE	ND
CHLORACETALDEHYDE	ND
CHLORAL	ND
CHLOROBENZENE	ND
CHLOROETHANE	ND
CHLOROFORM	ND
1-CHLOROHEXANE	ND
2-CHLOROETHYL VINYL ETHER	ND
CHLOROMETHANE	ND
CHLOROMETHYL METHYL ETHER	ND
CHLOROTOLUENE	ND
DIBROMOCHLOROMETHANE	ND
DIBROMOMETHANE	ND
1,2-DICHLOROBENZENE	ND
1,3-DICHLOROBENZENE	ND
1,4-DICHLOROBENZENE	ND
DICHLORODIFLUOROMETHANE	ND
1,1-DICHLOROETHANE	ND
1,2-DICHLOROETHANE	ND
1,1-DICHLOROETHYLENE	ND
TRANS-1,2-DICHLOROETHYLENE	ND
DICHLOROMETHANE	0.26B
1,2-DICHLOROPROPANE	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1064

TEST COMPOUND	DANGB-3-SL8-SW1 88092807
1,3-DICHLOROPROPYLENE	ND
1,1,2,2-TETRACHLOROETHANE	ND
1,1,1,2-TETRACHLOROETHANE	ND
TETRACHLOROETHYLENE	ND
1,1,1-TRICHLOROETHANE	ND
1,1,2-TRICHLOROETHANE	ND
TRICHLOROETHYLENE	10
TRICHLOROFLUOROMETHANE	ND
TRICHLOROPROPANE	ND
VINYL CHLORIDE	ND

ND - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 1064
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/28/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 4, UNITS: ug/L, GROUP 8020

TEST COMPOUND	DANGB-3-SL8-SW1 88092807
BENZENE	ND
CHLOROBENZENE	ND
1,2-DICHLOROBENZENE	ND
1,3-DICHLOROBENZENE	ND
1,4-DICHLOROBENZENE	ND
ETHYL BENZENE	ND
TOLUENE	ND
XYLENES	ND

ND - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 1064
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/28/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 4, UNITS: ug/L, GROUP 8080

TEST COMPOUND	DANGB-3-SL10-SW1 88092806
ALDRIN	ND
ALPHA-BHC	ND
BETA-BHC	ND
DELTA-BHC	ND
GAMMA-BHC	ND
CHLORDANE	ND
4,4'-DDD	ND
4,4'-DDE	ND
4,4'-DDT	ND
DIELDRIN	ND
ENDOSULFAN I	ND
ENDOSULFAN II	ND
ENDOSULFAN SULFATE	ND
ENDRIN	ND
ENDRIN ALDEHYDE	NA
HEPTACHLOR	ND
HEPTACHLOR EPOXIDE	ND
KEPONE	ND
METHOXYCHLOR	ND
TOXAPHENE	ND
PCB-1016	ND
PCB-1221	ND
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND

ND - Not Detected

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

Date Received: September 26, 1988
Date Reported: December 9, 1988

Work Order: 1064
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092806
Sample No.:	DANGB-3-SL10-SW1
Date Sampled:	9-26-88
Time Sampled:	14:00
Date Extracted:	10-04-88
Date Analyzed:	11-11-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L
1,3-Dichlorobenzene	10	ND
1,4-Dichlorobenzene	10	ND
Hexachloroethane	10	ND
Bis(2-chloroethyl)ether	10	ND
1,2-Dichlorobenzene	10	ND
N-Nitrosodimethylamine	10	ND
Bis(2-chloroisopropyl)ether	10	ND
N-Nitrosodi-n-propylamine	10	ND
Hexachlorobutadiene	10	ND
1,2,4-Trichlorobenzene	10	ND
Nitrobenzene	10	ND
Isophorone	10	ND
Naphthalene	10	ND
Bis(2-chloroethoxy)methane	10	ND
2-Chloronaphthalene	10	ND
Hexachlorocyclopentadiene	10	ND
Acenaphthylene	10	ND
Acenaphthene	10	ND
Dimethyl phthalate	10	ND
2,6-Dinitrotoluene	10	ND
Fluorene	10	ND
2,4-Dinitrotoluene	10	ND
Diethyl phthalate	10	ND
N-Nitrosodiphenylamine	10	ND
Hexachlorobenzene	10	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 26, 1988
Date Reported: December 9, 1988

Work Order: 1064
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092806
Sample No.:	DANGB-3-SL10-SW1
Date Sampled:	9-26-88
Time Sampled:	14:00
Date Extracted:	10-04-88
Date Analyzed:	11-11-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L
Phenanthrene	10	ND
Anthracene	10	ND
Dibutyl phthalate	10	ND
Fluoranthene	10	ND
4-Chlorophenyl phenyl ether	10	ND
Pyrene	10	ND
Butyl Benzyl phthalate	10	ND
Bis(2-ethylhexyl) phthalate	10	ND
Chrysene	10	ND
4-Bromophenyl phenyl ether	10	ND
Benzo(a)anthracene	10	ND
Di-n-octylphthalate	10	ND
Benzo(b)fluoranthene	10	ND
Benzo(k)fluoranthene	10	ND
Benzidine	60	ND
3,3'-Dichlorobenzidine	20	ND
Benzo(a)pyrene	10	ND
Indeno(1,2,3-cd)pyrene	10	ND
Dibenzo(a,h)anthracene	10	ND
Benzo(ghi)perylene	10	ND
Benzyl Alcohol	20	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 26, 1988
Date Reported: December 9, 1988

Work Order: 1064
Job Number: OR001

For: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092806
Sample No.:	DANGB-3-SL10-SW1
Date Sampled:	9-26-88
Time Sampled:	14:00
Date Extracted:	10-04-88
Date Analyzed:	11-11-88

Compound	Detection Limits ug/L	Analytical Results (dry weight) ug/L
Acetophenone	--*	ND
Aniline	--*	ND
4-Aminobiphenyl	--*	ND
4-Chloroaniline	20	ND
1-Chloronaphthalene	--*	ND
Dibenzofuran	10	ND
p-Dimethylaminoazobenzene	--*	ND
7,12-Dimethylbenz(a)anthracene	--*	ND
a-,a-Dimethylphenethylamine	--*	ND
Diphenylamine	--*	ND
1,2-Diphenylhydrazine	--*	ND
Ethyl methanesulfonate	--*	ND
3-Methylcholanthrene	--*	ND
Methyl methanesulfonate	--*	ND
2-Methylnaphthalene	10	ND
1-Naphthylamine	--*	ND
2-Naphthylamine	--*	ND
2-Nitroaniline	50	ND
3-Nitroaniline	50	ND
4-Nitroaniline	50	ND
N-Nitroso-di-n-butylamine	--*	ND
N-Nitrosopiperidine	--*	ND
Pentachlorobenzene	--*	ND
Pentachloronitrobenzene	--*	ND
Phenacetin	--*	ND
2-Picoline	--*	ND
Pronamide	--*	ND
1,2,4,5-Tetrachlorobenzene	--*	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

Date Received: September 26, 1988
Date Reported: December 9, 1988

Work Order: 1064
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN:Mr. Bill Hayden

Lab Number:	88092806
Sample No.:	DANGB-3-SL10-SW1
Date Sampled:	9-26-88
Time Sampled:	14:00
Date Extracted:	10-04-88
Date Analyzed:	11-11-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L
Alpha-BHC	--*	ND
Gamma-BHC	--*	ND
Beta-BHC	20	ND
Heptachlor	10	ND
Delta-BHC	15	ND
Aldrin	10	ND
Heptachlor epoxide	10	ND
Endosulfan I	--*	ND
Dieldrin	15	ND
4,4'-DDE	30	ND
Endrin	--*	ND
Endosulfan II	--*	ND
4,4'-DDD	15	ND
4,4'-DDT	25	ND
Endosulfan Sulfate	30	ND
Endrin aldehyde	--*	ND
Endrin Ketone	--*	ND
Chlordane	60	ND
Methoxychlor	--*	ND
Toxaphene	60	ND
Aroclor-1016	60	ND
Aroclor-1221	60	ND
Aroclor-1232	60	ND
Aroclor-1242	60	ND
Aroclor-1248	60	ND
Aroclor-1254	60	ND
Aroclor-1260	60	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

Date Received: September 26, 1988
Date Reported: December 9, 1988

Work Order: 1064
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092806
Sample No.:	DANGB-3-SL10-SW1
Date Sampled:	9-26-88
Time Sampled:	14:00
Date Extracted:	10-04-88
Date Analyzed:	11-11-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L
2-Chlorophenol	10	ND
2-Nitrophenol	10	ND
Phenol	10	ND
2,4-Dimethylphenol	10	ND
2,4-Dichlorophenol	10	ND
2,4,6-Trichlorophenol	10	ND
4-Chloro-3-methylphenol	20	ND
2,4-Dinitrophenol	50	ND
2,6-Dichlorophenol	--*	ND
2-Methyl-4,6-Dinitrophenol	50	ND
Pentachlorophenol	50	ND
4-Nitrophenol	50	ND
Benzoic Acid	50	ND
2-Methylphenol	10	ND
3- & 4-Methylphenol	10	ND
2,3,4,6-Tetrachlorophenol	--*	ND
2,4,5-Trichlorophenol	10	ND

Analyst

Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) Jo Ann Sherwin

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 601	EPA 625	EPA 418.1	SW 8040, 7060, 7131	SW7421, 7470	SW9030, 9315	SM429	REMARKS
~~9/26/88~~	~~14:00~~	~~DANGB-3-SL10-SW1~~	2			X						
~~9/26/88~~	~~14:00~~	~~DANGB-3-SL10-SW1~~	2		X							
~~9/26/88~~	~~14:00~~	~~DANGB-3-SL10-SW1~~	2									
~~9/26/88~~	~~15:30~~	~~DANGB-3-SL8-SW1~~	5	X								

022

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Jo Ann Sherwin	9/26 6:30p	Air Cargo			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO(S).: TPH-W-0062-88

Relative percent difference for the quality control sample exceed the ES Laboratory limit. A blank spike analysis shows the laboratory to be in control.

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092677-88092678, 88092765-88092766
88092768-88092770, 88092772, 88092777
88092694-88092695, 88092806

QC Report No: TPH-W-0062-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-24-88
Date Prepared: 10-11-88
Date Analyzed: 10-20-88
Date Reported: 10-28-88
Dilution Factor: 4

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88092677	418.1	1.1	<1B	10	6.2	62	8.1	81	27	*

222

* See Case Narrative attached.
B See Legend attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092677-88092678, 88092765-88092766
88092768-88092770, 88092772, 88092777
88092694-88092695, 88092806

QC Report No: TPH-W-0062-88B
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-10-88
Date Analyzed: 10-11-88
Date Reported: 10-28-88
Dilution Factor: 6

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1	<1	10	11	110	11	110	0	*

322

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO(S).: VGC-W-0056-88

Percent recoveries for trichloroethene and benzene are below the ES Laboratory limit. Relative percent differences exceed the limit for 1,1-dichloroethene. A method blank spike analysis shows the laboratory to be in control.

QUALITY CONTROL RESULTS SUMMARY
VOLATILE ORGANICS
EPA 8010/8020

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092807

QC Report No: VGC-W-0056-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-28-88
Date Prepared: NA
Date Analyzed: 10-10-88
Date Reported: 10-28-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092807	1,1-Dichloroethane	10	ND	9.78	98	6.86	69	35*	26	70-130
	Trichloroethene	10	9.0	13.5	*45	12.8	*35	5	19	65-131
	Chlorobenzene	10	ND	10.5	105	10.2	102	3	40	59-137
	Aromatics: 8020									
88092807	Benzene	10	ND	3.0	*30	2.83	*28	6	20	56-146
	Toluene	10	ND	8.03	80	5.69	57	34	41	42-150
	Chlorobenzene	10	ND	11.0	110	10.7	107	3	36	76-133

225

* See Case Narrative attached.

Relative Percent Difference (PR) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Sample Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
VOLATILE ORGANICS
EPA 8010/8020

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092807

QC Report No: VGC-W-0056-88B
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: NA
Date Prepared: NA
Date Analyzed: 10-10-88
Date Reported: 10-28-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
Blank	1,1-Dichloroethane	10	ND	10.1	101	10.3	103	2	26	70-130
	Trichloroethene	10	ND	10.5	105	9.81	98	7	19	65-131
	Chlorobenzene	10	ND	10.0	100	9.37	94	7	40	59-137
	Aromatics: 8020									
Blank	Benzene	10	ND	10.3	103	9.72	97	6	20	56-146
	Toluene	10	ND	10.1	101	10.1	101	0	41	42-150
	Chlorobenzene	10	ND	10.2	102	9.70	97	5	36	76-133

226

Relative Percent Difference (PR) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Sample Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 10-28-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
23	9-30-88	VGC	Vocol	75-09-2	Dichloromethane	39	0.25	88092807

227

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: OCP-W-0039-88
QC REPORT NO.: OCP-W-0039-88B

Analysis of matrix spikes resulted in recoveries for aldrin that were slightly above EPA recommended limits. Subsequent analysis of spiked blanks resulted in poor precision for all spiked compounds, although the recoveries were within limits for all but endrin in one of the two spiked blanks. The analytical data associated with these analyses were closely examined. No errors or problems were found.

Heptachlor epoxide was inadvertently used instead of heptachlor in the matrix spiking solution.

Endrin aldehyde and Kepone were not recoverable because they were removed by the alumina column clean-up used on these samples.

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s).:
88092694-88092696, 88092726-88092727
88092765-88092766, 88092772, 88092777
88092806, 88092721

QC Report No.: OCP-W-0039-88
QC Sample No.: 88092694
Level (Low/Med): Low
Date Reported: 11-11-88

Laboratory Supervisor Approval:

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	200	ND	0.196	98	56-123
Heptachlor epoxide	200	ND	0.239	120	40-131
Aldrin	200	ND	0.253	127*	40-120
Dieldrin	500	ND	0.532	106	52-126
Endrin	500	ND	0.475	95	56-121
4,4'-DDT	500	ND	0.435	87	38-127

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.217	109	98	10	15	56-123
Heptachlor epoxide	0.256	128	120	7	20	40-131
Aldrin	0.251	126*	127*	1	22	40-120
Dieldrin	0.606	121	106	13	18	52-126
Endrin	0.543	109	95	13	21	56-121
4,4'-DDT	0.518	104	87	17	27	38-127

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 6 outside limits

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

QC Report No.: OCP-W-0030-88B
QC Sample No.: Blank
Level (Low/Med): Low
Date Reported: 11-11-88

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Laboratory Supervisor Approval: R W Burton

QC Report for Laboratory Sample No(s).:
88092694-88092696, 88092726-88092727
88092765-88092766, 88092772, 88092777, 88092806

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	200	ND	0.169	85	56-123
Heptachlor epoxide	200	ND	0.184	92	40-131
Aldrin	200	ND	0.155	78	40-120
Dieldrin	500	ND	0.419	84	52-126
Endrin	500	ND	0.193	39*	56-121
4,4'-DDT	500	ND	0.385	77	38-127

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.236	118	85	33*	15	56-123
Heptachlor epoxide	0.263	132	92	35*	20	40-131
Aldrin	0.231	116	78	39*	22	40-120
Dieldrin	0.608	122	84	37*	18	52-126
Endrin	0.522	104	39*	92*	21	56-121
4,4'-DDT	0.567	113	77	38*	27	38-127

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 6 out of 6 outside limits

Spike Recovery: 1 out of 12 outside limits

PESTICIDE METHOD BLANK SUMMARY

Job No.:	OR001	Lab Name:	Engineering Science
		Lab Sample No.:	Blank
Client:	ES Oak Ridge		
Attn:	Bill Hayden	Matrix:	Soil
Address:	710 S. Illinois Avenue	Level (low/med):	Low
	Suite F-103	Extraction:	
	Oak Ridge, Tn. 37830	(SepF/Cont/Sonc):	Sonc
		Date Reported:	11-03-88
Project:	Duluth ANGB		
Date Extracted:	10-03-88		
Date Analyzed (1):	10-25-88	Date Analyzed (2):	10-25-88
Time Analyzed (1):	03:10	Time Analyzed (2):	22:06
Instrument ID (1):	5890 #2	Instrument ID (2):	5880
GC Column ID (1):	OV-1	GC Column ID (2):	Mixed

This Method Blank applies to the following samples, MS and MSD.

EPA Sample No.	Lab Sample ID (1)	Date Analyzed 1	Lab Sample ID (2)	Date Analyzed 2
-	88092772	10-25-88	88092772	10-26-88
-	88092777	10-25-88		
-	88092806	10-25-88		

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: BNA-W-0072-88
QC REPORT NO.: BNA-W-0072-88B
WORK ORDER NO(S).: 1072/1069
EPA METHOD 625

Results of analysis of matrix spikes showed one recovery of 2,4-dinitrotoluene of 100%, which is higher than EPA QC limits. Spiked blanks were analyzed after the extract holding time had expired. The results showed one recovery of trichlorobenzene and one of acenaphthene that were slightly below EPA QC limits. RPD's for all of the base neutral spikes were higher than EPA QC limits.

The data associated with these analyses was carefully inspected. No errors or problems were found. Since the only target compound found was a small amount of phthalate (also found in the blank), the lack of precision in the spike analyses should not affect the data quality objectives of this project.

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092806

QC Report No: BNA-W-0072-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 09-28-88
Date Prepared: 10-04-88
Date Analyzed: 11-11-88
Date Reported: 03-07-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limits RPD	RECOVERY
	1,2,4-Trichlorobenzene	100	ND	69.8	70	72.5	72	4	28	39-98
B/N	Acenaphthene	100	ND	78.8	79	77.9	78	1	31	46-118
Laboratory	2,4-Dinitrotoluene	100	ND	99.8	100*	95.6	96	4	38	24-96
Sample #	Pyrene	100	ND	74.7	75	77.4	77	4	31	26-127
	N-Nitroso-di-n-Propylamine	100	ND	105	105	104	104	1	38	41-116
88092806	1,4-Dichlorobenzene	100	ND	78.4	78	80.1	80	2	28	36-97
ACID	Pentachlorophenol	200	ND	116	58	136	68	16	50	9-103
Laboratory	Phenol	200	ND	112	56	121	60	8	42	12-89
Sample #	2-Chlorophenol	200	ND	122	61	131	65	7	40	27-123
	4-Chloro-3-Methylphenol	200	ND	155	78	149	74	4	42	23-97
88092806	4-Nitrophenol	200	ND	142	71	124	62	14	50	10-80

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092806

QC Report No: BNA-W-0072-88B
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: NA
Date Prepared: 10-04-88
Date Analyzed: 12-15-88
Date Reported: 03-07-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limits RPD	RECOVERY
	1,2,4-Trichlorobenzene	100	ND	35.8	36*	66.8	67	60*	28	39-98
B/N	Acenaphthene	100	ND	36.7	37*	74.2	74	68*	31	46-118
Laboratory	2,4-Dinitrotoluene	100	ND	33.0	33	85.3	85	88*	38	24-96
Sample #	Pyrene	100	ND	47.6	48	93.6	94	65*	31	26-127
	N-Nitroso-di-n-Propylamine	100	ND	49.0	49	94.5	94	65*	38	41-116
BLANK	1,4-Dichlorobenzene	100	ND	37.8	38	70.0	70	60*	28	36-97
ACID	Pentachlorophenol	200	ND	140	70	162	81	15	50	9-103
Laboratory	Phenol	200	ND	98.8	49	118	59	18	42	12-89
Sample #	2-Chlorophenol	200	ND	148	74	162	81	9	40	27-123
	4-Chloro-3-Methylphenol	200	ND	144	72	156	78	8	42	23-97
BLANK	4-Nitrophenol	200	ND	86.5	43	110	55	24	50	10-80

234

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Work Order No.: 1064

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Sample Matrix: WATER
Conc. Unit: ug/L
Date Reported: 03-09-89

Laboratory Supervisor Approval:

Project: Duluth ANGB

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
S0475	11-11-88	AC	1	-	None Detected	-	-	88092806
S0476	11-11-88	BN	1 1	117-81-7	Bis(2-Ethylhexyl)phthalate	16	10	88092806

235

S0931 = REX BLANK

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1064
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Client Sample ID:	
Attn:	Bill Hayden	Lab Sample ID:	88092806 AC
Address:	710 S. Illinois Avenue	Lab File ID:	S0477
	Suite F-103	Date Received:	09-26-88
	Oak Ridge, Tn. 37830	Date Extracted:	10-04-88
		Date Analyzed:	11-11-88
		Date Reported:	03-28-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	NA
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	8	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
79-01-6	Trichloroethene	3.45	16	
108-88-3	Toluene	4.38	4	
-	Unknown	4.87	12	
127-18-4	Tetrachloroethene	5.09	25	B
-	Unknown	5.43	7	
79-34-5	1,1,2,2-Tetrachloroethene	7.07	8	
-	Unknown Aromatic	12.50	4	
-	Unknown	27.14	11	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1064
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Client Sample ID:	
Attn:	Bill Hayden	Lab Sample ID:	88092806 BN
Address:	710 S. Illinois Avenue	Lab File ID:	S0478
	Suite F-103	Date Received:	09-26-88
	Oak Ridge, Tn. 37830	Date Extracted:	10-04-88
		Date Analyzed:	11-11-88
		Date Reported:	03-28-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	NA
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	12	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
79-01-6	Trichloroethene	3.44	18	
108-88-3	Toluene	4.38	5	
-	Unknown	4.88	30	
127-18-4	Tetrachloroethene	5.09	29	B
-	Unknown	5.44	21	
79-34-5	1,1,2,2-Tetrachloroethene	7.07	16	
-	Unknown	26.88	11	
-	Unknown Saturated Hydrocarbons	36.55	5	
-	Unknown Saturated Hydrocarbons	38.57	5	
-	Unknown Saturated Hydrocarbons	41.05	6	
-	Unknown Saturated Hydrocarbons	44.07	5	
-	Unknown Saturated Hydrocarbons	47.81	4	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 4

Work Order No.: 1064
Matrix: (soil/water) Water
Sample Wt/vol:
Client Sample ID:
Lab Sample ID: 88092806,24,35 AC BLK
Lab File ID: S0475
Date Received: NA
Date Extracted: 10-04-88
Date Analyzed: 11-11-88
Date Reported: 03-28-89
Dilution Factor: 1
% Moisture: dec: NA
not dec:
GPC Clean up: (Y/N)
Extraction:
(SepF/Cont/Conc)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.33	98	
-	Unknown	3.43	10	
127-18-4	Tetrachloroethene	5.08	14	
-	Unknown	5.69	4	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 4

Work Order No.: 1064
Matrix: (soil/water) Water
Sample Wt/vol:
Client Sample ID:
Lab Sample ID: 88092806,24,35 BN BLK
Lab File ID: S0476
Date Received: 09-26-88
Date Extracted: 10-04-88
Date Analyzed: 11-11-88
Date Reported: 03-28-89
Dilution Factor: NA
% Moisture: dec: NA
not dec:
GPC Clean up: (Y/N)
Extraction:
(SepF/Cont/Conc)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.26	39	
-	Unknown	3.32	120	
-	Unknown	3.44	13	
127-18-4	Tetrachloroethene	5.08	16	B

CHAIN OF CUSTODY RECORD

EST. JOB NO.	PROJECT NAME/LOCATION
10R001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) Jo-Ann Sherwin

SHIP TO: ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 6010, 7040, 7131	SW7421, 7470	SW9310, 9315	SM429	REMARKS
9/26/88	14:00	DANGB-3-SL10-SW1	2				X					882806
9-26-88	14:00	DANGB-3-SL10-SW1	2			X						882806
9/26/88	14:00	DANGB-3-SL10-SW1	2		X							882806
9/26/88	15:30	DANGB-3-SL8-SW1	3	X								882807

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Jo-Ann Sherwin	9/26 6:30p	Floyd Abney 9/28/88 0850			
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092806-88092807
WORK ORDER NO.: 1064

These water samples were received at the ES Berkeley Laboratory on 9-28-88. They were received cold and intact.

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 04-03
Lab File ID: 50475/50476
Matrix: water
Level (low/med):
Date Analyzed: 11-11-88
Time Analyzed: 00:14, 1:14
Instrument ID:
Date Reported:

Project: Duluth

This Method Blank applies to the following samples, MS and MSD.

Sample Number	Lab Sample ID	Lab File ID	Date of Analysis
DANGB-3-SL10-SW1	88092806	50477, 50478	11-11-88
↓	88092806 MS	50487, 50488	11-11-88
↓	88092806 MSD	50489, 50490	11-11-88
———	BLANK MS	50728, 50729	12 14-88 12.15-88
———	BLANK MSD	50730, 50731	12-15-88

5B

SEMIVOLATILE ORGANIC GC/MS TUNING AND MASS CALIBRATION - DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

Lab Name: Engineering Science Contract: _____.

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____.

Lab File ID: >T1214 DFTPP Injection Date: 12/14/88

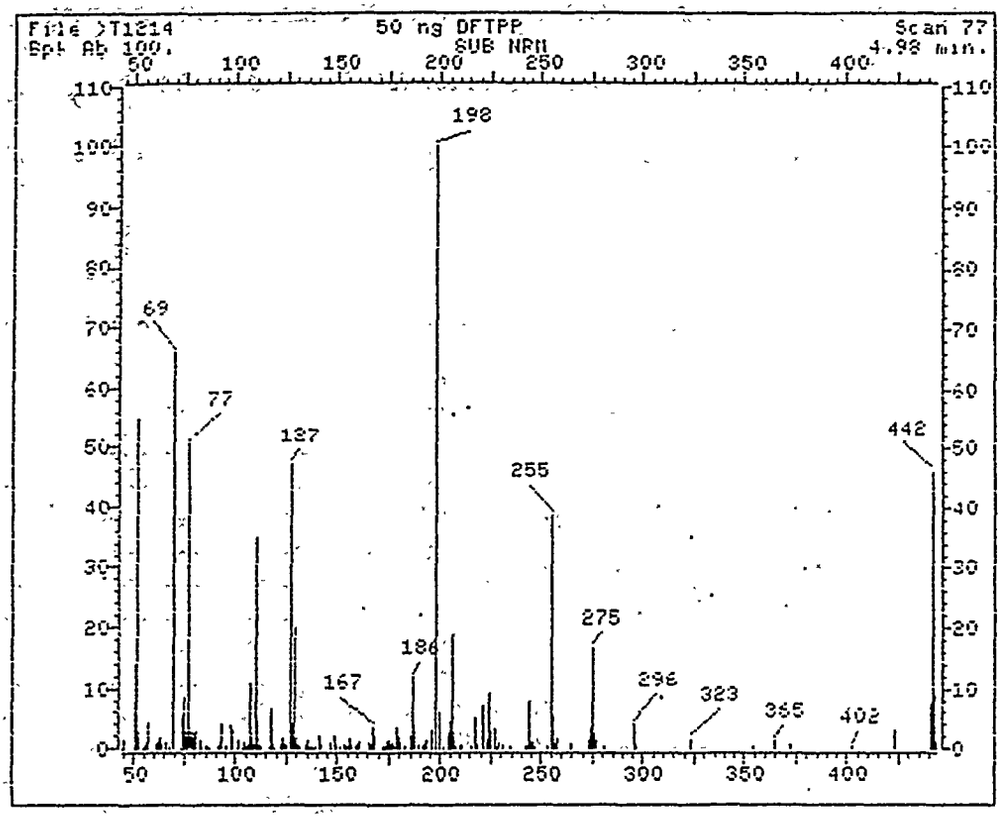
Instrument ID: 70 1 DFTPP Injection Time: 14:16

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	55.0
68	Less than 2.0% of mass 69	0.0(0.0)1
69	Mass 69 relative abundance	66.
70	Less than 2.0% of mass 69	0.0(0.0)1
127	40.0 - 60.0% of mass 198	47.1
197	Less than 1.0% of mass 198	0.0
198	Base Peak, 100% relative abundance	100.
199	5.0 - 9.0% of mass 198	6.3
275	10.0 - 30.0% of mass 198	16.8
365	Greater than 1.00% of mass 198	1.33
441	Present, but less than mass 443	7.4
442	Greater than 40.0% of mass 198	46.0
443	17.0 - 23.0% of mass 442	9.0(19.6)2

1-Value is % mass 69 2-Value is % mass 442

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	80 mg/L BNA STD + IS	>S0720	12/14/88	14:55
02	88113102 AC 1ml?	>S0721	12/14/88	16:07
03	88113102 BN 1ml?	>S0722	12/14/88	17:09
04	88113102 AC MS 1ml?	>S0723	12/14/88	18:08
05	88113102 BN MS 1ml?	>S0724	12/14/88	19:07
06	88113102 AC MSD 1ml?	>S0725	12/14/88	20:07
07	88113102 BN MSD 1ml?	>S0726	12/14/88	21:06
08	88113105 BN 1ml	>S0727	12/14/88	22:05
09	88092806 AC BLK MS	>S0728	12/14/88	23:05
10	88092806 BN BLK MS	>S0729	12/15/88	0:04
11	88092806 AC BLK MSD	>S0730	12/15/88	1:03
12	88092806 BN BLK MSD	>S0731	12/15/88	2:02
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				



File: >T1214 Scan #: 77 Retn. time: 4.98

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
44.10	.082	95.10	.435	135.15	1.518	180.05	1.989	231.10	.694
45.00	1.342	96.10	.306	136.15	.471	181.15	1.009	234.00	.282
50.10	13.854	97.20	.388	137.15	.541	182.25	.282	242.10	.506
51.10	54.962	98.10	3.955	138.05	.235	185.15	1.966	243.10	.577
52.10	2.907	99.00	3.037	139.15	.400	186.15	11.817	244.20	7.933
54.20	.200	101.10	1.283	141.05	2.154	187.15	3.672	245.00	.942
55.10	.541	103.10	.235	142.05	.918	189.05	.671	246.00	1.259
56.10	1.224	104.10	1.036	147.15	1.118	191.05	.365	247.00	.530
57.10	4.555	105.10	.589	148.15	2.130	192.15	.718	253.00	.447
61.00	.871	106.10	.718	149.15	.812	193.05	1.283	255.10	38.630
62.10	.930	107.00	10.923	151.05	.541	196.10	3.225	256.10	5.603
63.10	1.624	108.10	2.283	151.25	.530	198.10	100.000	257.10	.624
64.00	.600	109.20	.789	153.15	.789	199.10	6.262	258.10	1.813
65.20	1.224	110.10	35.052	154.05	.577	201.50	.589	265.10	.777
67.20	.353	111.10	4.696	155.15	.589	204.20	2.542	273.10	1.342
69.00	65.913	112.10	.824	156.05	1.671	205.20	4.626	274.15	3.460
73.10	.035	113.10	.294	157.25	.647	206.20	18.526	275.15	16.761
74.10	5.355	116.20	.341	159.25	.447	207.10	2.436	276.25	2.495
75.10	8.416	117.10	6.368	160.15	.871	208.10	.589	277.15	1.283
76.20	2.825	118.05	.871	161.05	1.000	210.40	.494	281.05	.412
77.10	50.683	119.15	.224	165.15	.977	210.70	.565	296.15	4.014
78.10	3.319	122.05	.742	166.15	.683	211.20	.671	297.15	.612
79.10	2.825	123.15	1.824	167.05	3.543	216.00	.435	323.15	1.507
80.10	2.601	124.15	.812	168.15	2.260	217.10	5.061	354.30	.471

85.10	.559	126.15	9.001	175.15	1.059	223.20	1.337	402.00	.300
85.20	.330	129.05	20.009	175.15	1.354	224.10	9.334	423.20	3.084
86.10	.494	130.05	1.789	176.05	.636	225.20	2.649	441.25	7.427
87.20	.212	131.05	.718	177.05	1.106	227.10	3.343	442.25	45.975
91.10	.282	132.05	.424	178.15	.471	228.00	.483	443.25	9.016
92.00	1.189	134.05	.659	179.15	3.519	229.10	1.095	444.25	1.036
93.10	4.002								

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 12/14/88

Contractor: ENGINEERING-SCIENCE Time: 14:55

Contract No: Laboratory ID: >S0720

Instrument ID: 1 Initial Calibration Date: 10/12/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	1.08166	19.96		
2-Fluorophenol	1.15802	1.35546	17.05		
bis(2-Chloroethyl)ether	1.11892	1.18673	6.06		
Phenol	1.41657	1.64513	16.14	*	
Phenol-d5	1.22488	1.11750	8.77		
Aniline	.54193	.56793	4.80		
2-Chlorophenol	1.23175	1.29341	5.01		
1,3-Dichlorobenzene	1.47535	1.38865	5.88		
1,4-Dichlorobenzene	1.40530	1.42249	1.22	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.69824	5.60		
1,2-Dichlorobenzene	1.32240	1.45035	9.68		
2-Methylphenol	1.17367	1.75820	49.80		
3-&-4-Methylphenol	1.07139	1.28445	19.89		
bis(2-chloroisopropyl)Ether	2.15627	3.40009	57.68		
N-Nitroso-Di-n-Propylamine	.84050	1.03178	22.76		**
Hexachloroethane	.53840	.60595	12.55		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.53464	32.63		
Nitrobenzene-d5	.39137	.46464	18.72		
2-Nitrophenol	.24657	.26686	8.23	*	
Isophorone	.74170	.89619	20.83		
bis(2-Chloroethoxy)methane	.49386	.60742	23.00		
2,4-Dimethylphenol	.34849	.43206	23.98		
Benzoic Acid	.29725	.37184	25.09		
2,4-Dichlorophenol	.56733	.62919	10.90	*	
1,2,4-Trichlorobenzene	.36913	.32954	10.73		
Naphthalene	.94589	.93096	1.58		
4-Chloroaniline	.36309	.37448	3.14		
Hexachlorobutadiene	.20283	.18960	6.52	*	
4-Chloro-3-Methylphenol	.31360	.34492	9.99	*	
2-Methylnaphthalene	.56397	.61434	8.93		

$\overline{RF}$ - Response factor from daily standard file at 80.00 ng/L

RF - Response factor from daily standard file at 80.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 12/14/88

Contractor: ENGINEERING - SCIENCE Time: 14:55

Contract No: Laboratory ID: >S0720

Instrument ID: 1 Initial Calibration Date: 10/13/88 12 DAD

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.29749	.61		**
2,4,6-Trichlorophenol	.42280	.35691	15.58	*	
2,4,5-Trichlorophenol	.52897	.49370	6.67		
2-Fluorobiphenyl	1.27220	1.07731	15.32		
2-Chloronaphthalene	1.23784	1.07257	13.35		
2-Nitroaniline	.47288	.57531	21.66		
Dimethylphthalate	1.40629	1.23580	12.12		
2,6-Dinitrotoluene	.37415	.35211	5.89		
Acenaphthylene	1.68918	1.50431	10.94		
3-Nitroaniline	.44557	.62619	40.54		
2,4-Dinitrophenol	.11898	.12133	1.97		**
Acenaphthene	1.13011	.95986	15.06	*	
Dibenzofuran	1.64131	1.47185	10.32		
2,4-dinitrotoluene	.28418	.31302	10.15		
4-[illegible]ophenol	.28450	.13993	50.81		**
Fluorene	1.12850	.90285	20.00		
Diethylphthalate	1.20939	1.06911	11.60		
4-Chlorophenyl-phenylether	.59183	.49341	16.32		
4-Nitroaniline	.35956	.36348	1.09		
2,4,6-Tribromophenol	.21023	.15777	24.95		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.46282	14.88	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.21431	.61		
Hexachlorobenzene	.26273	.24253	7.69		
Pentachlorophenol	.14536	.12564	13.56	*	

$\overline{RF}$ - Response Factor from daily standard file at 80.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 12/14/88

Contractor: ENGINEERING - SCIENCE Time: 14:55

Contract No: Laboratory ID:)S0720

Instrument ID: 4 Initial Calibration Date: 10/13/88 12 DAD

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	.98717	4.56		
Anthracene	1.05155	1.08977	3.63		
Di-n-Butylphthalate	1.51956	1.43836	5.34		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.11867	6.03	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.17553	336.31		
Pyrene	1.56086	1.66455	6.64		
Terphenyl-d14	1.05835	1.10370	4.28		
Butylbenzylphthalate	1.03390	1.17712	13.85		
3,3'-Dichlorobenzidine	.13689	.23426	71.13		
Chrysene	.99655	1.05878	6.24		
Benzo(a)Anthracene	1.10407	1.10013	.36		
bis(2-Ethylhexyl)Phthalate	1.21073	1.35859	12.21		
Di-n-octylphthalate	3.40275	3.32381	2.32	*	
Benzo(a)Pyrene	1.32098	1.30430	1.26	*	
Benzo(b)Fluoranthene	1.60850	1.76942	10.00		
Indeno(1,2,3-cd)Pyrene	.96800	1.04885	8.35		
Dibenzo(a,h)Anthracene	.87481	.93848	7.28		
Benzo(k)Fluoranthene	1.44370	1.15007	20.34		
Benzo(g,h,i)Perylene	.89761	.94551	5.34		

RF - Response Factor from daily standard file at 80.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: _____.

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____.

Lab File ID (Standard): >S0720 Date Analyzed: 12/14/88

Instrument ID: 70 1 Time Analyzed: 14:55

	IS1(DCB) AREA	#	RT	IS2(NPT) AREA	#	RT	IS3(ANT) AREA	#	RT
12 HOUR STD	149004.		9.13	512954.		12.75	329220.		18.21
UPPER LIMIT	298008.			1025908.			658440.		
LOWER LIMIT	74502.			256477.			164610.		
SAMPLE NO.									
01 88113102 AC	204764.		9.14	767532.		12.84	382204.		18.26
02 88113102 BN	131090.		9.15	472793.		12.81	255268.		18.27
03 88113102 AC	135141.		9.12	523234.		12.78	273939.		18.21
04 88113102 BN	160886.		9.13	595773.		12.78	322161.		18.24
05 88113102 AC	120825.		9.11	445795.		12.89	258923.		18.21
06 88113102 BN	130680.		9.13	483532.		12.77	275084.		18.23
07 88113105 BN	142129.		9.15	501364.		12.80	283682.		18.26
08 88092806 AC	124006.		9.12	448322.		12.86	186323.		18.21
09 88092806 BN	190844.		9.12	722547.		12.75	397398.		18.23
10 88092806 AC	142534.		9.11	589711.		12.82	227046.		18.21
11 88092806 BN	180629.		9.11	715890.		12.75	371523.		18.21
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal stansard area.
LOWER LIMIT = - 50% of internal standard area.

* Column used to flag internal standard area values with an asterisk

Name: Engineering Science Contract: _____.

Lab Code: ES01 Case No.: ____ SAS No.: ____ SDG No.: ____.

Lab File ID (Standard): >S0720 Date Analyzed: 12/14/88

Instrument ID: 70 1 Time Analyzed: 14:55

		IS4 (PHN) AREA #	RT	IS5 (CRY) AREA #	RT	IS3 (PRY) AREA #	RT
	12 HOUR STD	478498.	22.88	305434.	31.35	202436.	37.50
	UPPER LIMIT	956996.		610868.		404872.	
	LOWER LIMIT	239249.		152717.		101218.	
	EPA SAMPLE NO.						
01	88113102 AC	554815.	22.99	277892.	31.45	147079.	37.65
02	88113102 BN	363625.	22.92	191838.	31.42	100213.*	37.58
03	88113102 AC	399598.	22.90	209434.	31.40	118883.	37.53
04	88113102 BN	476034.	22.99	228246.	31.46	117679.	37.61
05	88113102 AC	369952.	22.94	180693.	31.45	97065.*	37.62
06	88113102 BN	421073.	22.92	235748.	31.40	133389.	37.51
07	88113105 BN	417706.	22.95	215142.	31.44	113044.	37.59
08	88092806 AC	357720.	22.91	170618.	31.47	10107.*	37.85
09	88092806 BN	596996.	22.95	286760.	31.43	41726.*	37.72
10	88092806 AC	428356.	22.90	199801.	31.44	16729.*	37.82
11	88092806 BN	588806.	22.96	296463.	31.42	39890.*	37.73
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal stansard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

DATA PACKAGE #5

This page intentionally left blank.

ES
ENGINEERING-SCIENCE, INC.

RESEARCH AND DEVELOPMENT
LABORATORY
600 BANCROFT WAY
BERKELEY, CALIFORNIA 94710
(415) 841-7353

Job No.: OR001

Work Order No.: 953

Client: ES Oak Ridge
Attention: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Attached are the analytical reports for the water sample(s) received by this laboratory on 9-08-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092291	DANG-BR1	AS-F	9-07-88		11-04-88	
88092291	DANG-BR1	BA-I	9-07-88		10-17-88	
88092291	DANG-BR1	CD-F	9-07-88		10-26-88	
88092291	DANG-BR1	CR-F	9-07-88		10-28-88	
88092291	DANG-BR1	HG-C	9-07-88		9-27-88	
88092291	DANG-BR1	PB-F	9-07-88		10-20-88	
88092291	DANG-BR1	418.1	9-07-88	9-23-88	9-26-88	
88092291	DANG-BR1	8010	9-07-88		9-14-88	9-16-88
88092291	DANG-BR1	8020	9-07-88		9-14-88	
88092291	DANG-BR1	8080	9-07-88	9-09-88	10-06-88	
88092291	DANG-BR1	8270	9-07-88	9-12-88	10-21-88	

* If applicable

Job No.: OR001

Work Order No.: 953

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092292	DANG-BG-MW50-GW1	AS-F	9-07-88		11-04-88	
88092292	DANG-BG-MW50-GW1	BA-I	9-07-88		10-17-88	
88092292	DANG-BG-MW50-GW1	CD-F	9-07-88		10-26-88	
88092292	DANG-BG-MW50-GW1	CR-F	9-07-88		10-28-88	
88092292	DANG-BG-MW50-GW1	HG-C	9-07-88		9-27-88	
88092292	DANG-BG-MW50-GW1	PB-F	9-07-88		10-20-88	
88092292	DANG-BG-MW50-GW1	418.1	9-07-88	9-23-88	9-26-88	
88092292	DANG-BG-MW50-GW1	8010	9-07-88		9-14-88	9-16-88
88092292	DANG-BG-MW50-GW1	8020	9-07-88		9-14-88	
88092292	DANG-BG-MW50-GW1	8080	9-07-88	9-09-88	10-06-88	
88092292	DANG-BG-MW50-GW1	8270	9-07-88	9-12-88	10-21-88	
88092293	DANG-BG-MW43-GW1	AS-F	9-07-88		11-04-88	
88092293	DANG-BG-MW43-GW1	BA-I	9-07-88		10-17-88	
88092293	DANG-BG-MW43-GW1	CD-F	9-07-88		10-26-88	
88092293	DANG-BG-MW43-GW1	CR-F	9-07-88		10-28-88	
88092293	DANG-BG-MW43-GW1	HG-C	9-07-88		9-27-88	
88092293	DANG-BG-MW43-GW1	PB-F	9-07-88		10-20-88	
88092293	DANG-BG-MW43-GW1	418.1	9-07-88	9-23-88	9-26-88	
88092293	DANG-BG-MW43-GW1	8010	9-07-88		9-14-88	9-16-88
88092293	DANG-BG-MW43-GW1	8020	9-07-88		9-14-88	
88092293	DANG-BG-MW43-GW1	8080	9-07-88	9-09-88	10-06-88	
88092293	DANG-BG-MW43-GW1	8270	9-07-88	1-03-89	1-13-89	

* If applicable

ENGINEERING-SCIENCE INC.
12/05/88

ANALYSIS REPORT

WORK ORDER NUMBER: 953
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/08/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : AR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 2, UNITS: mg/L

TEST COMPOUND	DANG-BR1 88092291	DANGB-BG-MW50-GW-1 88092292	DANGB-BG-MW43-GW-1 88092293
ACID DIG FLAME	NA	NA	NA
ACID DIG FURNACE	NA	NA	NA
ARSENIC	<0.005	<0.005	<0.005
BARIUM	<0.05N	0.13BN	0.13BN
CADMIUM	<0.001	<0.001	<0.001
CHROMIUM	<0.002	<0.002	0.003B
MERCURY	<.0002	<.0002	<.0002
LEAD	<0.005	<0.005	<0.005

ND - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 953
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/08/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
S OAK RIDGE/DULUTH ANGB
10 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
ILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

ONTRACT / PO # : AR001
ONTACT : BILL HAYDEN
(615)-481-3920

ASK: 3, UNITS: mg/L

EST COMPOUND	DANG-BR1 88092291	DANGB-BG-MW50-GW-1 88092292	DANGB-BG-MW43-GW-1 88092293
18.1 PETROLEUM HYDROCARBONS	<1.5	<1.5	<1.5

- Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 953
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/08/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : AR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 4, UNITS: ug/L, GROUP 8010

TEST COMPOUND	DANG-BR1 88092291	DANGB-BG-MW50-GW-1 88092292	DANGB-BG-MW43-GW-1 88092293
BENZYL CHLORIDE	ND	ND	ND
BIS (2-CHLOROETHOXY)METHANE	ND	ND	ND
BIS (2-CHLOROISOPROPYL)ETHER	ND	ND	ND
BROMOBENZENE	ND	ND	ND
BROMODICHLOROMETHANE	ND	ND	ND
BROMOFORM	ND	ND	ND
BROMOETHANE	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND
CHLORACETALDEHYDE	ND	ND	ND
CHLORAL	ND	ND	ND
CHLOROBENZENE	ND	ND	ND
CHLOROETHANE	ND	ND	ND
CHLOROFORM	14	ND	ND
1-CHLOROHEXANE	ND	ND	ND
2-CHLOROETHYL VINYL ETHER	ND	ND	ND
CHLOROMETHANE	ND	ND	ND
CHLOROMETHYL METHYL ETHER	ND	ND	ND
CHLOROTOLUENE	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND
DIBROMOMETHANE	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	ND
1,2-DICHLOROETHANE	ND	ND	ND
1,1-DICHLOROETHYLENE	ND	ND	ND
TRANS-1,2-DICHLOROETHYLENE	ND	ND	ND
DICHLOROMETHANE	1.1B	0.80B	1.6B
1,2-DICHLOROPROPANE	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 953

'EST COMPOUND	DANG-BR1 88092291	DANGB-BG-MW50-GW-1 88092292	DANGB-BG-MW43-GW-1 88092293
.,3-DICHLOROPROPYLENE	ND	ND	ND
.,1,2,2-TETRACHLOROETHANE	ND	ND	ND
.,1,1,2-TETRACHLOROETHANE	ND	ND	ND
'ETRACHLORCETHYLENE	ND	ND	ND
.,1,1-TRICHLOROETHANE	ND	ND	ND
.,1,2-TRICHLOROETHANE	ND	ND	ND
'RICHLOROETHYLENE	ND	ND	ND
:RICHLOROFLUOROMETHANE	ND	ND	ND
:RICHLOROPROPANE	ND	ND	ND
'INYL CHLORIDE	ND	ND	ND

ID - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 953
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/08/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : AR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 4, UNITS: ug/L, GROUP 8020

TEST COMPOUND	DANG-BR1 88092291	DANGB-BG-MW50-GW-1 88092292	DANGB-BG-MW43-GW-1 88092293
BENZENE	ND	ND	ND
CHLOROBENZENE	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND
ETHYL BENZENE	ND	ND	ND
TOLUENE	ND	ND	ND
XYLENES	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 953
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/08/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
S OAK RIDGE/DULUTH ANGB
10 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
ILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

ONTRACT / PO # : AR001
ONTACT : BILL HAYDEN
(615)-481-3920

ASK: 4, UNITS: ug/L, GROUP 8080

EST COMPOUND	DANG-BR1 88092291	DANGB-BG-MW50-GW-1 88092292	DANGB-BG-MW43-GW-1 88092293
LDRIN	ND	ND	ND
LPHA-BHC	ND	ND	ND
ETA-BHC	ND	ND	ND
ELTA-BHC	ND	ND	ND
AMMA-BHC	ND	ND	ND
HLORDANE	ND	ND	ND
,4'-DDD	ND	ND	ND
,4'-DDE	ND	ND	ND
,4'-DDT	ND	ND	ND
IELDRIN	ND	ND	ND
NDOSULFAN I	ND	ND	ND
NDOSULFAN II	ND	ND	ND
NDOSULFAN SULFATE	ND	ND	ND
NDRIN	ND	ND	ND
NDRIN ALDEHYDE	NA	NA	NA
EPTACHLOR	ND	ND	ND
EPTACHLOR EPOXIDE	ND	ND	ND
EPONE	ND	ND	ND
ETHOXYCHLOR	ND	ND	ND
OXAPHENE	ND	ND	ND
CB-1016	ND	ND	ND
CB-1221	ND	ND	ND
CB-1232	ND	ND	ND
CB-1242	ND	ND	ND
CB-1248	ND	ND	ND
CB-1254	ND	ND	ND
CB-1260	ND	ND	ND

D - Not Detected

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

Date Received: September 8, 1988
Date Reported: December 8, 1988

Work Order: 953
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092291	88092292
Sample No.:	DANG-BR1	DANGB-B6-MW50-GW1
Date Sampled:	09-07-88	09-07-88
Time Sampled:	09:00	15:05
Date Extracted:	09-12-88	09-12-88
Date Analyzed:	10-21-88	10-21-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
1,3-Dichlorobenzene	10	ND	ND
1,4-Dichlorobenzene	10	ND	ND
Hexachloroethane	10	ND	ND
Bis(2-chloroethyl)ether	10	ND	ND
1,2-Dichlorobenzene	10	ND	ND
N-Nitrosodimethylamine	10	ND	ND
Bis(2-chloroisopropyl)ether	10	ND	ND
N-Nitrosodi-n-propylamine	10	ND	ND
Hexachlorobutadiene	10	ND	ND
1,2,4-Trichlorobenzene	10	ND	ND
Nitrobenzene	10	ND	ND
Isophorone	10	ND	ND
Naphthalene	10	ND	ND
Bis(2-chloroethoxy)methane	10	ND	ND
1-Chloronaphthalene	10	ND	ND
Hexachlorocyclopentadiene	10	ND	ND
Acenaphthylene	10	ND	ND
Acenaphthene	10	ND	ND
Dimethyl phthalate	10	ND	ND
2,6-Dinitrotoluene	10	ND	ND
Fluorene	10	ND	ND
2,4-Dinitrotoluene	10	ND	ND
Diethyl phthalate	10	15	ND
N-Nitrosodiphenylamine	10	ND	ND
Hexachlorobenzene	10	ND	ND

B = Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

:e Received: September 8, 1988
:e Reported: December 8, 1988

Work Order: 953
Job Number: OR001

?: ES:Oak Ridge/Duluth ANGB
dress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

ɔ Number:	88092291	88092292
ıple No.:	DANG-BR1	DANGB-B6-MW50-GW1
:e Sampled:	09-07-88	09-07-88
ne Sampled:	09:00	15:05
:e Extracted:	09-12-88	09-12-88
:e Analyzed:	10-21-88	10-21-88

npound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
enanthrene	10	ND	ND
:hracene	10	ND	ND
ɔutyl phthalate	10	ND	ND
ıoranthene	10	ND	ND
Chlorophenyl phenyl ether	10	ND	ND
:ene	10	ND	ND
:yl Benzyl phthalate	10	ND	ND
s(2-ethylhexyl) phthalate	10	ND	ND
:ysene	10	ND	ND
Bromophenyl phenyl ether	10	ND	ND
ızo(a)anthracene	10	ND	ND
-n-octylphthalate	10	ND	ND
ızo(b)fluoranthene	10	ND	ND
ızo(k)fluoranthene	10	ND	ND
ızidine	60	ND	ND
3'-Dichlorobenzidine	20	ND	ND
ızo(a)pyrene	10	ND	ND
deno(1,2,3-cd)pyrene	10	ND	ND
ɔenzo(a,h)anthracene	10	ND	ND
ızo(ghi)perylene	10	ND	ND
ızyl Alcohol	20	ND	ND

= Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 8, 1988 Work Order: 953
Date Reported: December 8, 1988 Job Number: OR001

For: ES-Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

Lab Number:	88092291	88092292
Sample No.:	DANG-BR1	DANGB-B6-MW50-GW1
Date Sampled:	09-07-88	09-07-88
Time Sampled:	09:00	15:05
Date Extracted:	09-12-88	09-12-88
Date Analyzed:	10-21-88	10-21-88

Compound	Detection Limits ug/L	Analytical Results ug/L	ug/L
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
4-Chloroaniline	20	ND	ND
2-Chloronaphthalene	--*	ND	ND
Dibenzofuran	10	ND	ND
p-Dimethylaminoazobenzene	--*	ND	ND
7,12-Dimethylbenz(a)anthracene	--*	ND	ND
α,α-Dimethylphenethylamine	--*	ND	ND
Diphenylamine	--*	ND	ND
1,2-Diphenylhydrazine	--*	ND	ND
Ethyl methanesulfonate	--*	ND	ND
3-Methylcholanthrene	--*	ND	ND
Methyl methanesulfonate	--*	ND	ND
2-Methylnaphthalene	10	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	50	ND	ND
3-Nitroaniline	50	ND	ND
4-Nitroaniline	50	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
4-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

:e Received: September 8, 1988
:e Reported: December 8, 1988

Work Order: 953
Job Number: OR001

:: ES:Oak Ridge/Duluth ANGB
lress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN:Mr. Bill Hayden

› Number:	88092291	88092292
ıple No.:	DANG-BR1	DANGB-B6-MW50-GW1
:e Sampled:	09-07-88	09-07-88
ıe Sampled:	09:00	15:05
:e Extracted:	09-12-88	09-12-88
:e Analyzed:	10-21-88	10-21-88

ıpound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
›ha-BHC	--*	ND	ND
ımma-BHC	--*	ND	ND
:a-BHC	20	ND	ND
›tachlor	10	ND	ND
:ta-BHC	15	ND	ND
ldrin	10	ND	ND
›tachlor epoxide	10	ND	ND
dosulfan I	--*	ND	ND
eldrin	15	ND	ND
4'-DDE	30	ND	ND
drin	--*	ND	ND
dosulfan II	--*	ND	ND
4'-DDD	15	ND	ND
4'-DDT	25	ND	ND
dosulfan Sulfate	30	ND	ND
drin aldehyde	--*	ND	ND
drin Ketone	--*	ND	ND
ordane	60	ND	ND
:hoxychlor	--*	ND	ND
‹aphene	60	ND	ND
›clor-1016	60	ND	ND
›clor-1221	60	ND	ND
›clor-1232	60	ND	ND
›clor-1242	60	ND	ND
›clor-1248	60	ND	ND
›clor-1254	60	ND	ND
›clor-1260	60	ND	ND

EPA has not yet determined detection limits for these compounds.

* Compound was detected in the blank.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

Date Received: September 8, 1988
Date Reported: December 8, 1988

Work Order: 953
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092291	88092292
Sample No.:	DANG-BR1	DANGB-B6-MW50-GW1
Date Sampled:	09-07-88	09-07-88
Time Sampled:	09:00	15:05
Date Extracted:	09-12-88	09-12-88
Date Analyzed:	10-21-88	10-21-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
4-Chlorophenol	10	ND	ND
2-Nitrophenol	10	ND	ND
Phenol	10	ND	ND
2,4-Dimethylphenol	10	ND	ND
2,4-Dichlorophenol	10	ND	ND
2,4,6-Trichlorophenol	10	ND	ND
4-Chloro-3-methylphenol	20	ND	ND
2,4-Dinitrophenol	50	ND	ND
2,6-Dichlorophenol	--*	ND	ND
2-Methyl-4,6-Dinitrophenol	50	ND	ND
Pentachlorophenol	50	ND	ND
4-Nitrophenol	50	ND	ND
Benzoic Acid	50	ND	ND
2-Methylphenol	10	ND	ND
3 & 4-Methylphenol	10	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
2,4,5-Trichlorophenol	10	ND	ND

Laura Kuck
Analyst

N W Burton
Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

ate Received: September 8, 1988
ate Reported: February 28, 1989

Work Order: 953
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

ab Number:	88092293 REEXTRACT
ample No.:	DANGB-BG-MW43-GW1
ate Sampled:	09-07-88
ime Sampled:	14:35
ate Extracted:	01-03-89
ate Analyzed:	01-13-89

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L
,3-Dichlorobenzene	10	ND
,4-Dichlorobenzene	10	ND
exachloroethane	10	ND
is(2-chloroethyl)ether	10	ND
,2-Dichlorobenzene	10	ND
-Nitrosodimethylamine	10	ND
is(2-chloroisopropyl)ether	10	ND
-Nitrosodi-n-propylamine	10	ND
exachlorobutadiene	10	ND
,2,4-Trichlorobenzene	10	ND
itrobenzene	10	ND
sophorone	10	ND
aphthalene	10	ND
is(2-chloroethoxy)methane	10	ND
-Chloronaphthalene	10	ND
exachlorocyclopentadiene	10	ND
cenaphthylene	10	ND
cenaphthene	10	ND
imethyl phthalate	10	ND
,6-Dinitrotoluene	10	ND
luorene	10	ND
,4-Dinitrotoluene	10	ND
iethyl phthalate	10	ND
-Nitrosodiphenylamine	10	ND
exachlorobenzene	10	ND

= Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 8, 1988
Date Reported: February 28, 1989

Work Order: 953
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092293 REEXTRACT
Sample No.:	DANGB-BG-MW43-GW1
Date Sampled:	09-07-88
Time Sampled:	14:35
Date Extracted:	01-03-89
Date Analyzed:	01-13-89

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L
Phenanthrene	10	ND
Anthracene	10	ND
Dibutyl phthalate	10	ND
Fluoranthene	10	ND
4-Chlorophenyl phenyl ether	10	ND
Pyrene	10	ND
Butyl Benzyl phthalate	10	10
Bis(2-ethylhexyl) phthalate	10	13 B MRD 3-3-89
Chrysene	10	ND
4-Bromophenyl phenyl ether	10	ND
Benzo(a)anthracene	10	ND
Di-n-octylphthalate	10	ND
Benzo(b)fluoranthene	10	ND
Benzo(k)fluoranthene	10	ND
Benzidine	60	ND
3,3'-Dichlorobenzidine	20	ND
Benzo(a)pyrene	10	ND
Indeno(1,2,3-cd)pyrene	10	ND
Dibenzo(a,h)anthracene	10	ND
Benzo(ghi)perylene	10	ND
Benzyl Alcohol	20	ND

B = Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

ate Received: September 8, 1988 Work Order: 953
ate Reported: February 28, 1989 Job Number: OR001

or: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
ddress:710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ab Number:	88092293 REEXTRACT
ample No.:	DANGB-BG-MW43-GW1
ate Sampled:	09-07-88
ime Sampled:	14:35
ate Extracted:	01-03-89
ate Analyzed:	01-13-89

ompound	Detection Limits ug/L	Analytical Results ug/L
cetophenone	--*	ND
niline	--*	ND
-Aminobiphenyl	--*	ND
-Chloroaniline	20	ND
-Chloronaphthalene	--*	ND
ibenzofuran	10	ND
-Dimethylaminoazobenzene	--*	ND
,12-Dimethylbenz(a)anthracene	--*	ND
-,a-Dimethylphenethylamine	--*	ND
iphenylamine	--*	ND
,2-Diphenylhydrazine	--*	ND
thyl methanesulfonate	--*	ND
-Methylcholanthrene	--*	ND
ethyl methanesulfonate	--*	ND
-Methylnaphthalene	10	ND
-Naphthylamine	--*	ND
-Naphthylamine	--*	ND
-Nitroaniline	50	ND
-Nitroaniline	50	ND
-Nitroaniline	50	ND
-Nitroso-di-n-butylamine	--*	ND
-Nitrosopiperidine	--*	ND
entachlorobenzene	--*	ND
entachloronitrobenzene	--*	ND
henacetin	--*	ND
-Picoline	--*	ND
ronamide	--*	ND
,2,4,5-Tetrachlorobenzene	--*	ND

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

Date Received: September 8, 1988
Date Reported: February 28, 1989

Work Order: 953
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN:Mr. Bill Hayden

Lab Number:	88092293 REEXTRACT
Sample No.:	DANGB-BG-MW43-GW1
Date Sampled:	09-07-88
Time Sampled:	14:35
Date Extracted:	01-03-89
Date Analyzed:	01-13-89

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L
Alpha-BHC	--*	ND
Gamma-BHC	--*	ND
Beta-BHC	20	ND
Heptachlor	10	ND
Delta-BHC	15	ND
Aldrin	10	ND
Heptachlor epoxide	10	ND
Endosulfan I	--*	ND
Dieldrin	15	ND
4,4'-DDE	30	ND
Endrin	--*	ND
Endosulfan II	--*	ND
4,4'-DDD	15	ND
4,4'-DDT	25	ND
Endosulfan Sulfate	30	ND
Endrin aldehyde	--*	ND
Endrin Ketone	--*	ND
Chlordane	60	ND
Methoxychlor	--*	ND
Toxaphene	60	ND
Aroclor-1016	60	ND
Aroclor-1221	60	ND
Aroclor-1232	60	ND
Aroclor-1242	60	ND
Aroclor-1248	60	ND
Aroclor-1254	60	ND
Aroclor-1260	60	ND

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

ate Received: September 8, 1988
ate Reported: February 28, 1989

Work Order: 953
Job Number: OR001

)R: ES:Oak Ridge/Duluth ANGB
ddress:710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

ab Number:	88092293 REEXTRACT
ample No.:	DANGB-BG-MW43-GW1
ate Sampled:	09-07-88
ime Sampled:	14:35
ate Extracted:	01-03-89
ate Analyzed:	01-13-89

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L
-Chlorophenol	10	ND
-Nitrophenol	10	ND
henol	10	ND
,4-Dimethylphenol	10	ND
,4-Dichlorophenol	10	ND
,4,6-Trichlorophenol	10	ND
-Chloro-3-methylphenol	20	ND
,4-Dinitrophenol	50	ND
,6-Dichlorophenol	--*	ND
-Methyl-4,6-Dinitrophenol	50	ND
entachlorophenol	50	ND
-Nitrophenol	50	ND
enzoic Acid	50	ND
-Methylphenol	10	ND
- & 4-Methylphenol	10	ND
,3,4,6-Tetrachlorophenol	--*	ND
,4,5-Trichlorophenol	10	ND

Analyst

Laboratory Supervisor

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

)TE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.			ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710
SAMPLER(S): (Signature)				

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW5030, 8020	EPA 601	EPA 625	EPA 418.1	SW 6010, 7060, 7131	SW7421, 7470 7191	SW9310, 9315	SM425	REMARKS
9-1-88	0900	DANG-BR1	8		X	X	X	X	X			882291

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	9-7-88 1800				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
			09/08/1988 10:00	Samples received cold and intact.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.			ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710

SAMPLER(S): (Signature)

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 601	EPA 625	EPA 418.1	SW 6010, 7060, 7131	SW7421, 7470	SW8310, 9315	SM429	REMARKS
9-7-88	1505	DANGB-BG-MWSO-GW-1	5		X	X	X	X	X			882292

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	9-7-88 1800				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
			09/08/88 10:10	Samples received cold and Intact

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

275

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.			ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710

SAMPLER(S): (Signature)

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 601	EPA 625	EPA 418.1	SW 8010, 7060, 7131	SW7421, 7410 7191	SW9310, 9315	SM429	REMARKS
9-7-88	1435	DANGB-BG-MW43-GW-1	8		X	X	X	X	X			882293

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	9-7-88 1800				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
			9/8/88 1020	Samples received cold and intact.

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
OR001	.Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature)

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8240, 8020	EPA 608	EPA 625	EPA 418.1	SW 8010, 7860, 7131	SW7421, 7470, 7191	SW9310, 9315	SM429	REMARKS
9-7-88	1435	DANGB-BG-MW43-GW-1	5	X								~~882294~~ 882293
9-7-88	1505	DANGB-BG-MW50-GW-1	5	X								~~882295~~ 882292
9-7-88	1330	DANGB-FB-1	2	X								~~882296~~ 882294
9-7-88	0900	DANGB-BR1	5	X								~~882297~~ 882291

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

WATER ANALYSES REQUIRED

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	9-7-88 1800				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
			990888 1030	Samples received cold and intact

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

274

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.			ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710
SAMPLER(S): (Signature)				

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 6010, 7060, 7131	SW7421, 7470	SW9010, 9315	SM429	REMARKS
[illegible]	1100	LANDF - INF	1							X		
[illegible]	1405	DANGE - 1-5 MW14-GW-1	1							X		
[illegible]	1505	DANGE - 1-6 - MW20-GW-1	1							X		
9-28-88	0900	DANG B - BR 1	1							X		

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature]	11-6 1700				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

215

276

FEDERAL EXPRESS

AIRBILL

USE THIS AIRBILL FOR DOMESTIC SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIRWAYBILL FOR SHIPMENTS TO PUERTO RICO.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 949 314352

949031 4352

SENDER'S COPY

Sender's Federal Express Account Number: 1196-207-8 | Date: 9-7-88

1 From (Your Name) Please Print: Kim Davis | Your Phone Number (Very Important): (615) 361-426

Company: Logistics Systems Inc. | Department/Floor No.:

Street Address: 1610 Gallatin Ave.

City: Oak Ridge | State: TN | ZIP Required: 37830-4

2 To (Recipient's Name) Please Print: Wm Mann | Recipient's Phone Number (Very Important): (14) 6[illegible]

Company: Nuclear Inc. | Department/Floor No.:

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): 1215 Lake Ave.

City: Rock City | State: NJ | ZIP Required: 0745

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.): 88-001

PAYMENT: [✓] Bill Sender [ ] Bill Recipient's FedEx Acct. No. [ ] Bill 3rd Party FedEx Acct. No. [ ] Bill Credit Card [ ] Cash

H IF HOLD FOR PICK-UP, Print FEDEX Address Here: Street Address | City | State | ZIP Required

4 SERVICES

1 [✓] PRIORITY 1 Overnight Delivery
2 [ ] COURIER-PAK OVERNIGHT ENVELOPE*
3 [ ] OVERNIGHT BOX
4 [ ] OVERNIGHT TUBE
5 [ ] STANDARD AIR Delivery not later than second business day
6 [ ] OVERNIGHT LETTER*
7 [ ]
8 [ ]
9 [ ]
10 [ ]

*Declared Value Limit $100.

DELIVERY AND SPECIAL HANDLING

1 [ ] HOLD FOR PICK-UP (If in Box H)
2 [✓] DELIVER WEEKDAY
3 DELIVER SATURDAY (Extra charge) [ ]
4 [ ] DANGEROUS GOODS (Extra charge)
5 [ ] CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charge) (Release Signature Not Applicable)
6 [ ] DRY ICE ____ Lbs.
7 [ ] OTHER SPECIAL SERVICE
8 [ ]
9 [ ] SATURDAY PICK-UP (Extra charge)
10 [ ]
11 [ ]
12 [ ] HOLIDAY DELIVERY (If offered) (Extra charge)

	PACKAGES	WEIGHT	YOUR DECLARED VALUE (See right)	OVER SIZE
	1	17		
Total	1	12	Total	

Received At
1 [ ] Regular Stop
2 [ ] On-Call Stop
3 [ ] Drop Box
4 [ ] BSC
5 [ ] Station

FEDEX Corp. Employee No.:

Date/Time for FEDEX Use: 9/7/88

SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY

Use of this airbill constitutes your agreement to the service conditions in our current Service Guide which is available upon request. See back of sender's copy of this airbill for further information.

We will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay or non-delivery, unless you specify a higher amount in the space to the left, pay 40¢ per additional $100 specified and document your actual loss in the event of a claim. Maximum amount limitations found in the current Federal Express Service Guide apply. Your rights to recover from Federal Express for loss of the intrinsic value of the package, as well as for loss of sales, income, interest, profit, attorneys fees, costs and any other form of damage whether direct, incidental, consequential or special is limited to the greater of $100 or the declared value specified to the left. In no event shall your recovery exceed your actual loss.

In the event of untimely delivery, Federal Express will at your request and with some limitations, refund all transportation charges paid. See Service Guide for further information.

5 Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.

Release Signature:

Federal Express Use

Base Charges	
Declared Value Charge	
Other 1	
Other 2	
Total Charges	

PART #2041738900
REVISION DATE 7/88
PRINTED IN U.S.A. GBFE

009

© 1988 F.E.C.

SENDER'S COPY

FEDERAL EXPRESS

AIRBILL

USE THIS AIRBILL FO[R] [DOM]ESTIC SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIRBILL FOR SHIPMENTS TO PUERTO RICO.
QUESTIONS? CALL 800-[G]O-FEDEX TOLL FREE.

PACKAGE TRACKING NUMBER 949 314352

949031 4352

SENDER'S COPY

Sender's Federal Express Account Number: 1196 4207-8
Date: 9-7-88

1 From (Your Name) Please Print: [illegible]
Your Phone Number (Very Important): (415) 961-[illegible]
Company: [illegible]
Department/Floor No.:
Street Address: [illegible]
City: [illegible] State: [illegible] ZIP Required: [illegible]

2 To (Recipient's Name) Please Print: [illegible]
Recipient's Phone Number (Very Important): ([illegible]
Company: [illegible]
Department/Floor No.:
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. # Zip Codes.): [illegible]
City: [illegible] State: [illegible] ZIP Required: [illegible]

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.): [illegible]

H IF HOLD FOR PICK-UP, Print FEDEX Address Here
Street Address:
City: State: ZIP Required:

PAYMENT: [X] Bill Sender [ ] Bill Recipient's FedEx Acct. No. [ ] Bill 3rd Party FedEx Acct. No. [ ] Bill Credit Card [ ] Cash

4 SERVICES

1 [X] PRIORITY 1 Overnight Delivery
2 [ ] COURIER-PAK OVERNIGHT ENVELOPE*
3 [ ] OVERNIGHT BOX
4 [ ] OVERNIGHT TUBE
5 [ ] STANDARD AIR Delivery not later than second business day *
6 [ ] OVERNIGHT LETTER*
7 [ ]
8 [ ]
9 [ ]
10 [ ]

* Declared Value Limit $100.

DELIVERY AND SPECIAL HANDLING

1 [ ] HOLD FOR PICK-UP (If no Box #)
2 [X] DELIVER WEEKDAY
3 [ ] DELIVER SATURDAY (Extra charges)
4 [ ] DANGEROUS GOODS (Extra charges)
5 [ ] CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charges Released Signature Not Applicable)
6 [ ] DRY ICE ____ Lbs.
7 [ ] OTHER SPECIAL SERVICE
8 [ ]
9 [ ] SATURDAY PICK-UP (Extra charges)
10 [ ]
11 [ ]
12 [ ] HOLIDAY DELIVERY (If selected) (Extra charges)

PACKAGES	WEIGHT	YOUR DECLARED VALUE (See right)	OVER SIZE
1	12		
Total 1	Total 12	Total	

Received At
1 [ ] Regular Stop
2 [ ] On-Call Stop
3 [ ] Drop Box
4 [ ] BSC
5 [ ] Station

FEDEX Corp. Employee No.: [illegible]

Date/Time for FEDEX Use: 9/7/88

SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY

Use of this airbill constitutes your agreement to the service conditions in our current Service Guide which is available upon request. See back of sender's copy of this airbill for further information.

We will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay or non-delivery, unless you specify a higher amount in the space to the left, pay 40¢ per additional $100 specified and document your actual loss in the event of a claim. Maximum amount limitations found in the current Federal Express Service Guide apply. Your rights to recover from Federal Express for loss of the intrinsic value of the package, as well as for loss of sales, income, interest, profit, attorneys fees, costs and any other form of damage whether direct, incidental, consequential or special is limited to the greater of $100 or the declared value specified to the left. In no event shall your recovery exceed your actual loss.

In the event of untimely delivery, Federal Express will at your request and with some limitations, refund all transportation charges paid. See Service Guide for further information.

5 Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.

Release Signature: _____

Federal Express Use

Base Charges	
Declared Value Charge	
Other 1	
Other 2	
Total Charges	

PART #2041738900
REVISION DATE 7/88
PRINTED IN U.S.A. GBFE

009

© 1988 F.E.C.

SENDER'S COPY

277

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092291-88092293
WORK ORDER NO.: 953

These water samples were received at the ES Berkeley Laboratory on 9-08-88.

They were received cold and intact.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Project No: 953
Sample Matrix: Water
Conc. Unit: ug/l
Work Order No: 953
Lab Sample ID: ~~50224~~ 50213, 50214
Lab File ID: 8809229l-93 BN BLK
AC BLK
Date Received: 9-8-88
Date Extracted: 9-12-88
Date Analyzed: 10-23-88
Date Reported: 10-31-89
Dilution Factor: 1
% Moisture: NA

Lab No.:
Client: ES: Oakridge
Attn:
Address:

Project: Duluth ANGB

TICs Found: 1

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	Unknown	21.22	4	

DANG-BR1

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES: Oakridge
Attn:
Address:

Project: Duluth ~~ANG~~ B

TICs Found: ~~0~~ 4

Project No: 953
Sample Matrix: water
Conc. Unit: ug/L
Work Order No: 953
Lab Sample ID: 8 0205 + 502204
Lab File ID: 88092291
Date Received: 9-8-88
Date Extracted: 9-12-88
Date Analyzed: 10-21-88
Date Reported: 2-28-89
Dilution Factor: 1
% Moisture: NA

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	Unknown	7.24	9	
	"	7.83	7	
	"	7.89	4	
	"	7.81	4	

IF

EPA SAMPLE NO.

DANGB-B6-MW50-GW1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Name: Engineering Science Contract: OR01

Code: _____ Case No.: 953 SAS No.: _____ Job No.: _____

Matrix: (soil/water) water Lab Sample ID: 88082292

Sample wt/vol: 1000 (g/mL) mL Lab File ID: E5945 + E5946

Level: (low/med) low Date Received: 9-8-88

% Moisture: not dec. ✓ dec. _____ Date Extracted: 9-12-88

Extraction: (SepF/Cont/Sonc) SepF Date Analyzed: 10/21/88

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: none

Number TICs found: 10 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	127-18-4	tetrachloroethene	4.29	13	
2.		Unknown	4.28	6	
3.			4.74	5	
4.			6.22	37	
5.			6.43	7	
6.			6.77	24	
7.			6.82	14	
8.			6.91	5	
9.			25.20	64	
10.		↓	28.01	15	
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: DAN6B-BG-mw43-GW1

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 953 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Water Lab Sample ID: 88092293 RE

Sample wt/vol: 1000 (g/mL) mL Lab File ID: E6627 + E6628

Level: (low/med) low Date Received: 9-8-88

% Moisture: not dec. ✓ dec. _____ Date Extracted: 1-3-89

Extraction: (SepF/Cont/Sonc) SepF Date Analyzed: 1/13/89

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1

Number TICs found: 3 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	127-18-4	tetrachloroethene	3.86	13	
2.		unknown	24.46	190	
3.		unknown	27.31	7	
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

FORM I SV-TIC 1/87 Rev.

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092256, 88092303-88092306, 88092291-88092293
88092312-88092316, 88092321-88092327

QC Report No: AAF-W-0032-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-01-88
Date Reported: 11-07-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	PR	Notes
Arsenic	88092256	88092256	11-04-88	10-11-88	7060	<0.010	<0.005	<0.005	NC	0.040	<0.005	0.0410	102	
Cadmium	88092256	88092256	10-26-88	10-11-88	7131	<0.005	<0.001	<0.001	NC	5.0	<0.001	5.26	105	
Chromium	88092256	88092256	10-28-88	10-11-88	6010	<0.005	<0.002	<0.002	NC	20.0	<0.002	20.07	100	
Lead	88092256	88092256	10-20-88	10-11-88	7421	<0.010	<0.005	<0.005	NC	0.020	<0.005	0.0229	114	

0343

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

QC Report No: ICP-W-0051-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-08-88
Date Reported: 11-07-88
Dilution Factor: NA

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092291-88092293, 88092256, 88092303-88092306
88092312-88092317, 88092321-88092327

Laboratory Supervisor Approval:

Analyte	Laboratory Sample Nos. Duplicates	Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	SA	Spike Recovery SR	Spike Recovery SSR	PR	Notes
Barium	88092291	88092291	10-17-88	10-14-88	6010	<0.2	<0.05	<0.05	NC	2.0	<0.05	1.38	69N	

284

N - See Legend attached.

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092291-88092293
88092305-88092306

QC Report No: CVM-W-0014-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-08-88
Date Reported: 10-10-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Mercury	88092291	88092291	9-27-88	9-26-88	245.1	<0.0002	<0.0002	<0.0002	NC	0.0010	<0.0002	0.000958	96	

285

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY

QC REPORT NO.: TPH-W-0072-88

Insufficient sample was available for quality control purposes. The laboratory control sample is designated as a quality control sample for this batch.

The reporting limit for the samples in this batch is provided by the sub-contract laboratory.

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No: TPH-W-0072-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 9-23-88
Date Analyzed: 9-26-88
Date Reported: 11-01-88
Dilution Factor: NA

QC Report for Laboratory Sample No(s):
88092291-88092293, 88092305-88092306
88092314-88092317, 88092312, 88092321,
88092354, 88092324, 88092349, 88092388-88092390

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1.5	<1.5	39.5	38.5	97	37.5	95	3	*

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

VOLATILE ORGANICS
EPA 8010/8020

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88082256, 88092291-88092294
88092303-88092309, 88092312-88092317
88092321, 88082189

QC Report No: VGC-W-0047-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-12-88
Date Prepared: NA
Date Analyzed: 9-22-88
Date Reported: 10-25-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092321	1,1-Dichloroethane	10	ND	9.59	96	9.28	93	3	26	70-130
	Trichloroethene	10	ND	10.2	102	10.3	103	1	19	65-131
	Chlorobenzene	10	ND	10.5	105	10.7	107	2	40	59-137
	Aromatics: 8020									
88092321	Benzene	10	20	30.8	108	30.8	108	0	20	56-146
	Toluene	10	ND	10.7	107	9.72	97	10	41	42-150
	Chlorobenzene	10	ND	10.1	101	9.37	94	7	36	76-133

Relative Percent Difference (PR) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Sample Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 10-25-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
19	9-14-88	VGC	Carbopack	75-09-2	Dichloromethane	1.5	0.25	88092291-88092294

882

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: OCP-W-0036-88
QC REPORT NO.: OCP-W-0036-88B

Analysis of matrix spikes gave one recovery and the RPD for aldrin that were higher than EPA QC guidelines. Analysis of spiked blanks gave one recovery each for aldrin, endrin, and lindane and RPDs for dieldrin and endrin that are outside of EPA QC guidelines. Data associated with these analyses were closely examined, no analytical problem was found.

Heptachlor epoxide was inadvertently used instead of heptachlor in the matrix spiking solution.

Endrin aldehyde and Kepone were not recoverable because they were removed by the alumina column clean-up used on these samples.

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s).:
88082189, 88082256
88092291-88092293

QC Report No.: OCP-W-0036-88
QC Sample No.: 88082256
Level (Low/Med): Low
Date Reported: 11-10-88

Laboratory Supervisor Approval:

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	400	ND	0.378	95	56-123
Heptachlor epoxide	400	ND	0.443	111	40-131
Aldrin	400	ND	0.747	187*	40-120
Dieldrin	1000	ND	1.19	119	52-126
Endrin	1000	ND	1.03	103	56-121
4,4'-DDT	1000	ND	1.19	119	38-127

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.361	91	95	5	15	56-123
Heptachlor epoxide	0.431	108	111	2	20	40-131
Aldrin	0.473	118	187*	46*	22	40-120
Dieldrin	1.18	118	119	<1	18	52-126
Endrin	1.12	112	103	8	21	56-121
4,4'-DDT	1.10	111	119	8	27	38-127

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 1 out of 6 outside limits

Spike Recovery: 1 out of 12 outside limits

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s).:
88082189, 88082256
88092291-88092293

QC Report No.: OCP-W-0036-88B
QC Sample No.: Blank
Level (Low/Med): Low
Date Reported: 11-10-88

Laboratory Supervisor Approval:

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	200	ND	0.157	79	56-123
Heptachlor epoxide	200	ND	0.208	104	40-131
Aldrin	200	ND	0.271	136*	40-120
Dieldrin	500	ND	0.513	103	52-126
Endrin	500	ND	0.461	92	56-121
4,4'-DDT	500	ND	0.392	78	38-127

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.0966	48*	79	49	15	56-123
Heptachlor epoxide	0.186	93	104	12	20	40-131
Aldrin	0.227	111	136*	20	22	40-120
Dieldrin	0.287	57	103	56*	18	52-126
Endrin	0.0298	6*	92	176*	21	56-121
4,4'-DDT	0.313	63	78	22	27	38-127

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 3 out of 6 outside limits

Spike Recovery: 2 out of 12 outside limits

PESTICIDE METHOD BLANK SUMMARY

Job No.:	OR001	Lab Name:	Engineering Science
		Lab Sample No.:	Blank
Client:	ES Oak Ridge		
Attn:	Bill Hayden	Matrix:	Water
Address:	710 S. Illinois Avenue	Level (low/med):	Low
	Suite F-103	Extraction:	
	Oak Ridge, Tn. 37830	(SepF/Cont/Sonc):	Sonc
		Date Reported:	11-11-88
Project:	Duluth ANGB		
Date Extracted:	9-13-88		
Date Analyzed (1):	10-06-88	Date Analyzed (2):	
Time Analyzed (1):	10:31	Time Analyzed (2):	
Instrument ID (1):	5890 #2	Instrument ID (2):	
GG Column ID (1):	OV-1	GC Column ID (2):	

This Method Blank applies to the following samples, MS and MSD.

EPA Sample No.	Lab Sample ID (1)	Date Analyzed 1	Lab Sample ID (2)	Date Analyzed 2
-	88082291	10-06-88		
-	88082292	10-06-88		
-	88082293	10-06-88		

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
EPA 8270 ANALYSIS
WORK ORDER NO.: 953

These samples were first extracted on September 12, 1988, within holding time. Samples 88092291 and 88092292 were analyzed on October 21-22, 1988, also within holding time. Sample 88092293 was analyzed on October 23, 1988, one day out of holding time. Two or more base neutral surrogate spike recoveries for this sample were lower than EPA QC limits. The sample was re-extracted and analyzed. Surrogate spike recoveries in the second analysis met EPA criteria. Base neutral surrogate spike recoveries were also low in the laboratory blank that was extracted with these samples. Surrogate spike recoveries in the blank extracted with 88092293RE met EPA QC criteria.

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No: BNA-W-0051-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-08-88
Date Prepared: 9-12-88
Date Analyzed: 10-21-88
Date Reported: 12-13-88
Dilution Factor: 1

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88082305-88082306
88092291-88092293, 88092423-88092427

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limits RPD	RECOVERY
	1,2,4-Trichlorobenzene	100	ND	58.2	58	55.0	55	5	28	39-98
B/N	Acenaphthene	100	ND	56.5	56	56.5	57	2	31	46-118
Laboratory	2,4-Dinitrotoluene	100	ND	59.2	59	59.0	59	0	38	24-96
Sample #	Pyrene	100	ND	77.1	77	79.0	79	3	31	26-127
	N-Nitroso-di-n-Propylamine	100	ND	71.8	72	70.6	71	1	38	41-116
88092291	1,4-Dichlorobenzene	100	ND	50.4	50	48.5	49	2	28	36-97
ACID	Pentachlorophenol	200	ND	105	52	114	57	9	50	9-103
Laboratory	Phenol	200	ND	72.3	36	52.3	26	32	42	12-89
Sample #	2-Chlorophenol	200	ND	92.4	46	63.6	32	36	40	27-123
	4-Chloro-3-Methylphenol	200	ND	114	57	95.2	48	17	42	23-97
88092291	4-Nitrophenol	200	ND	94.7	47	61.7	31	41	50	10-80

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Work Order No.: 953

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 4-21-89

Laboratory Supervisor Approval:

Project: Duluth ANGB

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
S0216	10-23-88	AC	1	-	None Detected	-	-	88092291-88092293
S0215	10-23-88	BN	1	117-81-7	bis(2-ethylhexyl) phthalate	11	10	88092291-88092293

296

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project:

QC Report for Laboratory Sample No(s):
88092293Re

QC Report No: BNA-W-0005-89
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 12-20-88
Date Prepared: 12-28-88
Date Analyzed: 01-17-89
Date Reported: 02-23-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limits RPD	EPA QC Limits RECOVERY
	1,2,4-Trichlorobenzene	100	ND	64.7	65	58.4	58	10	28	39-98
B/N	Acenaphthene	100	ND	68.7	69	57.0	57	19	31	46-118
Laboratory	2,4-Dinitrotoluene	100	ND	45.7	46	36.1	36	24	38	24-96
Sample #	Pyrene	100	ND	55.7	56	51.3	51	8	31	26-127
	N-Nitroso-di-n-Propylamine	100	ND	69.3	69	47.5	48	37	38	41-116
88123521	1,4-Dichlorobenzene	100	ND	53.3	53	44.9	45	17	28	36-97
ACID	Pentachlorophenol	200	ND	50.6	25	70.5	35	33	50	9-103
Laboratory	Phenol	200	ND	60.3	30	82.3	41	31	42	12-89
Sample #	2-Chlorophenol	200	ND	71.6	36	102	51	35	40	27-123
	4-Chloro-3-Methylphenol	200	ND	68.6	34	81.2	41	17	42	23-97
88123521	4-Nitrophenol	200	ND	68.9	34	83.3	42	19	50	10-80

297

The quality control sample for this batch is from a different project.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 4-20-89

Laboratory Supervisor Approval: _____

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E6620	1-13-89	AC	2	-	None Detected	-	-	88092293Re
E6621	1-13-89	BN	2	117-81-7	bis(2-ethylhexyl) phthalate	26	10	88092293Re

298

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Project: Duluth

Work Order No.:
Lab Sample No.: 03-73
Lab File ID: S0213/S0214
Matrix: water
Level (low/med):
Date Analyzed: 10-23-88
Time Analyzed: 17:46, 18:45
Instrument ID:
Date Reported:

This Method Blank applies to the following samples, MS and MSD.

Sample Number	Lab Sample ID	Lab File ID	Date of Analysis
DANG - BR1	8809229I	S0204, S0205	10-21-88
DANG - BR1	8809229I MS	S0206, S0207	10-21-88
DANG - BR1	8809229I MSD	S0208, S0209	10-21-88
DANGB - BG - MW50 - GW1	8809229Z	ES945, ES946	10-21-88, 10-22-88
DANGB - BG - MW43 - GW-1	8809229Z	S0210, S0211	10-23-88

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 04-51
Lab File ID: E6620/6621
Matrix: water
Level (low/med):
Date Analyzed: 1-13-89
Time Analyzed: 16:19 / 17:14
Instrument ID:
Date Reported:

Project: Duluth

This Method Blank applies to the following samples, MS and MSD.

Sample Number	Lab Sample ID	Lab File ID	Date of Analysis
DANGB-BG-MW43-GW-1	88092293 RCA	E6626, E6627	1-13-89

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 10/23/88 14:15

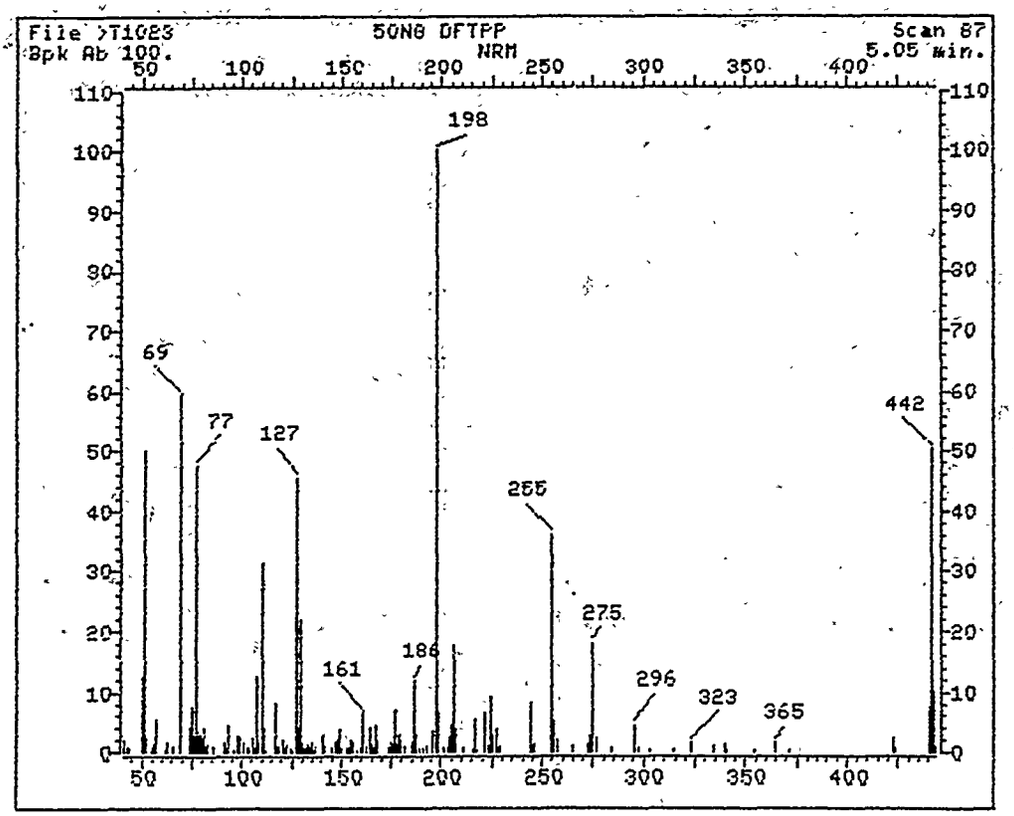
Lab ID >T1023::02 Data Release Authorized By: _____

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	50.24 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	59.15	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	45.46 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	6.66 OK	
275	10.0 - 30.0% of mass 198	18.08 OK	
365	greater than 1.00% of mass 198	1.74 OK	
441	present, but less than mass 443	7.54 OK	
442	greater than 40.0% of mass 198	50.43 OK	
443	17.0 - 23.0% of mass 442	10.17 OK	(20.17) #2

THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

SAMPLE ID	LAB_ID	DATE_OF_ANALYSIS	TIME_OF_ANALYSIS
50NG DFTPP	>T1023	10/23/88	14:15
SSTD060	S0210		14:39
8809229 3BW	S0211		15:46
8809229 3AC	S0212		16:46
8809229 1-93 BLK BW	S0213		17:46
8809229 1-93 BLK AC	S0214		18:45
8809230 5-06 BLK BW	S0215		19:43
8809230 5-06 BLK AC	S0216		21:43
8809230 5AC	S0217		22:42
8809230 5BW	S0218		23:42
8809230 6AC	S0219	10/24/88	00:41
8809230 6BW	S0220		01:41
8808224 9BW	S0221		02:40 *



File: >T1023 Scan #: 87 Retn. time: 5.05

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.10	2.054	98.00	2.615	135.95	.531	180.05	1.997	245.00	.977
43.10	.934	99.00	2.887	137.15	1.005	181.05	1.049	246.10	1.365
44.00	.632	101.00	1.682	141.05	3.146	185.05	1.781	255.00	35.967
50.10	12.439	102.80	.718	141.95	1.178	186.05	11.764	256.00	5.228
51.10	50.244	103.90	.977	144.95	.733	187.05	3.059	257.90	2.183
52.10	2.456	105.10	2.399	147.05	1.637	189.05	.819	265.00	1.077
55.20	.891	106.10	.689	148.05	2.255	191.05	.646	273.00	1.278
56.10	1.479	107.00	12.699	149.15	3.735	193.05	.962	274.05	2.945
57.10	5.559	108.00	2.011	150.05	.646	196.10	3.347	275.05	18.084
62.10	.531	110.00	31.586	153.05	.833	198.00	100.000	276.05	2.327
63.10	1.839	111.00	4.108	153.95	.819	199.00	6.665	276.95	1.250
65.10	1.049	112.00	.402	155.15	2.126	201.50	.704	284.15	.704
69.00	59.150	117.00	8.302	156.05	1.896	203.10	.790	295.95	4.510
74.10	4.180	118.05	1.005	157.95	.431	204.00	2.499	296.95	.689
75.10	7.354	119.15	1.163	159.95	.747	205.10	4.395	302.95	.546
76.10	2.413	121.15	2.083	161.05	6.421	206.10	17.811	314.95	.445
77.10	47.673	122.05	.919	162.15	1.178	207.10	3.964	323.05	1.738
78.10	3.620	123.05	1.566	162.85	.546	211.20	.876	334.05	.934
79.00	2.959	124.05	.718	164.15	4.165	216.10	.402	340.25	1.594
80.00	2.327	125.05	.531	165.05	1.566	217.00	5.415	341.15	.503
81.00	4.252	127.05	45.461	166.15	.804	218.00	.431	354.00	.488
82.10	.934	128.15	3.933	167.05	4.481	221.00	6.593	365.00	1.738
83.10	1.365	129.05	22.134	168.05	2.040	222.90	1.034	372.00	.531
85.10	.661	130.05	1.853	173.95	.689	224.00	9.221	423.00	2.528
86.00	1.163	130.95	.804	175.05	1.853	225.00	2.643	424.00	.646
91.00	1.738	132.05	.675	176.15	.891	227.00	3.634	441.05	7.541
92.10	.819	133.15	1.408	177.15	7.153	228.00	.747	442.05	50.431
93.00	4.352	134.05	.776	178.15	1.163	229.00	.934	443.05	10.169

96.00 .474 139.05 1.781 178.95 3.131 244.00 8.087 444.05 .934

Continuing Calibration Check
HSL Compounds

Case No: | Calibration Date: 10/23/88

Contractor: ENGINEERING-SCIENCE | Time: 14:39

Contract No: | Laboratory ID: X50219

Instrument ID: 1 | Initial Calibration Date: 10/13/88

Minimum $\overline{RF}$ for SPCC is | Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	.91015	.94		
2-Fluorophenol	1.15602	1.32037	14.02		
bis(2-Chloroethyl)ether	1.11832	1.01119	9.63		
Phenol	1.41657	1.57623	11.27	*	
Phenol-d5	1.22988	1.43602	16.75		
Aniline	.54193	.70365	30.98		
2-Chlorophenol	1.23175	1.30257	5.75		
1,3-Dichlorobenzene	1.47535	1.42076	3.70		
1,4-Dichlorobenzene	1.40530	1.35390	3.66	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	1.05716	15.05		
1,2-Dichlorobenzene	1.32210	1.42201	7.53		
2-Methylphenol	1.17367	1.40481	19.69		
3-&-4-Methylphenol	1.07139	1.40072	30.74		
bis(2-chloroisopropyl)Ether	2.15627	2.42137	12.30		
N-Nitroso-Di-n-Propylamine	.84050	.80157	4.63	**	
Hexachloroethane	.53810	.56597	5.12		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.44057	9.39		
Nitrobenzene-d5	.39137	.41841	6.91		
2-Nitrophenol	.24657	.26496	7.46	*	
Isophorone	.74170	.83745	12.91		
bis(2-Chloroethoxy)methane	.49386	.52902	7.12		
2,4-Dimethylphenol	.34819	.34700	.43		
Benzoic Acid	.29725	.30852	3.79		
2,4-Dichlorophenol	.56733	.60991	7.51	*	
1,2,4-Trichlorobenzene	.36913	.36202	1.93		
Naphthalene	.94589	.94312	.26		
4-Chloroaniline	.36369	.42475	16.78		
Hexachlorobutadiene	.20283	.20175	.95	*	
4-Chloro-3-Methylphenol	.31360	.36918	17.72	*	
2-Methylnaphthalene	.56397	.62052	10.03		

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 10/23/88

Contractor: ENGINEERING-SCIENCE Time: 14:39

Contract No: _____ Laboratory ID: X50210

Instrument ID: 1 Initial Calibration Date: 10/13/88 10/23

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29566	.35271	19.29		**
2,4,6-Trichlorophenol	.42260	.36697	13.20	*	
2,4,5-Trichlorophenol	.52837	.57656	9.00		
2-Fluorobiphenyl	1.27220	1.16507	8.42		
2-Chloronaphthalene	1.23781	1.17191	5.33		
2-Nitroaniline	.47289	.48656	2.89		
Dimethylphthalate	1.40629	1.32523	5.76		
2,6-Dinitrotoluene	.37415	.37767	.94		
Acenaphthylene	1.68918	1.57896	6.53		
3-Nitroaniline	.44557	.44857	.67		
2,4-Dinitrophenol	.11838	.10617	10.77		**
Acenaphthene	1.13011	.98917	12.47	*	
Dibenzofuran	1.64131	1.53667	6.36		
2,4-Dinitrotoluene	.28418	.28600	1.31		
4-Nitrophenol	.28450	.34524	21.35		**
Fluorene	1.12650	.96321	14.12		
Diethylphthalate	1.20939	1.10667	8.18		
4-Chlorophenyl-phenylether	.59183	.57597	2.68		
4-Nitroaniline	.35956	.37392	3.99		
2,4,6-Tribromophenol	.21023	.20530	2.35		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.50039	24.21	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.23729	11.39		
Hexachlorobenzene	.26273	.28806	9.64		
Pentachlorophenol	.14536	.14051	3.32	*	

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 10/23/88

Contractor: ENGINEERING-SCIENCE Time: 14:39

Contract No: _____ Laboratory ID: X90210

Instrument ID: 1 Initial Calibration Date: 10/[illegible]/88

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is _____ %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	1.02330	1.06		
Anthracene	1.05455	1.08512	3.19		
Di-n-Butylphthalate	1.51956	1.61475	6.26		
1,1'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.05707	11.21	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.15315	280.69		
Pyrene	1.56086	1.77013	13.41		
Terphenyl-d14	1.05835	1.28161	21.09		
Butylbenzylphthalate	1.03390	1.23504	19.45		
3,3'-Dichlorobenzidine	.13683	.21575	57.61		
Chrysene	.99655	.97586	2.08		
Benzo(a)Anthracene	1.10107	1.15168	4.31		
bis(2-Ethylhexyl)Phthalate	1.21073	1.57316	29.94		
Di-n-octylphthalate	3.10275	3.64161	7.02	*	
Benzo(a)Pyrene	1.32058	1.28988	2.35	*	
Benzo(b)Fluoranthene	1.60850	1.63240	1.49		
Indeno(1,2,3-cd)Pyrene	.96800	1.14389	18.17		
Dibenzo(a,h)Anthracene	.87181	1.04160	19.41		
Benzo(k)Fluoranthene	1.11370	1.20364	16.63		
Benzo(g,h,i)Perylene	.83761	1.00641	21.03		

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR0001

Lab Code: _____ Case No.: _____ SAS No.: _____ Job No.: _____

Sample No. (Standard): SSTD060 Date Analyzed: 10/23/88

Lab File ID (Standard): S0210 Time Analyzed: 14:39

Instrument ID: 1

	IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
12 HOUR STD	55322	9.24	180905	12.87	107837	18.35
UPPER LIMIT	110644	9.74	361810	13.37	215674	18.85
LOWER LIMIT	27661	8.74	90453	12.37	53919	17.85
EPA SAMPLE NO.						
01 88092293 BN	59189	9.22	209506	12.82	116668	18.33
02 88092293 AC	55631	9.22	198465	12.82	111266	18.31
03 88092291-93 BLK BN	66136	9.22	220656	12.82	126616	18.32
04 88092291-93 BLK AC	56312	9.21	196602	12.82	107443	18.32
05 88092305-06 BLK BN	48730	9.21	169716	12.82	92376	18.32
06 88092305-06 BLK AC	52148	9.21	181225	12.82	104440	18.31
07 88092305 AC	54388	9.21	188768	12.82	104541	18.31
08 88092305 BN	49756	9.21	180183	12.81	102183	18.30
09 88092306 AC	48282	9.22	167999	12.82	97026	18.31
10 88092306 BN	55003	9.21	194194	12.82	112310	18.31
11 88088249 BE	46261	9.23	164505	12.83	91982	18.32
12 88088248 BE	53600	9.23	192902	12.81	105973	18.30
13 88088247 BE	52125	9.26	180955	12.86	100282	18.37
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR0041

Lab Code: _____ Case No.: _____ SAS No.: _____ Job No.: _____

Sample Nc. (Standard): SSTD060 Date Analyzed: 10/23/88

Lab File ID (Standard): S0210 Time Analyzed: 14:39

Instrument ID: 1

	IS4 (PHN) AREA #	RT	IS5 (CRY) AREA #	RT	IS4 (PRY) AREA #	RT
12 HOUR STD	161718	23.00	92293	31.46	61026	37.56
UPPER LIMIT	323436	23.50	184486	31.96	122052	38.16
LOWER LIMIT	80859	22.50	46122	30.96	30513	37.16
EPA SAMPLE NO.						
01 88092293 BN	178547	22.98	102590	31.43	65203	37.54
02 88092293 AC	169706	22.98	91647	31.43	50869	37.54
03 88092291-93 BLK BN	196914	22.99	108430	31.43	69668	37.55
04 88092291-93 BLK AC	164646	22.97	75492	31.44	37420	37.55
05 88092305-06 BLK BN	140419	22.98	65586	31.44	37159	37.55
06 88092305-06 BLK AC	158423	22.96	78019	31.44	41305	37.54
07 88092305 AC	158841	22.96	75665	31.43	41953	37.54
08 88092305 BN	158165	22.97	77615	31.42	43483	37.51
09 88092306 AC	151445	22.96	81786	31.42	46401	37.52
10 88092306 BN	171327	22.97	94902	31.43	58090	37.52
11 88082249 RE	139548	22.97	72442	31.43	38105	37.52
12 88082248 RE	166456	22.96	84406	31.42	43505	37.52
13 88082247 RE	58880*	23.13	69961	31.61	23597*	37.74
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS7 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

\# Column used to flag internal standard area values with an asterisk

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 10/24/88 15:00

Lab ID >11024::01 Data Release Authorized By:

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	42.53 OK
68	less than 2.0% of mass 69	0.00 OK (0.00) #1
69	mass 69 relative abundance	47.48
70	less than 2.0% of mass 69	0.00 OK (0.00) #1
127	40.0 - 60.0% of mass 198	43.21 OK
197	less than 1.0% of mass 198	0.00 OK
198	base peak, 100% relative abundance	100.00 OK
199	5.0 - 9.0% of mass 198	6.96 OK
275	10.0 - 30.0% of mass 198	18.42 OK
365	greater than 1.00% of mass 198	1.71 OK
441	present, but less than mass 443	7.30 OK
442	greater than 40.0% of mass 198	60.63 OK
443	17.0 - 23.0% of mass 442	10.60 OK (17.81) #2

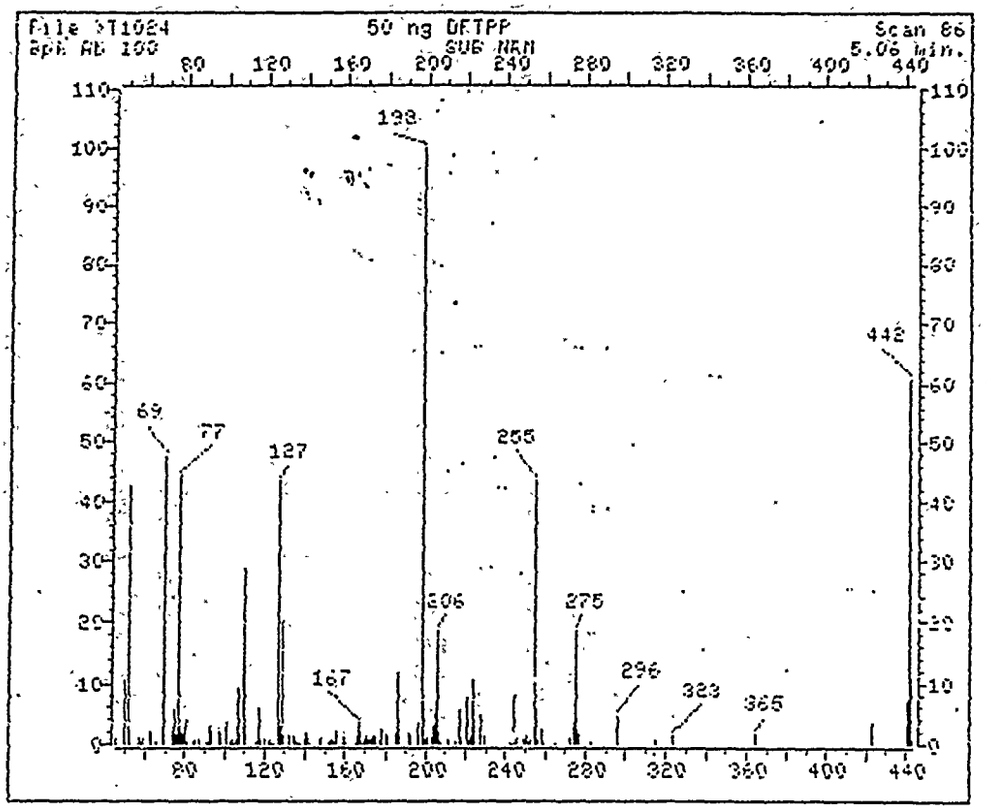
THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS
50 ng DFTPP	>11024	10/24/88	15:00
~~8809~~ SSTD060	50224		15:18
8809 2293 BWLN	50225		16:50
8809 0914-97 BW BLK RA	50226		17:51
8809 2252 RA	50227		18:50
8809 2357 AC	50228		19:49
8809 2357 BN	50229		20:48
8809 2358 AC	50230		21:48
8809 2358 BN	50231		22:47
8809 2359 AC	50232		23:47
8809 2359 BN	50233	10/25/88	00:46
8809 2357-59 AK&R	50234		01:45
8809 2357-59 BN BLK	50235		02:45

another project

FORM V 7/85



File: T1024 Scan #: 86 Retn. time: 5.06

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
45.20	.946	103.00	.378	141.05	1.923	179.95	1.891	243.10	.889
50.10	10.552	104.00	.662	142.15	1.229	181.05	1.305	244.00	2.867
51.10	42.530	105.10	.189	143.05	.189	185.05	1.834	245.10	.851
52.10	2.364	106.10	.883	145.15	.113	186.05	11.422	246.00	1.834
56.10	.057	107.00	9.153	147.05	.927	187.05	2.477	249.00	.670
57.10	.946	108.00	1.721	148.05	1.248	192.05	1.721	250.10	.681
58.10	.359	110.00	26.952	152.15	.416	193.05	1.475	251.10	1.286
59.10	1.191	111.10	3.272	153.05	.883	196.10	3.347	252.10	.397
63.10	1.918	113.10	.132	154.15	.908	198.00	100.000	253.00	.738
65.20	.567	115.10	.227	155.05	.511	199.00	6.959	255.00	43.268
69.00	47.485	116.00	.492	156.05	2.175	200.10	.883	256.00	5.681
71.00	2.269	117.00	5.843	159.05	.170	201.30	1.002	257.00	.681
75.00	5.711	118.05	.738	159.95	1.116	203.10	1.097	258.00	2.288
76.10	1.797	120.15	.870	161.05	.303	204.10	3.026	259.00	.586
77.10	41.289	122.15	.435	165.15	.208	205.10	4.955	265.00	.132
78.10	3.007	123.15	.794	166.05	1.305	206.10	18.419	272.90	1.172
79.00	2.005	124.15	.019	167.05	3.423	207.10	1.918	274.05	3.820
80.10	1.664	125.15	.246	168.05	2.080	208.10	.435	275.05	18.419
81.10	3.668	127.05	43.211	169.05	.151	211.10	.870	276.05	2.458
82.10	.454	128.05	3.007	170.15	.662	215.00	.454	276.95	1.759
84.10	.416	129.05	19.675	171.05	1.589	217.00	5.541	283.05	.435
85.10	.662	129.65	1.607	172.05	.738	218.10	1.097	295.95	4.595
87.10	.719	131.05	.246	173.15	.794	221.10	7.470	315.05	.643
91.10	.473	132.15	1.513	174.05	1.210	222.10	.813	323.05	1.418
92.00	.567	134.15	1.267	175.05	1.343	223.00	1.513	365.00	1.740
93.10	3.120	135.15	1.002	176.05	1.002	224.00	10.458	423.00	3.309
94.10	2.061	136.15	.378	177.15	.813	225.00	2.969	441.05	7.300
98.00	2.175	137.15	.151	178.05	.170	227.00	4.652	442.05	60.628

99.00	1.663	138.15	.055	178.35	.756	229.10	1.362	113.05	10.798
101.00	3.326	140.15	.775	176.95	2.591	242.00	.605	111.05	.869

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 10/24/88.

Contractor: ENGINEERING-SCIENCE Time: 15:18

Contract No: Laboratory ID:)S0224

Instrument ID: 1 Initial Calibration Date: 10/12/88 12/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	.89255	1.01		
2-Fluorophenol	1.15802	1.23035	6.25		
bis(2-Chloroethyl)ether	1.11892	.92762	17.10		
Phenol	1.41657	1.46014	3.08	*	
Phenol-d5	1.22488	1.11828	8.70		
Aniline	.54193	.62737	15.77		
2-Chlorophenol	1.23175	1.26534	2.73		
1,3-Dichlorobenzene	1.47535	1.41165	4.32		
1,4-Dichlorobenzene	1.40530	1.38622	1.36	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.51689	29.10		
1,2-Dichlorobenzene	1.32240	1.43132	8.24		
2-Methylphenol	1.17367	1.46216	24.58		
3-&-4-Methylphenol	1.07139	1.61083	50.35		
bis(2-chloroisopropyl)Ether	2.15627	2.39841	11.23		
N-Nitroso-Di-n-Propylamine	.84050	.80911	3.74		**
Hexachloroethane	.53840	.55653	3.37		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.42445	5.29		
Nitrobenzene-d5	.39137	.41068	4.98		
2-Nitrophenol	.24657	.26327	6.77	*	
Isophorone	.74170	.78316	5.59		
bis(2-Chloroethoxy)methane	.49386	.51176	3.63		
2,4-Dimethylphenol	.34849	.39034	12.01		
Benzoic Acid	.29725	.29143	1.96		
2,4-Dichlorophenol	.56733	.61232	7.93	*	
1,2,4-Trichlorobenzene	.36913	.37736	2.23		
Naphthalene	.94589	.92536	2.17		
4-Chloroaniline	.36309	.38218	5.26		
Hexachlorobutadiene	.20283	.20585	1.49	*	
4-Chloro-3-Methylphenol	.31360	.33215	5.92	*	
2-Methylnaphthalene	.56397	.58568	3.85		

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: | Calibration Date: 10/24/88

Contractor: ENGINEERING SCIENCE | Time: 15:18

Contract No: | Laboratory ID:)S0224

Instrument ID: 1 | Initial Calibration Date: 10/13/88 (13 DEC)

Minimum $\overline{RF}$ for SPCC is | Maximum % Diff for CCC is %

Compound	RF	$\overline{RF}$	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.33202	12.29		**
2,4,6-Trichlorophenol	.42290	.39467	6.65	*	
2,4,5-Trichlorophenol	.52897	.53644	1.41		
2-Fluorobiphenyl	1.27220	1.10253	13.34		
2-Chloronaphthalene	1.23784	1.14239	7.71		
2-Nitroaniline	.47288	.46239	2.22		
Dimethylphthalate	1.40629	1.28208	8.83		
2,6-Dinitrotoluene	.37415	.36352	2.84		
Acenaphthylene	1.68918	1.51357	10.40		
3-Nitroaniline	.44557	.40845	8.33		
2,4-Dinitrophenol	.11898	.09098	23.53		**
Acenaphthene	1.13011	.94134	16.70	*	
Dibenzofuran	1.64131	1.50692	8.19		
2,4-Dinitrotoluene	.28418	.26507	6.72		
4-Nitrophenol	.28450	.21558	24.23		**
Fluorene	1.12850	.92665	17.89		
Diethylphthalate	1.20939	1.00863	16.60		
4-Chlorophenyl-phenylether	.59183	.55363	6.45		
4-Nitroaniline	.35956	.32328	10.09		
2,4,6-Tribromophenol	.21023	.21112	.42		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.48544	20.50	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.24560	15.30		
Hexachlorobenzene	.26273	.30870	17.50		
Pentachlorophenol	.14536	.13768	5.28	*	

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 10/24/88

Contractor: ENGINEERING-SCIENCE Time: 15:18

Contract No: Laboratory ID:)S0224

Instrument ID: 1 Initial Calibration Date: 10/13/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	1.01066	2.29		
Anthracene	1.05155	1.08798	3.47		
Di-n-Butylphthalate	1.51956	1.54914	1.95		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.02649	13.77	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.04925	22.42		
Pyrene	1.56086	1.84285	18.07		
Terphenyl-d14	1.05835	1.33864	26.48		
Butylbenzylphthalate	1.03390	1.27915	23.72		
3,3'-Dichlorobenzidine	.13689	.21217	54.99		
Chrysene	.99655	1.02044	2.40		
Benzo(a)Anthracene	1.10407	1.16164	5.21		
bis(2-Ethylhexyl)Phthalate	1.21073	1.62631	34.33		
Di-n-octylphthalate	3.40275	3.81348	12.07	*	
Benzo(a)Pyrene	1.32098	1.30919	.89	*	
Benzo(b)fluoranthene	1.60850	1.49160	7.27		
Indeno(1,2,3-cd)Pyrene	.96800	1.19028	22.96		
Dibenzo(a,h)Anthracene	.87481	1.04812	19.81		
Benzo(k)fluoranthene	1.44370	1.14891	20.42		
Benzo(g,h,i)Perylene	.89761	1.09852	22.38		

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR01

Lab Code: _____ Case No.: _____ SAS No.: _____ Job No.: _____

Sample No. (Standard): SSTD060 Date Analyzed: 10/24/88

Lab File ID (Standard): S0224 Time Analyzed: 15:18

Instrument ID: 1

		IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
	12 HOUR STD	57529	9.25	191708	12.88	118667	18.37
	UPPER LIMIT	115058	9.75	383416	13.38	237334	18.87
	LOWER LIMIT	28765	8.75	95854	12.38	59334	17.87
	EPA SAMPLE NO.						
Scan 5 01	88092393 BN RE	60294	9.24	227398	12.83	124288	18.33
26 02	88092391-93 BN BLK RE	63830	9.23	206104	12.83	125931	18.34
27 03	88092358 RE	52394	9.23	194903	12.84	107798	18.33
28 04	88092357 AC	57584	9.22	193491	12.83	109775	18.31
29 05	88092357 BN	57318	9.22	192699	12.83	108415	18.32
Scan 30 06	88092358 AC	53572	9.22	188810	12.82	105882	18.32
31 07	88092358 BN	52014	9.22	179819	12.83	97894	18.32
32 08	88092359 AC	53762	9.23	181511	12.83	112734	18.32
33 09	88092359 BN	59634	9.22	208679	12.83	120040	18.32
34 10	88092357-59 BLK AC	56442	9.23	190436	12.83	111605	18.31
35 11	88092357-59 BLK BN	59804	9.22	210337	12.83	122915	18.33
36 12	88091871 3:1 dil	60843	9.22	233417	12.82	123269	18.32
37 13	88091872 3:1 dil	64095	9.22	230282	12.83	125463	18.32
Scan 38 14	88091873 3:1 dil	61700	9.22	217391	12.82	126105	18.32
15							
16							
17							
18							
19							
20							
21							
22							

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR001

Lab Code: _____ Case No.: _____ SAS No.: _____ Job No.: _____

Sample No. (Standard): SSTD060 Date Analyzed: 10/24/88

Lab File ID (Standard): S0224 Time Analyzed: 15:18

Instrument ID: 1

		IS4 (PHN) AREA	#	RT	IS5 (CRY) AREA	#	RT	IS4 (PRY) AREA	#	RT
	12 HOUR STD	174951		23.02	90140		31.48	59827		37.62
	UPPER LIMIT	349102		23.52	180280		31.98	119654		38.12
	LOWER LIMIT	87276		22.52	45070		30.98	29914		37.12
	EPA SAMPLE NO.									
01	88092297 BN RE	186258		23.00	92069		31.45	54609		37.60
02	88092291-97 BN BLK RE	182310		23.00	77749		31.47	44244		37.62
03	88082352 RE	151346		23.01	64216		31.46	30422		37.59
04	88092357 AC	164521		22.99	82995		31.45	53083		37.60
05	88092357 BN	165526		23.00	85960		31.45	46565		37.57
06	88092358 AC	147699		22.99	55922		31.46	29373	*	37.59
07	88092358 BN	145318		22.99	86623		31.46	46473		37.61
08	88092359 AC	165498		22.99	68443		31.46	33963		37.61
09	88092359 BN	175809		22.99	85269		31.46	49282		37.59
10	88092357-59 BLK AC	157865		23.00	58452		31.48	29222	*	37.64
11	88092357-59 BLK BN	178355		23.01	82772		31.48	47296		37.64
12	88091871 3:1 dil	183939		22.99	82430		31.47	31120		37.60
13	88091872 3:1 dil	182852		22.99	78683		31.46	30407		37.59
14	88091873 3:1 dil	184386		22.98	87255		31.45	43516		37.59
15										
16										
17										
18										
19										
20										
21										
22										

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

page __ of __

5B

SEMIVOLATILE ORGANIC GC/MS TUNING AND MASS CALIBRATION - DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

Lab Name: Engineering Science Contract: _____.

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____.

Lab File ID: >D0113 DFTPP Injection Date: 1/13/89

Instrument ID: 70 2 DFTPP Injection Time: 14:02

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	53.9
68	Less than 2.0% of mass 69	0.0(0.0)1
69	Mass 69 relative abundance	60.
70	Less than 2.0% of mass 69	.9(1.4)1
127	40.0 - 60.0% of mass 198	44.2
197	Less than 1.0% of mass 198	0.0
198	Base Peak, 100% relative abundance	100.
199	5.0 - 9.0% of mass 198	6.8
275	10.0 - 30.0% of mass 198	22.9
365	Greater than 1.00% of mass 198	2.30
441	Present, but less than mass 443	10.9
442	Greater than 40.0% of mass 198	71.5
443	17.0 - 23.0% of mass 442	13.9(19.4)2

1-Value is % mass 69 2-Value is % mass 442

12/21/87 SV

all SV
all I

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

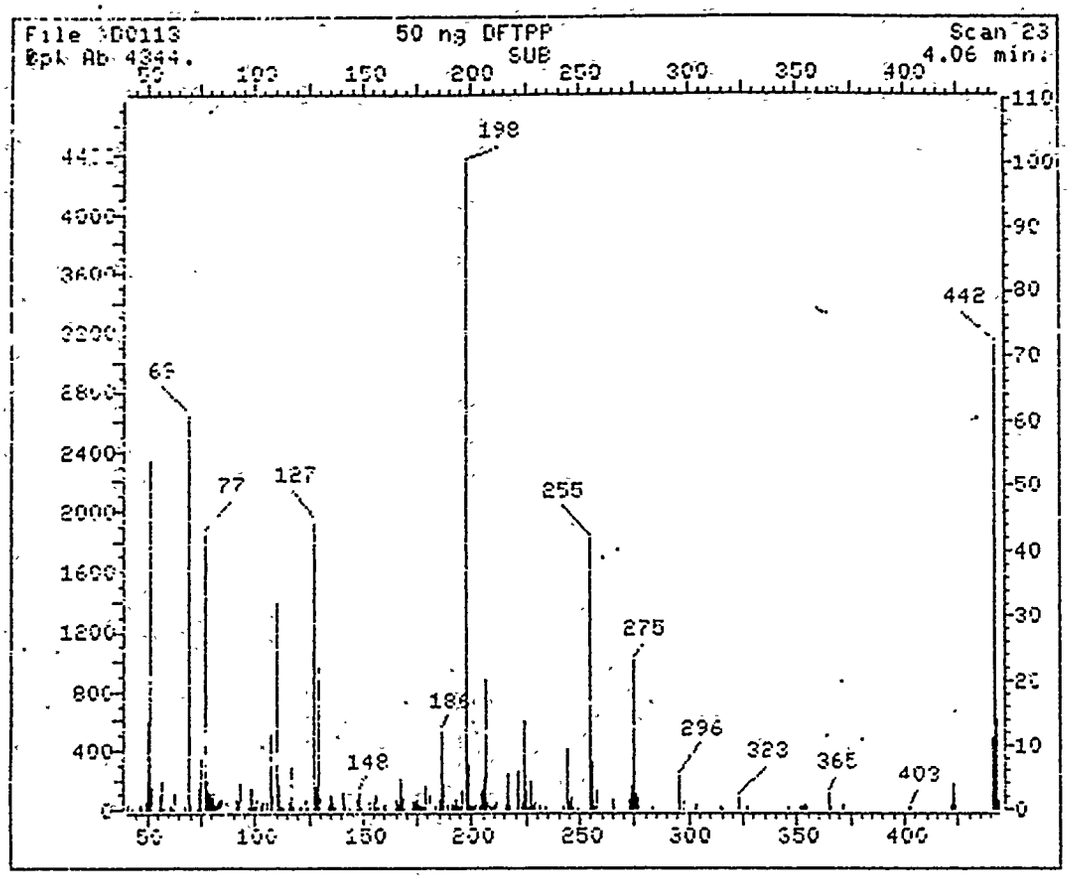
	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED	
01	80 mg/L BNA STD + IS	>E6618	1/13/89	14:21	
02	88092553 REX RA + IS	>E6619	1/13/89	15:24	another project
03	BLANK PB51 B4 AC+ IS	>E6620	1/13/89	16:19	BLK 2293 Rex use
04	BLANK PB51 B4 BN+ IS	>E6621	1/13/89	17:14	BLK 2293 Rex use
05	88092686 REX AC + IS	>E6622	1/13/89	18:09	another project
06	88092686 REX BN + IS	>E6623	1/13/89	19:04	
07	88092817 REX AC + IS	>E6624	1/13/89	19:59	
08	88092817 REX BN + IS	>E6625	1/13/89	20:54	
09	88092793 REX AC + IS	>E6626	1/13/89	21:49	use
10	88092293 REX BN + IS	>E6627	1/13/89	22:45	use
11	88092340 REX RA + IS	>E6628	1/13/89	23:40	another project
12	88092341 REX RA + IS	>E6629	1/14/89	0:34	
13	88092554 REX RA + IS	>E6630	1/14/89	1:29	
14					
15					
16					
17					
18					
19					
20					
21					
22					

GC/MS PERFORMANCE STANDARD

Decafluorotriphenylphosphine (DFTPP)

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	53.89	53.89	Ok
68	Less than 2% of mass 69	0.80	0.80	Ok
69	(reference only)	60.47	60.47	Ok
70	Less than 2% of mass 69	.37	1.45	Ok
127	40-60% of mass 198	44.15	44.15	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.84	6.84	Ok
275	10-30% of mass 198	22.93	22.93	Ok
365	Greater than 1% of mass 198	2.30	2.30	Ok
441	Present but less than mass 443	10.87	76.15	Ok
442	Greater than 40% of mass 198	71.50	71.50	Ok
443	17-23% of mass 442	13.90	19.45	Ok

Injection Date: 01/13/89
Injection Time: 14:02
Data File: >D0113
Scan: 23



File: >DD113 Scan #: 23 Retn. time: 4.06

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.10	.599	99.95	3.246	147.90	2.601	197.85	100.000	255.00	41.575
43.10	.714	100.05	.522	149.00	.806	198.85	6.837	256.00	7.251
47.00	.806	100.95	1.588	153.00	.990	199.95	.806	257.00	.529
47.70	.460	102.85	.765	154.90	1.128	200.85	.368	257.90	2.878
49.10	1.055	103.05	.629	156.00	2.072	201.45	.852	265.00	1.361
50.00	15.697	104.05	1.154	157.10	.460	202.85	.760	272.70	1.356
51.00	53.894	105.05	1.220	159.90	.668	203.95	2.762	273.95	3.499
52.00	3.581	105.55	.760	160.90	.921	204.95	4.926	274.95	22.928
56.00	4.072	106.55	11.625	164.90	1.381	205.95	20.005	275.85	2.578
57.00	4.788	107.95	2.256	165.90	.875	206.95	1.197	276.75	1.727
57.80	.391	109.95	31.745	167.00	4.351	207.95	.829	283.05	.460
61.00	.852	110.95	3.775	168.00	1.727	208.95	.506	295.95	5.018
61.80	.460	111.85	.622	169.00	.253	210.15	.875	296.95	1.128
62.90	2.417	112.95	.322	172.90	1.013	210.95	1.059	302.95	.783
67.20	.483	114.65	1.082	173.90	.967	215.65	.668	314.85	.552
67.50	.668	116.95	6.377	174.45	.391	216.95	5.364	315.75	.230
69.00	60.474	117.95	.829	174.95	1.289	217.95	.691	323.00	1.657
70.00	.875	120.95	.483	175.95	.898	220.95	5.824	326.80	.506
73.00	.253	121.55	.622	176.85	.875	221.65	1.312	345.80	.506
74.00	3.225	123.05	1.289	177.95	.460	223.05	.944	352.00	.460
74.95	7.781	124.60	.414	178.95	3.568	223.90	13.697	352.80	.322
76.95	42.449	124.90	.414	180.05	2.026	224.90	2.785	353.80	.714
77.95	4.627	126.90	44.153	180.85	.875	225.80	.276	354.00	.668
78.95	2.739	127.90	3.384	183.85	.460	226.90	4.489	364.80	2.302
80.05	2.601	128.90	22.007	185.05	1.588	227.90	.737	366.00	.506
80.95	3.660	129.90	1.750	185.95	12.040	228.80	.944	371.90	.875
81.95	.691	134.00	.645	186.95	3.683	231.00	.829	402.05	.368
82.95	1.220	135.00	2.210	188.75	.645	233.90	.414	402.75	.391
84.05	1.312	135.90	1.059	190.85	.783	241.90	.483	421.95	.760
84.95	1.358	136.90	.576	191.65	.875	243.90	9.070	422.90	3.890

71.83	1.059	141.30	.921	193.85	.391	246.60	.460	441.90	71.501
92.95	4.788	143.00	.506	194.95	.345	248.80	.414	442.90	13.904
97.15	.437	145.90	.322	195.95	2.647	249.00	.437	444.00	1.312
98.05	3.177	147.10	1.450						

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 01/13/89

Contractor: _____ Time: 14:21

Contract No: _____ Laboratory ID:)E6618

Instrument ID: _____ Initial Calibration Date: 12/22/88

Minimum $\overline{RF}$ for SPEC is _____ Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPEC	
N-Nitroso-Dimethylamine	1.26769	.74969	40.86			
2-Fluorophenol	1.44569	.94143	34.89			
bis(2-Chloroethyl)ether	1.40851	1.64138	17.20			
Phenol	1.55425	1.32684	14.63			
Phenol-d5	1.27053	1.15352	9.21	*		
Aniline	.49940	1.24947	150.19			
2-Chlorophenol	1.35193	1.17954	12.75			
1,3-Dichlorobenzene	1.45417	1.36889	5.86			
1,4-Dichlorobenzene	1.46835	1.48710	1.28	*		
Benzyl Chloride	-	-	-			
Benzyl Alcohol	.44030	.50731	15.22			
1,2-Dichlorobenzene	1.59406	1.28274	19.53			
2-Methylphenol	1.51111	1.01947	32.53			
3-&-4-Methylphenol	1.02617	.54547	46.85			(Conc=160.00)
bis(2-chloroisopropyl)Ether	4.93284	2.94497	41.02			
N-Nitroso-Di-n-Propylamine	1.74322	1.47753	15.24		**	
Hexachloroethane	.69801	.59275	15.09			
Dibromochloropropane	-	-	-			
Nitrobenzene	.75536	.65950	12.69			
Nitrobenzene-d5	.56823	.42669	24.91			
2-Nitrophenol	.30890	.24745	19.89	*		
Isophorone	1.15989	.79318	31.62			
bis(2-Chloroethoxy)methane	.77293	.51452	33.43			
2,4-Dimethylphenol	.31600	.37653	19.15			
Benzoic Acid	.39793	.23104	41.94			
2,4-Dichlorophenol	.48395	.46009	4.93	*		
1,2,4-Trichlorobenzene	.34216	.35953	5.08			
Naphthalene	1.06107	.99815	5.93			
4-Chloroaniline	.39342	.35569	9.59			
Hexachlorobutadiene	.19669	.22356	13.67	*		
4-Chloro-3-Methylphenol	.47207	.37998	19.51	*		
2-Methylnaphthalene	.71389	.62961	11.80			

RF - Response Factor from daily standard file at 80.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPEC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 01/13/89

Contractor: Time: 14:21

Contract No: Laboratory ID: >E6618

Instrument ID: Initial Calibration Date: 12/22/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.33867	.41542	22.59		**
2,4,6-Trichlorophenol	.32158	.33427	3.95	*	
2,4,5-Trichlorophenol	.33276	.42452	27.56		
2-Fluorobiphenyl	1.16908	1.28989	10.33		
2-Chloronaphthalene	1.21333	1.12767	7.06		
2-Nitroaniline	.82802	.50620	38.87		
Dimethylphthalate	1.37376	1.41958	3.34		
2,6-Dinitrotoluene	.37974	.33487	11.82		
Acenaphthylene	1.66804	1.60812	3.59		
3-Nitroaniline	.89360	.51627	42.23		
2,4-Dinitrophenol	.17317	.13518	21.94		**
Acenaphthene	1.13491	1.12262	1.08	*	
Dibenzofuran	1.71826	1.65167	3.89		
2,4-Dinitrotoluene	.41224	.27514	33.26		
4-Nitrophenol	.26174	.21530	17.74		**
Fluorene	1.20871	1.20305	.47		
Diethylphthalate	1.34749	1.31717	2.25		
4-Chlorophenyl-phenylether	.52112	.56089	7.63		
4-Nitroaniline	.42297	.32120	24.06		
2,4,6-Tribromophenol	.19798	.24933	25.94		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.41328	.44379	7.38	*	
4,6-Dinitro-2-Methylphenol	.11586	-	-		
4-Bromophenyl-phenylether	.24957	.26577	6.67		
Hexachlorobenzene	.29405	.33127	12.66		
Pentachlorophenol	.14065	.15296	8.75	*	

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 01/13/89

Contractor: Time: 14:21

Contract No: Laboratory ID:)E6618

Instrument ID: Initial Calibration Date: 12/22/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	.94887	1.00480	5.89		
Anthracene	1.20764	1.07688	10.83		
Di-n-Butylphthalate	1.71347	1.50094	12.40		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.27487	1.08616	14.75	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.15204	.01116	92.65		
Pyrene	1.60282	1.38259	13.74		
Terphenyl-d14	1.09290	1.07099	2.00		
Butylbenzylphthalate	1.10739	.87217	21.24		
3,3'-Dichlorobenzidine	.21405	.12342	42.34		
Chrysene	1.08347	1.02919	5.84		
Benzo(a)Anthracene	1.04612	.91003	13.01		
bis(2-Ethylhexyl)Phthalate	1.25492	1.01232	19.32		
Di-n-octylphthalate	2.80651	2.50250	10.83	*	
Benzo(a)Pyrene	1.21831	1.25850	3.30	*	
Benzo(b)Fluoranthene	1.01975	1.20420	18.09		
Indeno(1,2,3-cd)Pyrene	.91688	.94825	3.42		
Dibenzo(a,h)Anthracene	.81339	.76106	6.42		
Benzo(k)Fluoranthene	1.59568	1.82631	14.45		
Benzo(g,h,i)Perylene	.80078	.91014	13.66		

RF - Response Factor from daily standard file at 80.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

WATER SEMIVOLATILE SURROGATE RECOVERY

1/13/89

Lab Name: Job No.:

Client:
Attn:
Address:

Project: Duluth

Level-(low/med):

EPA Sample No.	S1 (NBZ)#	S2 (FBP)#	S3 (THP)#	S4 (PHL)#	S5 (2FP)#	S6 (TBP)#	OTHER	TOT OUT
88092293 Rex B4C	53	86	114	10	54	12		0
88092293 Reextract	34	62	78	23	19*	80		1

	QC LIMITS
S1 (NBZ) = Nitrobenzene-d5	(35-114)
S2 (FBP) = 2-Fluorobiphenyl	(43-116)
S3 (TPH) = Terphenyl-d14	(33-141)
S4 (PHL) = Phenol-d5	(10-94)
S5 (2FP) = 2-Fluorophenol	(21-100)
S6 (TBP) = 2,4,6-Tribromophenol	(10-123)

Column to be used to flag recovery values with an asterisk
* Values outside of contract required QC limits

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Lab File ID (Standard): >F6618 Date Analyzed: 1/13/89

Instrument ID: 70 2 Time Analyzed: 14:21

	IS1(DCB)		IS2(NPT)		IS3(ANT)	
	AREA #	RT	AREA #	RT	AREA #	RT
12 HOUR STD	100854.	7.59	335969.	11.07	201190.	16.40
UPPER LIMIT	201708.		671938.		402380.	
LOWER LIMIT	50427.		167984.		100595.	
SAMPLE NO.						
01 88092553 REX	96933.	7.55	317016.	10.99	184046.	16.35
02 BLANK PGS1 B	72683.	7.56	334135.	11.11	185706.	16.40
03 BLANK PGS1 B	71299.	7.59	262659.	11.07	182695.	16.40
04 88092686 REX	86293.	7.57	318938.	11.10	186799.	16.40
05 88092686 REX	81597.	7.60	263761.	11.09	189993.	16.40
06 88092617 REX	80519.	7.58	335870.	11.11	198289.	16.38
07 88092317 REX	58346.	7.63	233979.	11.08	169591.	16.38
08 88092293 REX	64381.	7.61	253347.	11.18	153935.	16.41
09 88092283 REX	83571.	7.57	311356.	11.04	229617.	16.36
10 88092340 REX	115825.	7.55	358131.	11.01	234575.	16.37
11 88092341 REX	113678.	7.54	329682.	10.99	231122.	16.36
12 88092554 REX	124450.	7.53	387633.	10.99	268862.	16.35
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

QC

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name:Engineering Science Contract:_____.

Lab Code: ES01 Case No.: ____ SAS No.: ____ SDG No.: ___.

Lab File ID (Standard): >E6618 Date Analyzed: 1/13/89

Instrument ID: 70 2 Time Analyzed: 14:21

	IS4(PHN)		IS5(CRY)		IS3(PRY)	
	AREA #	RT	AREA #	RT	AREA #	RT
12 HOUR STD	309377.	20.99	215988.	29.34	137071.	34.10
UPPER LIMIT	618754.		431976.		274142.	
LOWER LIMIT	154689.		107994.		68535.	
EPA SAMPLE NO.						
01 88092553 REX	265983.	20.96	177852.	29.30	86888.	34.05
02 BLANK P651 B	272522.	21.04	177474.	29.42	70046.	34.19
03 BLANK P651 B	277645.	21.06	177940.	29.43	118287.	34.18
04 88092686 REX	280664.	21.05	173239.	29.41	117894.	34.16
05 88092686 REX	301994.	21.07	220008.	29.41	123491.	34.18
06 88092817 REX	296526.	20.99	209561.	29.40	100055.	34.19
07 88092817 REX	274982.	21.03	224409.	29.39	161587.	34.11
08 88092293 REX	256199.	21.08	189240.	29.45	123376.	34.21
09 88092293 REX	377565.	20.97	304260.	29.34	168892.	34.03
10 88092340 REX	366515.	20.97	262198.	29.33	124767.	34.08
11 88092341 REX	370875.	20.97	316592.	29.30	79390.	34.03
12 88092554 REX	414010.	20.98	322450.	29.32	171226.	34.07
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100%
of internal standard area.
LOWER LIMIT = - 50%
of internal standard area.

Column used to flag internal standard area values with an asterisk

VOLATILE ORGANICS INITIAL CALIBRATION DATA

LabName: ENGINEERING SCIENCE Contract:

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

Instrument ID.: VOCOL Calibration Date(s): 9/14/88

LAB FILE ID: RRF10= 77, 84 RRF20= 78, 85
RRF 50= 79, 86 RRF100= 80, 87 RRF200= 81, 88

COMPOUND	RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$	%RSD
Benzyl chloride	5.21	4.65	5.19	4.05	3.70	4.56	14.82
bis (2-choroethoxy) methane	0.09	0.12	0.12	0.14	0.12	0.12	15.16
bis (2-choroisopropyl ether	0.09	0.12	0.12	0.14	0.12	0.12	15.16
Bromobenzene	3.10	3.02	3.45	2.95	2.87	3.08	7.30
Bromodichloromethane	5.26	4.87	4.57	4.24	3.91	4.57	11.52
Bromoform	3.35	2.40	3.36	3.28	3.25	3.13	13.12
Bromomethane	0.70	0.64	0.28	0.29	0.25	0.43	50.65
Carbon tetrachloride	4.97	5.28	4.84	4.37	4.15	4.72	9.70
Chloroacetaldehyde	0.07	0.08	0.08	0.07	0.05	0.07	17.50
Chlorobenzene	1.42	1.41	1.38	1.27	1.20	1.33	7.20
Chloroethane	1.10	1.08	0.63	0.55	0.29	0.73	48.21
Chloroform	4.14	4.52	4.18	3.68	3.44	3.99	10.83
1-Chorohexane	0.80	0.80	0.94	0.79	0.79	0.82	7.89
2-Chloroethyl vinyl ether	0.09	0.12	0.12	0.14	0.12	0.12	15.16
Chloromethane	2.11	1.21	2.21	1.76	1.90	1.84	21.36
Chloromethyl methyl ether	0.02	0.02	0.03	0.02	0.03	0.02	22.82
o_,m_,& p_Chlorotoluenes	3.60	3.45	3.67	3.10	2.87	3.34	10.24
Dibromochloromethane	4.49	3.80	4.47	4.32	4.00	4.22	7.23
Dibromomethane	2.95	2.94	3.42	2.95	3.03	3.06	6.72
1,2_Dichlorobenzene	2.30	2.09	2.13	1.94	1.72	2.04	10.70
1,3_Dichlorobenzene	1.83	1.80	1.80	1.70	1.62	1.75	5.10
1,4_Dichlorobenzene	1.84	1.83	1.75	1.61	1.49	1.70	8.95
Dichlorodifluormethane	0.59	0.77	0.44	0.42	0.49	0.54	26.46
1,1_Dichloroethane	3.21	3.01	2.65	2.39	2.22	2.70	15.33
1,2_Dichloroethane	3.89	3.41	3.39	3.01	2.74	3.29	13.28
1,1_Dichloroethylene	1.75	1.73	1.71	1.58	1.41	1.64	8.62
trans_1,2_dichloroethylene	3.13	3.04	2.63	2.41	2.22	2.69	14.57
Dichloromethane	4.00	4.64	2.40	2.09	1.77	2.98	42.29
1,2_Dichloropropane	3.41	3.30	3.02	2.74	2.59	3.01	11.62
1,3_Dichloropropylene	0.48	0.47	0.54	0.45	0.43	0.47	8.77
1,1,2,2_Tetrachloroethane	4.24	2.69	3.48	3.32	3.16	3.38	16.74
1,1,1,2_Tetrachloroethane	5.32	4.93	5.25	4.40	4.25	4.83	10.08
Tetrachloroethylene	5.38	4.96	4.53	4.12	3.78	4.55	14.05
1,1,1_Trichloroethane	2.63	2.91	2.79	2.53	2.41	2.65	7.55
1,1,2_Trichloroethane	3.91	5.38	5.19	3.91	3.69	4.42	18.14
Trichloroethylene	4.34	4.29	3.91	3.62	3.34	3.90	10.98
Trichlorofluormethane	1.04	0.94	0.86	0.80	0.74	0.88	13.40
Trichloropropane	3.10	3.02	3.45	2.95	2.87	3.08	7.30
Vinyl chloride	2.11	1.21	2.21	1.76	1.90	1.84	21.36

VOLATILE ORGANICS INITIAL CALIBRATION DATA

LabName: ENGINEERING SCIENCE Contract:

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

Instrument ID.: VOCOL Calibration Date(s): 9/14/88

LAB FILE ID: RRF 10 77 RRF 20 78
RRF 50= 79 RRF100= 80 RRF200= 81

COMPOUND	RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$	%RSD
Benzene	5.45	4.67	4.17	3.65	6.72	4.93	24.33
Chlorobenzene	5.27	5.04	4.72	4.24	3.99	4.65	11.51
1,2_Dichlorobenzene	8.34	4.30	3.87	3.43	3.23	4.64	45.57
1,3_Dichlorobenzene	4.30	4.18	4.15	3.76	3.58	3.99	7.74
1,4_Dichlorobenzene	3.47	3.30	3.31	3.04	2.89	3.20	7.31
Ethyl Benzene	3.31	3.22	3.03	2.76	2.60	2.98	10.09
Toluene	4.14	3.73	3.59	3.23	3.03	3.54	12.21
Xylenes	10.88	10.42	10.10	9.17	8.76	9.87	8.95

24 Oct 88

9/14/88

VOLATILE ORGANICS INITIAL CALIBRATION DATA

LabName:_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____ SDG No.:_____

Instrument ID.: CARbopAK Calibration Date(s): 9/14/88 _____

LAB FILE ID: RRF10= 6 , 13 RRF20= 7 , 14

RRF 50= 8 , 15 RRF100= 9 , 16 RRF200= 10 , 17

COMPOUND	RRF10	RRF20	RRF 50	RRF100	RRF200	$\overline{RRF}$	% RSD	
Benzyl chloride	0.31	0.27	0.34	0.37	0.30	0.32	1.3	0.004
bis (2-chloroethoxy methane	0.03	0.03	0.05	0.04	0.06	0.04	2.5	0.001
bis (2-chloroispropyl ether	0.24	0.27	0.26	0.24	0.30	0.26	9.6	0.005
Bromobenzene	0.80	0.88	1.0	1.3	1.1	1.0	20	0.196
Bromodichloromethane	4.1	3.6	3.6	3.6	2.5	3.5	17	0.59
Bromoform	1.5	1.5	1.7	1.9	1.4	1.7	12	0.20
Bromomethane	-	0.43	0.23	0.20	0.16	0.20	60	
Carbon tetrachloride	4.8	4.2	4.2	4.1	2.6	4.0	21	0.82
Chloroacetaldehyde	0.001	0.003	0.001	0.0005	0.0005	0.005	1.4	6.6x10⁻⁴
Chlorobenzene	1.4	1.3	1.3	1.3	0.87	1.2	18	0.21
Chloroethane	0.48	0.42	0.51	0.49	0.37	0.45	13	0.06
Chloroform	5.5	4.4	4.4	4.2	2.7	4.2	24	1.00
1-Chorohexane	0.84	0.82	0.86	0.99	0.82	0.87	8.0	0.007
2-Chloroethyl vinyl ether	0.03	0.03	0.05	0.04	0.06	0.04	0.5	0.001
Chloromethane	0.94	0.83	0.78	0.70	0.70	0.79	13	0.10
Chloromethyl methyl ether	0.72	0.21	0.22	0.16	0.15	0.17	25	
o_,m_,& p_Chlorotoluenes	3.7	3.2	3.5	4.0	3.1	3.5	10	0.37
Dibromochloromethane	3.8	3.4	3.5	3.8	2.5	3.4	18	0.60
Dibromomethane	2.1	2.1	2.3	2.9	2.5	2.4	14	0.33
1,2_Dichlorobenzene	2.7	2.5	2.2	2.3	1.5	2.2	21	0.46
1,3_Dichlorobenzene	2.3	2.1	2.0	2.0	1.3	1.9	19	0.36
1,4_Dichlorobenzene	2.3	2.0	1.9	1.9	1.2	1.9	21	0.40
Dichlorodifluormethane	0.51	0.49	0.50	0.57	0.64	0.54	11	0.06
1,1_Dichloroethane	2.8	2.3	2.4	2.4	1.6	2.3	19	0.44
1,2_Dichloroethane	3.2	2.7	2.7	2.7	1.8	2.6	20	0.51
1,1_Dichloroethylene	3.2	2.6	2.6	2.6	1.8	2.6	19	0.50
trans_1,2_dichloroethylene	3.0	2.4	2.6	2.5	1.7	2.4	20	0.47
Dichloromethane	6.0	4.1	3.3	1.9	2.0	3.5	48	1.7
1,2_Dichloropropane	2.9	2.4	2.4	2.4	1.6	2.3	20	0.47
1,3_Dichloropropylene	4.9	4.4	4.4	4.8	3.9	4.5	8	0.36
1,1,2,2_Tetrachloroethane	8.3	7.1	6.6	6.5	4.2	6.5	23	1.5
1,1,1,2_Tetrachloroethane	4.6	4.0	4.1	4.3	3.5	4.1	10	0.41
Tetrachloroethylene	8.3	7.1	6.6	6.5	4.2	6.5	23	1.5
1,1,1_Trichloroethane	3.6	3.0	3.0	3.1	2.0	2.9	20	0.58
1,1,2_Trichloroethane	4.9	4.4	4.4	4.8	3.9	4.5	8	0.36
Trichloroethylene	5.1	4.2	3.0	3.7	2.5	3.9	24	0.94
Trichlorofluormethane	2.9	2.5	2.5	2.5	1.7	2.4	18	0.44
Trichloropropane	2.2	1.9	1.9	2.2	1.9	2.0	8	0.16
Vinyl chloride	1.2	1.0	1.0	0.96	0.75	0.98	16	0.16

file: 8020CAL
21 Oct 88

9/14/88

VOLATILE ORGANICS INITIAL CALIBRATION DATA

LabName: _____ Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Instrument ID.: CARBOPAK Calibration Date(s): 9/14/88 _____

LAB FILE ID:
RRF 50= 8
RRF10= 6 RRF20= 7
RRF100= 9 RRF200= 10

COMPOUND	RRF10	RRF20	RRF 50	RRF100	RRF200	$\overline{RRF}$	% RSD	
Benzene	5.4	5.6	3.7	4.4	3.8	4.6	19	.48
Chlorobenzene	4.6	5.6	3.9	5.0	4.4	4.7	14	0.64
1,2_Dichlorobenzene	3.8	4.3	2.9	4.1	3.5	3.7	15	0.55
1,3_Dichlorobenzene	4.4	4.9	3.5	4.6	3.9	4.3	13	0.56
1,4_Dichlorobenzene	3.3	3.8	2.7	3.7	3.2	3.3	13	0.44
Ethyl Benzene	5.1	3.7	2.5	3.3	2.9	3.5	24	1
Toluene	3.7	4.3	3.2	3.8	3.3	3.7	12	0.44
Xylenes	14	15	10	12	10	12	19	2.3

DATA PACKAGE #6

This page intentionally left blank.

ENGINEERING-SCIENCE, INC.

RESEARCH AND DEVELOPMENT
LABORATORY
600 BANCROFT WAY
BERKELEY, CALIFORNIA 94710
(415) 841-7353

Job No.: OR001

Work Order No.: 1041

Client: ES Oak Ridge
Attention: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Attached are the analytical reports for the water sample(s) received by this laboratory on 9-26-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092694	DANGB-BG-SL1-SW1	418.1	9-24-88	10-10-88	10-11-88	
88092694	DANGB-BG-SL1-SW1	8010	9-24-88		9-28-88	
88092694	DANGB-BG-SL1-SW1	8020	9-24-88		9-28-88	
88092694	DANGB-BG-SL1-SW1	8080	9-24-88	9-29-88	10-24-88	
88092694	DANGB-BG-SL1-SW1	8270	9-24-88	9-30-88	11-09-88	
88092695	DANGB-BG-SL2-SW1	AS-F	9-24-88		10-16-88	
88092695	DANGB-BG-SL2-SW1	BA-I	9-24-88		10-13-88	
88092695	DANGB-BG-SL2-SW1	CD-F	9-24-88		10-26-88	
88092695	DANGB-BG-SL2-SW1	CR-F	9-24-88		10-19-88	
88092695	DANGB-BG-SL2-SW1	HG-C	9-24-88		10-22-88	
88092695	DANGB-BG-SL2-SW1	PB-F	9-24-88		10-24-88	
88092695	DANGB-BG-SL2-SW1	418.1	9-24-88	10-10-88	10-11-88	
88092695	DANGB-BG-SL2-SW1	8010	9-24-88		9-28-88	10-03-88
88092695	DANGB-BG-SL2-SW1	8020	9-24-88		9-28-88	
88092695	DANGB-BG-SL2-SW1	8080	9-24-88	9-29-88	10-24-88	
88092695	DANGB-BG-SL2-SW1	8270	9-24-88	9-30-88	11-09-88	
88092696	DANGB-BG-SL3-SW1	8010	9-24-88		9-29-88	9-28-88
88092696	DANGB-BG-SL3-SW1	8020	9-24-88		9-29-88	9-28-88
88092696	DANGB-BG-SL3-SW1	8080	9-24-88	9-29-88	10-24-88	
88092697	DANGB-TB12	8010	9-24-88		9-28-88	9-29-88
88092697	DANGB-TB12	8020	9-24-88		9-28-88	
88092698	DANGB-FB16	8010	9-24-88		9-29-88	10-03-88
88092698	DANGB-FB16	8020	9-24-88		9-29-88	

* If applicable

DETECTION LIMITS
ENVIRONMENTAL QUALITY PARAMETERS
SAMPLE NO(S).: 88092694-88092695

Parameter	Detection Limits	
418.1 Petroleum Hydrocarbons	1	mg/L

The method detection limits listed are based upon the EPA method listed. Dilution or other deviations from the normal procedures, required due to characteristics of a sample, will influence these values. These changes are described in the report narrative if applicable.

ANALYSIS REPORT

WORK ORDER NUMBER: 1041
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/26/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (. 134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 2, UNITS: mg/L

TEST COMPOUND	DANGB-BG-SL2-SW1 88092695
ACID DIG FLAME	NA
ACID DIG FURNACE	NA
ARSENIC	<0.01
BARIUM	<0.2
CADMIUM	<0.005
CHROMIUM	<0.01
MERCURY	<.0002
LEAD	<0.005

ND - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1041
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/26/88

APPROVED BY: _____
Lab Supervisor

EPORT DATA:
S OAK RIDGE/DULUTH ANGB
10 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
ILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

ONTRACT / PO # : OR001
ONTACT : BILL HAYDEN
(615)-481-3920

ASK: 3, UNITS: mg/L

EST COMPOUND	DANGB-BG-SL1-SW1 88092694	DANGB-BG-SL2-SW1 88092695
18.1 PETROLEUM HYDROCARBONS	<1	<1

) - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1041
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/26/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
ILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN. 37830

OF REPORT COPIES: 1

ONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

ASK: 4, UNITS: ug/L, GROUP 8010

TEST COMPOUND	DANGB-BG-SL1-SW1 88092694	DANGB-BG-SL2-SW1 88092695	DANGB-BG-SL3-SW1 88092696	DANGB-TB-12 88092697	DANGB-FB-16 88092698
ENZYL CHLORIDE	ND	ND	ND	ND	ND
IS (2-CHLOROETHOXY)METHANE	ND	ND	ND	ND	ND
BIS (2-CHLOROISOPROPYL)ETHER	ND	ND	ND	ND	ND
ROMOBENZENE	ND	ND	ND	ND	ND
ROMODICHLOROMETHANE	ND	ND	ND	ND	ND
ROMOFORM	ND	ND	ND	26	ND
ROMOETHANE	ND	ND	ND	ND	ND
ARBON TETRACHLORIDE	ND	ND	ND	ND	ND
HLORACETALDEHYDE	ND	ND	ND	ND	ND
CHLORAL	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
HLOROETHANE	ND	ND	ND	ND	ND
HLOROFORM	ND	ND	ND	ND	4.2B
1-CHLOROHEXANE	ND	ND	ND	ND	ND
2-CHLOROETHYL VINYL ETHER	ND	ND	ND	ND	ND
HLOROMETHANE	ND	ND	ND	ND	ND
HLOROMETHYL METHYL ETHER	ND	ND	ND	ND	ND
CHLOROTOLUENE	ND	ND	ND	ND	ND
IBROMOCHLOROMETHANE	ND	ND	ND	4.7	ND
IBROMOMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
ICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHYLENE	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND	ND
DICHLOROMETHANE	ND	ND	6.9B	0.84B	2.3B
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1041

ST. COMPOUND	DANGB-BG-SL1-SW1 88092694	DANGB-BG-SL2-SW1 88092695	DANGB-BG-SL3-SW1 88092696	DANGB-TB-12 88092697	DANGB-FB-16 88092698
.3-DICHLOROPROPYLENE	ND	ND	ND	ND	ND
,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
,1,1,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
ETRACHLOROETHYLENE	ND	ND	ND	ND	ND
.1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND
,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
RICHLOROETHYLENE	ND	ND	ND	ND	ND
RICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND
RICHLOROPROPANE	ND	ND	ND	ND	ND
INYL CHLORIDE	ND	ND	ND	ND	ND

D - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1041
OB NUMBER : ZB0000000440
WORK ORDER DATE : 09/26/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
ILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

ONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

ASK: 4, UNITS: ug/L, GROUP 8020

TEST COMPOUND	DANGB-BG-SL1-SW1 88092694	DANGB-BG-SL2-SW1 88092695	DANGB-BG-SL3-SW1 88092696	DANGB-TB-12 88092697	DANGB-FB-16 88092698
ENZENE	ND	ND	18	ND	ND
HLOROBENZENE	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
THYL BENZENE	ND	ND	ND	ND	ND
TOLUENE	ND	ND	19	ND	ND
YLENES	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT

)RK-ORDER NUMBER: 1041
)B NUMBER : ZB0000000440
)RK ORDER DATE : 09/26/88

APPROVED BY _____
Lab Supervisor

:PORT DATA:
; OAK RIDGE/DULUTH ANGB
10 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
:LL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

)NTRACT / PO # : OR001
)NTACT : BILL HAYDEN
(615)-481-3920

ASK: 4, UNITS: ug/L, GROUP 8080

:ST COMPOUND	DANGB-BG-SL1-SW1 88092694	DANGB-BG-SL2-SW1 88092695	DANGB-BG-SL3-SW1 88092696
_DRIN	ND	ND	ND
.PHA-BHC	ND	ND	ND
:TA-BHC	ND	ND	ND
:LTA-BHC	ND	ND	ND
AMMA-BHC	ND	ND	ND
ILORDANE	ND	ND	ND
,4'-DDD	ND	ND	ND
,4'-DDE	ND	ND	ND
,4'-DDT	ND	ND	ND
.ELDRIN	ND	ND	ND
DOSULFAN I	ND	ND	ND
DOSULFAN II	ND	ND	ND
DOSULFAN SULFATE	ND	ND	ND
DRIN	ND	ND	ND
DRIN ALDEHYDE	NA	NA	NA
PTACHLOR	ND	ND	ND
PTACHLOR EPOXIDE	ND	ND	ND
PONE	ND	ND	ND
THOXYCHLOR	ND	ND	ND
XAPHENE	ND	ND	ND
B-1016	ND	ND	ND
B-1221	ND	ND	ND
B-1232	ND	ND	ND
B-1242	ND	ND	ND
B-1248	ND	ND	ND
B-1254	ND	ND	ND
B-1260	ND	ND	ND

- Not Detected

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

Date Received: September 26, 1988
Date Reported: December 9, 1988

Work Order: 1041
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092694	88092695
Sample No.:	DANGB-BG-SL1-SW1	DANGB-BG-SL2-SW1
Date Sampled:	09-24-88	09-24-88
Time Sampled:	10:45	09:15
Date Extracted:	09-30-88	09-30-88
Date Analyzed:	11-09-88	11-09-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
1,3-Dichlorobenzene	10	ND	ND
1,4-Dichlorobenzene	10	ND	ND
Hexachloroethane	10	ND	ND
Bis(2-chloroethyl)ether	10	ND	ND
1,2-Dichlorobenzene	10	ND	ND
N-Nitrosodimethylamine	10	ND	ND
Bis(2-chloroisopropyl)ether	10	ND	ND
N-Nitrosodi-n-propylamine	10	ND	ND
Hexachlorobutadiene	10	ND	ND
1,2,4-Trichlorobenzene	10	ND	ND
Nitrobenzene	10	ND	ND
Isophorone	10	ND	ND
Naphthalene	10	ND	ND
Bis(2-chloroethoxy)methane	10	ND	ND
2-Chloronaphthalene	10	ND	ND
Hexachlorocyclopentadiene	10	ND	ND
Acenaphthylene	10	ND	ND
Acenaphthene	10	ND	ND
Dimethyl phthalate	10	ND	ND
2,6-Dinitrotoluene	10	ND	ND
Fluorene	10	ND	ND
2,4-Dinitrotoluene	10	ND	ND
Diethyl phthalate	10	ND	ND
N-Nitrosodiphenylamine	10	ND	ND
Hexachlorobenzene	10	ND	ND

B = Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

ate Received: September 26, 1988 Work Order: 1041
ate Reported: December 9, 1988 Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ab Number:	88092694	88092695
ample No.:	DANGB-BG-SL1-SW1	DANGB-BG-SL2-SW1
ate Sampled:	09-24-88	09-24-88
ime Sampled:	10:45	09:15
ate Extracted:	09-30-88	09-30-88
ate Analyzed:	11-09-88	11-09-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
henanthrene	10	ND	ND
nthracene	10	ND	ND
ibutyl phthalate	10	ND	ND
luoranthene	10	ND	ND
-Chlorophenyl phenyl ether	10	ND	ND
yrene	10	ND	ND
utyl Benzyl phthalate	10	ND	ND
is(2-ethylhexyl) phthalate	10	ND	ND
hrysene	10	ND	ND
-Bromophenyl phenyl ether	10	ND	ND
enzo(a)anthracene	10	ND	ND
is-n-octylphthalate	10	ND	ND
enzo(b)fluoranthene	10	ND	ND
enzo(k)fluoranthene	10	ND	ND
enzidine	60	ND	ND
,3'-Dichlorobenzidine	20	ND	ND
enzo(a)pyrene	10	ND	ND
ndeno(1,2,3-cd)pyrene	10	ND	ND
ibenzo(a,h)anthracene	10	ND	ND
enzo(ghi)perylene	10	ND	ND
enzyl Alcohol	20	ND	ND

= Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 26, 1988 Work Order: 1041
Date Reported: December 9, 1988 Job Number: OR001

For: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

Lab Number:	88092694	88092695
Sample No.:	DANGB-BG-SL1-SW1	DANGB-BG-SL2-SW1
Date Sampled:	09-24-88	09-24-88
Time Sampled:	10:45	09:15
Date Extracted:	09-30-88	09-30-88
Date Analyzed:	11-09-88	11-09-88

Compound	Detection Limits ug/L	Analytical Results ug/L	ug/L
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
4-Chloroaniline	20	ND	ND
1-Chloronaphthalene	--*	ND	ND
Dibenzofuran	10	ND	ND
p-Dimethylaminoazobenzene	--*	ND	ND
7,12-Dimethylbenz(a)anthracene	--*	ND	ND
a-,a-Dimethylphenethylamine	--*	ND	ND
Diphenylamine	--*	ND	ND
1,2-Diphenylhydrazine	--*	ND	ND
Ethyl methanesulfonate	--*	ND	ND
3-Methylcholanthrene	--*	ND	ND
Methyl methanesulfonate	--*	ND	ND
2-Methylnaphthalene	10	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	50	ND	ND
3-Nitroaniline	50	ND	ND
4-Nitroaniline	50	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
2-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

ate Received: September 26, 1988
ate Reported: December 9, 1988

Work Order: 1041
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN:Mr. Bill Hayden

ab Number:	88092694	88092695
ample No.:	DANGB-BG-SL1-SW1	DANGB-BG-SL2-SW1
ate Sampled:	09-24-88	09-24-88
ime Sampled:	10:45	09:15
ate Extracted:	09-30-88	09-30-88
ate Analyzed:	11-09-88	11-09-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
lpha-BHC	--*	ND	ND
amma-BHC	__*	ND	ND
eta-BHC	20	ND	ND
eptachlor	10	ND	ND
elta-BHC	15	ND	ND
ldrin	10	ND	ND
eptachlor epoxide	10	ND	ND
ndosulfan I	--*	ND	ND
ieldrin	15	ND	ND
,4'-DDE	30	ND	ND
ndrin	--*	ND	ND
ndosulfan II	--*	ND	ND
,4'-DDD	15	ND	ND
,4'-DDT	25	ND	ND
ndosulfan Sulfate	30	ND	ND
ndrin aldehyde	--*	ND	ND
ndrin Ketone	--*	ND	ND
hlordane	60	ND	ND
ethoxychlor	--*	ND	ND
oxaphene	60	ND	ND
roclor-1016	60	ND	ND
roclor-1221	60	ND	ND
roclor-1232	60	ND	ND
roclor-1242	60	ND	ND
roclor-1248	60	ND	ND
roclor-1254	60	ND	ND
roclor-1260	60	ND	ND

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

Date Received: September 26, 1988
Date Reported: December 9, 1988

Work Order: 1041
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:		88092694	88092695
Sample No.:		DANGB-BG-SL1-SW1	DANGB-BG-SL2-SW1
Date Sampled:		09-24-88	09-24-88
Time Sampled:		10:45	09:15
Date Extracted:		09-30-88	09-30-88
Date Analyzed:		11-09-88	11-09-88
Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
2-Chlorophenol	10	ND	ND
2-Nitrophenol	10	ND	ND
Phenol	10	ND	ND
2,4-Dimethylphenol	10	ND	ND
2,4-Dichlorophenol	10	ND	ND
2,4,6-Trichlorophenol	10	ND	ND
4-Chloro-3-methylphenol	20	ND	ND
2,4-Dinitrophenol	50	ND	ND
2,6-Dichlorophenol	--*	ND	ND
2-Methyl-4,6-Dinitrophenol	50	ND	ND
Pentachlorophenol	50	ND	ND
4-Nitrophenol	50	ND	ND
Benzoic Acid	50	ND	ND
2-Methylphenol	10	ND	ND
3- & 4-Methylphenol	10	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
2,4,5-Trichlorophenol	10	ND	ND

Analyst

Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

CHAIN OF CUSTODY RECORD

1041

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) John Sherwin Mike Ruby

SHIP TO: ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8240, 8020	EPA 601	EPA 625	EPA 418.1	SW 8010, 7040, 7131	SW7421, 7470, 7191	SW3510, 9315	SM423	REMARKS
9/24	10:45	DAN&B-BG-SL1-SW1	2				X					882694
9/24	9:15	DAN&B-BG-SL2-SW1	2				X					882695
9/1/8	12:45	DAN&B-TB-12	3	X								882697
9/24	10:45	DAN&B-BG-SL2-SW1	5	X								
9/24	10:40	DAN&B-FB16	2	X								882698
9/24	10:45	DAN&B-BG-SL2-SW1	2					X	X			
9/24	10:45	DAN&B-BG-SL2-SW1	2			X						
	345											

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
John Sherwin	9/24 4:30	Floyd Abrey 9/26/88 1200			
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks: SAMPLES RECEIVED COLD AND INTACT.	

White Original Accompanies Shipment, Copy to Coordinator Field Files

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

604

ES JOB NO.: OR001

PROJECT NAME/LOCATION: Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) Jo-Ann Sherwin Mike Rodkey

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 6010, 7060, 7131	SW7421, 7470	SW9310, 9315	SM429	REMARKS
9/24	9:15	DANGB-BG-SL1-SW1	5	X								
9/24	9:15	DANGB-BG-SL1-SW1	2		X							
9/24	9:15	DANGB-BG-SL1-SW1	2			X						
9/24	10:45	DANGB-BG-SL2-SW1	2		X							
9/24	14:05	DANGB-BG-SL3-SW1	5	X								8826706
9/24	14:05	DANGB-BG-SL3-SW1	2		X							

347

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Jo-Ann Sherwin	9/24 4:30	Hood Tyree 9/26/88 1440 hrs
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)

Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Remarks: SAMPLES RECEIVED COLD AND INTACT

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092694-88092698
WORK ORDER NO.: 1041

These water samples were received at the ES Berkeley Laboratory on 9-26-88. They were received cold and intact.

IF

EPA SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BLANK

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 1041 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Water Lab Sample ID: 8809266 3-85 BLAN 2766-70 AC
8809266 4, 95, 2724

Sample wt/vol: _____ (g/mL) _____ Lab File ID: E6135

Level: (low/med) _____ Date Received: NA

% Moisture: not dec. _____ dec. _____ Date Extracted: 9-30-88

Extraction: (SepF/Cont/Sonc) _____ Date Analyzed: 11-8-88

GPC Cleanup: (Y/N) ___ pH: ___ Dilution Factor: NA

Number TICs found: 1 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	184 3-3-89 EA	Tetrachloroethene	4.20	10	
2.	127-18-4				
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: BLANK

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 1641 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) water Lab Sample ID: 8809263-85 (2766-10 BK) (IS 8809269 4,95,272)

Sample wt/vol: _____ (g/mL) _____ Lab File ID: F6136

Level: (low/med) _____ Date Received: _____

% Moisture: not dec. _____ dec. _____ Date Extracted: 9-30-88

Extraction: (SepF/Cont/Sonc) _____ Date Analyzed: 11-8-88

GPC Cleanup: (Y/N) ___ pH: ___ Dilution Factor: NA

Number TICs found: 3 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	~~127-18-4~~ 184 (EA 3,38)	Tetrachloroethene	4.16	10	
2.	—	Unknown	25.07	17	
3.	—	↓	28.77	7	
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: DANGB-BG-SL1-SW1

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: 1041 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Water Lab Sample ID: 8809269 4 AC

Sample wt/vol: 1000 (g/mL) mL Lab File ID: S0443

Level: (low/med) low Date Received: 9-26-88

% Moisture: not dec. _____ dec. _____ Date Extracted: 9-30-88

Extraction: (SepF/Cont/Sonc) SepF Date Analyzed: 11/9/88

GPC Cleanup: (Y/N) N pH: ___ Dilution Factor: NA

Number TICs found: 6 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	—	unknown	3.29	220	
2.	—	unknown	4.99	66	
3.	127-18-4	tetrachloroethene	5.21 B	30 B	
4.	—	unknown	5.57	48	
5.	—	unknown	7.24	21	
6.	—	unknown	21.61	6.	
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

DAN6B-BG-SC1-SW1

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: 1041 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Water Lab Sample ID: 88092694 BN

Sample wt/vol: 1000 (g/mL) mL Lab File ID: S0444

Level: (low/med) low Date Received: 9-26-88

% Moisture: not dec. _____ dec. _____ Date Extracted: 9-30-88

Extraction: (SepF/Cont/Sonc) SepF Date Analyzed: 11/9/88

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: NA

Number TICs found: 3 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	—	unknown	3.26	98	
2.	—	unknown	3.32	250	
3.	—	unknown	4.96	6	
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

IF

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

DA7LB-BG-SL2-SW1

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: 1641 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Water Lab Sample ID: 88092695 AC

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 50445

Level: (low/med) low Date Received: 9-26-88

% Moisture: not dec. _____ dec. _____ Date Extracted: 9-30-88

Extraction: (SepF/Cont/Sonc) SepF Date Analyzed: 11/9/88

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: NA

Number TICs found: 4 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	—	unknown	3.35	320	
2.	127-18-4	tetrachloroethene	5.20	18	B
3.	—	unknown	5.25	21	
4.	—	unknown	8.28	15	
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: DAN08-BG-SL2-SW1

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: 1641 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Water Lab Sample ID: 88092695 BN

Sample wt/vol: 1000 (g/mL) mL Lab File ID: S0446

Level: (low/med) low Date Received: 9-26-88

% Moisture: not dec. _____ dec. _____ Date Extracted: 9-30-88

Extraction: (SepF/Cont/Sonc) SepF Date Analyzed: 11/9/88

GPC Cleanup: (Y/N) N pH: ___ Dilution Factor: NA

Number TICs found: 6 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	—	unKnown	3.28	150	
2.	—	unKnown	3.34	390	
3.	—	unKnown	4.98	19	
4.	127-18-4	tetrachloroethene	5.20	19 B	
5.	—	unKnown	5.55	10	
6.	79-34-5	1,1,2,2-tetrachloroethane	7.23	12	
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

QC Report No: AAF-W-0052-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Reported: 2-27-89
Dilution Factor: NA

Project: Duluth_ANGB

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88092548-88092551, 88092573-88092579
88092677-88092681, 88092695, 88092612-88092614

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Arsenic	88092677	88092677	10-16-88	NA	7060	<0.01	<0.01	<0.01	NC	0.040	<0.01	0.0383	96	
Cadmium	88092677	88092677	10-26-88	NA	6010	<0.005	<0.005	<0.005	NC	0.010	<0.005	0.011	110	
Chromium	88092677	88092677	10-19-88	NA	6010	<0.01	<0.01	<0.01	NC	0.020	<0.01	0.0218	109	
Lead	88092677	88092677	10-21-88	NA	7421	<0.005	<0.005	<0.005	NC	0.020	<0.005	0.0227	114	

356

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092548-88092551, 88092573-88092579
88092677-88092681, 88092695, 88092612-88092614

QC Report No: LCP-W-0059-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-24-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	Duplicate RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Barium	88092677	88092677	10-13-88	NA	6010	<0.2	<0.2	<0.2	NC	2.0	<0.2	1.96	98	

356

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092548-88092551, 88092573-88092579
88092677-88092681, 88092695, 88092612-88092614

QC Report No: CVM-W-0030-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	SA	Spike Recovery SR	Spike Recovery SSR	PR	Notes
Mercury	88092677	88092677	10-14-88	NA	7471	<0.0002	<0.0002	<0.0002	NC	0.0010	<0.0002	0.00087	87	

357

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092677-88092678, 88092765-88092766
88092768-88092770, 88092772, 88092777
88092694-88092695, 88092806

QC Report No: TPH-W-0062-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-24-88
Date Prepared: 10-11-88
Date Analyzed: 10-20-88
Date Reported: 10-28-88
Dilution Factor: 4

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88092677	418.1	1.1	<1B	10	6.2	62	8.1	81	27	*

358

* See Case Narrative attached.
B See Legend attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO(S).: TPH-W-0062-88

Relative percent difference for the quality control sample exceed the ES Laboratory limit. A blank spike analysis shows the laboratory to be in control.

QUALITY CONTROL RESULTS SUMMARY
VOLATILE ORGANICS
EPA 8010/8020

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092694-88092699
88092719-88092723
88092726-88092730

QC Report No: VGC-W-0052-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-27-88
Date Prepared: NA
Date Analyzed: 10-07-88
Date Reported: 10-27-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092744*	1,1-Dichloroethane	10	ND	10.2	102	10.2	102	0	26	70-130
	Trichloroethene	10	ND	10.0	100	10.2	102	2	19	65-131
	Chlorobenzene	10	ND	10.2	102	10.1	101	1	40	59-137
	Aromatics: 8020									
88092744*	Benzene	10	ND	10.0	100	10.6	106	6	20	56-146
	Toluene	10	ND	10.8	108	10.6	106	2	41	42-150
	Chlorobenzene	10	ND	10.6	106	10.4	104	2	36	76-133

* The quality control sample is from a different project.

Relative Percent Difference (PR) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Sample Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 10-28-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
79	9-28-88	VGC	Vocol	75-09-2	Dichloromethane	11	0.25	88092694-88092695
				79-01-6	Trichloroethylene	0.80	0.12	
34	9-29-88	VGC	Carbopack	75-09-2	Dichloromethane	2.5	0.25	88092696, 88092698
				67-66-3	Chloroform	0.65	0.05	
18	9-28-88	VGC	Carbopack	75-09-2	Dichloromethane	1.0	0.25	88092697
				67-66-3	Chloroform	0.74	0.05	

361

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No.: OCP-W-0039-88
QC Sample No.: 88092694
Level (Low/Med): Low
Date Reported: 11-11-88

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s).:
88092694-88092696, 88092726-88092727
88092765-88092766, 88092772, 88092777
88092806, 88092721

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	200	ND	0.196	98	56-123
Heptachlor epoxide	200	ND	0.239	120	40-131
Aldrin	200	ND	0.253	127*	40-120
Dieldrin	500	ND	0.532	106	52-126
Endrin	500	ND	0.475	95	56-121
4,4'-DDT	500	ND	0.435	87	38-127

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.217	109	98	10	15	56-123
Heptachlor epoxide	0.256	128	120	7	20	40-131
Aldrin	0.251	126*	127*	1	22	40-120
Dieldrin	0.606	121	106	13	18	52-126
Endrin	0.543	109	95	13	21	56-121
4,4'-DDT	0.518	104	87	17	27	38-127

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 6 outside limits

Spike Recovery: 2 out of 12 outside limits

362

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No.: OCP-W-0039-88B
QC Sample No.: Blank
Level (Low/Med): Low
Date Reported: 11-11-88

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s).:
88092694-88092696, 88092726-88092727
88092765-88092766, 88092772, 88092777, 88092806

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	200	ND	0.169	85	56-123
Heptachlor epoxide	200	ND	0.184	92	40-131
Aldrin	200	ND	0.155	78	40-120
Dieldrin	500	ND	0.419	84	52-126
Endrin	500	ND	0.193	39*	56-121
4,4'-DDT	500	ND	0.385	77	38-127

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.236	118	85	33*	15	56-123
Heptachlor epoxide	0.263	132	92	35*	20	40-131
Aldrin	0.231	116	78	39*	22	40-120
Dieldrin	0.608	122	84	37*	18	52-126
Endrin	0.522	104	39*	92*	21	56-121
4,4'-DDT	0.567	113	77	38*	27	38-127

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 6 out of 6 outside limits

Spike Recovery: 1 out of 12 outside limits

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: OCP-W-0039-88
QC REPORT NO.: OCP-W-0039-88B

Analysis of matrix spikes resulted in recoveries for aldrin that were slightly above EPA recommended limits. Subsequent analysis of spiked blanks resulted in poor precision for all spiked compounds, although the recoveries were within limits for all but endrin in one of the two spiked blanks. The analytical data associated with these analyses were closely examined. No errors or problems were found.

Heptachlor epoxide was inadvertently used instead of heptachlor in the matrix spiking solution.

Endrin aldehyde and Kepone were not recoverable because they were removed by the alumina column clean-up used on these samples.

PESTICIDE METHOD BLANK SUMMARY

Job No.:	OR001	Lab Name:	Engineering Science
		Lab Sample No.:	Blank
Client:	ES Oak Ridge		
Attn:	Bill Hayden	Matrix:	Water
Address:	710 S. Illinois Avenue	Level (low/med):	Low
	Suite F-103	Extraction:	
	Oak Ridge, Tn. 37830	(SepF/Cont/Sonc):	Sonc
		Date Reported:	11-03-88
Project:	Duluth ANGB		
Date Extracted:	9-29-88		
Date Analyzed (1):	10-24-88	Date Analyzed (2):	
Time Analyzed (1):	12:47	Time Analyzed (2):	
Instrument ID (1):	5890 #2	Instrument ID (2):	
GC Column ID (1):	OV-1	GC Column ID (2):	

This Method Blank applies to the following samples, MS and MSD.

EPA Sample No.	Lab Sample ID (1)	Date Analyzed 1	Lab Sample ID (2)	Date Analyzed 2
-	88092694	10-24-88		
-	88092695	10-24-88		
-	88092696	10-24-88		

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
EPA 8270 ANALYSIS
WORK ORDER NO.: 1041

When sample 88092694 was first analyzed, it was obvious that the base neutral surrogate spikes had been omitted. There was no more sample for re-extraction.

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No: BNA-W-0054-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-23-88
Date Prepared: 9-28-88
Date Analyzed: 11-07-88
Date Reported: 12-28-88
Dilution Factor: 1.0

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88092612-88092617, 88092677-88092678
88092681, 88092694-88092695, 88092724,
88092765-88092766, 88092768-88092770, 88092772, 88092777

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limits RPD	EPA QC Limits RECOVERY
	1,2,4-Trichlorobenzene	100	ND	63.3	63	71.6	72	13	28	39-98
B/N	Acenaphthene	100	ND	71.2	71	73.9	74	4	31	46-118
Laboratory	2,4-Dinitrotoluene	100	ND	71.3	71	68.0	68	4	38	24-96
Sample #	Pyrene	100	ND	91.7	92	80.6	81	13	31	26-127
	N-Nitroso-di-n-Propylamine	100	ND	80.0	80	80.9	81	1	38	41-116
88092617	1,4-Dichlorobenzene	100	ND	70.4	70	76.7	77	10	28	36-97
ACID	Pentachlorophenol	200	ND	53.4	27	74.5	37	31	50	9-103
Laboratory	Phenol	200	ND	59.4	30	68.0	34	12	42	12-89
Sample #	2-Chlorophenol	200	ND	118	59	129	64	8	40	27-123
	4-Chloro-3-Methylphenol	200	ND	132	66	135	68	3	42	23-97
88092617	4-Nitrophenol	200	ND	81.1	41	88.0	44	7	50	10-80

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1041

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 4-21-89

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E6135	11-08-88	AC	2	-	None Detected	-	-	88092694-88092695
E6136	11-08-88	BN	2	117-81-7	bis(2-ethylhexyl) phthalate	59	10	88092694-88092695

368

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092694-88092695

QC Report No: TPH-W-0060-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-10-88
Date Analyzed: 10-11-88
Date Reported: 10-25-988
Dilution Factor: 11

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1	<1	10	11	110	11	110	0	*

369

* The blank spike is designated as a quality control for this batch, since insufficient sample is available for quality control purpose.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

5B

SEMIVOLATILE ORGANIC GC/MS TUNING AND MASS CALIBRATION - DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

Lab Name: Engineering Science Contract: _____.

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____.

Lab File ID: >T3108 DFTPP Injection Date: 11/08/88

Instrument ID: 70 1 DFTPP Injection Time: 22:30

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	49.0
68	Less than 2.0% of mass 69	0.0(0.0)1
69	Mass 69 relative abundance	62.
70	Less than 2.0% of mass 69	0.0(0.0)1
127	40.0 - 60.0% of mass 198	48.0
197	Less than 1.0% of mass 198	.5
198	Base Peak, 100% relative abundance	100.
199	5.0 - 9.0% of mass 198	6.6
275	10.0 - 30.0% of mass 198	17.1
365	Greater than 1.00% of mass 198	1.78
441	Present, but less than mass 443	7.2
442	Greater than 40.0% of mass 198	50.6
443	17.0 - 23.0% of mass 442	8.9(17.5)2

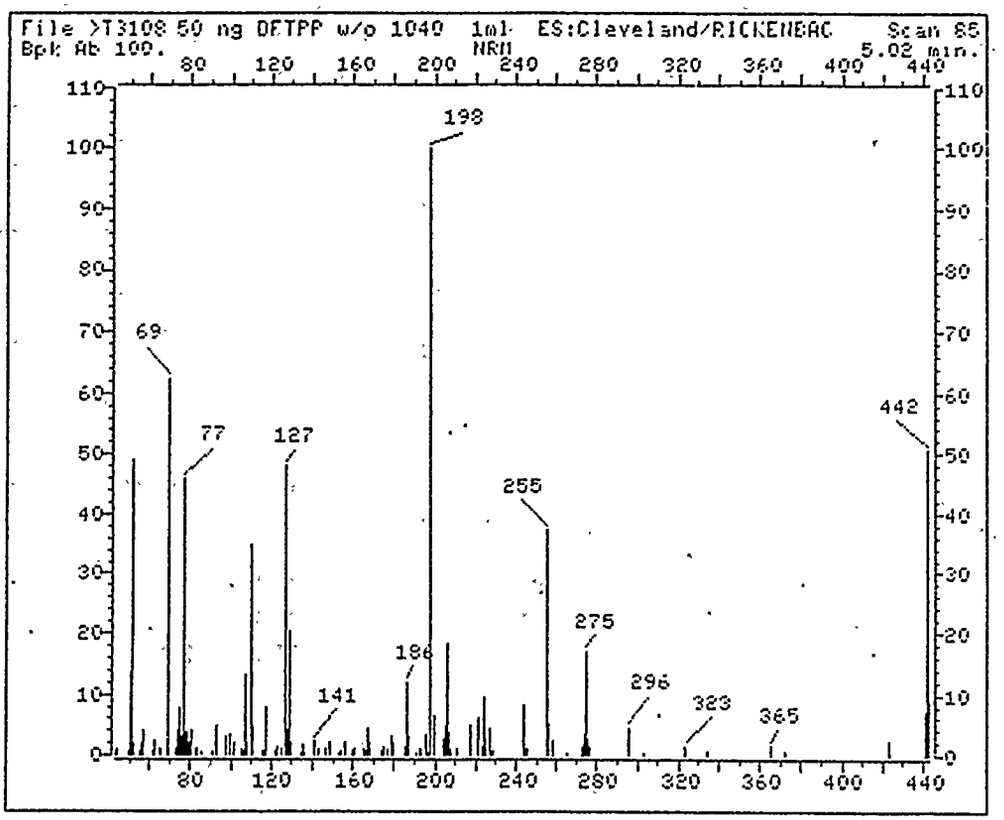
1-Value is % mass 69 2-Value is % mass 442

Spent 10/12/88

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	60 ug/ml BNA STD	>S0436	11/08/88	22:47
02	88092690 AC w/o 1040	>S0437	11/08/88	23:46
03	88092690 BN w/o 1040	>S0438	11/09/88	0:45
04	88092691 AC w/o 1040	>S0439	11/09/88	1:45
05	88092691 BN w/o 1040	>S0440	11/09/88	2:44
06	88092692 AC w/o 1040	>S0441	11/09/88	3:43
07	88092692 BN w/o 1040	>S0442	11/09/88	4:42
08	88092694 AC w/o 1041	>S0443	11/09/88	5:41
09	88092694 BN w/o 1041	>S0444	11/09/88	6:40
10	88092695 AC w/o 1041	>S0445	11/09/88	7:39
11	88092695 BN w/o 1041	>S0446	11/09/88	8:39
12	88092724 AC w/o 1047	>S0447	11/09/88	9:36
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

another project



>I3108 50 ng DFTPP w/o 1040 1ml ES:Cleveland/RICKENBACKER ANGB
85 NRM

File: >I3108 Scan #: 85 Retn. time: 5.02

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.10	.918	83.10	1.309	134.05	.547	186.05	11.934	244.00	8.184
44.10	1.133	85.00	.625	135.15	1.777	186.95	3.184	245.00	1.035
49.10	.645	91.10	.820	136.05	.586	191.05	.430	246.00	1.191
50.10	13.477	93.00	1.980	141.05	2.305	193.05	1.016	255.00	37.168
51.10	18.984	98.00	3.145	143.05	1.016	196.00	3.457	256.00	5.137
52.10	2.090	99.00	3.418	147.05	1.133	196.80	.547	257.90	2.363
55.00	.645	101.00	1.973	148.05	2.031	198.00	100.000	265.00	.586
56.00	1.973	105.10	1.113	152.95	.586	199.00	6.641	273.00	1.289
57.10	4.043	105.10	.605	154.15	.840	204.10	2.832	274.05	3.555
62.00	.801	107.00	13.398	156.15	1.992	205.10	4.805	275.05	17.148
63.10	2.305	108.00	2.168	160.05	.645	206.10	18.398	276.05	2.637
65.10	.996	110.00	35.039	161.05	1.113	207.10	3.730	277.05	1.426
69.00	62.344	111.10	4.688	165.05	.957	208.10	.996	295.95	4.512
73.20	.996	115.80	.664	165.95	.625	211.10	.957	302.95	.547
74.00	4.141	116.10	.703	167.05	4.512	217.00	4.805	323.15	1.406
75.10	7.773	117.00	7.930	167.95	1.953	221.00	6.055	333.95	.820
76.20	3.125	122.05	.820	174.05	.820	223.10	1.309	365.00	1.777
77.10	45.879	123.15	1.543	175.05	1.504	224.10	9.688	372.00	.703
78.00	3.770	125.05	1.035	177.05	.977	225.00	2.852	423.00	2.344
79.10	3.848	127.05	48.027	179.05	3.203	227.00	4.336	441.05	7.168
80.00	1.992	128.05	4.082	180.05	2.090	228.00	.781	442.05	50.645
81.00	4.219	129.05	20.410	185.05	1.367	229.00	.762	443.05	8.867
82.10	1.211	130.05	2.227						

Continuing Calibration Check
HSL Compounds

Case No: | Calibration Date: 11/08/88

Contractor: ENGINEERING SCIENCE | Time: 22:47

Contract No: | Laboratory ID:)S0436

Instrument ID: 2 | Initial Calibration Date: 10/13/88 20

Minimum $\overline{RF}$ for SPCC is | Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	1.05124	16.59		
2-Fluorophenol	1.15802	1.36032	17.47		
bis(2-Chloroethyl)ether	1.11892	1.15207	2.96		
Phenol	1.41657	1.73547	22.51	*	
Phenol-d5	1.22488	1.58861	29.70		
Aniline	.54193	.57496	6.10		
2-Chlorophenol	1.23175	1.35548	10.05		
1,3-Dichlorobenzene	1.47535	1.52286	3.22		
1,4-Dichlorobenzene	1.40530	1.54308	9.80	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.54144	25.74		
1,2-Dichlorobenzene	1.32240	1.49651	13.17		
2-Methylphenol	1.17367	1.50696	28.40		
3-&-4-Methylphenol	1.07139	1.52347	42.20		
bis(2-chloroisopropyl)Ether	2.15627	2.54138	17.86		
N-Nitroso-Di-n-Propylamine	.84050	.94106	11.96		**
Hexachloroethane	.53840	.61681	14.56		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.45878	13.81		
Nitrobenzene-d5	.39137	.40743	4.10		
2-Nitrophenol	.24657	.25094	1.77	*	
Isophorone	.74170	.78756	6.18		
bis(2-Chloroethoxy)methane	.49386	.52851	7.02		
2,4-Dimethylphenol	.34849	.36992	6.15		
Benzoic Acid	.29725	.27377	7.90		
2,4-Dichlorophenol	.56733	.52760	7.00	*	
1,2,4-Trichlorobenzene	.36913	.32014	13.27		
Naphthalene	.94589	.93585	1.06		
4-Chloroaniline	.36309	.34810	4.13		
Hexachlorobutadiene	.20283	.15550	23.33	*	
4-Chloro-3-Methylphenol	.31360	.33437	6.62	*	
2-Methylnaphthalene	.56397	.58581	3.87		

$\overline{RF}$ - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

372

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/08/88

Contractor: ENGINEERING SCIENCE Time: 22:47

Contract No: Laboratory ID: 'S0436

Instrument ID: Y Initial Calibration Date: 10/23/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.27193	8.03		**
2,4,6-Trichlorophenol	.42280	.33146	21.60	*	
2,4,5-Trichlorophenol	.52897	.52942	.09		
2-Fluorobiphenyl	1.27220	1.15366	9.32		
2-Chloronaphthalene	1.23784	1.17713	4.90		
2-Nitroaniline	.47288	.47807	1.10		
Dimethylphthalate	1.40629	1.38367	1.61		
2,6-Dinitrotoluene	.37415	.36234	3.16		
Acenaphthylene	1.68918	1.69671	.45		
3-Nitroaniline	.44557	.43962	1.33		
2,4-Dinitrophenol	.11898	.10340	13.10		**
Acenaphthene	1.13011	1.06817	5.48	*	
Dibenzofuran	1.64131	1.54255	6.02		
2,4-Dinitrotoluene	.28418	.29357	3.31		
4-Nitrophenol	.28450	.16267	42.82		**
Fluorene	1.12850	1.04492	7.41		
Diethylphthalate	1.20939	1.26453	4.56		
4-Chlorophenyl-phenylether	.59183	.53356	9.85		
4-Nitroaniline	.35956	.29299	18.51		
2,4,6-Tribromophenol	.21023	.15715	25.25		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.47430	17.73	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.21434	.62		
Hexachlorobenzene	.26273	.25251	3.89		
Pentachlorophenol	.14536	.12098	16.77	*	

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: | Calibration Date: 11/08/88

Contractor: ENGINEERING-SCIENCE | Time: 22:47

Contract No: | Laboratory ID:)S0436

Instrument ID: 5 | Initial Calibration Date: 10/12/88 Dup

Minimum $\overline{RF}$ for SPCC is | Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	.97725	5.52		
Anthracene	1.05155	1.18256	12.46		
Di-n-Butylphthalate	1.51956	1.79388	18.05		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.14840	3.53	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.05551	37.98		
Pyrene	1.56086	1.72532	10.54		
Terphenyl-d14	1.05835	1.13851	7.57		
Butylbenzylphthalate	1.03390	1.30412	26.14		
3,3'-Dichlorobenzidine	.13689	.18041	31.79		
Chrysene	.99655	1.11729	12.12		
Benzo(a)Anthracene	1.10407	.99228	10.13		
bis(2-Ethylhexyl)Phthalate	1.21073	1.51691	25.29		
Di-n-octylphthalate	3.40275	3.95594	16.26	*	
Benzo(a)Pyrene	1.32098	1.37754	4.28	*	
Benzo(b)fluoranthene	1.60850	1.38107	14.14		
Indeno(1,2,3-cd)Pyrene	.96800	1.14017	17.79		
Dibenzo(a,h)Anthracene	.87481	.90057	2.94		
Benzo(k)fluoranthene	1.44370	1.72541	19.51		
Benzo(g,h,i)Perylene	.89761	.78955	12.04		

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

374

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: _____.

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____.

Lab File ID (Standard): >S0436 Date Analyzed:11/08/88

Instrument ID: 70 1 Time Analyzed: 22:47

		IS1(DCB)		IS2(NPT)		IS3(ANT)	
		AREA #	RT	AREA #	RT	AREA #	RT
	12 HOUR STD	61167.	9.33	222535.	12.93	118036.	18.38
	UPPER LIMIT	122334.		445070.		236072.	
	LOWER LIMIT	30584.		111268.		59018.	
	SAMPLE NO.						
01	88092690 AC	58296.	9.35	217963.	13.06	108017.	18.43
02	88092690 BN	52091.	9.50	224489.	13.04	107776.	18.49
03	88092691 AC	61668.	9.35	235689.	13.07	119842.	18.44
04	88092691 BN	26447.	9.56	201443.	13.09	116472.	18.48
05	88092692 AC	71341.	9.36	288921.	13.05	140883.	18.42
06	88092692 BN	69350.	9.43	220383.	12.98	134089.	18.46
07	88092694 AC	59950.	9.35	234694.	13.08	115923.	18.46
08	88092694 BN	63622.	9.42	229601.	13.17	113493.	18.50
09	88092695 AC	69647.	9.36	263711.	13.04	132084.	18.46
10	88092695 BN	61876.	9.39	219342.	13.04	109966.	18.48
11	88092724 AC	54142.	9.36	213008.	13.06	105329.	18.46
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal stansard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

FORM VIII SV-1 1/87 Rev.

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: _____.

Lab Code: ES01 Case No.: ____ SAS No.: ____ SDG No.: ___.

Lab File ID (Standard): >S0436 Date Analyzed: 11/08/88

Instrument ID: 70 1 Time Analyzed: 22:47

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS3(PRY) AREA #	RT
12 HOUR STD	167076.	23.02	102996.	31.49	65963.	37.71
UPPER LIMIT	334152.		205992.		131926.	
LOWER LIMIT	83538.		51498.		32981.	
EPA SAMPLE NO.						
01 88092690 AC	138893.	23.16	71248.	31.66	37978.	38.04
02 88092690 BN	144370.	23.06	70125.	31.69	39837.	38.06
03 88092691 AC	153481.	23.14	77180.	31.67	42412.	38.02
04 88092691 BN	142843.	23.11	78345.	31.72	48876.	38.04
05 88092692 AC	155778.	23.14	96817.	31.64	55765.	37.98
06 88092692 BN	170786.	23.15	90910.	31.69	46901.	38.08
07 88092694 AC	148844.	23.15	76599.	31.67	43701.	38.01
08 88092694 BN	154116.	23.31	72953.	31.72	39595.	38.08
09 88092695 AC	176444.	23.15	91259.	31.68	50942.	38.01
10 88092695 BN	144823.	23.19	71578.	31.65	41504.	37.98
11 88092724 AC	128265.	23.18	62106.	31.73	30863.*	38.08
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal stansard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

FORM VIII SV-2 1/87 Rev.

DATA PACKAGE #7

This page intentionally left blank.

ES
ENGINEERING-SCIENCE, INC.

RESEARCH AND DEVELOPMENT
LABORATORY
600 BANCROFT WAY
BERKELEY, CALIFORNIA 94710
(415) 841-7353

REVISED REPORT

Job No.: OR001

Work Order No.: 796

Client: ES Oak Ridge
Attention: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Attached are the analytical reports for the soil sample(s) received by this laboratory on 8-01-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081589	DANGB2-BH1-SS6-10-12'	AS-F	7-30-88		8-16-88	
88081589	DANGB2-BH1-SS6-10-12'	BA-I	7-30-88		8-01-88	
88081589	DANGB2-BH1-SS6-10-12'	CD-F	7-30-88		8-09-88	
88081589	DANGB2-BH1-SS6-10-12'	HG-C	7-30-88		8-12-88	
88081589	DANGB2-BH1-SS6-10-12'	PB-F	7-30-88		8-15-88	
88081589	DANGB2-BH1-SS6-10-12'	418.1	7-30-88	8-05 88	8-19-88	
88081589	DANGB2-BH1-SS6-10-12'	MOIS	7-30-88		8-04-88	
88081589	DANGB2-BH1-SS6-10-12'	8080	7-30-88	8-04-88	9-09-88	
88081589	DANGB2-BH1-SS6-10-12'	8270	7-30-88	8-02-88	8-20-88	
88081590	DANGB2-BH2-SS1-0-2'	AS-F	7-30-88		8-16-88	
88081590	DANGB2-BH2-SS1-0-2'	BA-I	7-30-88		8-01-88	
88081590	DANGB2-BH2-SS1-0-2'	CD-F	7-30-88		8-09-88	
88081590	DANGB2-BH2-SS1-0-2'	HG-C	7-30-88		8-12-88	
88081590	DANGB2-BH2-SS1-0-2'	PB-F	7-30-88		8-15-88	
88081590	DANGB2-BH2-SS1-0-2'	418.1	7-30-88	8-05-88	8-19-88	
88081590	DANGB2-BH2-SS1-0-2'	MOIS	7-30-88		8-04-88	
88081590	DANGB2-BH2-SS1-0-2'	8080	7-30-88	8-04-88	9-09-88	
88081590	DANGB2-BH2-SS1-0-2'	8270	7-30-88	8-02-88	8-25-88	

* If applicable

Job No.: OR001

Work Order No.: 796

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081591	DANGB2-BH2-SS4-6-8'	AS-F	7-30-88		8-16-88	
88081591	DANGB2-BH2-SS4-6-8'	BA-I	7-30-88		8-01-88	
88081591	DANGB2-BH2-SS4-6-8'	CD-F	7-30-88		8-09-88	
88081591	DANGB2-BH2-SS4-6-8'	HG-C	7-30-88		8-12-88	
88081591	DANGB2-BH2-SS4-6-8'	PB-F	7-30-88		8-15-88	
88081591	DANGB2-BH2-SS4-6-8'	418.1	7-30-88	8-05-88	8-19-88	
88081591	DANGB2-BH2-SS4-6-8'	MOIS	7-30-88		8-04-88	
88081591	DANGB2-BH2-SS4-6-8'	8080	7-30-88	8-04-88	9-09-88	
88081591	DANGB2-BH2-SS4-6-8'	8270	7-30-88	8-02-88	8-24-88	
88081592	DANGB2-BH2-SS6-10-12'	AS-F	7-30-88		8-16-88	
88081592	DANGB2-BH2-SS6-10-12'	BA-I	7-30-88		8-01-88	
88081592	DANGB2-BH2-SS6-10-12'	CD-F	7-30-88		8-09-88	
88081592	DANGB2-BH2-SS6-10-12'	HG-C	7-30-88		8-12-88	
88081592	DANGB2-BH2-SS6-10-12'	PB-F	7-30-88		8-15-88	
88081592	DANGB2-BH2-SS6-10-12'	418.1	7-30-88	8-05-88	8-19-88	
88081592	DANGB2-BH2-SS6-10-12'	MOIS	7-30-88		8-04-88	
88081592	DANGB2-BH2-SS6-10-12'	8080	7-30-88	8-04-88	9-09-88	
88081592	DANGB2-BH2-SS6-10-12'	8270	7-30-88	8-02-88	8-23-88	
88081593	DANGB2-BH2-SS9-16-18'	AS-F	7-30-88		8-16-88	
88081593	DANGB2-BH2-SS9-16-18'	BA-I	7-30-88		8-01-88	
88081593	DANGB2-BH2-SS9-16-18'	CD-F	7-30-88		8-09-88	
88081593	DANGB2-BH2-SS9-16-18'	HG-C	7-30-88		8-12-88	
88081593	DANGB2-BH2-SS9-16-18'	PB-F	7-30-88		8-15-88	
88081593	DANGB2-BH2-SS9-16-18'	418.1	7-30-88	8-05-88	8-19-88	
88081593	DANGB2-BH2-SS9-16-18'	MOIS	7-30-88		8-04-88	
88081593	DANGB2-BH2-SS9-16-18'	8080	7-30-88	8-04-88	9-09-88	
88081593	DANGB2-BH2-SS9-16-18'	8270	7-30-88	8-02-88	8-24-88	

* If applicable

ENGINEERING-SCIENCE INC.
11/03/88

ANALYSIS REPORT

WO ORDER NUMBER: 796
JO NUMBER : Z80000000440
WORK ORDER DATE : 08/01/88

APPROVED BY _____
Lab Supervisor

RE RT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OA RIDGE, TN 37830
BI HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 2, UNITS: mg/KG

TEST COMPOUND	DANG2-BH1 SS-4 6-8' 7-29-88 88081589	DANG2 BH2,SS-1 0-2' 88081590	DANG2 BH2,SS-4 6-8' 88081591	DANG2 BH2,SS-6 10-12' 88081592	DANG2 BH2,SS-9 16-18' 88081593
A D DIG SOIL	NA	NA	NA	NA	NA
A ENIC	1.7*	1.7*	1.3*	1.2*	1.5*
BARIUM	57	104	41	54	41
CADMIUM	0.09B*	0.56*	0.13B*	0.11B*	0.12B*
M CURY	<0.2	<0.2	<0.2	0.1B*	<0.2
LEAD	6.5	54	5.0	6.4	3.8

NA - Not Analyzed
ND - Not Detected

ANALYSIS REPORT

ORDER NUMBER: 796
NUMBER : ZB0000000440 APPROVED BY R W Boulton
ORDER DATE : 08/01/88 Lab Supervisor

ORT DATA:
OAK RIDGE/DULUTH ANGB
S. ILLINOIS AVE. STE. S103
RIDGE, TN 37830
. HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

REPORT COPIES: 1

TRACT / PO # : OR001
TACT : BILL HAYDEN
(615)-481-3920

: 3, UNITS: mg/KG

T COMPOUND	DANG2 BH1,SS-6 10-12' 88081589	DANG2 BH2,SS-1 0-2' 88081590	DANG2 BH2,SS-4 6-8' 88081591	DANG2 BH2,SS-6 10-12' 88081592	DANG2 BH2,SS-9 16-18' 88081593
.1 PETROLEUM HYDROCARBONS	150	9100	104	<100	<100
OISTURE	13.6	9.4	9.0	11.8	8.2

ANALYSIS REPORT

ORDER NUMBER: 796
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 08/01/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 4, UNITS: mg/Kg, GROUP 8010

TEST COMPOUND	DANG2 BH1,SS-6 10-12' 88081589	DANG2 BH2,SS-1 0-2' 88081590	DANG2 BH2,SS-4 6-8' 88081591	DANG2 BH2,SS-6 10-12' 88081592	DANG2 BH2,SS-9 16-18' 88081593
BENZYL CHLORIDE	NT	NT	NT	NT	NT
BIS (2-CHLOROETHOXY)METHANE	NT	NT	NT	NT	NT
BIS (2-CHLOROISOPROPYL)ETHER	NT	NT	NT	NT	NT
BROMOBENZENE	NT	NT	NT	NT	NT
BROMODICHLOROMETHANE	NT	NT	NT	NT	NT
BROMOFORM	NT	NT	TT	NT	NT
BROMOETHANE	NT	NT	NT	TN	NT
CARBON TETRACHLORIDE	NT	TN	NT	TN	NT
CHLORACETALDEHYDE	NT	TN	NT	TNT	NT
CHLORAL	NT	TNT	NT	NT	TN
CHLOROBENZENE	NT	NT	NT	NT	TN
CHLOROETHANE	NT	NT	NT	TN	TNT
CHLOROFORM	NT	NTN	NT	TNT	NT
1-CHLOROHEXANE	NT	NT	NT	NT	NT
2-CHLOROETHYL VINYL ETHER	NT	NT	NT	NT	NT
CHLOROMETHANE	NT	NT	NT	NT	NT
CHLOROMETHYL METHYL ETHER	NT	NT	NT	NT	NT
CHLOROTOLUENE	NT	TNT	NT	NT	TN
DIBROMOCHLOROMETHANE	NT	ND	NT	NT	TN
DIBROMOMETHANE	NT	TN	NT	NT	TN
1,2-DICHLOROBENZENE	NT	TNT	TN	TN	TN
1,3-DICHLOROBENZENE	NT	NT	TN	TNT	TNT
1,4-DICHLOROBENZENE	TN	TNT	TNT	NT	NT
DICHLORODIFLUOROMETHANE	TNTN	NT	NT	NT	NT
1,1-DICHLOROETHANE	TN	NT	TN	NT	NT
1,2-DICHLOROETHANE	TNT	NT	TN	TN	NT
1,1-DICHLOROETHYLENE	NT	NT	NT	NT	NT
TRANS-1,2-DICHLOROETHYLENE	NT	TN	NTT	NT	NT
DICHLOROMETHANE	NT	TNNT	NT	TN	TN
1,2-DICHLOROPROPANE	NT	NT	NT	TN	NT

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 796

T COMPOUND	DANG2 BH1,SS-6 10-12' 88081589	DANG2 BH2,SS-1 0-2' 88081590	DANG2 BH2,SS-4 6-8' 88081591	DANG2 BH2,SS-6 10-12' 88081592	DANG2 BH2,SS-9 16-18' 88081593
-DICHLOROPROPYLENE	NT	TN	NT	TNT	TNT
,2,2-TETRACHLOROETHANE	NT	TNT	NT	NT	NT
,1,2-TETRACHLOROETHANE	NT	NT	NT	TNT	NT
RACHLOROETHYLENE	NT	NT	NT	NT	NT
,1-TRICHLOROETHANE	TN	TN	TN	TNT	TN
,2-TRICHLOROETHANE	TNT	TNT	TN	NT	TNT
CHLOROETHYLENE	NT	NT	'TNT	TNT	NT
CHLOROFLUOROMETHANE	NT	NT	NT	TD	NT
CHLOROPROPANE	NT	NT	NT	TNT	NT
YL CHLORIDE	NT	NT	NT	NT	NT

- Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 796
ES NUMBER : ZB0000000440
WORK ORDER DATE : 08/01/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

DESK: 4, UNITS: ug/Kg, GROUP 8080

TEST COMPOUND	DANG2 BH1,SS-6 10-12' 88081589	DANG2 BH2,SS-1 0-2' 88081590	DANG2 BH2,SS-4 6-8' 88081591	DANG2 BH2,SS-6 10-12' 88081592	DANG2 BH2,SS-9 16-18' 88081593
ALDRIN	ND	ND	ND	ND	ND
ALPHA-BHC	ND	ND	ND	ND	ND
BETA-BHC	ND	ND	ND	ND	ND
DELTA-BHC	ND	ND	ND	ND	ND
GAMMA-BHC	ND	ND	ND	ND	ND
CHLORDANE	ND	ND	ND	ND	ND
4,4'-DDD	ND	ND	ND	ND	ND
4,4'-DDE	ND	ND	ND	ND	ND
4,4'-DDT	ND	ND	ND	ND	ND
DIELDRIN	ND	ND	ND	ND	ND
ENDOSULFAN I	ND	ND	ND	ND	ND
ENDOSULFAN II	ND	ND	ND	ND	ND
ENDOSULFAN SULFATE	ND	ND	ND	ND	ND
ENDRIN	ND	ND	ND	ND	ND
ENDRIN ALDEHYDE	NA	NA	NA	NA	NA
HEPTACHLOR	ND	ND	ND	ND	ND
HEPTACHLOR EPOXIDE	ND	ND	ND	ND	ND
KEPONE	NA	NA	NA	NA	NA
METHOXYCHLOR	ND	ND	ND	ND	ND
TOXAPHENE	ND	ND	ND	ND	ND
PCB-1016	ND	ND	ND	ND	ND
PCB-1221	ND	ND	ND	ND	ND
PCB-1232	ND	ND	ND	ND	ND
PCB-1242	ND	ND	ND	ND	ND
PCB-1248	ND	ND	ND	ND	ND
PCB-1254	ND	ND	ND	ND	ND
PCB-1260	ND	ND	ND	ND	ND

NA - Not Analyzed
ND - Not Detected

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Soil

Date Received: August 1, 1988
Date Reported: August 29, 1988

Work Order: 796
Job No. : OR001

FOR: ES:Oakridge/Duluth ANGB
Address: 710 S. Illinois Ave. Suite F-103
Oakridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88081589	88081591
Sample No.:	DANG2 BH1, SS-6, 10-12'	DANG2 BH2, SS-4, 6-8'
Date Sampled:	7-30-88	7-30-88
Time Sampled:	09:39	14:23
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-20-88	8-24-88
Percent Moisture:	14	9

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
1,3-Dichlorobenzene	330	ND	ND
1,4-Dichlorobenzene	330	ND	ND
Hexachloroethane	330	ND	ND
Bis(2-chloroethyl)ether	330	ND	ND
1,2-Dichlorobenzene	330	ND	ND
N-Nitrosodimethylamine	330	ND	ND
Bis(2-chloroisopropyl)ether	330	ND	ND
N-Nitrosodi-n-propyl amine	330	ND	ND
Hexachlorobutadiene	330	ND	ND
1,2,4-Trichlorobenzene	330	ND	ND
Nitrobenzene	330	ND	ND
Isophorone	330	ND	ND
Naphthalene	330	ND	ND
Bis(2-chloroethoxy)methane	330	ND	ND
2-Chloronaphthalene	330	ND	ND
Hexachlorocyclopentadiene	330	ND	ND
Acenaphthylene	330	ND	ND
Acenaphthene	330	ND	ND
Dimethyl phthalate	330	ND	ND
2,6-Dinitrotoluene	330	ND	ND
Fluorene	330	ND	ND
2,4-Dinitrotoluene	330	ND	ND
Diethyl phthalate	330	ND	ND
N-Nitrosodiphenylamine	330	ND	ND
Hexachlorobenzene	330	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Soil
(continued)

Date Received: August 1, 1988 Work Order: 796
Date Reported: August 29, 1988 Job No. : OR001

FOR: ES:Oakridge/Duluth ANGB ATTN: Mr. Bill Hayden
Address: 710 S. Illinois Ave. Suite F-103
Oakridge, TN 37830

Lab Number:	88081589	88081591
Sample No.:	DANG2 BH1, SS-6, 10-12'	DANG2 BH2, SS-4, 6-8'
Date Sampled:	7-30-88	7-30-88
Time Sampled:	09:39	14:23
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-20-88	8-24-88
Percent Moisture:	14	9

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Phenanthrene	330	ND	ND
Anthracene	330	ND	ND
Dibutyl phthalate	330	2000 B	ND
Fluoranthene	330	ND	ND
4-Chlorophenyl phenyl ether	330	ND	ND
Pyrene	330	ND	ND
Butyl Benzyl phthalate	330	ND	ND
Bis(2-ethylhexyl) phthalate	330	ND	650
Chrysene	330	ND	ND
4-Bromophenyl phenyl ether	330	ND	ND
Benzo(a)anthracene	330	ND	ND
Di-n-octylphthalate	330	ND	ND
Benzo(b)fluoranthene	330	ND	ND
Benzo(k)fluoranthene	330	ND	ND
Benzidine	660	ND	ND
3,3'-Dichlorobenzidine	660	ND	ND
Benzo(a)pyrene	330	ND	ND
Indeno(1,2,3-cd)pyrene	330	ND	ND
Dibenzo(a,h)anthracene	330	ND	ND
Benzo(ghi)perylene	330	ND	ND
Benzyl Alcohol	660	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Soil
(continued)

Date Received: August 1, 1988
Date Reported: August 29, 1988

Work Order: 796
Job No. : OR001

For: ES:Oakridge/Duluth ANGB
Address: 710 S. Illinois Ave. Suite F-103
Oakridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88081589	88081591
Sample No.:	DANG2 BH1, SS-6, 10-12'	DANG2 BH2, SS-4, 6-8'
Date Sampled:	7-30-88	7-30-88
Time Sampled:	09:39	14:23
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-20-88	8-24-88
Percent Moisture:	14	9

Compound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg	ug/kg
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
4-Chloroaniline	660	ND	ND
1-Chloronaphthalene	--*	ND	ND
Dibenzofuran	330	ND	ND
p-Dimethylaminoazobenzene	--*	ND	ND
7,12-Dimethylbenz(a)anthracene	--*	ND	ND
a-,a-Dimethylphenethylamine	--*	ND	ND
Diphenylamine	--*	ND	ND
1,2-Diphenylhydrazine	--*	ND	ND
Ethyl methanesulfonate	--*	ND	ND
3-Methylcholanthrene	--*	ND	ND
Methyl methanesulfonate	--*	ND	ND
2-Methylnaphthalene	330	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	1600	ND	ND
3-Nitroaniline	1600	ND	ND
4-Nitroaniline	1600	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
2-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

*EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Soil

Date Received: August 1, 1988
Date Reported: August 29, 1988

Work Order: 796
Job No. : OR001

FOR: ES:Oakridge/Duluth ANGB
Address: 710 S. Illinois Ave. Suite F-103
Oakridge, TN 37830

ATTN:Mr. Bill Hayden

Lab Number:	88081589	88081591
Sample No.:	DANG2 BH1, SS-6, 10-12'	DANG2 BH2, SS-4, 6-8'
Date Sampled:	7-30-88	7-30-88
Time Sampled:	09:39	14:23
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-20-88	8-24-88
Percent Moisture:	14	9

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Alpha-BHC	--*	ND	ND
Gamma-BHC	--*	ND	ND
Beta-BHC	660	ND	ND
Heptachlor	330	ND	ND
Delta-BHC	500	ND	ND
Aldrin	330	ND	ND
Heptachlor epoxide	330	ND	ND
Endosulfan I	--*	ND	ND
Dieldrin	500	ND	ND
4,4'-DDE	1000	ND	ND
Endrin	--*	ND	ND
Endosulfan II	--*	ND	ND
4,4'-DDD	500	ND	ND
4,4'-DDT	830	ND	ND
Endosulfan Sulfate	1000	ND	ND
Endrin aldehyde	--*	ND	ND
Endrin Ketone	--*	ND	ND
Chlordane	2000	ND	ND
Methoxychlor	--*	ND	ND
Toxaphene	2000	ND	ND
Aroclor-1016	2000	ND	ND
Aroclor-1221	2000	ND	ND
Aroclor-1232	2000	ND	ND
Aroclor-1242	2000	ND	ND
Aroclor-1248	2000	ND	ND
Aroclor-1254	2000	ND	ND
Aroclor-1260	2000	ND	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Soil

Date Received: August 1, 1988
Date Reported: August 29, 1988

Work Order: 796
Job No. : OR001

FOR: ES:Oakridge/Duluth ANGB
Address:710 S. Illinois Ave. Suite F-103
Oakridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88081589	88081591
Sample No.:	DANG2 BH1, SS-6, 10-12'	DANG2 BH2, SS-4, 6-8'
Date Sampled:	7-30-88	7-30-88
Time Sampled:	09:39	14:23
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-20-88	8-24-88
Percent Moisture:	14	9

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
2-Chlorophenol	330	ND	ND
2-Nitrophenol	330	ND	ND
Phenol	330	ND	ND
2,4-Dimethylphenol	330	ND	ND
2,4-Dichlorophenol	330	ND	ND
2,4,6-Trichlorophenol	330	ND	ND
4-Chloro-3-methylphenol	660	ND	ND
2,4-Dinitrophenol	1600	ND	ND
2,6-Dichlorophenol	--*	ND	ND
2-Methyl-4,6-Dinitrophenol	1600	ND	ND
Pentachlorophenol	1600	ND	ND
4-Nitrophenol	1600	ND	ND
Benzoic Acid	1600	ND	ND
2-Methylphenol	330	ND	ND
3- & 4-Methylphenol	330	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
2,4,5-Trichlorophenol	330	ND	ND

Analyst

Laboratory Supervisor

*EPA has not yet determined detection limits for these compounds.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Soil

Date Received: August 1, 1988
Date Reported: August 29, 1988

Work Order: 796
Job No. : OR001

FOR: ES:Oakridge/Duluth ANGB
Address: 710 S. Illinois Ave. Suite F-103
Oakridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88081590
Sample No.:	DANG2 BH2, SS-1, 0-2'
Date Sampled:	7-30-88
Time Sampled:	13:37
Date Extracted:	8-02-88
Date Analyzed:	8-25-88
Percent Moisture:	9

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
1,3-Dichlorobenzene	3300	ND
1,4-Dichlorobenzene	3300	ND
Hexachloroethane	3300	ND
Bis(2-chloroethyl)ether	3300	ND
1,2-Dichlorobenzene	3300	ND
N-Nitrosodimethylamine	3300	ND
Bis(2-chloroisopropyl)ether	3300	ND
N-Nitrosodi-n-propylamine	3300	ND
Hexachlorobutadiene	3300	ND
1,2,4-Trichlorobenzene	3300	ND
Nitrobenzene	3300	ND
Isophorone	3300	ND
Naphthalene	3300	3700
Bis(2-chloroethoxy)methane	3300	ND
2-Chloronaphthalene	3300	ND
Hexachlorocyclopentadiene	3300	ND
Acenaphthylene	3300	ND
Acenaphthene	3300	ND
Dimethyl phthalate	3300	ND
2,6-Dinitrotoluene	3300	ND
Fluorene	3300	ND
2,4-Dinitrotoluene	3300	ND
Diethyl phthalate	3300	ND
N-Nitrosodiphenylamine	3300	ND
Hexachlorobenzene	3300	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Soil
(continued)

Date Received: August 1, 1988
Date Reported: August 29, 1988

Work Order: 796
Job No. : OR001

FOR: ES:Oakridge/Duluth ANGB
Address: 710 S. Illinois Ave. Suite F-103
Oakridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88081590
Sample No.:	DANG2 BH2, SS-1, 0-2'
Date Sampled:	7-30-88
Time Sampled:	13:37
Date Extracted:	8-02-88
Date Analyzed:	8-25-88
Percent Moisture:	9

Compound	Detection Limit ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
Phenanthrene	3300	ND
Anthracene	3300	ND
Dibutyl phthalate	3300	ND
Fluoranthene	3300	ND
4-Chlorophenyl phenyl ether	3300	ND
Pyrene	3300	3700
Butyl Benzyl phthalate	3300	ND
Bis(2-ethylhexyl) phthalate	3300	ND
Chrysene	3300	ND
4-Bromophenyl phenyl ether	3300	ND
Benzo(a)anthracene	3300	ND
Di-n-octylphthalate	3300	ND
Benzo(b)fluoranthene	3300	ND
Benzo(k)fluoranthene	3300	ND
Benzidine	6600	ND
3,3'-Dichlorobenzidine	6600	ND
Benzo(a)pyrene	3300	ND
Indeno(1,2,3-cd)pyrene	3300	ND
Dibenzo(a,h)anthracene	3300	ND
Benzo(ghi)perylene	3300	ND
Benzyl Alcohol	6600	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Soil
(continued)

Date Received: August 1, 1988
Date Reported: August 29, 1988

Work Order: 796
Job No. : OR001

For: ES:Oakridge/Duluth ANGB
Address: 710 S. Illinois Ave. Suite F-103
Oakridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88081590
Sample No.:	DANG2 BH2, SS-1, 0-2'
Date Sampled:	7-30-88
Time Sampled:	13:37
Date Extracted:	8-02-88
Date Analyzed:	8-25-88
Percent Moisture:	9.

Compound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg
Acetophenone	--*	ND
Aniline	--*	ND
4-Aminobiphenyl	--*	ND
4-Chloroaniline	6600	ND
1-Chloronaphthalene	--*	ND
Dibenzofuran	3300	ND
p-Dimethylaminoazobenzene	--*	ND
7,12-Dimethylbenz(a)anthracene	--*	ND
a-,a-Dimethylphenethylamine	--*	ND
Diphenylamine	--*	ND
1,2-Diphenylhydrazine	--*	ND
Ethyl methanesulfonate	--*	ND
3-Methylcholanthrene	--*	ND
Methyl methanesulfonate	--*	ND
2-Methylnaphthalene	3300	6200
1-Naphthylamine	--*	ND
2-Naphthylamine	--*	ND
2-Nitroaniline	16000	ND
3-Nitroaniline	16000	ND
4-Nitroaniline	16000	ND
N-Nitroso-di-n-butylamine	--*	ND
N-Nitrosopiperidine	--*	ND
Pentachlorobenzene	--*	ND
Pentachloronitrobenzene	--*	ND
Phenacetin	--*	ND
2-Picoline	--*	ND
Pronamide	--*	ND
1,2,4,5-Tetrachlorobenzene	--*	ND

*EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Soil

Date Received: August 1, 1988
Date Reported: August 29, 1988

Work Order: 796
Job No. : OR001

FOR: ES:Oakridge/Duluth ANGB
Address: 710 S. Illinois Ave. Suite F-103
Oakridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88081590
Sample No.:	DANG2 BH2,
Date Sampled:	7-30-88
Time Sampled:	13:37
Date Extracted:	8-02-88
Date Analyzed:	8-25-88
Percent Moisture:	9

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
Alpha-BHC	--*	ND
Gamma-BHC	--*	ND
Beta-BHC	6600	ND
Heptachlor	3300	ND
Delta-BHC	5000	ND
Aldrin	3300	ND
Heptachlor epoxide	3300	ND
Endosulfan I	--*	ND
Dieldrin	5000	ND
4,4'-DDE	10000	ND
Endrin	--*	ND
Endosulfan II	--*	ND
4,4'-DDD	5000	ND
4,4'-DDT	8300	ND
Endosulfan Sulfate	10000	ND
Endrin aldehyde	--*	ND
Endrin Ketone	--*	ND
Chlordane	20000	ND
Methoxychlor	--*	ND
Toxaphene	20000	ND
Aroclor-1016	20000	ND
Aroclor-1221	20000	ND
Aroclor-1232	20000	ND
Aroclor-1242	20000	ND
Aroclor-1248	20000	ND
Aroclor-1254	20000	ND
Aroclor-1260	20000	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Soil

Date Received: August 1, 1988
Date Reported: August 29, 1988

Work Order: 796
Job No. : OR001

FOR: ES:Oakridge/Duluth ANGB
Address: 710 S. Illinois Ave. Suite F-103
Oakridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88081590
Sample No.:	DANG2 BH2,
Date Sampled:	7-30-88
Time Sampled:	13:37
Date Extracted:	8-02-88
Date Analyzed:	8-25-88
Percent Moisture:	9

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
2-Chlorophenol	3300	ND
2-Nitrophenol	3300	ND
Phenol	3300	ND
2,4-Dimethylphenol	3300	ND
2,4-Dichlorophenol	3300	ND
2,4,6-Trichlorophenol	3300	ND
4-Chloro-3-methylphenol	6600	ND
2,4-Dinitrophenol	16000	ND
2,6-Dichlorophenol	--*	ND
2-Methyl-4,6-Dinitrophenol	16000	ND
Pentachlorophenol	16000	ND
4-Nitrophenol	16000	ND
Benzoic Acid	16000	ND
2-Methylphenol	3300	ND
3- & 4-Methylphenol	3300	ND
2,3,4,6-Tetrachlorophenol	--*	ND
2,4,5-Trichlorophenol	3300	ND

Analyst

Laboratory Supervisor

*EPA has not yet determined detection limits for these compounds.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Soil

Date Received: August 1, 1988
Date Reported: August 29, 1988

Work Order: 796
Job No. : OR001

FOR: ES:Oakridge/Duluth ANGB
Address: 710 S. Illinois Ave. Suite F-103
Oakridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88081592	88081593
Sample No.:	DANG2 BH2, SS-6, 10-12'	DANG2 BH2, SS-9, 16-18'
Date Sampled:	7-30-88	7-30-88
Time Sampled:	15:00	15:50
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-20-88	8-24-88
Percent Moisture:	12	8

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
1,3-Dichlorobenzene	330	ND	ND
1,4-Dichlorobenzene	330	ND	ND
Hexachloroethane	330	ND	ND
Bis(2-chloroethyl)ether	330	ND	ND
1,2-Dichlorobenzene	330	ND	ND
N-Nitrosodimethylamine	330	ND	ND
Bis(2-chloroisopropyl)ether	330	ND	ND
N-Nitrosodi-n-propyl amine	330	ND	ND
Hexachlorobutadiene	330	ND	ND
1,2,4-Trichlorobenzene	330	ND	ND
Nitrobenzene	330	ND	ND
Isophorone	330	ND	ND
Naphthalene	330	ND	ND
Bis(2-chloroethoxy)methane	330	ND	ND
2-Chloronaphthalene	330	ND	ND
Hexachlorocyclopentadiene	330	ND	ND
Acenaphthylene	330	ND	ND
Acenaphthene	330	ND	ND
Dimethyl phthalate	330	ND	ND
2,6-Dinitrotoluene	330	ND	ND
Fluorene	330	ND	ND
2,4-Dinitrotoluene	330	ND	ND
Diethyl phthalate	330	ND	ND
N-Nitrosodiphenylamine	330	ND	ND
Hexachlorobenzene	330	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Soil
(continued)

Date Received: August 1, 1988
Date Reported: August 29, 1988

Work Order: 796
Job No. : 0R001

FOR: ES:Oakridge/Duluth ANGB
Address: 710 S. Illinois Ave. Suite F-103
Oakridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88081592	88081593
Sample No.:	DANG2 BH2, SS-6, 10-12'	DANG2 BH2, SS-9, 16-18'
Date Sampled:	7-30-88	7-30-88
Time Sampled:	15:00	15:50
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-20-88	8-24-88
Percent Moisture:	12	8

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Phenanthrene	330	ND	ND
Anthracene	330	ND	ND
Dibutyl phthalate	330	1800 B	ND
Fluoranthene	330	ND	ND
4-Chlorophenyl phenyl ether	330	ND	ND
Pyrene	330	ND	ND
Butyl Benzyl phthalate	330	510	ND
Bis(2-ethylhexyl) phthalate	330	ND	ND
Chrysene	330	ND	ND
4-Bromophenyl phenyl ether	330	ND	ND
Benzo(a)anthracene	330	ND	ND
Di-n-octylphthalate	330	ND	ND
Benzo(b)fluoranthene	330	ND	ND
Benzo(k)fluoranthene	330	ND	ND
Benzidine	660	ND	ND
3,3'-Dichlorobenzidine	660	ND	ND
Benzo(a)pyrene	330	ND	ND
Indeno(1,2,3-cd)pyrene	330	ND	ND
Dibenzo(a,h)anthracene	330	ND	ND
Benzo(ghi)perylene	330	ND	ND
Benzyl Alcohol	660	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Soil
(continued)

Date Received: August 1, 1988
Date Reported: August 29, 1988

Work Order: 796
Job No. : OR001

For: ES:Oakridge/Duluth ANGB
Address: 710 S. Illinois Ave. Suite F-103
Oakridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88081592	88081593
Sample No.:	DANG2 BH2, SS-6, 10-12'	DANG2 BH2, SS-9, 16-18'
Date Sampled:	7-30-88	7-30-88
Time Sampled:	15:00	15:50
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-20-88	8-24-88
Percent Moisture:	12	8

Compound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg	ug/kg
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
4-Chloroaniline	660	ND	ND
1-Chloronaphthalene	--*	ND	ND
Dibenzofuran	330	ND	ND
p-Dimethylaminoazobenzene	--*	ND	ND
7,12-Dimethylbenz(a)anthracene	--*	ND	ND
a-,a-Dimethylphenethylamine	--*	ND	ND
Diphenylamine	--*	ND	ND
1,2-Diphenylhydrazine	--*	ND	ND
Ethyl methanesulfonate	--*	ND	ND
3-Methylcholanthrene	--*	ND	ND
Methyl methanesulfonate	--*	ND	ND
2-Methylnaphthalene	330	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	1600	ND	ND
3-Nitroaniline	1600	ND	ND
4-Nitroaniline	1600	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
2-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

*EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Soil

Date Received: August 1, 1988
Date Reported: August 29, 1988

Work Order: 796
Job No. : OR001

FOR: ES:Oakridge/Duluth ANGB
Address: 710 S. Illinois Ave. Suite F-103
Oakridge, TN 37830

ATTN:Mr. Bill Hayden

Lab Number:	88081592	88081593
Sample No.:	DANG2 BH2, SS-6, 10-12'	DANG2 BH2, SS-9, 16-18'
Date Sampled:	7-30-88	7-30-88
Time Sampled:	15:00	15:50
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-20-88	8-24-88
Percent Moisture:	12	8

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Alpha-BHC	--*	ND	ND
Gamma-BHC	--*	ND	ND
Beta-BHC	660	ND	ND
Heptachlor	330	ND	ND
Delta-BHC	500	ND	ND
Aldrin	330	ND	ND
Heptachlor epoxide	330	ND	ND
Endosulfan I	--*	ND	ND
Dieldrin	500	ND	ND
4,4'-DDE	1000	ND	ND
Endrin	--*	ND	ND
Endosulfan II	--*	ND	ND
4,4'-DDD	500	ND	ND
4,4'-DDT	830	ND	ND
Endosulfan Sulfate	1000	ND	ND
Endrin aldehyde	--*	ND	ND
Endrin Ketone	--*	ND	ND
Chlordane	2000	ND	ND
Methoxychlor	--*	ND	ND
Toxaphene	2000	ND	ND
Aroclor-1016	2000	ND	ND
Aroclor-1221	2000	ND	ND
Aroclor-1232	2000	ND	ND
Aroclor-1242	2000	ND	ND
Aroclor-1248	2000	ND	ND
Aroclor-1254	2000	ND	ND
Aroclor-1260	2000	ND	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Soil

Date Received: August 1, 1988
Date Reported: August 29, 1988

Work Order: 796
Job No. : OR001

FOR: ES:Oakridge/Duluth ANGB
Address:710 S. Illinois Ave. Suite F-103
Oakridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88081592	88081593
Sample No.:	DANG2 BH2, SS-6, 10-12'	DANG2 BH2, SS-9, 16-18'
Date Sampled:	7-30-88	7-30-88
Time Sampled:	15:00	15:50
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-20-88	8-24-88
Percent Moisture:	12	8

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
2-Chlorophenol	330	ND	ND
2-Nitrophenol	330	ND	ND
Phenol	330	ND	ND
2,4-Dimethylphenol	330	ND	ND
2,4-Dichlorophenol	330	ND	ND
2,4,6-Trichlorophenol	330	ND	ND
4-Chloro-3-methylphenol	660	ND	ND
2,4-Dinitrophenol	1600	ND	ND
2,6-Dichlorophenol	--*	ND	ND
2-Methyl-4,6-Dinitrophenol	1600	ND	ND
Pentachlorophenol	1600	ND	ND
4-Nitrophenol	1600	ND	ND
Benzoic Acid	1600	ND	ND
2-Methylphenol	330	ND	ND
3- & 4-Methylphenol	330	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
2,4,5-Trichlorophenol	330	ND	ND

Laura Kuck
Analyst

Laboratory Supervisor

*EPA has not yet determined detection limits for these compounds.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

796

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	SOILS ANALYSES REQUIRED	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.			ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkley, CA. ~~97410~~ 94710

SAMPLER(S): (Signature) Peter E Rinnerman

Kimberly J. Dain

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	SW8080	SW8270	EPA 418.1	SW6010, 7060	SW7131, 7421, 7471	REMARKS
7/30/88	0939	DANG 2 BH1, SS-6, 10-12'	1	X						→ 001533
7/30/88	0939	DANG 2 BH1, SS-6, 10-12'	1		X	X	X	X	X	
	1337	DANG 2 BH2, SS1, 0-2'	1	X						→ 001534
	1337	DANG 2 BH2, SS1, 0-2'	1		X	X	X	X	X	
	1423	DANG 2 BH2, SS 4, 6-8'	1	X						→ 001535
	1423	DANG 2 BH2, SS 4, 6-8'	1		X	X	X	X	X	
	1500	DANG 2 BH2, SS 6, 10-12'	1	X						→ 001536
	1500	DANG 2 BH2, SS 6, 10-12'	1		X	X	X	X	X	
	1550	DANG 2 BH2, SS 8, 14-16'	1	X						→ 001537
	1550	Dang 2 BH2, SS 8, 14-16'	1		X	X	X	X	X	Bottle shows 18-20'

401

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Kimberly J. Dain	7-30-88 1630				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Kathe C. Kidd	8/1/88 1300	Box cold + intact — See memo above

Original Accompanies Shipment, Copy to Coordinator Field Files

FEDERAL EXPRESS

AIRBILL

USE THIS AIRBILL FOR D... USE THE INTERNATIONA... QUESTIONS? CALL 800-... IC SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII. ...RBILL FOR SHIPMENTS TO PUERTO RICO. IS TOLL FREE.

PACKAGE TRACKING NUMBER [illegible]

8109M [illegible]

Sender's Federal Express Account Number: 0300-0641 | Date: [illegible]

SENDER'S COPY

SENDER'S COPY

1 From (Your Name) Please Print: [illegible]
Your Phone Number (Very Important): [illegible]
Company: ENGINEERING SCIENCE
Department/Floor No.:
Street Address: 57 EXECUTIVE PARK S STE 590
City: ATLANTA State: [illegible] ZIP Required: 0329

2 To (Recipient's Name) Please Print: [illegible]
Recipient's Phone Number (Very Important): [illegible]
Company: [illegible]
Department/Floor No.:
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. # Zip Codes.): [illegible]
City: [illegible] State: [illegible] ZIP Required: 94710

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.)

PAYMENT ☐ Bill Sender ☐ Bill Recipient's FedEx Acct No. ☐ Bill 3rd Party FedEx Acct. No. ☐ Bill Credit Card ☒ Cash

4 IF HOLD FOR PICK-UP, Print FEDEX Address Here
Street Address:
City: State: ZIP Required:

4 SERVICES	DELIVERY AND SPECIAL HANDLING	PACKAGES	WEIGHT	YOUR DECLARED VALUE (See right)	OTHER SIZE
1 ☒ PRIORITY 1 Overnight Delivery	1 ☐ HOLD FOR PICK-UP. (If in Box 4)	1	LBS		
2 ☐ COURIER-PAK OVERNIGHT ENVELOPE*	2 ☐ DELIVER WEEKDAY		LBS		
3 ☐ OVERNIGHT BOX	3 DELIVER SATURDAY (Extra charge) ☐		LBS		
4 ☐ OVERNIGHT TUBE	4 ☐ DANGEROUS GOODS (Extra charge)		LBS		
5 ☐ STANDARD AIR Delivery not later than second business day	5 ☐ CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charge) (Release Signature Not Applicable)	Total 1	Total 2	Total	
6 ☐ OVERNIGHT LETTER*	6 ☐ DRY ICE ____ Lbs.				
7 ☐	7 ☐ OTHER SPECIAL SERVICE ____				
8 ☐	8 ☐				
9 ☐	9 ☐ SATURDAY PICK-UP (Extra charge)				
10 ☐	10 ☐				
	11 ☐				
	12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)				

*Declared Value Limit $100.

Received At: 1 ☐ Regular Stop 2 ☐ On-Call Stop 3 ☐ Drop Box 4 ☐ B.S.C. 5 ☐ Station

FEDEX Corp. Employee No.: [illegible]

Date/Time for FEDEX Use: [illegible]

SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY

Use of this airbill constitutes your agreement to the service conditions in our current Service Guide which is available upon request. See back of sender's copy of this airbill for further information.

We will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay or non-delivery unless you specify a higher amount in the space to the left, pay 40¢ per additional $100 specified and document your actual loss in the event of a claim. Maximum amount limitations found in the current Federal Express Service Guide apply. Your rights to recover from Federal Express for loss of the intrinsic value of the package, as well as for loss of sales, income, interest, profit, attorneys fees, costs and any other form of damage whether direct, incidental, consequential or special is limited to the greater of $100 or the declared value specified to the left. In no event shall your recovery exceed your actual loss.

In the event of untimely delivery, Federal Express will at your request and with some limitations, refund all transportation charges paid. See Service Guide for further information.

5 Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.

Release Signature: _____

Federal Express Use	
Base Charges	
Declared Value Charge	
Other 1	
Other 2	
Total Charges	

PART #111800
REVISION DATE 1/88
PRINTED IN U.S.A. NCREC

009

© 1988 F.E.C.

402

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88081589-88081593
WORK ORDER NO.: 796

These soil samples were received at the ES Berkeley Laboratory on 8-01-88. They were received cold and intact.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001		
		Sample Matrix:	Soil
Client:	ES Oak Ridge	Conc. Unit:	ug/KG
Attn:	Bill Hayden	Work Order No:	796
Address:	710 S. Illinois Avenue	Lab Sample ID:	Blank
	Suite F-103	Lab File ID:	7E5455
	Oak Ridge, Tn. 37830	Date Received:	NA
		Date Extracted:	8-02-88
		Date Analyzed:	8-19-88
Project:	Duluth ANGB	Date Reported:	9-13-88
		Dilution Factor:	NA
# TICs Found:	9	% Moisture:	NA

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
67-66-3	Chloroform	2.58	570	60
--	Unknown	2.79	3300	—
71-43-2	Benzene	3.08	2400	94
--	Unknown	3.95	270	—
--	Unknown	4.19	1500	—
--	Unknown	4.56	370	—
--	Unknown	4.62	530	—
--	C4 Aliphatic	5.07	570	—
--	Unknown	6.84	530	—

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001		
		Sample Matrix:	Soil
Client:	ES Oak Ridge	Conc. Unit:	ug/KG
Attn:	Bill Hayden	Work Order No:	796
Address:	710 S. Illinois Avenue	Lab Sample ID:	Blank
	Suite F-103	Lab File ID:	E5500
	Oak Ridge, Tn. 37830	Date Received:	NA
		Date Extracted:	8-23-88
		Date Analyzed:	8-24-88
Project:	Duluth ANGB	Date Reported:	9-13-88
		Dilution Factor:	NA
# TICs Found:	15	% Moisture:	NA

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
--	Chloroform	2.67	1800	58
--	Unknown	2.88	5000	—
--	Unknown	2.90	1500	—
--	Benzene	3.16	330	93
--	Unknown	3.29	530	—
--	Unknown	4.05	530	--
--	Unknown	4.16	1300	—
--	Unknown	5.15	1300	—
--	Unknown	6.78	570	—
--	Unknown	7.46	400	—
--	Unknown	8.62	570	—
--	Unknown	24.58	700	—
--	Unknown	27.21	530	—
--	Unknown	29.31	2300	—
--	Unknown	29.53	570	—

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001		
		Sample Matrix:	Soil
Client:	ES Oak Ridge	Conc. Unit:	ug/KG
Attn:	Bill Hayden	Work Order No:	796
Address:	710 S. Illinois Avenue	Lab Sample ID:	88081589
	Suite F-103	Lab File ID:	E5463
	Oak Ridge, Tn. 37830	Date Received:	8-01-88
		Date Extracted:	8-02-88
		Date Analyzed:	8-20-88
Project:	Duluth ANGB	Date Reported:	9-13-88
		Dilution Factor:	None
# TICs Found:	15	% Moisture:	14

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
67-66-3	Chloroform	2.53	1500	30
--	Unknown	2.61	4300	—
71-43-2	Benzene	2.93	850	94
--	Unknown	6.85	1000	—
--	Unknown	11.00	390	—
--	Unknown	11.38	350	—
--	Unknown	11.98	1000	—
--	Unknown	12.16	660	—
--	Unknown	13.79	1900	—
--	Unsaturated Aliphatic	15.14	300	—
--	Unknown	15.97	400	—
--	Unsaturated Aliphatic	26.06	540	—
--	Unknown	29.55	1400	—
--	Unknown	29.78	500	—
--	Phthalate acid ester	31.38	900	--

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001		
		Sample Matrix:	Soil
Client:	ES Oak Ridge	Conc. Unit:	ug/KG
Attn:	Bill Hayden	Work Order No:	796
Address:	710 S. Illinois Avenue	Lab Sample ID:	88081590
	Suite F-103	Lab File ID:	E5505
	Oak Ridge, Tn. 37830	Date Received:	8-01-88
		Date Extracted:	8-02-88
		Date Analyzed:	8-25-88
Project:	Duluth ANGB	Date Reported:	9-13-88
		Dilution Factor:	None
# TICs Found:	20	% Moisture:	9

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
--	Unknown	5.38	5100	—
--	Branched hydrocarbon	6.49	4400	—
--	Branched hydrocarbon	7.16	3600	—
--	Unknown	7.33	3600	—
--	Unknown	7.76	6200	—
--	Unsaturated C10 hydrocarbon	8.25	4400	—
--	Alkyl Substituted Aromatic C9 H12	8.47	4800	—
--	Saturated hydrocarbon	8.64	16000	—
--	Unknown	9.08	8800	—
--	Unsaturated hydrocarbon	9.28	3300	—
--	Unknown	9.77	4400	—
--	Saturated hydrocarbon	10.72	10000	—
--	Unknown	11.00	1900	—
--	Unknown	11.73	2700	—
--	Saturated hydrocarbon	12.65	5900	—
--	Saturated hydrocarbon	12.90	2200	—
--	Saturated hydrocarbon	16.30	3200	—
--	Saturated hydrocarbon	17.97	2900	—
--	Saturated hydrocarbon	19.54	2700	—
--	Saturated hydrocarbon	21.04	4800	—

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001		
		Sample Matrix:	Soil
Client:	ES Oak Ridge	Conc. Unit:	ug/KG
Attn:	Bill Hayden	Work Order No:	796
Adcress:	710 S. Illinois Avenue	Lab Sample ID:	88081591
	Suite F-103	Lab File ID:	E5502
	Oak Ridge, Tn. 37830	Date Received:	8-01-88
		Date Extracted:	8-23-88
		Date Analyzed:	8-24-88
Project:	Duluth ANGB	Date Reported:	9-13-88
		Dilution Factor:	None
# TICs Found:	17	% Moisture:	9

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
--	Unknown	2.86	6200	—
--	Unknown	2.88	1500	—
--	Unknown	4.15	1500	—
--	Unknown	5.11	1500	—
--	C10 Saturated Aliphatic	8.48	3100	—
--	C10 Saturated Aliphatic	8.94	1400	—
--	Saturated Aliphatic	10.54	5500	—
--	C10 Aromatic	11.61	1100	—
--	Unknown	12.08	1100	—
--	Saturated Aliphatic	12.52	2900	—
--	C13 Saturated Aliphatic	12.77	1100	—
--	Unknown	14.40	2200	—
--	Unknown	16.04	1200	—
--	Carboxylic acid	24.63	2100	—
--	Unknown	29.40	9200	—
--	Carboxylic acid	29.67	2300	—
--	Unknown	30.84	1500	—

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 16

Sample Matrix: Soil
Conc. Unit: ug/KG
Work Order No: 796
Lab Sample ID: 88U81592
Lab File ID: E5464
Date Received: 8-01-88
Date Extracted: 8-02-88
Date Analyzed: 8-20-88
Date Reported: 9-13-88
Dilution Factor: None
% Moisture: 12

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
--	Chloroform	2.55	1600	66
--	Unknown	2.62	5300	--
--	Unknown	2.86	980	--
--	Benzene	2.94	1100	94
--	Unknown	3.93	910	--
--	Unknown	6.85	870	--
--	Unknown	11.43	570	--
--	Unknown	12.08	1900	--
--	Unknown	12.16	300	--
--	Unknown	15.03	490	--
--	Unknown	15.19	380	--
--	Unknown	15.97	420	--
--	Unknown	26.02	870	--
--	Carboxylic acid	29.77	680	--
--	Unknown	31.23	680	--
--	Unknown Phthalate	31.37	680	--

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001		
		Sample Matrix:	Soil
Client:	ES Oak Ridge	Conc. Unit:	ug/KG
Attn:	Bill Hayden	Work Order No:	796
Address:	710 S. Illinois Avenue	Lab Sample ID:	88081593
	Suite F-103	Lab File ID:	E5501
	Oak Ridge, Tn. 37830	Date Received:	8-01-88
		Date Extracted:	8-23-88
		Date Analyzed:	8-24-88
Project:	Duluth ANGB	Date Reported:	9-13-88
		Dilution Factor:	None
# TICs Found:	12	% Moisture:	8

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
--	Unknown	2.75	1300	—
67-66-3	Chloroform	2.77	2000	83
71-43-2	Benzene	3.07	250	92
78-93-3	2-Butanone	3.99	360	26
--	Unknown	5.03	500	—
--	Unknown	6.75	180	—
--	Unknown	8.62	360	—
--	Hexadecanoic acid	24.59	470	93
--	Unknown	27.21	250	—
--	Unknown	29.36	800	—
--	Unknown	29.53	360	—
--	Unknown Phthalate	31.23	220	—

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88071552-88071555,
88081589-88081593

QC Report No: ICP-S-0020-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 7-30-88
Date Reported: 8-25-88
Dilution Factor: NA
%Moisture: 12

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	Duplicate RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Barium	88071552	88071552	8-09-88	8-08-88	6010	<0.5	60.3	65.0	7	227	60.3	283	98	

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
Samples No.: 88071552-88071555
Samples No.: 88081589-88081593
QC REPORT NO.: AAF-S-0014-88
QC REPORT NO.: CVM-S-0007-88

The MDL for the following analyte(s) is as provided by the subcontracting laboratory: Cadmium, Mercury.

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88071552-88071555
88081589-88081593

QC Report No: AAF-S-0014-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 7-30-88
Date Reported: 8-26-88
Dilution Factor: NA
%Moisture: 12

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate Spike Recovery C1	C2	RPD	SA	SR	SSR	PR	Notes
Arsenic	88071552	88071552	8-15-88	8-08-88	7060	<0.3	1.4	1.8	25*	4.54	1.4	5.3	86	
Cadmium	88071552	88071552	8-15-88	8-08-88	7131	<0.04	0.158B	0.124B	24*	0.340	0.158B	0.417	76	A
Lead	88071552	88071552	8-15-88	8-08-88	7421	0.2	8.03	9.22	14	2.27	8.03	10.8	122	

413

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* See Legend attached.
A See Case Narrative attached.
B See Legend attached.

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two
NA = Not Applicable
NC = Not Calculated
ND = Not Detected
SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88071552-88071555,
88081589-88081593

QC Report No: CVM-S-0007-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 7-30-88
Date Reported: 8-25-88
Dilution Factor: NA
%Moisture: 12

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates / Spike	Sample Nos.	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	Duplicate RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Mercury	88071552	88071552	8-12-88	8-08-88	7471	<0.2	<0.2	<0.2	NC	0.568	<0.2	0.484	85	A

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
A See case narrative attached.

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88081589-88081592

QC Report No: TPH-S-0043-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-01-88
Date Prepared: 8-18-88
Date Analyzed: 8-19-88
Date Reported: 9-12-88
Dilution Factor: 6.6
%Moisture: 16.2

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88081559	418.1	<100	120	1200	790	56	630	42*	23	*
Blank	418.1	<100	<100	1000	720	72	660	66	9	

415

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* The quality control sample is from a different Martin Marietta project. Percent recovery for spike duplicate does not meet the ES QC limits. The method blank spike analysis shows the laboratory to be in control.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88081593, 88081661-88081664

QC Report No: TPH-S-0037-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-05-88
Date Prepared: 8-19-88
Date Analyzed: 8-19-88
Date Reported: 9-12-88
Dilution Factor: 6.5
%Moisture: 18

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88081665	418.1	<100	<100	1200	700	58	730	61	4	*

416

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* The quality control sample is from a different Martin Marietta project.
Percent recovery and RPD are within ES Laboratory QC limits.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: OCP-S-0029-88
QC REPORT NO.: OCP-S-0029-88B

Although the matrix spikes met EPA QC guidelines, analysis of blank spikes showed high recoveries for aldrin and DDT. The data associated with the analysis of this batch of samples was re-examined closely. No analytical problems were found. Since there were no detectable pesticides found in this batch of samples, the quality of the data should not be affected.

Endrin aldehyde and Kepone were not recoverable because they were removed by the alumina column clean-up used on these samples.

Heptachlor epoxide was accidently substituted for heptachlor in the matrix spiking solution.

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
SOIL

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s).:
88081552-88081558
88081589-88081593

QC Report No.: OCP-S-0029-88
QC Sample No.: 88081592
Level (Low/Med): Low
Date Reported: 11-02-88

Laboratory Supervisor Approval:

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/Kg)	MS Conc. In Extract (ug/Kg)	MS % Rec. #	QC Limits Rec.
Lindane	2270	ND	67.6	89	46-127
Heptachlor epoxide	2270	ND	63.9	85	35-130
Aldrin	2270	ND	57.4	76	34-132
Dieldrin	5670	ND	167	114	31-134
Endrin	5670	ND	180	95	42-139
4,4'-DDT	5670	ND	161	85	23-134

	MSD Conc. In Extract (ug/Kg)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	73.9	98	89	9	50	46-127
Heptachlor epoxide	67.9	90	85	6	31	35-130
Aldrin	70.5	93	76	21	43	34-132
Dieldrin	178	94	114	7	38	31-134
Endrin	193	102	95	7	45	42-139
4,4'-DDT	141	74	85	14	50	23-134

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 6 outside limits

Spike Recovery: 0 out of 12 outside limits

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
SOIL

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s).:
88081552-88081558
88081589-88081593

QC Report No.: OCP-S-0029-88B
QC Sample No.: Blank
Level (Low/Med): Low
Date Reported: 11-02-88

Laboratory Supervisor Approval:

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/Kg)	MS Conc. In Extract (ug/Kg)	MS % Rec. #	QC Limits Rec.
Lindane	2000	ND	79.1	119	46-127
Heptachlor epoxide	2000	ND	79.2	119	35-130
Aldrin	2000	ND	86.1	129	34-132
Dieldrin	5000	ND	210	126	31-134
Endrin	5000	ND	234	140*	42-139
4,4'-DDT	5000	ND	254	152*	23-134

	MSD Conc. In Extract (ug/Kg)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	78.1	117	119	1	50	46-127
Heptachlor epoxide	79.1	119	119	<1	31	35-130
Aldrin	88.0	132	129	2	43	34-132
Dieldrin	211	127	126	<1	38	31-134
Endrin	237	142*	140*	1	45	42-139
4,4'-DDT	256	154*	152*	1	50	23-134

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 6 outside limits. See Case Narrative attached.

Spike Recovery: 4 out of 12 outside limits

PESTICIDE METHOD BLANK SUMMARY

Job No.:	OR001	Lab Name:	Engineering Science
		Lab Sample No.:	Blank
Client:	ES Oak Ridge		
Attn:	Bill Hayden	Matrix:	Soil
Address:	710 S. Illinois Avenue	Level (low/med):	Low
	Suite F-103	Extraction:	
	Oak Ridge, Tn. 37830	(SepF/Cont/Sonc):	Sonc
		Date Reported:	11-02-88
Project:	Duluth ANGB		
Date Extracted:	8-04-88		
Date Analyzed (1):	9-09-88	Date Analyzed (2):	
Time Analyzed (1):	06:26	Time Analyzed (2):	
Instrument ID (1):	5880	Instrument ID (2):	
GC Column ID (1):	Mixed	GC Column ID (2):	

This Method Blank applies to the following samples, MS and MSD.

EPA Sample No.	Lab Sample ID (1)	Date Analyzed 1	Lab Sample ID (2)	Date Analyzed 2
-	88071552	9-09-88		
-	88071553	9-09-88		
-	88071554	9-09-88		
-	88071555	9-09-88		
-	88071589	9-09-88		
-	88071590	9-09-88		
-	88071591	9-09-88		
-	88071592	9-09-88		
-	88071593	9-09-88		

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLES NO.: 88081591 & 88081593

When these samples were extracted and analyzed by EPA Method 8270, two or more surrogate spike recoveries were outside of EPA QC limits. They were reextracted and analyzed after the sample holding time had expired. The second extraction showed good surrogate recoveries and no change in results for target compounds. The first extraction date for these samples was August 2, 1988, as shown on the enclosed report. The second extraction date was August 23, 1988.

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 8270

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88081589-88081590, 8808071552-88081555,
88081591-88081593

QC Report No: BNA-S-0023-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 7-28-88
Date Prepared: 7-30-88
Date Analyzed: 8-03-88
Date Reported: 8-17-88
Dilution Factor: NA
%Moisture: 14

Laboratory Supervisor Approval:

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
	1,2,4-Trichlorobenzene	3970	ND	2630	66	2490	63	5	23	38-107
B/N	Acenaphthene	3970	ND	2390	60	2310	58	3	19	31-137
Laboratory	2,4-Dinitrotoluene	3970	ND	2560	64	2430	61	5	47	28-89
Sample #	Pyrene	3970	ND	2260	57	2160	54	4	36	35-142
88071506	N-Nitroso-Di-n-Propylamine	3970	ND	2670	67	2450	62	8	38	41-126
	1,4-Dichlorobenzene	3970	ND	2230	56	2140	54	4	27	28-104
	Pentachlorophenol	7940	ND	7860	99	7420	93	6	47	17-109
ACID	Phenol	7940	ND	4520	57	4290	54	5	35	26-90
Laboratory	2-Chlorophenol	7940	ND	4320	54	4080	51	6	50	25-102
Sample #	4-Chloro-3-Methylphenol	7940	ND	5010	63	4810	60	4	33	26-103
88071506	4-Nitrophenol	7940	ND	6150	77	6000	76	2	50	11-114

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* The quality control sample is from a different Martin Marietta project.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Sample Matrix: Soil
Conc. Unit: ug/KG
Date Reported: 8-29-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E5455	8-19-88	BNA	1	84-74-2	Di-n-butyl phthalate	1200	330	88081589-88081593
E5500	8-24-88	BNA	1	-	None found	--	--	88081591, 88081593 Re-extraction

423

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name:	Engineering Science	Job No.:	OR001.02
		Project:	Duluth ANGB
Client:	ES Oak Ridge	Level-(low/med):	Low
Attn:	Bill Hayden	Date Analyzed:	8-19-88
Address:	710 S. Illinois Avenue	Date Reported:	1-30-89
	Suite F-103	Instrument ID:	1
	Oak Ridge, Tn. 37830	Lab File ID:	

	IS1(DCB) Area #	RT	IS2(NPT) Area #	RT	IS3(ANT) Area #	RT
12 Hour Std.	36542	8.78	130270	12.35	70629	17.82
Upper Limit	73084		260540		141258	
Lower Limit	18271		65135		35314	
Sample No.						
38081589 RA	65161	8.81	236369	12.38	125037	17.85
38081592 RA	61444	8.80	225940	12.36	121000	17.84

IS1(DCB) = 1,4-Dichlorobenzene-d4
IS2(NPT) = Naphthalene-d8
IS3(ANT) = Acenaphthene-d8

Upper Limit = + 100% of internal standard area
Lower Limit = - 50% of internal standard area

Column used to flag internal standard area values with an asterisk

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name:	Engineering Science	Job No.:	OR001.02
		Project:	Duluth ANGB
Client:	ES Oak Ridge	Level-(low/med):	Low
Attn:	Bill Hayden	Date Analyzed:	8-19-88
Address:	710 S. Illinois Avenue	Date Reported:	1-30-89
	Suite F-103	Instrument ID:	1
	Oak Ridge, Tn. 37830	Lab File ID:	E5451

	IS1(DCB) Area #	RT	IS2(NPT) Area #	RT	IS3(ANT) Area #	RT
12 Hour Std.	41849	8.77	144896	12.35	74607	17.81
Upper Limit	83698		289792		149214	
Lower Limit	20924		72448		37304	
Sample No.						
88071506	62205	8.79	228408	12.33	121142	17.80
88071506 MS	65176	8.80	239396	12.34	122740	17.82
88071506 MSD	63084	8.82	228292	12.36	122246	17.83
Blank	63988	8.79	253886	12.34	135769	17.81
88071555	25556	8.92	112481	12.44	91393	17.91
88081589	65777	8.81	247711	12.35	135279	17.83
88081591	74642	8.80	258920	12.36	156245*	17.84
88081592	65845	8.80	250712	12.35	133225	17.83
88081593	62572	8.81	244033	12.34	129890	17.83

IS1(DCB) = 1,4-Dichlorobenzene-d4
IS2(NPT) = Naphthalene-d8
IS3(ANT) = Acenaphthene-d8

Upper Limit = + 100% of internal standard area
Lower Limit = - 50% of internal standard area

Column used to flag internal standard area values with an asterisk

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science
Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Job No.: OR001.02
Project: Duluth ANGB
Level-(low/med): Low
Date Analyzed: 8-19-88
Date Reported: 1-30-89
Instrument ID: 1
Lab File ID: E5451

	IS4(PHN) Area #	RT	IS5(CRY) Area #	RT	IS6(PRY) Area #	RT
12 Hour Std.	118658	22.42	96289	30.82	67277	36.34
Upper Limit	237316		192578		134554	
Lower Limit	59329		48144		33638	
Sample No.						
38071506	190638	22.43	121195	30.81	99836	36.34
38071506 MS	190758	22.45	117846	30.82	98692	36.35
38071506 MSD	195119	22.46	112065	30.83	71086	36.37
Blank	214279	22.44	114874	30.83	130290	36.38
38071555	177300	22.50	135243	30.91	40464	36.49
38081589	222563	22.45	166575	30.84	139811*	36.39
38081591	255310*	22.46	192146	30.86	125687	36.40
38081592	166141	22.44	173263	30.85	101128	36.37
38081593	212902	22.45	158859	30.84	136838*	36.39

IS4(PHN) = Phenanthrene-d10
IS5(CRY) = Chrysene-d12
IS6(PRY) = Perylene-d12

Upper Limit = + 100% of internal standard area
Lower Limit = - 50% of internal standard area

Column used to flag internal standard area values with an asterisk

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science
Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Job No.: OR001.02
Project: Duluth ANGB
Level-(low/med): Low
Date Analyzed: 8-20-88
Date Reported: 1-30-89
Instrument ID: 1
Lab File ID:

	IS4(PHN) Area #	RT	IS5(CRY) Area #	RT	IS6(PRY) Area #	RT
12 Hour Std.	118968	22.44	87362	30.85	53177	36.35
Upper Limit	237938		174724		106354	
Lower Limit	59484		43681		26588	
Sample No.						
88081589 RA	209385	22.46	150839	30.86	98517	36.40
88081593 RA	200403	22.46	142456	30.85	93594	36.38

IS4(PHN) = Phenanthrene-d10
IS5(CRY) = Chrysene-d12
IS6(PRY) = Perylene-d12

Upper Limit = + 100% of internal standard area
Lower Limit = - 50% of internal standard area

Column used to flag internal standard area values with an asterisk

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name:	Engineering Science	Job No.:	OR001.02
		Project:	Duluth ANGB
Client:	ES Oak Ridge	Level-(low/med):	Low
Attn:	Bill Hayden	Date Analyzed:	8-21/22-88
Address:	710 S. Illinois Avenue	Date Reported:	01-27-89
	Suite F-103	Instrument ID:	1
	Oak Ridge, Tn. 37830	Lab File ID:	

	IS1(DCB) Area #	RT	IS2(NPT) Area #	RT	IS3(ANT) Area #	RT
12 Hour Std.	35805	8.75	125745	12.32	70104	17.78
Upper Limit	71610		251490		1402^8	
Lower Limit	17902		62872		35052	
Sample No.						
88081593 RA	75664*	8.79	278938*	12.34	145428*	17.81
88081591 RA	68285	8.76	231157	12.33	126849	17.80
88071552	27162	8.97	132295	12.44	115194	17.91
88081553	18554	9.13	112435	12.55	101520	18.00
88071590	Swamped	-	-	-	-	
88071554	Swamped	-	-	-	-	

IS1(DCB) = 1,4-Dichlorobenzene-d4
IS2(NPT) = Naphthalene-d8
IS3(ANT) = Acenaphthene-d8

Upper Limit = + 100% of internal standard area
Lower Limit = - 50% of internal standard area

Column used to flag internal standard area values with an asterisk

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science
Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Job No.: OR001.02
Project: Duluth ANGB
Level-(low/med): Low
Date Analyzed: 8-21/22-88
Date Reported: 1-30-89
Instrument ID: 1
Lab File ID:

	IS4(PHN) Area #	RT	IS5(CRY) Area #	RT	IS6(PRY) Area #	RT
12 Hour Std.	117819	22.40	98366	30.81	66178	36.29
Upper Limit	235638		196732		132356	
Lower Limit	58909		49183		33089	
Sample No.						
88081593 RA	246829*	22.43	200033*	30.83	145769*	36.34
88081591 RA	217949	22.42	193115	30.80	144081*	36.32
88071552	224711	22.50	88289	30.97	122370	36.55
88071553	198983	22.57	52669	31.05	42099	36.53
88081590	Swamped	-	-	-	-	-
88071554	Swamped	-	-	-	-	-

IS4(PHN) = Phenanthrene-d10
IS5(CRY) = Chrysene-d12
IS6(PRY) = Perylene-d12

Upper Limit = + 100% of internal standard area
Lower Limit = - 50% of internal standard area

Column used to flag internal standard area values with an asterisk

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name:	Engineering Science	Job No.:	OR001.02
		Project:	Duluth ANGB
Client:	ES Oak Ridge	Level-(low/med):	Low
Attn:	Bill Hayden	Date Analyzed:	08-24-88
Address:	710 S. Illinois Avenue	Date Reported:	01-27-89
	Suite F-103	Instrument ID:	1
	Oak Ridge, Tn. 37830	Lab File ID:	

	IS1(DCB) Area #	RT	IS2(NPT) Area #	RT	IS3(ANT) Area #	RT
12 Hour Std.	58230	8.70	207835	12.27	105650	17.73
Upper Limit	116460		415670		211300	
Lower Limit	29115		103918		52825	
Sample No.						
Blank	57501	8.72	212671	12.23	122163	17.70
38081593 RE	59050	8.71	210309	12.24	114831	17.70
38081591 RE	62879	8.72	216940	12.25	121261	17.73
38071552(10:1)	68490	8.76	242632	12.29	128997	17.75
38071554(10:1)	64004	8.75	198207	12.32	108176	17.77
38081590(10:1)	67225	8.79	218800	12.34	117261	17.80

IS1(DCB) = 1,4-Dichlorobenzene-d4
IS2(NPT) = Naphthalene-d8
IS3(ANT) = Acenaphthene-d8

Upper Limit = + 100% of internal standard area
Lower Limit = - 50% of internal standard area

Column used to flag internal standard area values with an ascerisk

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name:	Engineering Science	Job No.:	OR001.02
		Project:	Duluth ANGB
Client:	ES Oak Ridge	Level-(low/med):	Low
Attn:	Bill Hayden	Date Analyzed:	8-24-88
Address:	710 S. Illinois Avenue	Date Reported:	1-30-89
	Suite F-103	Instrument ID:	1
	Oak Ridge, Tn. 37830	Lab File ID:	

	IS4(PHN) Area #	RT	IS5(CRY) Area #	RT	IS6(PRY) Area #	RT
12 Hour Std.	176974	22.33	131790	30.74	78278	36.19
Upper Limit	353948		263580		156556	
Lower Limit	88487		65895		39139	
Sample No.						
Blank	171758	22.33	105006	30.71	45655	36.11
88081593 RE	186076	22.32	102499	30.71	37392*	36.10
88081591 RE	193924	22.33	87493	30.71	28533*	36.11
88071552(10:1)	213456	22.35	119235	30.74	45771	36.16
88071554(10:1)	173746	22.36	54595*	30.71	18200*	36.12
88081590(10:1)	194586	22.41	71024	30.75	25959*	36.17

IS4(PHN) = Phenanthrene-d10
IS5(CRY) = Chrysene-d12
IS6(PRY) = Perylene-d12

Upper Limit = + 100% of internal standard area
Lower Limit = - 50% of internal standard area

Column used to flag internal standard area values with an asterisk

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 03-54
Lab File ID: ES500
Matrix: Soil
Level (low/med):
Date Analyzed: 8-24-88
Time Analyzed: 20:16
Instrument ID:
Date Reported:

Project: Duluth

This Method Blank applies to the following samples, MS and MSD.

Sample Number	Lab Sample ID	Lab File ID	Date of Analysis
DANG-2-BH2 SS-4 6-8	88081591 Rex	ES502	8-24-88
DANG-2 BH2 -SS-9 16-18	88081593 Rex	Not Needed	—

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88081589-88081592

QC Report No: TPH-S-0043-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-01-88
Date Prepared: 8-18-88
Date Analyzed: 8-19-88
Date Reported: 9-12-88
Dilution Factor: 6.6
%Moisture: 16.2

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88081559	418.1	<100	120	1200	790	56	630	42*	23	*
Blank	418.1	<100	<100	1000	720	72	660	66	9	

433

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* The quality control sample is from a different Martin Marietta project. Percent recovery for spike duplicate does not meet the ES QC limits. The method blank spike analysis shows the laboratory to be in control.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 8/19/88 10:42

Lab ID >D0819::D1 Data Release Authorized By: Lana Kuck

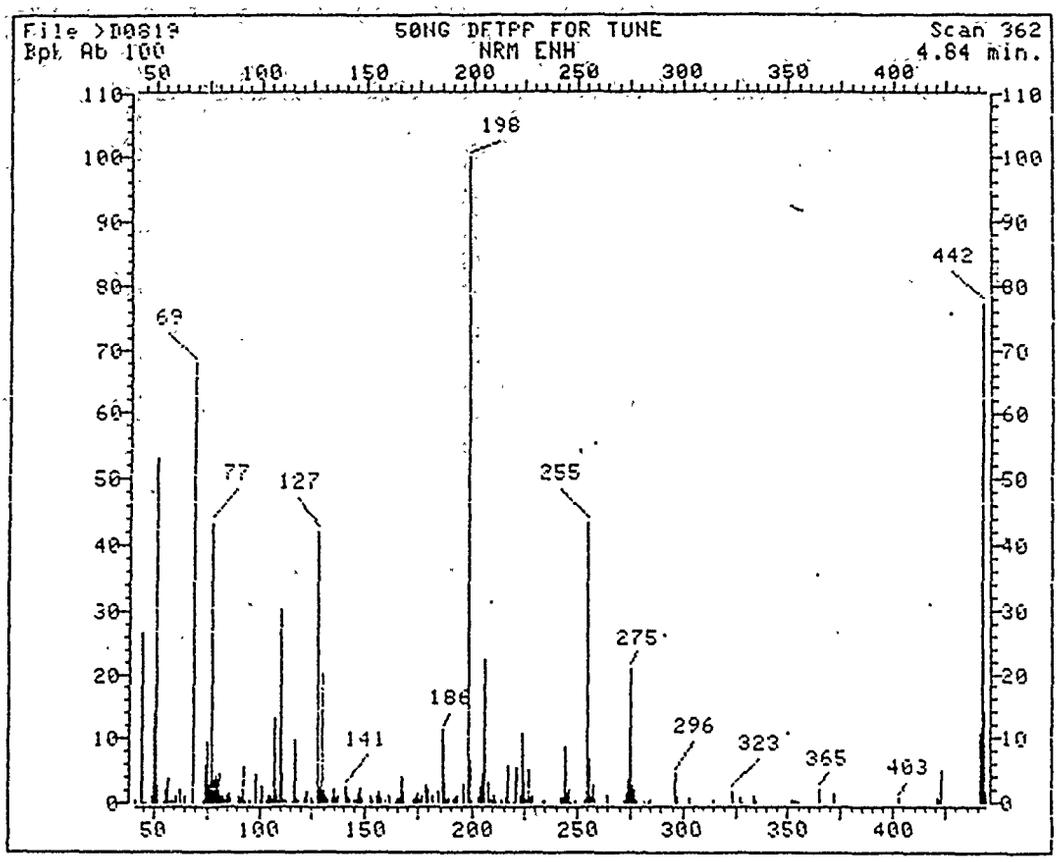
m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	53.03 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	67.69	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	42.05 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	6.40 OK	
275	10.0 - 30.0% of mass 198	20.94 OK	
365	greater than 1.00% of mass 198	2.09 OK	
441	present, but less than mass 443	10.77 OK	
442	greater than 40.0% of mass 198	77.37 OK	
443	17.0 - 23.0% of mass 442	14.25 OK	(18.42) #2

3/18 Spoint

THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

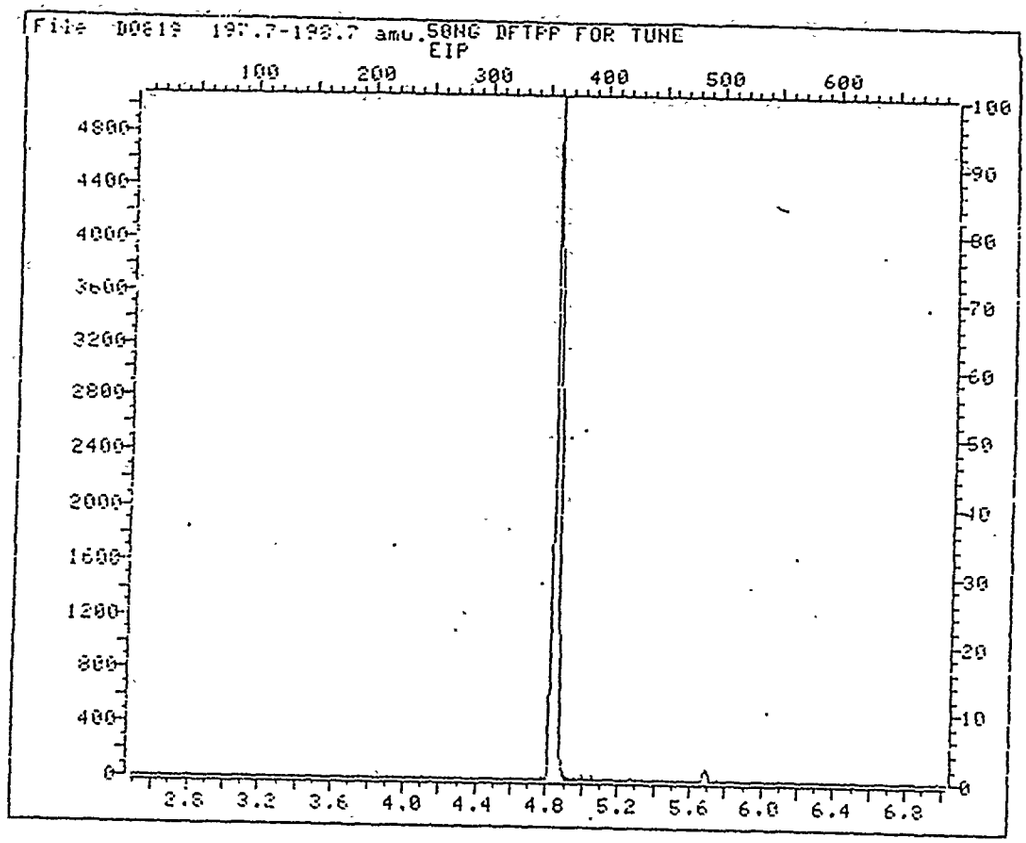
SAMPLE ID	LAB_ID	DATE_OF_ANALYSIS	TIME_OF_ANALYSIS	
50NG DFTPP FOR TUNI	>D0819	8/19/88	10:42	
25 mg/L SRM	>E5451	9/19/88	11:07	✓ good
8807150G	>E5452		12 09	✓ good
8807150G MS	>E5453		13 06	✓ good
8807150G MSD	>E5454		14 03	✓ good
8807 1552-55 1539-938K	>E5455		15:00	✓ good
8806315 89	>E5456		15.57	IS out - see RA E5463
8806315 93	>E5457		16:54	IS out - USE, RA BAD
8806315 92	>E5458		17:50	~~out~~ - see RA E5464
8806315 91	>E5459		15:46	~~good~~, IS out, see rex E5502
8806315 55	>E5460		19 43	✓ good



File: >D0819 Scan #: 362 Retn. time: 4.84

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.10	.478	93.95	.292	143.00	.357	200.15	.399	256.00	6.691
44.10	26.485	94.15	.143	145.20	.214	202.75	.564	257.20	.671
44.80	.128	96.05	.314	145.90	.285	203.85	2.325	258.10	2.889
45.10	.143	98.05	4.394	147.20	1.384	204.05	.706	259.00	.442
45.40	.121	98.95	3.032	148.10	2.226	205.05	4.458	265.00	1.177
46.60	.128	100.15	.314	149.20	.792	206.05	22.027	272.00	.207
49.00	1.091	100.95	2.261	150.40	.114	207.15	3.153	273.00	1.519
50.10	14.010	103.25	.471	152.20	.078	207.95	.870	274.10	3.745
51.10	53.028	103.45	.271	152.90	.913	208.15	.314	275.10	20.943
52.10	2.604	103.85	1.134	153.90	.392	209.15	.200	276.20	2.732
55.00	.200	104.95	1.141	155.00	.992	209.95	.506	277.10	1.933
56.00	1.890	106.05	.271	156.10	1.855	210.65	.949	278.10	.342
57.10	3.631	107.05	13.025	156.80	.128	211.05	.264	282.20	.093
57.90	.128	108.05	2.019	157.60	.585	211.25	.514	284.30	.121
58.60	.250	108.85	.121	159.50	.314	211.55	.185	284.90	.207
59.50	.093	110.05	30.195	161.20	.885	214.85	.207	296.10	4.572
61.00	1.020	111.05	4.522	163.80	.071	216.15	.571	297.00	1.120
63.10	2.176	111.85	.350	165.10	.842	217.05	5.778	303.05	.785
64.70	.207	112.75	.243	166.00	.621	218.45	.150	315.05	.449
65.20	1.113	115.75	.185	167.10	4.116	219.85	.136	323.05	1.869
69.00	67.694	117.05	9.651	168.10	1.876	221.15	5.514	326.95	.606
73.00	.471	117.95	.749	173.10	.449	222.85	1.120	328.25	.136
74.00	5.600	118.95	.292	174.10	.706	224.05	10.778	333.95	1.113
75.00	9.273	121.85	.856	175.00	1.541	225.15	3.067	335.15	.314
76.10	2.582	123.05	1.555	176.00	.250	226.05	.385	351.85	.378
77.10	43.441	124.95	.556	177.00	.963	227.15	5.150	352.15	.428

80.10	3.345	128.25	2.275	181.10	.984	234.05	.114	354.85	.086
81.00	4.423	129.05	20.322	184.10	.385	234.25	.221	365.10	2.090
81.90	1.027	130.05	2.033	184.90	1.676	242.25	.756	372.00	1.234
83.05	.906	130.95	1.020	186.20	11.306	242.45	.121	403.10	.692
83.65	.185	132.15	.499	187.10	2.996	243.25	.827	421.05	.556
83.95	.407	133.85	.635	188.10	.271	244.15	8.767	421.85	.392
85.05	.906	134.15	.399	189.00	.870	245.05	1.220	422.25	.414
85.85	1.298	135.05	2.047	191.00	.371	246.05	2.197	423.25	5.000
86.15	.414	136.15	.392	191.95	.806	247.10	.121	441.15	10.771
87.05	.699	136.95	.956	193.05	1.063	249.10	.335	442.15	77.366
91.15	.984	141.10	2.539	196.15	2.618	254.00	.321	443.25	14.252
92.15	.542	142.10	.992	197.95	100.000	255.10	43.434	444.25	1.698
52.95	5.578	142.80	.556	199.05	6.398				


File D0619 197.7-198.7 amu.SONG DFTPP FOR TUNE
EIP
100
200
300
400
500
600
4800
4400
4000
3600
3200
2800
2400
2000
1600
1200
800
400
0
100
90
80
70
60
50
40
30
20
10
0
2.8
3.2
3.6
4.0
4.4
4.8
5.2
5.6
6.0
6.4
6.8

Calibration Check Report

Title: ID 625 ACID AND BASE/NEUTRALS + EtPHENOL,DNSBP&2-NO2-4-MEPH
Calibrated: 880819 10:10

Check Standard Data File: >E5451
Injection Time: 880819 11:07

fits 8270 protocol for ID8270

Compound	$\overline{RF}$	RF	%Diff	Calib Meth	
N-Nitroso-Dimethylamine	.97447	.91078	6.54	Average	
2-Fluorophenol	1.13043	1.14732	1.49	Average	
bis(2-Chloroethyl)ether	1.34309	1.12263	16.41	Average	
Phenol	1.59648	1.49773	6.19	Average	
Phenol-d5	1.38909	1.34159	3.42	Average	
Aniline	1.37724	1.33509	3.06	Average	
2-Chlorophenol	1.23872	1.23629	.20	Average	
1,3-Dichlorobenzene	1.33894	1.37110	2.40	Average	
1,4-Dichlorobenzene	1.29251	1.36972	5.97	Average	
Benzyl Chloride	-	-	-	Average	
Benzyl Alcohol	.74390	.70417	5.34	Average	
1,2-Dichlorobenzene	1.23619	1.30133	5.27	Average	
2-Methylphenol	1.04062	1.01752	2.22	Average	
3-&-4-Methylphenol	1.04613	1.00554	3.88	Average	(Conc=50.00)
bis(2-chloroisopropyl)Ether	1.68957	1.87218	10.81	Average	
N-Nitroso-Di-n-Propylamine	1.01091	.94066	6.95	Average	
Hexachloroethane	.56084	.60912	8.61	Average	
Dibromochloropropane	-	-	-	Average	
Nitrobenzene	.46004	.44262	3.79	Average	
Nitrobenzene-d5	.39509	.38087	3.60	Average	
2-Nitrophenol	.20748	.20709	.19	Average	
Isophorone	.81764	.80436	1.62	Average	
bis(2-Chloroethoxy)methane	.47140	.42221	10.44	Average	
2,4-Dimethylphenol	.27958	.27455	1.80	Average	
Benzoic Acid	.24725	.23263	5.91	Average	
2,4-Dichlorophenol	.27946	.27969	.08	Average	
1,2,4-Trichlorobenzene	.31217	.32152	2.99	Average	
Naphthalene	.88333	.89725	1.58	Average	
4-Chloroaniline	.39406	.36686	6.90	Average	
Hexachlorobutadiene	.19193	.19916	3.77	Average	
4-Chloro-3-Methylphenol	.32605	.31186	4.35	Average	
2-Methylnaphthalene	.51308	.50203	2.15	Average	
Hexachlorocyclopentadiene	.41011	.43275	5.52	Average	
2,4,6-Trichlorophenol	.43671	.41864	4.14	Average	
2,4,5-Trichlorophenol	.34677	.39696	14.47	Average	
2-Fluorobiphenyl	1.07242	1.10006	2.58	Average	
2-Chloronaphthalene	1.10710	1.12629	1.73	Average	
2-Nitroaniline	.55901	.51965	7.04	Average	
Dimethylphthalate	1.24432	1.27570	2.52	Average	
2,6-Dinitrotoluene	.31339	.32739	4.47	Average	

Calibration Check Report

Title: ID 625 ACID AND BASE/NEUTRALS + EtPHENOL,DNSBP&2-NO2-4-MEPH
Calibrated: 880819 10:10

Check Standard Data File: >E5451
Injection Time: 880819 11:07

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
Acenaphthylene	1.57886	1.65544	4.85	Average
3-Nitroaniline	.57448	.55298	3.74	Average
2,4-Dinitrophenol	.15791	.15128	4.20	Average
Acenaphthene	1.08564	1.11713	2.90	Average
Dibenzofuran	1.36426	1.37240	.60	Average
2,4-Dinitrotoluene	.34710	.33756	2.75	Average
4-Nitrophenol	.80161	.79184	1.22	Average
Fluorene	1.12246	1.16015	3.36	Average
Diethylphthalate	1.28599	1.38430	7.64	Average
4-Chlorophenyl-phenylether	.47254	.49347	4.43	Average
4-Nitroaniline	.26489	.23961	9.54	Average
2,4,6-Tribromophenol	.21518	.21171	1.61	Average
1,2-Diphenylhydrazine	-	-	-	Average
Alpha-BHC	-	-	-	Average
Beta-BHC	-	-	-	Average
Gamma-BHC	-	-	-	Average
Delta-BHC	-	-	-	Average
Heptachlor	-	-	-	Average
Aldrin	-	-	-	Average
N-Nitrosodiphenylamine	.42249	.43596	3.19	Average
4,6-Dinitro-2-Methylphenol	.13086	.13632	4.17	Average
4-Bromophenyl-phenylether	.21830	.21848	.08	Average
Hexachlorobenzene	.30780	.33213	7.90	Average
Pentachlorophenol	.16736	.16468	1.60	Average
Phenanthrene	.94607	.96776	2.29	Average
Anthracene	.95445	.99998	4.77	Average
Di-n-Butylphthalate	1.51144	1.56161	3.32	Average
4,4'-Dibromobiphenyl	1.66708	1.92512	15.48	Average
Fluoranthene	.96211	1.01991	6.01	Average
Heptachlor Epoxide	-	-	-	Average
Endosulfan I	-	-	-	Average
4,4'-DDE	-	-	-	Average
Dieldrin	-	-	-	Average
Endrin	-	-	-	Average
4,4'-DDD	-	-	-	Average
Endosulfan II	-	-	-	Average
Endrin Aldehyde	-	-	-	Average
4,4'-DDT	-	-	-	Average
Endosulfan Sulfate	-	-	-	Average
Dibutylchlorendate	-	-	-	Average

Calibration Check Report

Title: ID 625 ACID AND BASE/NEUTRALS + EtPHENOL,DNSBP&2-NO2-4-MEPH
Calibrated: 880819 10:10

Check Standard Data File: >E5451
Injection Time: 880819 11:07

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
Benzidine	.18071	.07934	56.09	Average
Pyrene	1.48460	1.28631	13.36	Average
Terphenyl-d14	1.03862	.91682	11.73	Average
Butylbenzylphthalate	1.05779	.91307	13.68	Average
3,3'-Dichlorobenzidine	.15087	.09729	35.51	Average
Chrysene	1.14312	1.06473	6.86	Average
Benzo(a)Anthracene	1.09294	.96631	11.59	Average
bis(2-Ethylhexyl)Phthalate	1.30762	1.13997	12.82	Average
Di-n-octylphthalate	2.71198	2.51807	7.15	Average
Benzo(a)Pyrene	1.03642	.96401	6.99	Average
Benzo(b)Fluoranthene	1.33934	1.16443	13.06	Average
Indeno(1,2,3-cd)Pyrene	.98488	.75987	22.85	Average
Dibenzo(a,h)Anthracene	.88532	.87895	.72	Average
Benzo(k)Fluoranthene	1.08633	1.10785	1.98	Average
Benzo(g,h,i)Perylene	.98474	.75987	22.84	Average

RF - Response Factor from daily standard file at 25.00 mg/L

$\overline{RF}$ - Average Response Factor from Initial Calibration

%Diff - % Difference from original average or curve

ID625T
Rf TABLE

Calibration Report

Title: ID 625 ACID AND BASE/NEUTRALS + EtPHENOL,DNSBP&2-NO2-4-MEPH
Calibrated: 880819 13:44

Files: -)E5451 - - - - -

Compound	RF 10.00	RF 25.00	RF 40.00	RF 60.00	RF 80.00	RF 120.00	RF 160.00	$\overline{RRT}$	$\overline{RF}$	% RSD
N-Nitroso-Dimethylamine	-	.91078	-	-	-	-	-	.431	.91078	-
2-Fluorophenol	-	1.14732	-	-	-	-	-	.679	1.14732	-
bis(2-Chloroethyl)ether	-	1.12263	-	-	-	-	-	.941	1.12263	-
Phenol	-	1.49773	-	-	-	-	-	.923	1.49773	-
Phenol-d5	-	1.34159	-	-	-	-	-	.920	1.34159	-
Aniline	-	1.33509	-	-	-	-	-	.941	1.33509	-
2-Chlorophenol	-	1.23629	-	-	-	-	-	.947	1.23629	-
1,3-Dichlorobenzene	-	1.37110	-	-	-	-	-	.987	1.37110	-
1,4-Dichlorobenzene	-	1.36972	-	-	-	-	-	1.004	1.36972	-
Benzyl Chloride	-	-	-	-	-	-	-	-	-	-
Benzyl Alcohol	-	.70417	-	-	-	-	-	1.053	.70417	-
1,2-Dichlorobenzene	-	1.30133	-	-	-	-	-	1.057	1.30133	-
2-Methylphenol	-	1.01752	-	-	-	-	-	1.097	1.01752	-
3-&-4-Methylphenol	-	1.00554	-	-	-	-	-	1.149	1.00554	-
bis(2-chloroisopropyl)Ether	-	1.87218	-	-	-	-	-	1.104	1.87218	-
N-Nitroso-Di-n-Propylamine	-	.94068	-	-	-	-	-	1.157	.94068	-
Hexachloroethane	-	.60912	-	-	-	-	-	1.152	.60912	-
Dibromochloropropane	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	-	.44262	-	-	-	-	-	.841	.44262	-
Nitrobenzene-d5	-	.38087	-	-	-	-	-	.836	.38087	-
2-Nitrophenol	-	.20709	-	-	-	-	-	.914	.20709	-
Isophorone	-	.80436	-	-	-	-	-	.899	.80436	-
bis(2-Chloroethoxy)methane	-	.42221	-	-	-	-	-	.959	.42221	-
2,4-Dimethylphenol	-	.27455	-	-	-	-	-	.936	.27455	-
Benzoic Acid	-	.23263	-	-	-	-	-	.981	.23263	-
2,4-Dichlorophenol	-	.27969	-	-	-	-	-	.974	.27969	-
1,2,4-Trichlorobenzene	-	.32152	-	-	-	-	-	.990	.32152	-
Naphthalene	-	.89725	-	-	-	-	-	1.004	.89725	-
4-Chloroaniline	-	.36686	-	-	-	-	-	1.025	.36686	-
Hexachlorobutadiene	-	.19916	-	-	-	-	-	1.054	.19916	-
4-Chloro-3-Methylphenol	-	.31186	-	-	-	-	-	1.154	.31186	-
2-Methylnaphthalene	-	.50203	-	-	-	-	-	1.175	.50203	-
Hexachlorocyclopentadiene	-	.43275	-	-	-	-	-	.856	.43275	-
2,4,6-Trichlorophenol	-	.41864	-	-	-	-	-	.870	.41864	-
2,4,5-Trichlorophenol	-	.39696	-	-	-	-	-	.876	.39696	-
2-Fluorobiphenyl	-	1.10006	-	-	-	-	-	.886	1.10006	-
2-Chloronaphthalene	-	1.12629	-	-	-	-	-	.898	1.12629	-
2-Nitroaniline	-	.51965	-	-	-	-	-	.924	.51965	-
Dimethylphthalate	-	1.27570	-	-	-	-	-	.969	1.27570	-

(Conc=

RF - Response Factor (Subscript is amount in mg/L)

$\overline{RRT}$ - Average Relative Retention Time (RT Std/RT Istd)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

Calibration Report

Title: ID 625 ACID AND BASE/NEUTRALS + EtPHENOL,DNSBP&2-NO2-4-MEPH
Calibrated: 880819 13:44

Files: - >E5451 - - - - -

Compound	RF 10.00	RF 25.00	RF 40.00	RF 60.00	RF 80.00	RF 120.00	RF 160.00	$\overline{RRT}$	$\overline{RF}$	% RSD
2,6-Dinitrotoluene	-	.32739	-	-	-	-	-	.978	.32739	-
Acenaphthylene	-	1.65544	-	-	-	-	-	.970	1.65544	-
3-Nitroaniline	-	.55298	-	-	-	-	-	.998	.55298	-
2,4-Dinitrophenol	-	.15128	-	-	-	-	-	1.015	.15128	-
Acenaphthene	-	1.11713	-	-	-	-	-	1.005	1.11713	-
Dibenzofuran	-	1.37240	-	-	-	-	-	1.033	1.37240	-
2,4-Dinitrotoluene	-	.33756	-	-	-	-	-	1.045	.33756	-
4-Nitrophenol	-	.79184	-	-	-	-	-	1.033	.79184	-
Fluorene	-	1.16015	-	-	-	-	-	1.094	1.16015	-
Diethylphthalate	-	1.38430	-	-	-	-	-	1.097	1.38430	-
4-Chlorophenyl-phenylether	-	.49347	-	-	-	-	-	1.099	.49347	-
4-Nitroaniline	-	.23961	-	-	-	-	-	1.108	.23961	-
2,4,6-Tribromophenol	-	.21171	-	-	-	-	-	1.139	.21171	-
1,2-Diphenylhydrazine	-	-	-	-	-	-	-	-	-	-
Alpha-BHC	-	-	-	-	-	-	-	-	-	-
Beta-BHC	-	-	-	-	-	-	-	-	-	-
Gamma-BHC	-	-	-	-	-	-	-	-	-	-
Delta-BHC	-	-	-	-	-	-	-	-	-	-
Heptachlor	-	-	-	-	-	-	-	-	-	-
Aldrin	-	-	-	-	-	-	-	-	-	-
N-Nitrosodiphenylamine	-	.43596	-	-	-	-	-	.892	.43596	-
4,6-Dinitro-2-Methylphenol	-	.13632	-	-	-	-	-	.887	.13632	-
4-Bromophenyl-phenylether	-	.21848	-	-	-	-	-	.940	.21848	-
Hexachlorobenzene	-	.33213	-	-	-	-	-	.958	.33213	-
Pentachlorophenol	-	.16468	-	-	-	-	-	.985	.16468	-
Phenanthrene	-	.96776	-	-	-	-	-	1.003	.96776	-
Anthracene	-	.99998	-	-	-	-	-	1.009	.99998	-
Di-n-Butylphthalate	-	1.56161	-	-	-	-	-	1.103	1.56161	-
4,4'-Dibromobiphenyl	-	1.92512	-	-	-	-	-	1.137	1.92512	-
Fluoranthene	-	1.01991	-	-	-	-	-	1.171	1.01991	-
Heptachlor Epoxide	-	-	-	-	-	-	-	-	-	-
Endosulfan I	-	-	-	-	-	-	-	-	-	-
4,4'-DDE	-	-	-	-	-	-	-	-	-	-
Dieldrin	-	-	-	-	-	-	-	-	-	-
Endrin	-	-	-	-	-	-	-	-	-	-
4,4'-DDD	-	-	-	-	-	-	-	-	-	-
Endosulfan II	-	-	-	-	-	-	-	-	-	-
Endrin Aldehyde	-	-	-	-	-	-	-	-	-	-
4,4'-DDT	-	-	-	-	-	-	-	-	-	-

RF - Response Factor (Subscript is amount in mg/L)

$\overline{RRT}$ - Average Relative Retention Time (RT Std/RT Istd)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

Calibration Report

Title: ID 625 ACID AND BASE/NEUTRALS + EtPHENOL,DNSBP&2-NO2-4-MEPH
Calibrated: 880819 13:44

Files:	-	>E5451	-	-	-	-	-			
Compound	RF 10.00	RF 25.00	RF 40.00	RF 60.00	RF 80.00	RF 120.00	RF 160.00	$\overline{RRT}$	$\overline{RF}$	% RSD
Endosulfan Sulfate	-	-	-	-	-	-	-	-	-	-
Dibutylchlorendate	-	-	-	-	-	-	-	-	-	-
Benzidine	-	.07934	-	-	-	-	-	.868	.07934	-
Pyrene	-	1.28631	-	-	-	-	-	.874	1.28631	-
Terphenyl-d14	-	.91682	-	-	-	-	-	.895	.91682	-
Butylbenzylphthalate	-	.91307	-	-	-	-	-	.953	.91307	-
3,3'-Dichlorobenzidine	-	.09729	-	-	-	-	-	.999	.09729	-
Chrysene	-	1.06473	-	-	-	-	-	1.003	1.06473	-
Benzo(a)Anthracene	-	.96631	-	-	-	-	-	.997	.96631	-
bis(2-Ethylhexyl)Phthalate	-	1.13997	-	-	-	-	-	1.018	1.13997	-
Di-n-octylphthalate	-	2.51807	-	-	-	-	-	.923	2.51807	-
Benzo(a)Pyrene	-	.96401	-	-	-	-	-	.991	.96401	-
Benzo(b)Fluoranthene	-	1.16443	-	-	-	-	-	.952	1.16443	-
Indeno(1,2,3-cd)Pyrene	-	.75987	-	-	-	-	-	1.176	.75987	-
Dibenzo(a,h)Anthracene	-	.87895	-	-	-	-	-	1.184	.87895	-
Benzo(k)Fluoranthene	-	1.10785	-	-	-	-	-	.955	1.10785	-
Benzo(g,h,i)Perylene	-	.75987	-	-	-	-	-	1.176	.75987	-

RF - Response Factor (Subscript is amount in mg/L)

$\overline{RRT}$ - Average Relative Retention Time (RT Std/RT Istd)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

EPA Sample No. (Standard): 25mg/L BNA STD Date Analyzed: 8/19/88

Lab File ID (Standard): E5451 Time Analyzed: 10:4

Instrument ID: _____

	IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
12 HOUR STD	41849	8.77	144896	12.35 ~~12.35~~	74607 20179	17.81 ~~15.25~~
UPPER LIMIT	83,698	9.27	289,792	12.85	149,214 ~~40,358~~	18.31 ~~15.75~~
LOWER LIMIT	20,925	8.27	72,448	11.85	37,304 10090	17.31 ~~14.75~~
EPA SAMPLE NO.						
01 8807150L	62205	8.79	228408	12.33	121142	17.80
02 8807150L MS	65176	8.80	239396	12.34	122740	17.82
03 8807150L MSD	63084	8.82	228292	12.36	122246	17.83
04 BLK 88081552-55	63988	8.79	253886	12.34	135769	17.81
05 88071555	25556	8.92	112481	12.44	91393	17.91
06 ~~88081589~~	~~65161~~	~~8.81~~	~~236369~~	~~12.38~~	~~125037~~	~~17.85~~
07 88081593	62572	8.81	244033	12.34	129890	17.83
08 88081592	65845	8.80	250722	~~12.25~~	133225	17.83
09 88081591	74602	8.80	258920	12.36	156245*	17.84
10 88081589	65777	8.81	247711	12.35	135229	17.83
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asteris

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

EPA Sample No. (Standard): 25 mg/L BNA STD Date Analyzed: 8/19/88

Lab File ID (Standard): E5451 Time Analyzed: 10:47

Instrument ID: _____

	IS4 (PHN) AREA #	RT	IS5 (CRY) AREA #	RT	IS4 (PRY) AREA #	RT
12 HOUR STD	118658	22.42	96289	30.82	67277	36.34
UPPER LIMIT	237,316	22.92	192,578	31.32	134554	36.84
LOWER LIMIT	59,329	21.92	48145	30.32	33,639	35.84
EPA SAMPLE NO.						
>E5452 01 88071506	190638	22.43	121195	30.81	99836	36.34
>E5453 02 88071506MS	190758	22.45	117846	30.82	98692	36.35
>E5454 03 88071506MSD	195119	22.46	112065	30.83	71086	36.37
>E5455 04 BLK [illegible]	214279	22.44	114874	30.83	130290	36.38
>E5460 05 88071555	177300	22.50	135243	30.91	40464	36.49
>E5456 06 88081584	209385	22.46	150829	30.86	98517	36.40
>E5457 07 88081593	212902	22.45	158859	30.84	136838 *	36.39 *
>E5458 08 88081592	166141	22.44	173263	30.85	101128	36.37
>E5459 09 88081591	255301 *	22.46	192146	30.86	125687	36.40
>E5456 10 88081589	222563	22.45	166575	30.84	139811 *	36.39 *
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

page __ of __

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 8/20/88 13:13

Lab ID: >D0820::01 Data Release Authorized By: Lana Kuck

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	52.07 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	86.92	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	41.01 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	6.77 OK	
275	10.0 - 30.0% of mass 198	22.02 OK	
365	greater than 1.00% of mass 198	1.90 OK	
441	present, but less than mass 443	12.23 OK	
442	greater than 40.0% of mass 198	90.33 OK	
443	17.0 - 23.0% of mass 442	15.80 OK	(17.50) #2

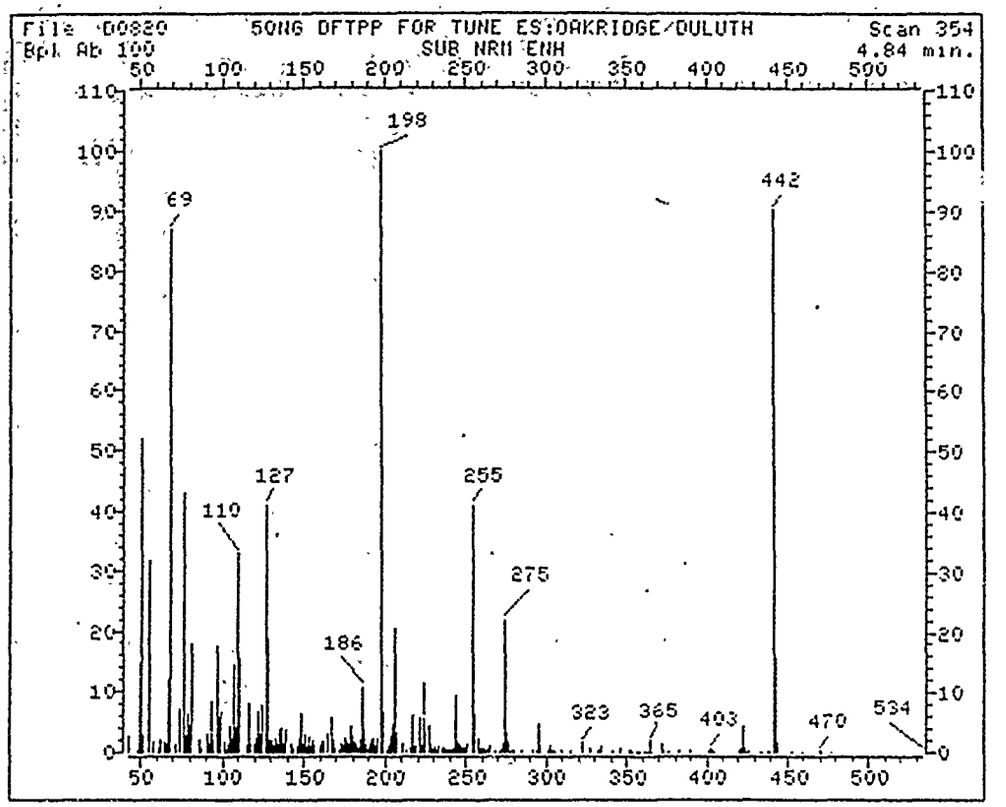
8/18 Spoint

THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS	
50NG DFTPP FOR TUN	>D0820	8/20/88	13:13	
25 ng/L ABN	>E5462	8/20/88	13:36	✓
88081589 R.A	>E5463	↓	14:48	good, use
88081592 R.A	>E5464	↓	15:44	good, use

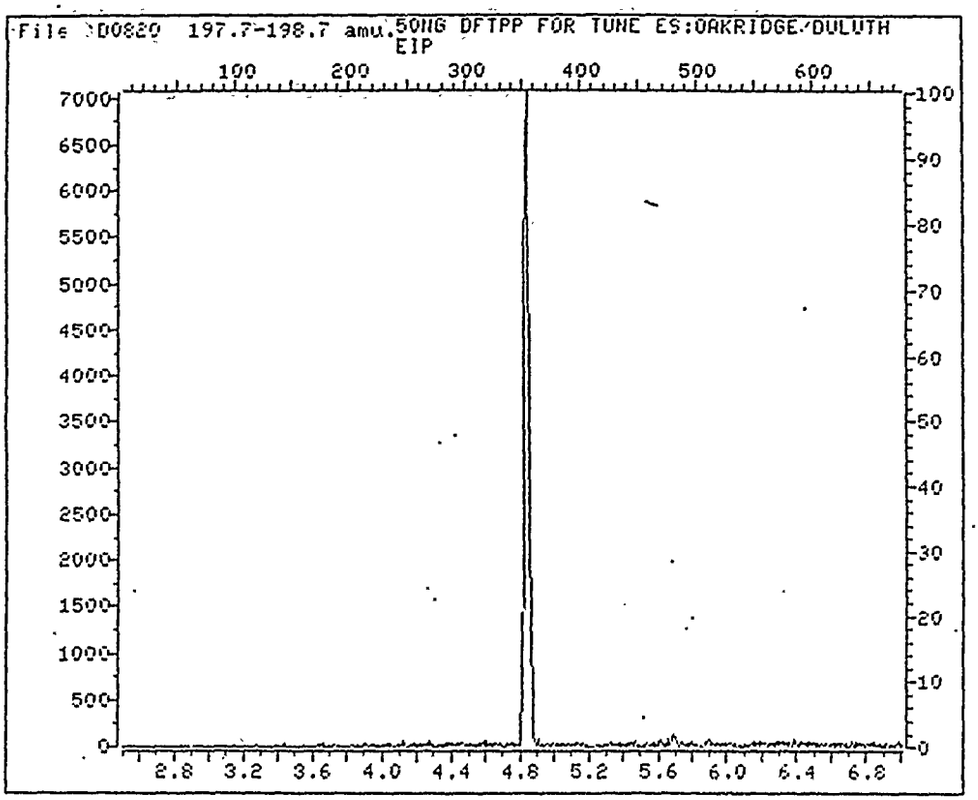
Reanalysis



File:)00820 Scan #: 354 Retn. time: 4.84

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
42.10	2.717	130.25	2.192	192.15	1.941	259.30	.666	353.85	.110
49.00	.425	131.15	2.025	193.25	2.219	260.20	.566	355.25	.194
50.10	14.797	132.25	.944	194.15	.944	261.30	.551	357.50	.021
51.10	52.074	133.25	2.355	195.35	1.720	262.10	.257	358.50	.110
52.20	3.053	134.05	1.369	196.15	2.418	262.30	.173	359.60	.005
55.10	31.713	135.15	3.672	198.05	100.000	262.60	.126	361.50	.136
58.10	1.810	136.25	1.820	199.05	6.766	263.40	.226	362.60	.094
61.20	.782	137.20	4.165	201.45	.278	264.30	.530	363.50	.089
62.20	.750	138.10	1.500	203.25	1.044	265.00	.997	365.10	1.904
63.00	2.119	139.20	3.645	204.15	2.670	269.00	.052	366.00	.126
65.20	1.605	143.00	1.474	205.15	4.684	270.70	.068	372.00	1.259
66.20	1.212	145.90	.839	206.15	20.566	272.20	.393	373.40	.288
67.10	11.980	146.10	.976	207.15	3.451	273.00	1.322	375.80	.058
69.10	86.924	147.20	2.376	208.05	1.254	274.10	4.086	376.90	.068
72.20	1.301	148.10	2.282	211.15	1.327	275.10	22.019	377.20	.100
74.10	4.296	149.10	6.268	213.05	.351	276.10	3.346	383.50	.504
75.00	7.238	150.20	1.264	216.15	.650	277.00	1.789	389.40	.142
77.10	42.853	151.20	3.137	217.05	5.932	277.80	.126	390.60	.231
78.10	2.686	152.10	1.149	218.15	.918	279.40	.283	392.60	.021
79.10	6.347	153.20	2.644	219.05	1.159	280.60	.262	401.60	.220
80.10	4.511	154.10	1.002	221.15	5.833	284.80	.519	402.00	.325
81.10	17.981	156.00	1.925	222.25	.923	292.30	.446	402.60	.131
82.10	6.116	157.10	1.353	223.25	.949	294.20	.362	403.20	.619
86.15	2.203	160.00	.949	224.05	11.282	296.20	4.668	404.20	.299
87.05	.656	161.00	1.684	225.15	3.483	296.80	.923	405.80	.079
91.15	3.221	161.20	.719	227.05	4.427	297.20	.262	412.35	.079
92.05	1.311	162.20	.629	227.95	.682	302.25	.283	416.05	.157
93.05	8.586	163.10	1.878	228.95	1.400	303.15	.923	421.15	.278

94.25	2.103	165.20	3.037	230.25	.530	304.05	.278	421.95	.640
97.15	17.488	167.10	5.670	230.85	.189	304.85	.294	422.25	.372
98.05	5.738	168.10	2.172	231.25	1.075	306.25	.115	423.15	4.485
99.15	6.871	169.20	1.988	232.15	.514	309.45	.446	424.35	.860
101.05	1.789	170.20	.729	233.35	.986	310.15	.079	425.45	.136
102.95	.535	172.20	.530	233.75	.268	316.15	.325	426.45	.341
103.95	1.427	173.20	1.217	233.95	.105	317.85	.100	433.65	.063
105.05	4.390	174.00	1.175	235.75	.173	318.45	.068	434.35	.126
106.25	1.962	174.20	.430	236.25	.656	321.05	.184	438.65	.068
107.05	14.613	175.20	2.224	237.35	.551	323.05	1.610	439.75	.073
108.05	4.201	176.10	1.028	238.25	.252	325.65	.105	441.25	12.227
110.05	32.929	177.30	1.720	238.75	.362	327.05	.619	442.15	90.333
111.15	15.646	178.00	1.322	240.25	.309	327.65	.199	443.25	15.804
116.15	1.018	179.10	4.469	241.25	.141	331.75	.241	444.25	1.631
117.05	7.967	180.20	2.554	243.05	.745	332.05	.199	449.55	.152
117.95	1.212	181.20	1.668	244.05	9.494	332.45	.105	449.75	.089
120.05	1.542	183.30	1.359	245.15	1.631	333.15	.241	452.65	.152
121.15	2.345	184.10	.687	245.95	1.437	334.15	1.070	453.75	.152
122.05	2.234	185.10	2.025	247.30	.897	335.15	.351	459.45	.152
123.15	6.688	186.10	10.789	249.10	.818	337.25	.184	470.50	.226
124.15	3.042	187.10	3.824	250.30	.708	341.25	.477	470.80	.105
125.25	7.632	188.30	.855	251.20	1.338	342.15	.294	476.60	.184
127.05	41.012	189.20	1.400	255.10	41.107	346.15	.598	498.70	.089
128.05	3.876	190.20	.378	256.10	6.300	352.05	.446	533.75	.115
129.05	18.767	191.20	1.463	258.10	2.397	353.35	.488		


File D00820 197.7-198.7 amu.50NG DFTPP FOR TUNE ES:OAKRIDGE/DULUTH
EIP
100
200
300
400
500
600
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
100
90
80
70
60
50
40
30
20
10
0
2.8
3.2
3.6
4.0
4.4
4.8
5.2
5.6
6.0
6.4
6.8

Calibration Check Report

Title: ID 625 ACID AND BASE/NEUTRALS + ClPHENOL,DNSBP&2-NO2-4-MEPH
Calibrated: 880819 10:10

fits CA625 C1

create CLP1 C1

Check Standard Data File:)C5462
Injection Time: 880820 13:36

Compound	$\overline{RF}$	RF	%Diff	Calib Meth	
N-Nitroso-Dimethylamine	.97447	.92995	4.57	Average	
2-Fluorophenol	1.13043	1.18303	4.65	Average	
bis(2-Chloroethyl)ether	1.34309	1.16399	13.33	Average	
Phenol	1.59648	1.59199	.28	Average	
Phenol-d5	1.38909	1.39955	.75	Average	
Aniline	1.37724	-	-	Average	
2-Chlorophenol	1.23872	1.29666	4.68	Average	
1,3-Dichlorobenzene	1.33894	1.41058	5.35	Average	
1,4-Dichlorobenzene	1.29251	1.40375	8.61	Average	
Benzyl Chloride	-	-	-	Average	
Benzyl Alcohol	.74390	.53313	28.33	Average	
1,2-Dichlorobenzene	1.23619	1.33943	8.35	Average	
2-Methylphenol	1.04062	1.20383	15.68	Average	
3-&-4-Methylphenol	1.04613	1.03896	.69	Average	(Conc=50.00)
bis(2-chloroisopropyl)Ether	1.68957	1.45687	13.77	Average	
N-Nitroso-Di-n-Propylamine	1.01091	1.02720	1.61	Average	
Hexachloroethane	.56084	.60651	8.14	Average	
Dibromochloropropane	-	-	-	Average	
Nitrobenzene	.46004	.45196	1.76	Average	
Nitrobenzene-d5	.39509	.38554	2.42	Average	
2-Nitrophenol	.20748	.21412	3.20	Average	
Isophorone	.81764	.81086	.83	Average	
bis(2-Chloroethoxy)methane	.47140	.47587	.95	Average	
2,4-Dimethylphenol	.27958	.28754	2.85	Average	
Benzoic Acid	.24725	.20135	18.56	Average	
2,4-Dichlorophenol	.27946	.28520	2.05	Average	
1,2,4-Trichlorobenzene	.31217	.32906	5.41	Average	
Naphthalene	.88333	.91916	4.06	Average	
4-Chloroaniline	.39406	.36855	6.47	Average	
Hexachlorobutadiene	.19193	.21262	10.78	Average	
4-Chloro-3-Methylphenol	.32605	.33491	2.72	Average	
2-Methylnaphthalene	.51308	.52156	1.65	Average	
Hexachlorocyclopentadiene	.41011	.33548	18.20	Average	
2,4,6-Trichlorophenol	.43671	.40156	8.05	Average	
2,4,5-Trichlorophenol	.34677	.43388	25.12	Average	
2-Fluorobiphenyl	1.07242	1.07022	.20	Average	
2-Chloronaphthalene	1.10710	1.12951	2.02	Average	
2-Nitroaniline	.55901	.54215	3.02	Average	
Dimethylphthalate	1.24432	1.30711	5.05	Average	
2,6-Dinitrotoluene	.31339	.34549	10.24	Average	

RF - Response Factor from daily standard file at 25.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration

%Diff - % Difference from original average or curve

Calibration Check Report

Title: ID 625 ACID AND BASE/NEUTRALS + EtPHENOL,DMSBPA2-MO2-4-MEPH
Calibrated: 880819 10:10

Check Standard Data File:)E5462
Injection Time: 880820 13:36

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
Acenaphthylene	1.57886	1.63994	3.87	Average
3-Nitroaniline	.57448	.53274	7.27	Average
2,4-Dinitrophenol	.15791	.10183	35.51	Average
Acenaphthene	1.08564	1.10826	2.08	Average
Dibenzofuran	1.36426	1.42740	4.63	Average
2,4-Dinitrotoluene	.34710	.33142	4.52	Average
4-Nitrophenol	.80161	.81437	1.59	Average
Fluorene	1.12246	1.15135	2.57	Average
Diethylphthalate	1.28599	1.42915	11.13	Average
4-Chlorophenyl-phenylether	.47254	.55399	17.24	Average
4-Nitroaniline	.26489	.21106	20.32	Average
2,4,6-Tribromophenol	.21518	.27044	25.68	Average
1,2-Diphenylhydrazine	-	-	-	Average
Alpha-BHC	-	-	-	Average
Beta-BHC	-	-	-	Average
Gamma-BHC	-	-	-	Average
Delta-BHC	-	-	-	Average
Heptachlor	-	-	-	Average
Aldrin	-	-	-	Average
N-Nitrosodiphenylamine	.42249	.45827	8.47	Average
4,6-Dinitro-2-Methylphenol	.13086	-	-	Average
4-Bromophenyl-phenylether	.21830	.22234	1.85	Average
Hexachlorobenzene	.30780	.31307	1.71	Average
Pentachlorophenol	.16736	.17437	4.18	Average
Phenanthrene	.94607	.95754	1.21	Average
Anthracene	.95445	.97025	1.66	Average
Di-n-Butylphthalate	1.51144	1.55886	3.14	Average
4,4'-Dibromobiphenyl	1.66708	1.96366	17.79	Average
Fluoranthene	.96211	1.00303	4.25	Average
Heptachlor Epoxide	-	-	-	Average
Endosulfan I	-	-	-	Average
4,4'-DDE	-	-	-	Average
Dieldrin	-	-	-	Average
Endrin	-	-	-	Average
4,4'-DDD	-	-	-	Average
Endosulfan II	-	-	-	Average
Endrin Aldehyde	-	-	-	Average
4,4'-DDT	-	-	-	Average
Endosulfan Sulfate	-	-	-	Average
Dibutylchlorendate	-	-	-	Average

RF - Response factor from daily standard file at 25.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration

%Diff - % Difference from original average or curve

Calibration Check Report

Title: 10 625 ACID AND BASE/NEUTRALS + ETPHENOL,DNSBP&2-NO2-4-MEPH
Calibrated: 880819 10:10

Check Standard Data File: XE5462
Injection Time: 880820 13:36

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
Benzidine	.18071	.00264	98.54	Average
Pyrene	1.48460	1.36436	8.10	Average
Terphenyl-d14	1.03862	1.04888	.99	Average
Butylbenzylphthalate	1.05779	1.00880	1.63	Average
3,3'-Dichlorobenzidine	.15087	.15967	5.83	Average
Chrysene	1.14312	1.16148	1.61	Average
Benzo(a)Anthracene	1.09294	1.03347	5.44	Average
bis(2-Ethylhexyl)Phthalate	1.30762	1.23184	5.80	Average
Di-n-octylphthalate	2.71198	3.23523	19.29	Average
Benzo(a)Pyrene	1.03642	1.04030	.37	Average
Benzo(b)Fluoranthene	1.33934	1.31645	1.71	Average
Indeno(1,2,3-cd)Pyrene	.98188	.79701	19.08	Average
Dibenzo(a,h)Anthracene	.88532	.69651	21.33	Average
Benzo(k)Fluoranthene	1.08633	1.23957	14.11	Average
Benzo(g,h,i)Perylene	.98474	.79704	19.06	Average

RF - Response Factor from daily standard file at 25.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration

%Diff - % Difference from original average or curve

CCP625

Calibration Report

Title: ID 625 ACID AND BASE/NEUTRALS + ClPHENOL,DMSBP&2-NO2-4-MEPH
Calibrated: 880820 15:26

Compound	Files: -	)E5462 -	-	-	-	-	-	$\overline{RRT}$	$\overline{RF}$	% RSD	
	$RF_{10.00}$	$RF_{25.00}$	$RF_{40.00}$	$RF_{60.00}$	$RF_{80.00}$	$RF_{120.00}$	$RF_{160.00}$				
N-Nitroso-Dimethylamine	-	.92995	-	-	-	-	-	.426	.92995	-	
2-Fluorophenol	-	1.18303	-	-	-	-	-	.678	1.18303	-	
bis(2-Chloroethyl)ether	-	1.16399	-	-	-	-	-	.941	1.16399	-	
Phenol	-	1.59199	-	-	-	-	-	.924	1.59199	-	
Phenol-d5	-	1.39955	-	-	-	-	-	.921	1.39955	-	
Aniline	-	1.34929	-	-	-	-	-	.941	1.34929	-	
2-Chlorophenol	-	1.29666	-	-	-	-	-	.948	1.29666	-	
1,3-Dichlorobenzene	-	1.41058	-	-	-	-	-	.987	1.41058	-	
1,4-Dichlorobenzene	-	1.40301	-	-	-	-	-	1.004	1.40301	-	
Benzyl Chloride	-	-	-	-	-	-	-	-	-	-	
Benzyl Alcohol	-	.53313	-	-	-	-	-	1.053	.53313	-	
1,2-Dichlorobenzene	-	1.33943	-	-	-	-	-	1.058	1.33943	-	
2-Methylphenol	-	1.20383	-	-	-	-	-	1.098	1.20383	-	
3-&-4-Methylphenol	-	1.03896	-	-	-	-	-	1.149	1.03896	-	(Conc=20.0,50.0,80
bis(2-chloroisopropyl)Ether	-	1.45687	-	-	-	-	-	1.105	1.45687	-	
N-Nitroso-Di-n-Propylamine	-	1.02720	-	-	-	-	-	1.150	1.02720	-	
Hexachloroethane	-	.60651	-	-	-	-	-	1.153	.60651	-	
Dibromochloropropane	-	-	-	-	-	-	-	-	-	-	
Nitrobenzene	-	.45196	-	-	-	-	-	.841	.45196	-	
Nitrobenzene-d5	-	.38554	-	-	-	-	-	.836	.38554	-	
2-Nitrophenol	-	.21412	-	-	-	-	-	.915	.21412	-	
Isophorone	-	.81086	-	-	-	-	-	.898	.81086	-	
bis(2-Chloroethoxy)methane	-	.47587	-	-	-	-	-	.956	.47587	-	
2,4-Dimethylphenol	-	.28754	-	-	-	-	-	.937	.28754	-	
Benzoic Acid	-	.20135	-	-	-	-	-	.979	.20135	-	
2,4-Dichlorophenol	-	.28520	-	-	-	-	-	.974	.28520	-	
1,2,4-Trichlorobenzene	-	.32906	-	-	-	-	-	.991	.32906	-	
Naphthalene	-	.91916	-	-	-	-	-	1.004	.91916	-	
4-Chloroaniline	-	.36855	-	-	-	-	-	1.025	.36855	-	
Hexachlorobutadiene	-	.21262	-	-	-	-	-	1.054	.21262	-	
4-Chloro-3-Methylphenol	-	.33491	-	-	-	-	-	1.156	.33491	-	
2-Methylnaphthalene	-	.52156	-	-	-	-	-	1.175	.52156	-	
Hexachlorocyclopentadiene	-	.33548	-	-	-	-	-	.856	.33548	-	
2,4,6-Trichlorophenol	-	.40156	-	-	-	-	-	.871	.40156	-	
2,4,5-Trichlorophenol	-	.43388	-	-	-	-	-	.877	.43388	-	
2-Fluorobiphenyl	-	1.07022	-	-	-	-	-	.886	1.07022	-	
2-Chloronaphthalene	-	1.12951	-	-	-	-	-	.898	1.12951	-	
2-Nitroaniline	-	.54215	-	-	-	-	-	.924	.54215	-	
Dimethylphthalate	-	1.30711	-	-	-	-	-	.969	1.30711	-	

RF - Response Factor (Subscript is amount in ng/L)

$\overline{RRT}$ - Average Relative Retention Time (RT Std/RT Istd)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

Calibration Report

Title: ID 625 ACID AND BASE/NEUTRALS + EtPHENOL,DNSBP&2-NO2-4-MEPH
Calibrated: 880820 15:26

Compound	Files: -	)E5462	-	-	-	-	-			
	RF 10.00	RF 25.00	RF 40.00	RF 60.00	RF 80.00	RF 120.00	RF 160.00	$\overline{RRT}$	$\overline{RF}$	% RSD
2,6-Dinitrotoluene	-	.34549	-	-	-	-	-	.978	.34549	-
Acenaphthylene	-	1.63994	-	-	-	-	-	.971	1.63994	-
3-Nitroaniline	-	.53274	-	-	-	-	-	.999	.53274	-
2,4-Dinitrophenol	-	.10183	-	-	-	-	-	1.016	.10183	-
Acenaphthene	-	1.10826	-	-	-	-	-	1.005	1.10826	-
Dibenzofuran	-	1.42740	-	-	-	-	-	1.033	1.42740	-
2,4-Dinitrotoluene	-	.33142	-	-	-	-	-	1.045	.33142	-
4-Nitrophenol	-	.81437	-	-	-	-	-	1.033	.81437	-
Fluorene	-	1.15135	-	-	-	-	-	1.094	1.15135	-
Diethylphthalate	-	1.42915	-	-	-	-	-	1.096	1.42915	-
4-Chlorophenyl-phenylether	-	.55399	-	-	-	-	-	1.099	.55399	-
4-Nitroaniline	-	.21106	-	-	-	-	-	1.106	.21106	-
2,4,6-Tribromophenol	-	.27044	-	-	-	-	-	1.140	.27044	-
1,2-Diphenylhydrazine	-	-	-	-	-	-	-	-	-	-
Alpha-BHC	-	-	-	-	-	-	-	-	-	-
Beta-BHC	-	-	-	-	-	-	-	-	-	-
Gamma-BHC	-	-	-	-	-	-	-	-	-	-
Delta-BHC	-	-	-	-	-	-	-	-	-	-
Heptachlor	-	-	-	-	-	-	-	-	-	-
Aldrin	-	-	-	-	-	-	-	-	-	-
N-Nitrosodiphenylamine	-	.45827	-	-	-	-	-	.892	.45827	-
4,6-Dinitro-2-Methylphenol	-	-	-	-	-	-	-	-	-	-
4-Bromophenyl-phenylether	-	.22234	-	-	-	-	-	.940	.22234	-
Hexachlorobenzene	-	.31307	-	-	-	-	-	.958	.31307	-
Pentachlorophenol	-	.17437	-	-	-	-	-	.985	.17437	-
Phenanthrene	-	.95754	-	-	-	-	-	1.003	.95754	-
Anthracene	-	.97025	-	-	-	-	-	1.009	.97025	-
Di-n-Butylphthalate	-	1.55886	-	-	-	-	-	1.102	1.55886	-
4,4'-Dibromobiphenyl	-	1.96366	-	-	-	-	-	1.136	1.96366	-
Fluoranthene	-	1.00303	-	-	-	-	-	1.171	1.00303	-
Heptachlor Epoxide	-	-	-	-	-	-	-	-	-	-
Endosulfan I	-	-	-	-	-	-	-	-	-	-
4,4'-DDE	-	-	-	-	-	-	-	-	-	-
Dieldrin	-	-	-	-	-	-	-	-	-	-
Endrin	-	-	-	-	-	-	-	-	-	-
4,4'-DDD	-	-	-	-	-	-	-	-	-	-
Endosulfan II	-	-	-	-	-	-	-	-	-	-
Endrin Aldehyde	-	-	-	-	-	-	-	-	-	-
4,4'-DDT	-	-	-	-	-	-	-	-	-	-

RF - Response Factor (Subscript is amount in ng/L)

$\overline{RRT}$ - Average Relative Retention Time (RT Std/RT Istd)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

Calibration Report

Title: ID 625 ACID AND BASE/NEUTRALS + EtPHENOL,DNSBP&2-NO2-4-MEPH
Calibrated: 880820 15:26

Files: -)E5462 - - - - -

Compound	RF 10.00	RF 25.00	RF 40.00	RF 60.00	RF 80.00	RF 120.00	RF 160.00	$\overline{RRT}$	$\overline{RF}$	%RSD
Endosulfan Sulfate	-	-	-	-	-	-	-	-	-	-
Dibutylchlorendate	-	-	-	-	-	-	-	-	-	-
Benzidine	-	.00264	-	-	-	-	-	.868	.00264	-
Pyrene	-	1.36436	-	-	-	-	-	.874	1.36436	-
Terphenyl-d14	-	1.04888	-	-	-	-	-	.895	1.04888	-
Butylbenzylphthalate	-	1.00860	-	-	-	-	-	.953	1.00860	-
3,3'-Dichlorobenzidine	-	.15967	-	-	-	-	-	.999	.15967	-
Chrysene	-	1.16148	-	-	-	-	-	1.002	1.16148	-
Benzo(a)Anthracene	-	1.03347	-	-	-	-	-	.997	1.03347	-
bis(2-Ethylhexyl)Phthalate	-	1.23184	-	-	-	-	-	1.017	1.23184	-
Di-n-octylphthalate	-	3.23523	-	-	-	-	-	.923	3.23523	-
Benzo(a)Pyrene	-	1.04030	-	-	-	-	-	.992	1.04030	-
Benzo(b)fluoranthene	-	1.31645	-	-	-	-	-	.953	1.31645	-
Indeno(1,2,3-cd)Pyrene	-	.79701	-	-	-	-	-	1.177	.79701	-
Dibenzo(a,h)Anthracene	-	.69651	-	-	-	-	-	1.185	.69651	-
Benzo(k)fluoranthene	-	1.23957	-	-	-	-	-	.956	1.23957	-
Benzo(g,h,i)Perylene	-	.79704	-	-	-	-	-	1.177	.79704	-

RF - Response Factor (Subscript is amount in ng/L)

$\overline{RRT}$ - Average Relative Retention Time (RT Std/RT Istd)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

EPA Sample No. (Standard): _____ Date Analyzed: 8/20/8

Lab File ID (Standard): E5462 Time Analyzed: 13:36

Instrument ID: _____

	IS4 (PHN) AREA #	RT	IS5 (CRY) AREA #	RT	IS4 (PRY) AREA #	RT
12 HOUR STD	118968	22.44	87362	30.85	53177	36.35
UPPER LIMIT	237,936	22.94	174,724	31.35	106354	36.85
LOWER LIMIT	59,484	21.94	43681	30.35	26,589	35.85
EPA SAMPLE NO.						
E5463 01	880815891	209385 *65767	28.86	150839	3086	98517	36.40
E5464 02	880815892	200403	22.46	142456	30.85	93594	36.38
03						
04						
05						
06						
07						
08						
09						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

page __ of __

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

EPA Sample No. (Standard): _____ Date Analyzed: 8/20/88

Lab File ID (Standard): E5462 Time Analyzed: 13:36

Instrument ID: _____

	IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
12 HOUR STD	36542	8.78	130270	12.35	70629	17.82
UPPER LIMIT	73,084	9.28	260540	12.85	141,258	18.32
LOWER LIMIT	18271	8.28	65,135	11.85	35,315	17.32
EPA SAMPLE NO.						
E5463 01 8808L589	65161	8.81	236369	12.38	125037	17.85
E5464 02 8808L592	61444	8.80	225940	12.36	121000	17.84
03						
04						
05						
06						
07						
08						
09						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

EPA Sample No.(Standard): _____ Date Analyzed: 8/20/8

Lab File ID (Standard): E5462 Time Analyzed: 13:36

Instrument ID: _____

	IS4 (PHN) AREA #	RT	IS5 (CRY) AREA #	RT	IS4 (PRY) AREA #	RT
12 HOUR STD	118968	22.44	87362	30.85	53177	36.35
UPPER LIMIT	237,936	22.94	174,724	31.35	106354	36.85
LOWER LIMIT	59,484	21.94	43681	30.35	26,589	35.85
EPA SAMPLE NO.						
E5463 01	880815891	209385 ~~65167~~	28.86	150839	3086	98517	36.40
E5464 02	880815912	20.0403	22.46	142456	30.85	93594	36.38
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

page __ of __

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 8/21/88 22:37

Lab ID >D1821::01 Data Release Authorized By: Laura Kuck

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	49.74 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	57.80	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	42.73 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	6.45 OK	
275	10.0 - 30.0% of mass 198	23.16 OK	
365	greater than 1.00% of mass 198	2.55 OK	
441	present, but less than mass 443	12.92 OK	
442	greater than 40.0% of mass 198	83.05 OK	
443	17.0 - 23.0% of mass 442	15.73 OK	(18.94) #2

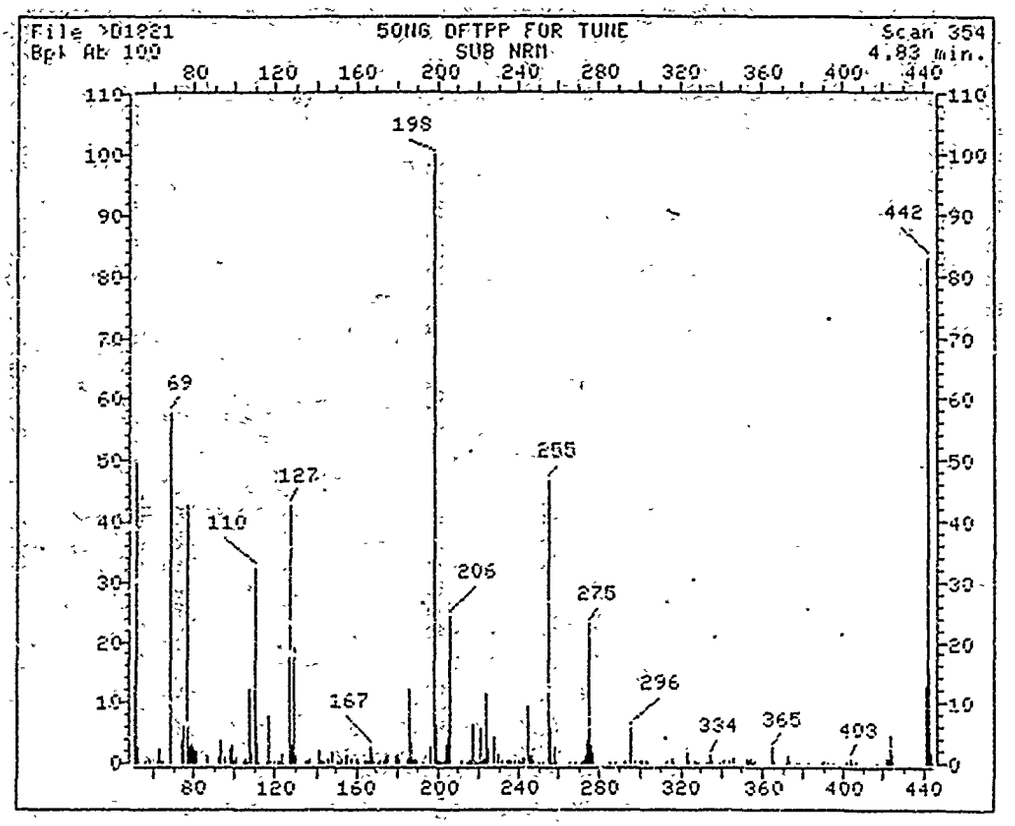
THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS	
50NG DFTPP FOR TUN	>D1821	8/21/88	22:37	
25mg/L ABN	>E5474	↓	23:07	✓
8808 1593 RA	>E5475	8/22/88	00:42	Is [redacted] out dont still - need ree
8808 1591 RA	>E5476		01:39	" " " " doneed
8807 1552	>E5477		02:36	good, use w/ES503
8807 1553	>E5479		05:34	good, use
8809 1590	>E5481	↓	07:27	Is still out, not needed

slightly truncated →

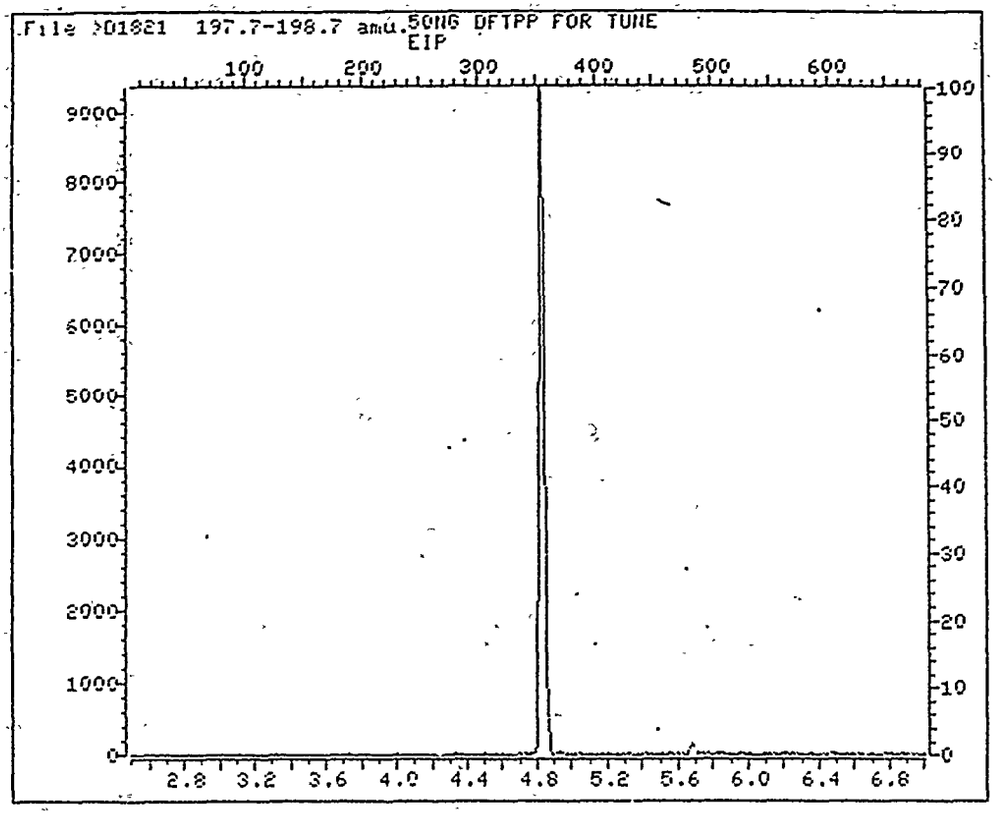
8/18 5 points



File: >01821 Scan #: 354 Retn. time: 4.83

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
50.10	12.787	123.95	.418	187.00	5.347	245.05	1.234	329.65	.193
51.10	49.743	124.45	.461	187.90	.397	246.05	1.963	332.15	.172
52.10	2.735	127.05	42.727	189.00	.783	247.00	.247	333.15	.204
56.10	.247	128.05	3.111	190.00	.236	250.00	.054	334.05	1.362
58.20	1.126	129.95	19.165	192.05	.075	252.00	.032	335.05	.451
61.90	.440	130.15	1.309	196.05	2.853	255.00	46.767	339.25	.161
62.10	.526	132.05	.943	198.05	100.000	256.10	5.900	341.05	.429
63.00	2.446	135.05	.375	199.05	6.447	257.10	.193	343.15	.279
63.90	.526	135.95	.322	199.95	.536	258.00	2.671	346.25	.687
65.10	.515	137.10	.633	201.05	.311	258.90	.408	352.25	.676
69.00	57.799	141.00	1.899	201.35	.225	259.20	.386	352.95	.429
74.10	3.722	142.20	.483	202.05	.161	265.10	.150	353.45	.343
75.10	6.190	142.90	.461	203.15	.386	268.20	.139	353.95	.579
77.10	42.545	144.10	.161	204.05	3.068	270.70	.139	355.15	.054
78.10	2.575	146.10	.601	205.05	5.310	271.00	.021	356.50	.268
79.10	3.250	148.00	1.653	206.05	24.276	272.10	.311	365.10	2.553
80.10	2.789	150.40	.225	211.15	.333	272.90	1.013	366.10	.247
81.10	1.920	151.00	.515	211.85	.150	273.30	.965	371.00	.225
82.10	1.909	152.00	.043	214.45	.161	274.10	3.572	372.10	.912
86.05	1.309	153.20	.826	215.25	.365	275.10	23.160	373.10	.354
91.95	.955	154.30	.086	216.15	.418	276.10	3.089	377.00	.129
92.95	3.830	155.10	1.148	217.05	6.436	277.10	1.609	378.40	.182
95.15	1.094	156.00	1.513	219.85	.333	278.70	.172	383.10	.150
98.05	2.532	157.20	.708	219.05	.064	285.00	.011	389.20	.204
99.05	2.939	160.10	.644	219.85	.172	285.30	.193	390.00	.279
99.95	.247	161.70	.097	221.05	5.610	288.00	.161	391.90	.139
101.05	.987	164.00	.215	222.15	.794	293.10	.472	395.00	.107
104.05	.225	165.00	.279	223.15	.611	296.10	5.803	402.00	.386

105.05	.569	166.10	.300	224.05	11.317	297.10	.461	403.10	.815
105.95	.193	167.10	2.875	225.05	2.360	300.75	.247	404.10	.204
107.05	12.186	167.90	1.684	227.15	4.355	301.05	.268	406.10	.257
108.05	1.738	168.80	.354	227.95	.815	303.05	.504	417.15	.193
110.05	32.300	170.40	.172	229.15	1.277	303.95	.172	421.05	.708
111.05	3.401	171.90	.343	231.15	.461	304.45	.172	421.65	.397
112.15	.118	173.20	.343	234.05	.408	313.05	.279	422.25	.783
114.15	.193	174.20	1.309	234.95	.247	315.25	.558	423.15	1.892
116.15	.279	175.00	.912	236.45	.225	316.05	.204	424.05	1.212
116.95	7.777	175.20	1.395	238.05	.215	323.05	1.845	441.25	12.916
117.95	.365	179.00	1.180	239.95	.343	323.85	.354	442.05	83.051
120.05	.483	180.00	1.330	241.05	.193	324.05	.386	443.15	15.726
121.25	.526	181.10	.708	242.15	.783	327.15	.493	444.25	1.706
122.05	.365	185.10	.719	243.05	.762	328.05	.182	445.25	.172
122.95	1.231	186.10	12.186	244.15	9.547				


File >01021 197.7-198.7 amu.SONG DFTPP FOR TUNE
EIP
100
200
300
400
500
600
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
100
90
80
70
60
50
40
30
20
10
0
2.8
3.2
3.6
4.0
4.4
4.8
5.2
5.6
6.0
6.4
6.8

Calibration Check Report

Title: ID 625 ACID AND BASE/NEUTRALS + EtPHENOL,DMSBP&2-NO2-4-MEPH
Calibrated: 880819 10:10

Check Standard Data File:)ES474
Injection Time: 880821 23:07

fits CA62. update

Compound	$\overline{RF}$	RF	XDiff	Calib Meth	
N-Nitroso-Dimethylamine	.97447	.88528	9.15	Average	
2-Fluorophenol	1.13043	1.07618	4.80	Average	
bis(2-Chloroethyl)ether	1.34309	1.10219	17.94	Average	
Phenol	1.59648	1.42930	10.47	Average	
Phenol-d5	1.38909	1.32111	4.89	Average	
Aniline	1.37724	1.36294	1.04	Average	
2-Chlorophenol	1.23872	1.23607	.21	Average	
1,3-Dichlorobenzene	1.33894	1.35664	1.32	Average	
1,4-Dichlorobenzene	1.29251	1.37938	6.72	Average	
Benzyl Chloride	-	-	-	Average	
Benzyl Alcohol	.74390	.05975	91.97	Average	
1,2-Dichlorobenzene	1.23619	1.33724	8.17	Average	
2-Methylphenol	1.04062	1.06247	2.10	Average	
3-&-4-Methylphenol	1.04613	.97209	7.08	Average	(Conc=50.00)
bis(2-chloroisopropyl)Ether	1.68957	1.36356	19.30	Average	
N-Nitroso-Di-n-Propylamine	1.01091	.97354	3.70	Average	
Hexachloroethane	.56084	.59080	5.34	Average	
Dibromochloropropane	-	-	-	Average	
Nitrobenzene	.46004	.42140	8.40	Average	
Nitrobenzene-d5	.39509	.36862	6.70	Average	
2-Nitrophenol	.20748	.20256	2.37	Average	
Isophorone	.81764	.79112	3.24	Average	
bis(2-Chloroethoxy)methane	.47140	.47331	.41	Average	
2,4-Dimethylphenol	.27958	.23195	17.04	Average	
Benzoic Acid	.24725	.02009	91.87	Average	
2,4-Dichlorophenol	.27946	.28615	2.39	Average	
1,2,4-Trichlorobenzene	.31217	.32630	4.52	Average	
Naphthalene	.88333	.93028	5.32	Average	
4-Chloroaniline	.39406	.32490	17.55	Average	
Hexachlorobutadiene	.19193	.21340	11.18	Average	
4-Chloro-3-Methylphenol	.32605	.25871	20.65	Average	
2-Methylnaphthalene	.51308	.51595	.56	Average	
Hexachlorocyclopentadiene	.41011	.19151	53.30	Average	
2,4,6-Trichlorophenol	.43671	.48974	12.14	Average	
2,4,5-Trichlorophenol	.34677	.23389	32.55	Average	
2-Fluorobiphenyl	1.07242	1.05044	2.05	Average	
2-Chloronaphthalene	1.10710	1.09068	1.48	Average	
2-Nitroaniline	.55901	.51188	8.43	Average	
Dimethylphthalate	1.24432	1.31316	5.53	Average	
2,6-Dinitrotoluene	.31339	.33096	5.61	Average	

RF - Response Factor from daily standard file at 25.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration

XDiff - % Difference from original average or curve

Calibration Check Report

Title: ID 625 ACID AND BASE/NEUTRALS + EIPHENOL,DNSBP&2-NO2-4-MEPH
Calibrated: 880819 10:10

Check Standard Data File:)E5474
Injection Time: 880821 23:07

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
Acenaphthylene	1.57886	1.62008	2.61	Average
3-Nitroaniline	.57448	.45325	21.10	Average
2,4-Dinitrophenol	.15791	.02533	83.96	Average
Acenaphthene	1.08564	1.07146	1.31	Average
Dibenzofuran	1.36426	1.42579	4.51	Average
2,4-Dinitrotoluene	.34710	.31177	10.18	Average
4-Nitrophenol	.80161	.09739	87.85	Average
Fluorene	1.12246	1.14947	2.41	Average
Diethylphthalate	1.28599	1.42123	10.52	Average
4-Chlorophenyl-phenylether	.47254	.55627	17.72	Average
4-Nitroaniline	.26489	.19712	25.58	Average
2,4,6-Tribromophenol	.21518	.19436	9.68	Average
1,2-Diphenylhydrazine	-	-	-	Average
Alpha-BHC	-	-	-	Average
Beta-BHC	-	-	-	Average
Gamma-BHC	-	-	-	Average
Delta-BHC	-	-	-	Average
Heptachlor	-	-	-	Average
Aldrin	-	-	-	Average
N-Nitrosodiphenylamine	.42249	.45280	7.18	Average
4,6-Dinitro-2-Methylphenol	.13086	.05592	57.27	Average
4-Bromophenyl-phenylether	.21830	.23124	5.93	Average
Hexachlorobenzene	.30780	.32393	5.24	Average
Pentachlorophenol	.16736	.12924	22.78	Average
Phenanthrene	.94607	.97952	3.54	Average
Anthracene	.95445	.99951	4.72	Average
Di-n-Butylphthalate	1.51144	1.56226	3.36	Average
4,4'-Dibromobiphenyl	1.66708	2.07065	24.21	Average
Fluoranthene	.96211	1.06153	10.33	Average
Heptachlor Epoxide	-	-	-	Average
Endosulfan I	-	-	-	Average
4,4'-DDE	-	-	-	Average
Dieldrin	-	-	-	Average
Endrin	-	-	-	Average
4,4'-DDD	-	-	-	Average
Endosulfan II	-	-	-	Average
Endrin Aldehyde	-	-	-	Average
4,4'-DDT	-	-	-	Average
Endosulfan Sulfate	-	-	-	Average
Dibutylchlorendate	-	-	-	Average

RF - Response Factor from daily standard file at 25.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration

%Diff - % Difference from original average or curve

Calibration Check Report

Title: ID 625 ACID AND BASE/NEUTRALS + E1PHENOL,GNSBP82-H02-4-MEPH
Calibrated: 880819 10:10

Check Standard Data File:)E5474
Injection Time: 880821 23:07

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
Benzidine	.18071	.01522	91.57	Average
Pyrene	1.48460	1.31180	11.64	Average
Terphenyl-d14	1.03862	.98441	5.22	Average
Butylbenzylphthalate	1.05779	.94080	11.06	Average
3,3'-Dichlorobenzidine	.15087	.15731	4.26	Average
Chrysene	1.14312	1.17702	2.97	Average
Benzo(a)Anthracene	1.09294	1.02588	6.14	Average
bis(2-Ethylhexyl)Phthalate	1.30762	1.17602	10.06	Average
Di-n-octylphthalate	2.71198	2.94072	8.43	Average
Benzo(a)Pyrene	1.03642	1.02835	.78	Average
Benzo(b)Fluoranthene	1.33934	1.21483	9.30	Average
Indeno(1,2,3-cd)Pyrene	.98488	.59403	39.68	Average
Dibenzo(a,h)Anthracene	.88532	.49624	43.95	Average
Benzo(k)Fluoranthene	1.08633	1.22842	13.08	Average
Benzo(g,h,i)Perylene	.98474	.59403	39.68	Average

RF - Response Factor from daily standard file at 25.00 mg/L

$\overline{RF}$ - Average Response Factor from Initial Calibration

%Diff - % Difference from original average or curve

Calibration Report

Title: ID 625 ACID AND BASE/NEUTRALS + ETPHENOL,DNSBP82-NO2-4-MEPH
Calibrated: 880822 00:53

Files: -)E5474 - - - - -

Compound	RF 10.00	RF 25.00	RF 40.00	RF 60.00	RF 80.00	RF 120.00	RF 160.00	$\overline{RRT}$	$\overline{RF}$	% RSD	
N-Nitroso-Dimethylamine	-	.88528	-	-	-	-	-	.426	.88528	-	
2-Fluorophenol	-	1.07618	-	-	-	-	-	.678	1.07618	-	
bis(2-Chloroethyl)ether	-	1.10219	-	-	-	-	-	.941	1.10219	-	
Phenol	-	1.42930	-	-	-	-	-	.925	1.42930	-	
Phenol-d5	-	1.32111	-	-	-	-	-	.922	1.32111	-	
Aniline	-	1.36294	-	-	-	-	-	.940	1.36294	-	
2-Chlorophenol	-	1.23607	-	-	-	-	-	.949	1.23607	-	
1,3-Dichlorobenzene	-	1.35664	-	-	-	-	-	.989	1.35664	-	
1,4-Dichlorobenzene	-	1.37938	-	-	-	-	-	1.004	1.37938	-	
Benzyl Chloride	-	-	-	-	-	-	-	-	-	-	
Benzyl Alcohol	-	.05975	-	-	-	-	-	1.094	.05975	-	
1,2-Dichlorobenzene	-	1.33724	-	-	-	-	-	1.058	1.33724	-	
2-Methylphenol	-	1.06247	-	-	-	-	-	1.099	1.06247	-	
3-&-4-Methylphenol	-	.97209	-	-	-	-	-	1.150	.97209	-	(Conc=20.0,50.0
bis(2-chloroisopropyl)Ether	-	1.36356	-	-	-	-	-	1.105	1.36356	-	
N-Nitroso-Di-n-Propylamine	-	.97354	-	-	-	-	-	1.150	.97354	-	
Hexachloroethane	-	.59080	-	-	-	-	-	1.153	.59080	-	
Dibromochloropropane	-	-	-	-	-	-	-	-	-	-	
Nitrobenzene	-	.42140	-	-	-	-	-	.840	.42140	-	
Nitrobenzene-d5	-	.36862	-	-	-	-	-	.836	.36862	-	
2-Nitrophenol	-	.20256	-	-	-	-	-	.915	.20256	-	
Isophorone	-	.79112	-	-	-	-	-	.898	.79112	-	
bis(2-Chloroethoxy)methane	-	.47331	-	-	-	-	-	.959	.47331	-	
2,4-Dimethylphenol	-	.23195	-	-	-	-	-	.937	.23195	-	
Benzoic Acid	-	.02009	-	-	-	-	-	1.069	.02009	-	
2,4-Dichlorophenol	-	.28615	-	-	-	-	-	.974	.28615	-	
1,2,4-Trichlorobenzene	-	.32630	-	-	-	-	-	.992	.32630	-	
Naphthalene	-	.93028	-	-	-	-	-	1.004	.93028	-	
4-Chloroaniline	-	.32490	-	-	-	-	-	1.026	.32490	-	
Hexachlorobutadiene	-	.21340	-	-	-	-	-	1.055	.21340	-	
4-Chloro-3-Methylphenol	-	.25871	-	-	-	-	-	1.164	.25871	-	
2-Methylnaphthalene	-	.51595	-	-	-	-	-	1.175	.51595	-	
Hexachlorocyclopentadiene	-	.19151	-	-	-	-	-	.856	.19151	-	
2,4,6-Trichlorophenol	-	.48974	-	-	-	-	-	.880	.48974	-	
2,4,5-Trichlorophenol	-	.23389	-	-	-	-	-	.880	.23389	-	
2-Fluorobiphenyl	-	1.05044	-	-	-	-	-	.886	1.05044	-	
2-Chloronaphthalene	-	1.09068	-	-	-	-	-	.898	1.09068	-	
2-Nitroaniline	-	.51188	-	-	-	-	-	.924	.51188	-	
Dimethylphthalate	-	1.31316	-	-	-	-	-	.969	1.31316	-	

RF - Response Factor (Subscript is amount in ng/L)

$\overline{RRT}$ - Average Relative Retention Time (RT Std/RT Istd)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

Calibration Report

Title: ID 625 ACID AND BASE/NEUTRALS + C1PHENOL,DNSBP82-NO2-4-MEPH
Calibrated: 880822 00:53

Files:	-	)E5474	-	-	-	-	-			
Compound	RF 10.00	RF 25.00	RF 40.00	RF 60.00	RF 80.00	RF 120.00	RF 160.00	$\overline{RRT}$	$\overline{RF}$	% RSD
2,6-Dinitrotoluene	-	.33096	-	-	-	-	-	.978	.33096	-
Acenaphthylene	-	1.62008	-	-	-	-	-	.971	1.62008	-
3-Nitroaniline	-	.45325	-	-	-	-	-	.999	.45325	-
2,4-Dinitrophenol	-	.02533	-	-	-	-	-	1.019	.02533	-
Acenaphthene	-	1.07146	-	-	-	-	-	1.005	1.07146	-
Dibenzofuran	-	1.42579	-	-	-	-	-	1.033	1.42579	-
2,4-Dinitrotoluene	-	.31177	-	-	-	-	-	1.045	.31177	-
4-Nitrophenol	-	.09739	-	-	-	-	-	1.045	.09739	-
Fluorene	-	1.14947	-	-	-	-	-	1.095	1.14947	-
Diethylphthalate	-	1.42123	-	-	-	-	-	1.096	1.42123	-
4-Chlorophenyl-phenylether	-	.55627	-	-	-	-	-	1.099	.55627	-
4-Nitroaniline	-	.19712	-	-	-	-	-	1.107	.19712	-
2,4,6-Tribromophenol	-	.19436	-	-	-	-	-	1.141	.19436	-
1,2-Diphenylhydrazine	-	-	-	-	-	-	-	-	-	-
Alpha-BHC	-	-	-	-	-	-	-	-	-	-
Beta-BHC	-	-	-	-	-	-	-	-	-	-
Gamma-BHC	-	-	-	-	-	-	-	-	-	-
Delta-BHC	-	-	-	-	-	-	-	-	-	-
Heptachlor	-	-	-	-	-	-	-	-	-	-
Aldrin	-	-	-	-	-	-	-	-	-	-
N-Nitrosodiphenylamine	-	.45280	-	-	-	-	-	.891	.45280	-
4,6-Dinitro-2-Methylphenol	-	.05592	-	-	-	-	-	.887	.05592	-
4-Bromophenyl-phenylether	-	.23124	-	-	-	-	-	.941	.23124	-
Hexachlorobenzene	-	.32393	-	-	-	-	-	.958	.32393	-
Pentachlorophenol	-	.12924	-	-	-	-	-	.989	.12924	-
Phenanthrene	-	.97952	-	-	-	-	-	1.003	.97952	-
Anthracene	-	.99951	-	-	-	-	-	1.009	.99951	-
Di-n-Butylphthalate	-	1.56226	-	-	-	-	-	1.102	1.56226	-
4,4'-Dibromobiphenyl	-	2.07065	-	-	-	-	-	1.137	2.07065	-
Fluoranthene	-	1.06153	-	-	-	-	-	1.171	1.06153	-
Heptachlor Epoxide	-	-	-	-	-	-	-	-	-	-
Endosulfan I	-	-	-	-	-	-	-	-	-	-
4,4'-DDE	-	-	-	-	-	-	-	-	-	-
Dieldrin	-	-	-	-	-	-	-	-	-	-
Endrin	-	-	-	-	-	-	-	-	-	-
4,4'-DDD	-	-	-	-	-	-	-	-	-	-
Endosulfan II	-	-	-	-	-	-	-	-	-	-
Endrin Aldehyde	-	-	-	-	-	-	-	-	-	-
4,4'-DDT	-	-	-	-	-	-	-	-	-	-

RF - Response Factor (Subscript is amount in ng/L)

$\overline{RRT}$ - Average Relative Retention Time (RT Std/RT Istd)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

Calibration Report

Title: ID 625 ACID AND BASE/NEUTRALS + DIPHENOL,DHSBP82-NO2-4-MEPH
Calibrated: 880822 00:53

Files:	-	)E5474	-	-	-	-	-			
	RF	RF	RF	RF	RF	RT	RF			
Compound	10.00	25.00	40.00	60.00	80.00	120.00	160.00	$\overline{RRT}$	$\overline{RF}$	% RSD
Endosulfan Sulfate	-	-	-	-	-	-	-	--	-	-
Dibutylchlorendate	-	-	-	-	-	-	-	-	-	-
Benzidine	-	.01522	-	-	-	-	-	.882	.01522	-
Pyrene	-	1.31180	-	-	-	-	-	.873	1.31180	-
Terphenyl-d14	-	.98441	-	-	-	-	-	.895	.98441	-
Butylbenzylphthalate	-	.94080	-	-	-	-	-	.953	.94080	-
3,3'-Dichlorobenzidine	-	.15731	-	-	-	-	-	.999	.15731	-
Chrysene	-	1.17702	-	-	-	-	-	1.002	1.17702	-
Benzo(a)Anthracene	-	1.02588	-	-	-	-	-	.997	1.02588	-
bis(2-Ethylhexyl)Phthalate	-	1.17602	-	-	-	-	-	1.017	1.17602	-
Di-n-octylphthalate	-	2.94072	-	-	-	-	-	.923	2.94072	-
Benzo(a)Pyrene	-	1.02835	-	-	-	-	-	.992	1.02835	-
Benzo(b)Fluoranthene	-	1.21483	-	-	-	-	-	.953	1.21483	-
Indeno(1,2,3-cd)Pyrene	-	.59403	-	-	-	-	-	1.176	.59403	-
Dibenzo(a,h)Anthracene	-	.49624	-	-	-	-	-	1.183	.49624	-
Benzo(k)Fluoranthene	-	1.22842	-	-	-	-	-	.956	1.22842	-
Benzo(g,h,i)Perylene	-	.59403	-	-	-	-	-	1.176	.59403	-

RF - Response Factor (Subscript is amount in ng/L)

$\overline{RRT}$ - Average Relative Retention Time (RT Std/RT Istd)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

EPA Sample No. (Standard): 25 mg/L BNA STD Date Analyzed: 8/21/88

Lab File ID (Standard): E5474 Time Analyzed: 22:37

Instrument ID: _____

	IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
12 HOUR STD	35805	8.75	125745	12.32	70104	17.78
UPPER LIMIT	71,610	9.25	251,490	12.82	140,208	18.28
LOWER LIMIT	17903	8.25	62,873	11.82	35,052	17.28
EPA SAMPLE NO.						
E5475 01 8808 1593	75664	8.79	278938	12.34	145428	17.81
E5476 02 8808 1591	68285	8.76	231157	12.33	126849	17.80
E5479 03 88071553	18,554	9.13	112435	12.55	101520	18.00
E5477 04 88071552	22162	8.97	132295	12.44	115194	17.91
05						
06						
07						
08						
09						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name:_____ Contract:_____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

EPA Sample No.(Standard): 25ng/L BNA STD Date Analyzed: 8/21/88

Lab File ID (Standard): E5474 Time Analyzed: 22.37

Instrument ID:_____

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS4(PRY) AREA #	RT
12 HOUR STD	117819	22.40	98366	30.81	66178	36.29
UPPER LIMIT	235,638	22.90	196,732	31.31	132,356	36.79
LOWER LIMIT	58910	21.90	49183	30.31	33089	35.79
EPA SAMPLE NO.						
01 8808593	246829 *	22.43	200033 *	30.83	145769 *	36.34
02 8808591	217949	22.42	193115	30.80	144081 *	36.32
03 8807553	198983	22.57	52669	31.05	42099	36.53
04 8807552	224711	22.50	88289	30.97	122370	36.55
05						
06						
07						
08						
09						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk.

page __ of __

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 8/24/88 14:53

Lab ID >D1824::D1 Data Release Authorized By: Lana Kuck

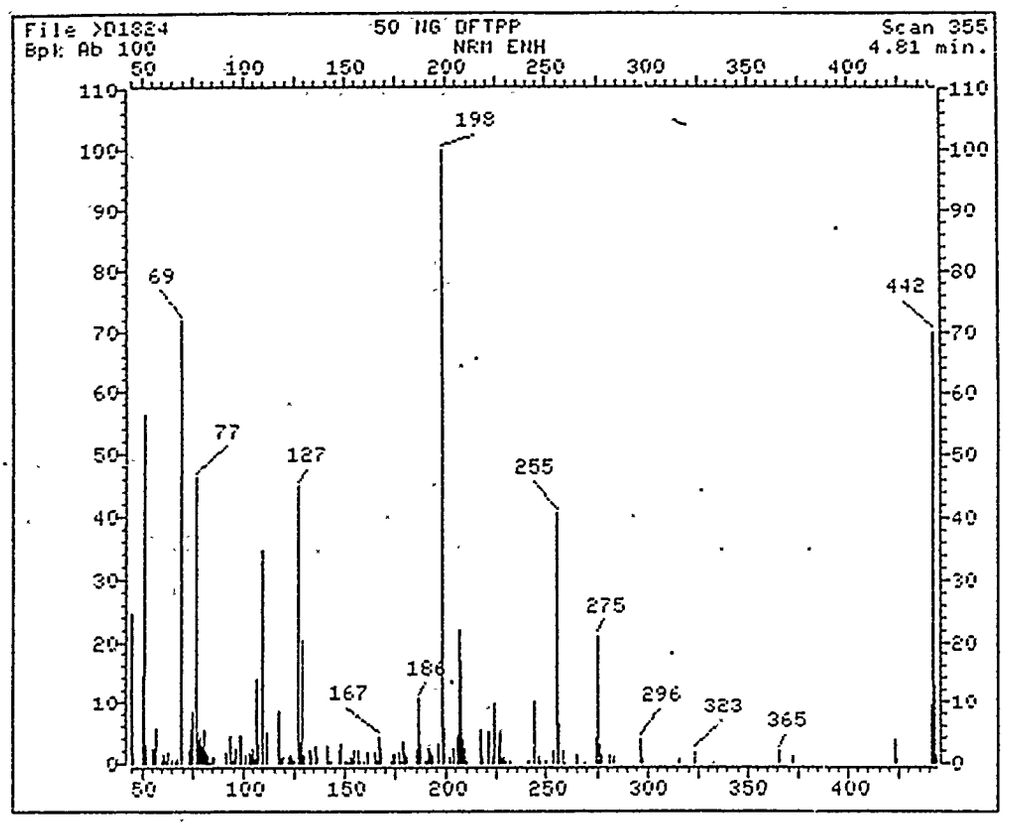
8/18 SP

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	56.54 OK	
68	less than 2.0% of mass 69	.57 OK	(.7987) #1
69	mass 69 relative abundance	71.85	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	44.92 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	5.89 OK	
275	10.0 - 30.0% of mass 198	20.97 OK	
365	greater than 1.00% of mass 198	2.02 OK	
441	present, but less than mass 443	9.49 OK	
442	greater than 40.0% of mass 198	69.99 OK	
443	17.0 - 23.0% of mass 442	12.94 OK	(18.49) #2

THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

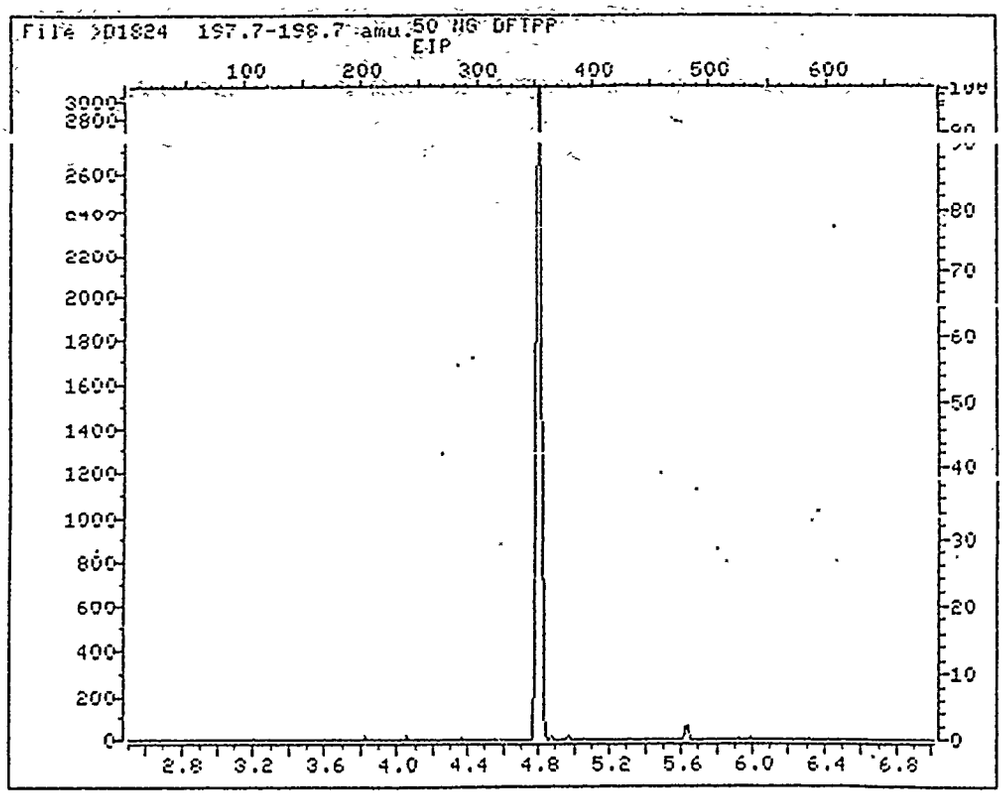
SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS	
50 NG DFTPP	>D1824	8/24/88	14:53	
25mg/LABW	>ES4967		15:32	
8808159193 BLK (Reextract)	>ES5500		20:16	good, use
88081593 RE	>ES5501		21.13	IS still out, don't use
88081591 RE	>ES5502		22:10	IS still out, SS good -
88071552 10:1	>ES5503		23:06	IS good - use
88071554 10.1	>ES5504	8/25/88	00.03	IS out - don't need
88081590 10:1	>ES5505		00.59	IS out - don't need



File: >D1824 Scan #: 355 Retn time: 4.81

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
44.10	24.436	91.75	.574	135.95	1.250	180.10	1.658	231.15	.472
45.10	.905	93.05	4.540	136.95	.893	181.00	1.186	240.65	.230
50.10	14.411	94.05	.319	141.00	2.678	185.20	1.939	244.25	9.973
51.10	56.536	95.15	.867	142.20	.497	186.20	10.738	246.05	1.097
52.10	3.010	96.05	2.219	143.00	.306	187.20	3.214	247.00	.268
55.10	2.283	98.05	4.234	143.30	.306	188.90	.217	249.10	.523
56.20	2.334	98.85	4.451	145.60	.153	190.60	.255	253.10	1.926
57.00	5.726	100.95	1.416	147.00	2.079	191.20	2.270	255.10	40.582
59.80	.306	103.05	1.569	148.00	3.188	192.05	1.569	256.10	6.453
61.10	1.288	104.05	1.352	150.30	.421	192.95	1.492	258.20	2.117
62.00	.536	104.25	.510	151.20	.459	196.15	3.150	259.10	.191
63.00	1.811	105.05	2.334	152.00	.140	198.05	100.000	265.00	1.467
65.00	.778	106.05	.714	152.90	1.148	199.05	5.892	269.10	.204
66.60	.357	107.05	13.697	153.90	.344	201.55	1.020	274.20	4.119
67.40	.663	108.05	2.933	154.10	.791	203.35	.128	275.10	20.967
67.70	.574	110.05	34.689	155.10	2.079	204.05	2.525	276.10	2.908
69.00	71.853	111.15	5.038	156.20	2.041	205.15	4.464	277.00	1.479
73.20	2.194	116.95	8.507	157.00	.574	206.15	21.859	281.10	1.416
74.00	5.471	118.15	.638	157.60	.497	207.15	16.869	283.20	.944
75.20	8.341	119.05	1.135	159.10	.370	208.05	3.801	296.10	3.964
77.10	46.333	119.65	.255	161.10	1.773	209.05	2.398	297.30	.714
78.10	3.864	122.05	1.122	165.00	1.645	210.45	.434	315.25	.676
79.00	4.464	122.85	1.263	165.90	.268	217.05	5.318	323.25	1.760
80.10	2.691	123.15	.663	167.00	4.107	218.15	.714	333.05	.140
81.10	5.267	124.15	.650	167.90	2.538	221.15	4.936	365.20	2.015
82.10	1.951	124.95	.510	171.00	1.129	222.15	1.047	372.30	1.196

83.75	.191	129.05	20.163	175.20	1.301	227.05	5.050	441.15	9.489
85.05	.918	129.95	1.365	176.90	1.645	227.95	.561	442.25	69.991
86.05	1.008	133.05	1.900	177.20	.612	228.95	1.046	443.25	12.945
91.05	1.747	133.95	1.441	177.90	.179	229.15	.306	444.15	1.301
91.55	.306	135.15	2.691	179.00	3.341				


File >D1824 197.7-198.7 amu 50 NG DFTPP
EIP
100
200
300
400
500
600
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
100
80
70
60
50
40
30
20
10
0
2.8
3.2
3.6
4.0
4.4
4.8
5.2
5.6
6.0
6.4
6.8

CA625

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 08/24/88

Contractor: _____ Time: 15:32

Contract No: _____ Laboratory ID: >E5497

Instrument ID: _____ Initial Calibration Date: 08/19/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC	
N-Nitroso-Dimethylamine	.97447	1.01130	3.78			
2-Fluorophenol	1.13043	1.21721	7.68			
bis(2-Chloroethyl)ether	1.34309	1.22024	9.15			
Phenol	1.59648	1.66971	4.59	*	✓	
Phenol-d5	1.38909	1.46764	5.65			
Aniline	1.37724	1.20411	12.57			
2-Chlorophenol	1.23872	1.30674	5.49			
1,3-Dichlorobenzene	1.33894	1.41989	6.05			
1,4-Dichlorobenzene	1.29251	1.38351	7.04	*	✓	
Benzyl Chloride	-	-	-			
Benzyl Alcohol	.74390	.70004	5.90			
1,2-Dichlorobenzene	1.23619	1.32394	7.10			
2-Methylphenol	1.04062	1.07884	3.67			
3-&-4-Methylphenol	1.04613	.99851	4.55			(Conc=50.00)
bis(2-chloroisopropyl)Ether	1.68957	1.52628	9.66			
N-Nitroso-Di-n-Propylamine	1.01091	.73842	26.95		** ✓	
Hexachloroethane	.56084	.55389	1.24			
Dibromochloropropane	-	-	-			
Nitrobenzene	.46004	.47002	2.17			
Nitrobenzene-d5	.39509	.41043	3.88			
2-Nitrophenol	.20748	.22285	7.41		** ✓	
Isophorone	.81764	.78578	3.90			
bis(2-Chloroethoxy)methane	.47140	.49141	4.24			
2,4-Dimethylphenol	.27958	.27142	2.92			
Benzoic Acid	.24725	.02698	89.09			
2,4-Dichlorophenol	.27946	.28877	3.33	*	✓	
1,2,4-Trichlorobenzene	.31217	.32692	4.72			
Naphthalene	.88333	.91115	3.15			
4-Chloroaniline	.39406	.39398	.02			
Hexachlorobutadiene	.19193	.19529	1.75	*	✓	
4-Chloro-3-Methylphenol	.32605	.31815	2.42	*	✓	
2-Methylnaphthalene	.51308	.51270	.07			

RF - Response Factor from daily standard file at 25.00 mg/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 08/24/88

Contractor: Time: 15:32

Contract No: Laboratory ID: >E5497

Instrument ID: Initial Calibration Date: 08/19/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.41011	.36646	10.64		** ✓
2,4,6-Trichlorophenol	.43671	.42763	2.08	* ✓	
2,4,5-Trichlorophenol	.34677	.45024	29.84		
2-Fluorobiphenyl	1.07242	1.09854	2.44		
2-Chloronaphthalene	1.10710	1.16539	5.26		
2-Nitroaniline	.55901	.60271	7.82		
Dimethylphthalate	1.24432	1.31291	5.51		
2,6-Dinitrotoluene	.31339	.36989	18.03		
Acenaphthylene	1.57886	1.63704	3.69		
3-Nitroaniline	.57448	.62835	9.38		
2,4-Dinitrophenol	.15791	.16618	5.24		** ✓
Acenaphthene	1.08564	1.13910	4.92	* ✓	
Dibenzofuran	1.36426	1.48530	8.91		
2,4-Dinitrotoluene	.34710	.37410	7.78		
4-Nitrophenol	.80161	.29247	63.52		** ✓
Fluorene	1.12246	1.23160	9.72		
Diethylphthalate	1.28599	1.41050	9.68		
4-Chlorophenyl-phenylether	.47254	.54130	14.55		
4-Nitroaniline	.26489	.37098	40.05		
2,4,6-Tribromophenol	.21518	.24973	16.06		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.42249	.46166	9.27	* ✓	
4,6-Dinitro-2-Methylphenol	.13086	.14891	13.79		
4-Bromophenyl-phenylether	.21830	-	-		
Hexachlorobenzene	.30780	.30490	.94		
Pentachlorophenol	.16736	.14434	13.76	* ✓	

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 08/24/88

Contractor: Time: 15:32

Contract No: Laboratory ID: >E5497

Instrument ID: Initial Calibration Date: 08/19/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	.94607	.95129	.55		
Anthracene	.95445	.99472	4.22		
Di-n-Butylphthalate	1.51144	1.56061	3.25		
4,4'-Dibromobiphenyl	1.66708	1.19636	28.24		
Fluoranthene	.96211	1.00066	4.01	* ✓	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.18071	.08205	54.60		
Pyrene	1.48460	1.35851	8.49		
Terphenyl-d14	1.03862	.96585	7.01		
Butylbenzylphthalate	1.05779	.96107	9.14		
3,3'-Dichlorobenzidine	.15087	.21156	40.23		
Chrysene	1.14312	1.14003	.27		
Benzo(a)Anthracene	1.09294	1.02580	6.14		
bis(2-Ethylhexyl)Phthalate	1.30762	1.11333	14.86		
Di-n-octylphthalate	2.71198	3.03437	11.89	* ✓	
Benzo(a)Pyrene	1.03642	1.07009	3.25	* ✓	
Benzo(b)Fluoranthene	1.33934	1.33395	.40		
Indeno(1,2,3-cd)Pyrene	.98488	.59086	40.01		
Dibenzo(a,h)Anthracene	.88532	.68008	23.18		
Benzo(k)Fluoranthene	1.08633	1.24138	14.27		
Benzo(g,h,i)Perylene	.98474	.55284	43.86		

RF - Response Factor from daily standard file at 25.00 mg/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

EPA Sample No.(Standard): 25ng/µL BNA STR Date Analyzed: 8/24/88

Lab File ID (Standard): E5497 Time Analyzed: 14:53

Instrument ID: _____

	IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
12 HOUR STD	58230	8.70	207835	12.27	105650	17.73
UPPER LIMIT	116,460	9.20	415,670	12.77	211,300	18.23
LOWER LIMIT	29,115	8.20	103,918	11.77	52,825	17.23
EPA SAMPLE NO.						
ES5000 01 BLK1591-93 (8805)	57501	8.72	212671	12.23	112163	17.70
ES501 02 8805E1593	59050	8.71	210309	12.24	114831	17.70
ES502 03 8805E1591	62879	8.72	216940	12.25	121261	17.73
ES503 04 8807I552 10:1	68490	8.76	242632	12.29	128997	17.75
ES504 05 8807I554 10:1	64004	8.75	198207	12.32	108176	17.77
ES505 06 8805I590 10:1	67225	8.79	218530	12.34	117261	17.80
07						
08						
09						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

EPA Sample No.(Standard): 25 mg/L BNA STD Date Analyzed: 8/24/88

Lab File ID (Standard): E5497 Time Analyzed: 14:53

Instrument ID: _____

6

	IS4(PHN) AREA	#	RT	IS5(CRY) AREA	#	RT	IS6(PRY) AREA	#	RT
12 HOUR STD	176974		22.33	131790		30.74	78278		36.8
UPPER LIMIT	353,948		22,83	263,580		31.24	156,556		36.69
LOWER LIMIT	88487		21.83	65895		30.24	39139		35.69
EPA SAMPLE NO.									
01 8808 bll 1591-93	171758		22.33	105006		30.71	45655		36.11
02 88081593	186076		22.32	102499		30.71	37392	*	36.10
03 88081591	193924		22.32	87493		30.71	28533	*	36.11
04 88071552 10:1	213456		22.35	119235		30.74	45771		36.16
05 88071554 10:1	173746		22.36	54595	*	30.71	18200	*	36.12
06 88081590 10:1	194586		22.41	71024		30.75	25959		36.17
07									
08									
09									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

page __ of __

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 8/24/88 14:53

Lab ID >D1824::01 Data Release Authorized By: Lana Kuck

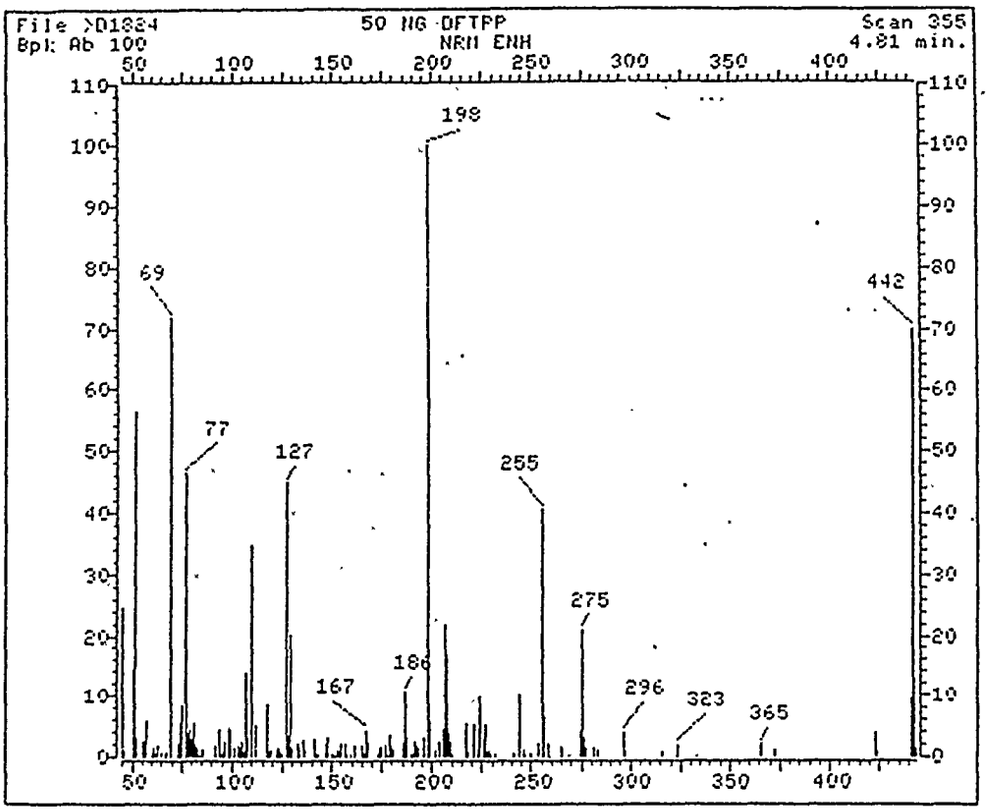
8/18 5?

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	56.54 OK	
68	less than 2.0% of mass 69	.57 OK	(.7987) #1
69	mass 69 relative abundance	71.85	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	44.92 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	5.89 OK	
275	10.0 - 30.0% of mass 198	20.97 OK	
365	greater than 1.00% of mass 198	2.02 OK	
441	present, but less than mass 443	9.49 OK	
442	greater than 40.0% of mass 198	69.99 OK	
443	17.0 - 23.0% of mass 442	12.94 OK	(18.49) #2

THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

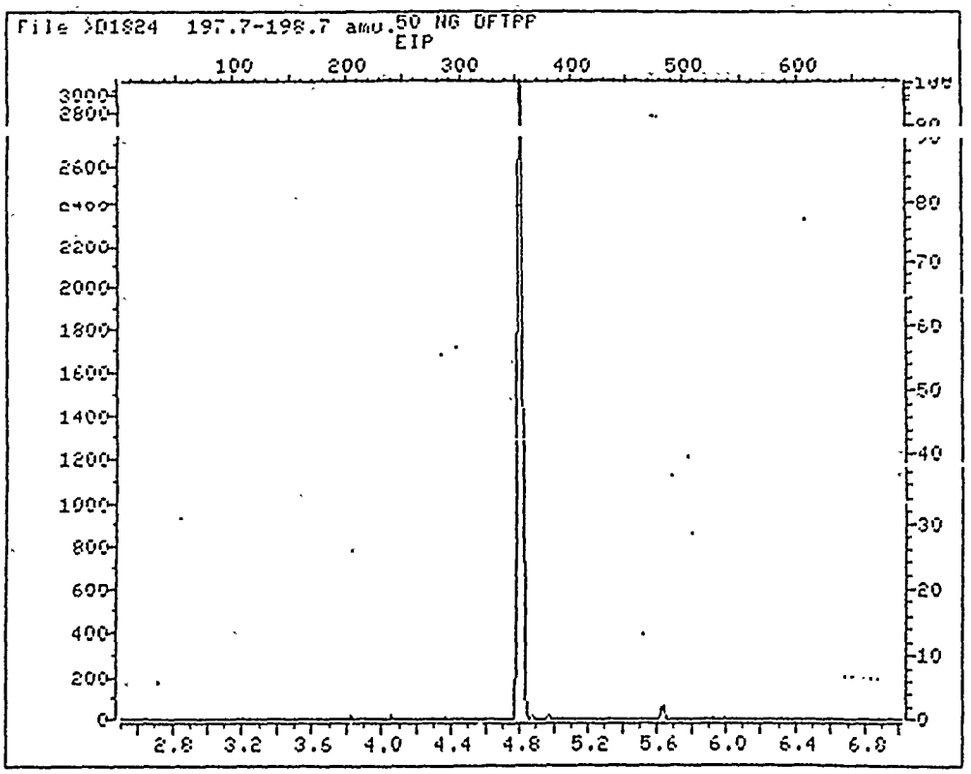
SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS	
50 NG DFTPP	>D1824	8/24/88	14:53	
25mg/LABN	>E54967		15.32	
8808159193 RE	>E5H00		20:16	good, use
(Reextract)				
88081593 RE	>E5501		21.13	IS still out, don't need
88081591 RE	>E5502		22:10	IS still out, SS good -
88071552 10:1	>E5503	↓	23:06	IS good - use
88071554 10.1	>E5504	8/25/88	00.03	IS out - don't need
88081590 10:1	>E5505	↓	00.59	IS out - don't need



File: >D1824 Scan #: 355 Retn. time: 4.81

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
44.10	24.436	91.75	.574	135.95	1.250	180.10	1.658	231.15	.472
45.10	.905	93.05	4.540	136.95	.893	181.00	1.186	240.65	.230
50.10	14.411	94.05	.319	141.00	2.678	185.20	1.939	244.25	9.973
51.10	56.536	95.15	.867	142.20	.497	186.20	10.738	246.05	1.097
52.10	3.010	96.05	2.219	143.00	.306	187.20	3.214	247.00	.268
55.10	2.283	98.05	4.234	143.30	.306	188.90	.217	249.10	.523
56.20	2.334	98.85	4.451	145.60	.153	190.60	.255	253.10	1.926
57.00	5.726	100.95	1.416	147.00	2.079	191.20	2.270	255.10	40.582
59.80	.306	103.05	1.569	148.00	3.188	192.05	1.569	256.10	6.453
61.10	1.288	104.05	1.352	150.30	.421	192.95	1.492	258.20	2.117
62.00	.536	104.25	.510	151.20	.459	196.15	3.150	259.10	.191
63.00	1.811	105.05	2.334	152.00	.140	198.05	100.000	265.00	1.467
65.00	.778	106.05	.714	152.90	1.148	199.05	5.892	269.10	.204
66.60	.357	107.05	13.697	153.90	.344	201.55	1.020	274.20	4.119
67.40	.663	108.05	2.933	154.10	.791	203.35	.128	275.10	20.967
67.70	.574	110.05	34.689	155.10	2.079	204.05	2.525	276.10	2.908
69.00	71.653	111.15	5.038	156.20	2.041	205.15	4.464	277.00	1.479
73.20	2.194	116.95	8.507	157.00	.574	206.15	21.859	281.10	1.416
74.00	5.471	118.15	.638	157.60	.497	207.15	16.860	283.20	.944
75.20	8.341	119.05	1.135	159.10	.370	208.05	3.801	296.10	3.864
77.10	46.333	119.65	.255	161.10	1.773	209.05	2.398	297.30	.714
78.10	3.864	122.05	1.122	165.00	1.645	210.45	.434	315.25	.676
79.00	4.464	122.85	1.263	165.90	.268	217.05	5.318	323.25	1.760
80.10	2.691	123.15	.663	167.00	4.107	218.15	.714	333.05	.140
81.10	5.267	124.15	.650	167.90	2.538	221.15	4.936	365.20	2.015
82.10	1.951	124.85	.510	171.00	.128	223.15	1.046	372.30	1.186

83.75	.191	129.05	20.163	175.20	1.301	227.05	5.050	441.15	9.489
85.05	.918	129.95	1.365	176.90	1.545	227.95	.561	442.25	69.991
86.05	1.008	133.05	1.900	177.20	.612	228.95	1.046	443.25	12.945
91.05	1.747	133.95	1.441	177.90	.179	229.15	.306	444.15	1.301
91.55	.306	135.15	2.691	179.00	3.341				


File >D1824 197.7-198.7 amu.50 NG DFTPP
EIP
100
200
300
400
500
600
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
100
90
80
70
60
50
40
30
20
10
0
2.8
3.2
3.6
4.0
4.4
4.8
5.2
5.6
6.0
6.4
6.8

CA62

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 08/24/88

Contractor: _____ Time: 15:32

Contract No: _____ Laboratory ID:)E5497

Instrument ID: _____ Initial Calibration Date: 08/19/88

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC	
N-Nitroso-Dimethylamine	.97447	1.01130	3.78			
2-Fluorophenol	1.13043	1.21721	7.68			
bis(2-Chloroethyl)ether	1.34309	1.22024	9.15			
Phenol	1.59648	1.66971	4.59	*	✓	
Phenol-d5	1.38909	1.46764	5.65			
Aniline	1.37724	1.20411	12.57			
2-Chlorophenol	1.23872	1.30674	5.49			
1,3-Dichlorobenzene	1.33894	1.41989	6.05			
1,4-Dichlorobenzene	1.29251	1.38351	7.04	*	✓	
Benzyl Chloride	-	-	-			
Benzyl Alcohol	.74390	.70004	5.90			
1,2-Dichlorobenzene	1.23619	1.32394	7.10			
2-Methylphenol	1.04062	1.07884	3.67			
3-&-4-Methylphenol	1.04613	.99851	4.55			(Conc=50.00)
bis(2-chloroisopropyl)Ether	1.68957	1.52628	9.66			
N-Nitroso-Di-n-Propylamine	1.01091	.73842	26.95	**	✓	
Hexachloroethane	.56084	.55389	1.24			
Dibromochloropropane	-	-	-			
Nitrobenzene	.46004	.47002	2.17			
Nitrobenzene-d5	.39509	.41043	3.88			
2-Nitrophenol	.20748	.22285	7.41	*	✓	
Isophorone	.81764	.78578	3.90			
bis(2-Chloroethoxy)methane	.47140	.49141	4.24			
2,4-Dimethylphenol	.27958	.27142	2.92			
nzoic Acid	.24725	.02698	89.09			
2,4-Dichlorophenol	.27946	.28877	3.33	*	✓	
1,2,4-Trichlorobenzene	.31217	.32692	4.72			
Naphthalene	.88333	.91115	3.15			
4-Chloroaniline	.39406	.39398	.02			
Hexachlorobutadiene	.19193	.19529	1.75	*	✓	
4-Chloro-3-Methylphenol	.32605	.31815	2.42	*	✓	
2-Methylnaphthalene	.51308	.51270	.07			

RF - Response Factor from daily standard file at 25.00 mg/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 08/24/88

Contractor: _____ Time: 15:32

Contract No: _____ Laboratory ID: >E5497

Instrument ID: _____ Initial Calibration Date: 08/19/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.41011	.36646	10.64		** ✓
2,4,6-Trichlorophenol	.43671	.42763	2.08	* ✓	
2,4,5-Trichlorophenol	.34677	.45024	29.84		
2-Fluorobiphenyl	1.07242	1.09854	2.44		
2-Chloronaphthalene	1.10710	1.16539	5.26		
2-Nitroaniline	.55901	.60271	7.82		
Dimethylphthalate	1.24432	1.31291	5.51		
2,6-Dinitrotoluene	.31339	.36989	18.03		
Acenaphthylene	1.57886	1.63704	3.69		
3-Nitroaniline	.57448	.62835	9.38		
2,4-Dinitrophenol	.15791	.16618	5.24		** ✓
Acenaphthene	1.08564	1.13910	4.92	* ✓	
Dibenzofuran	1.36426	1.48530	8.91		
2,4-Dinitrotoluene	.34710	.37410	7.78		
4-Nitrophenol	.80161	.29247	63.52		** ✓
Fluorene	1.12246	1.23160	9.72		
Diethylphthalate	1.28599	1.41050	9.68		
4-Chlorophenyl-phenylether	.47254	.54130	14.55		
4-Nitroaniline	.26489	.37098	40.05		
2,4,6-Tribromophenol	.21518	.24973	16.06		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.42249	.46166	9.27	* ✓	
4,6-Dinitro-2-Methylphenol	.13086	.14891	13.79		
4-Bromophenyl-phenylether	.21830	-	-		
Hexachlorobenzene	.30780	.30490	.94		
Pentachlorophenol	.16736	.14434	13.76	* ✓	

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 08/24/88

Contractor: _____ Time: 15:32

Contract No: _____ Laboratory ID:)E5497

Instrument ID: _____ Initial Calibration Date: 08/19/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	.94607	.95129	.55		
Anthracene	.95445	.99472	4.22		
Di-n-Butylphthalate	1.51144	1.56061	3.25		
4,4'-Dibromobiphenyl	1.66708	1.19636	28.24		
Fluoranthene	.96211	1.00066	4.01	*	✓
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.18071	.08205	54.60		
Pyrene	1.48460	1.35851	8.49		
Terphenyl-d14	1.03862	.96585	7.01		
Butylbenzylphthalate	1.05779	.96107	9.14		
3,3'-Dichlorobenzidine	.15087	.21156	40.23		
Chrysene	1.14312	1.14003	.27		
Benzo(a)Anthracene	1.09294	1.02580	6.14		
bis(2-Ethylhexyl)Phthalate	1.30762	1.11333	14.86		
Di-n-octylphthalate	2.71198	3.03437	11.89	*	✓
Benzo(a)Pyrene	1.03642	1.07009	3.25	*	✓
Benzo(b)Fluoranthene	1.33934	1.33395	.40		
Indeno(1,2,3-cd)Pyrene	.98488	.59086	40.01		
Dibenzo(a,h)Anthracene	.88532	.68008	23.18		
Benzo(k)Fluoranthene	1.08633	1.24138	14.27		
Benzo(g,h,i)Perylene	.98474	.55284	43.86		

RF - Response Factor from daily standard file at 25.00 mg/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

EPA Sample No. (Standard): 25ng/L BNA STD Date Analyzed: 8/24/88

Lab File ID (Standard): E5497 Time Analyzed: 14:53

Instrument ID: _____

	IS1 (DCB) AREA	#	RT	IS2 (NPT) AREA	#	RT	IS3 (ANT) AREA	#	RT
12 HOUR STD	58230		8.70	207835		12.27	105650		17.73
UPPER LIMIT	116,460		9.20	415,670		12.77	211,300		18.23
LOWER LIMIT	29,115		8.20	103,918		11.77	52,825		17.23
EPA SAMPLE NO.									
BLK01	57501		8.72	212671		12.23	112163		17.70
E5501 02	59050		8.71	210304		12.24	114831		17.70
E5502 03	62879		8.72	216940		12.25	121261		17.73
E5503 04	68490		8.76	242632		12.29	128997		17.75
E5504 05	64004		8.75	198207		12.32	108176		17.77
E5505 06	67225		8.79	218800		12.34	117261		17.80
07									
08									
09									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

EPA Sample No.(Standard): 25 mg/L BNA STD Date Analyzed: 8/24/88

Lab File ID (Standard): E5497 Time Analyzed: 14:53

Instrument ID: _____

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS6(PRY) AREA #	RT
12 HOUR STD	176974	22.33	131790	30.74	78278	36.19
UPPER LIMIT	353,948	22.83	263,580	31.24	156,556	36.69
LOWER LIMIT	88487	21.83	65895	30.24	39139	35.69
EPA SAMPLE NO.						
01 8808 bkl 1591-93	171758	22.33	105006	30.71	45655	36.11
02 88081593	186076	22.32	102499	30.71	37392*	36.10
03 88081591	193924	22.32	87493	30.71	28533*	36.11
04 88071552 10:1	213456	22.35	119235	30.74	45771	36.16
05 88071554 10:1	173746	22.36	54595*	30.71	18200*	36.12
06 88081590 10:1	194586	22.41	71024	30.75	25959	36.17
07						
08						
09						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

page __ of __

DATA PACKAGE #8

This page intentionally left blank.

ENGINEERING-SCIENCE, INC.

600 BANCROFT WAY
BERKELEY, CALIFORNIA 94710
(415) 548-7970

Job No.: OR001

Client: ES Oak Ridge
Attention: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Attached are the analytical reports for the water samples received by this laboratory on 9-19-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092492	DANGB-BR7	AS-F	9-16-88		10-15-88	
88092492	DANGB-BR7	BA-I	9-16-88		10-13-88	
88092492	DANGB-BR7	CD-F	9-16-88		10-20-88	
88092492	DANGB-BR7	CR-F	9-16-88		10-16-88	
88092492	DANGB-BR7	HG-C	9-16-88		10-14-88	
88092492	DANGB-BR7	PB-F	9-16-88		10-16-88	
88092492	DANGB-BR7	8010	9-16-88		9-21-88	9-20-88
88092492	DANGB-BR7	8020	9-16-88		9-21-88	
88092493	DANGB-TB8	8010	9-13-88		9-23-88	9-20-88
88092493	DANGB-TB8	8020	9-13-88		9-23-88	

* If applicable

ENGINEERING-SCIENCE, INC.

600 BANCROFT WAY
BERKELEY, CALIFORNIA 94710
(415) 548-7970

Job No.: OR001

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092494	DANGB-3-MW30-GW1	AS-F	9-16-88		10-15-88	
88092494	DANGB-3-MW30-GW1	BA-I	9-16-88		10-13-88	
88092494	DANGB-3-MW30-GW1	CD-F	9-16-88		10-20-88	
88092494	DANGB-3-MW30-GW1	CR-F	9-16-88		10-16-88	
88092494	DANGB-3-MW30-GW1	HG-C	9-16-88		10-14-88	
88092494	DANGB-3-MW30-GW1	PB-F	9-16-88		10-16-88	
88092494	DANGB-3-MW30-GW1	418.1	9-16-88	9-28/29-88	10-05/06-88	
88092494	DANGB-3-MW30-GW1	8010	9-16-88		9-20-88	9-26-88
88092494	DANGB-3-MW30-GW1	8020	9-16-88		9-20-88	
88092494	DANGB-3-MW30-GW1	8080	9-16-88	9-23-88	10-16-88	10-20-88
88092494	DANGB-3-MW30-GW1	8270	9-16-88	9-23-88	10-30-88	
88092495	DANGB-3-MW34-GW1	AS-F	9-16-88		10-15-88	
88092495	DANGB-3-MW34-GW1	BA-I	9-16-88		10-13-88	
88092495	DANGB-3-MW34-GW1	CD-F	9-16-88		10-20-88	
88092495	DANGB-3-MW34-GW1	CR-F	9-16-88		10-16-88	
88092495	DANGB-3-MW34-GW1	HG-C	9-16-88		10-14-88	
88092495	DANGB-3-MW34-GW1	PB-F	9-16-88		10-16-88	
88092495	DANGB-3-MW34-GW1	418.1	9-16-88	9-28/29-88	10-05/06-88	
88092495	DANGB-3-MW34-GW1	8010	9-16-88		9-20-88	9-26-88
88092495	DANGB-3-MW34-GW1	8020	9-16-88		9-20-88	
88092495	DANGB-3-MW34-GW1	8080	9-16-88	9-23-88	10-16-88	
88092495	DANGB-3-MW34-GW1	8270	9-16-88	9-23-88	10-30-88	

* If applicable

A SUBSIDIARY OF THE PARSONS CORPORATION

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092492-88092495
WORK ORDER NO.: 1002

These water samples were received at the ES Berkeley Laboratory on 9-19-88. They were received cold and intact, except for sample DANGB-BR7, in which seven out of eight sample containers were received. 418.1, 8080, and 8270 analyses were not performed due to accidental breakage of DANGB-BR7 in the laboratory.

DETECTION LIMITS
ENVIRONMENTAL QUALITY PARAMETERS
SAMPLES NO.: 88092494-88092495

Parameter	Detection Limits
Petroleum Hydrocarbons	<1.5 mg/L

The method detection limits listed are based upon the EPA method listed. Dilution or other deviations from the normal procedures, required due to characteristics of a sample, will influence these values. These changes are described in the report narrative if applicable.

ANALYSIS REPORT

WORK ORDER NUMBER: 1002
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/17/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 2, UNITS: mg/L

TEST COMPOUND	DANGB-BR7 88092492	DANGB-3-MW30-GW-1 88092494	DANGB-3-MW34-GW-1 88092495
ACID DIG FLAME	NA	NA	NA
ACID DIG FURNACE	NA	NA	NA
ARSENIC	<0.01	<0.01	<0.01
BARIUM	<0.2	<0.2	<0.2
CADMIUM	<0.005	<0.005	<0.005
CHROMIUM	<0.01	<0.01	<0.01
MERCURY	<.0002	<.0002	<.0002
LEAD	<0.005	<0.005	<0.005

ND - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1002
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/17/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
S OAK RIDGE/DULUTH ANGB
10 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
ILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

ONTRACT / PO # : OR001
ONTACT : BILL HAYDEN
(615)-481-3920.

ASK: 3, UNITS: mg/L

EST COMPOUND	DANGB-BR7 88092492	DANGB-3-MW30-GW-1 88092494	DANGB-3-MW34-GW-1 88092495
18.1 PETROLEUM HYDROCARBONS	NT	<1.5	<1.5

) - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 1002
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/17/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 4, UNITS: ug/L, GROUP 8010

TEST COMPOUND	DANGB-BR7 88092492	DANGB-TB8 88092493	DANGB-3-MW30-GW-1 88092494	DANGB-3-MW34-GW-1 88092495
BENZYL CHLORIDE	ND	ND	ND	ND
BIS (2-CHLOROETHOXY)METHANE	ND	ND	ND	ND
BIS (2-CHLOROISOPROPYL)ETHER	ND	ND	ND	ND
BROMOBENZENE	ND	ND	ND	ND
BROMODICHLOROMETHANE	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND
BROMOETHANE	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND
CHLORACETALDEHYDE	ND	ND	ND	ND
CHLORAL	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND
CHLOROFORM	11	ND	1.3	1.4
1-CHLOROHEXANE	ND	ND	ND	ND
2-CHLOROETHYL VINYL ETHER	ND	ND	ND	ND
CHLOROMETHANE	ND	ND	ND	ND
CHLOROMETHYL METHYL ETHER	ND	ND	ND	ND
CHLOROTOLUENE	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND
DIBROMOMETHANE	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND
,4-DICHLOROBENZENE	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	ND	ND
1,2-DICHLOROETHANE	ND	ND	ND	ND
,1-DICHLOROETHYLENE	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND
DICHLOROMETHANE	0.69B	2.6B	ND	0.51B
1,2-DICHLOROPROPANE	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1002

ST COMPOUND	DANGB-BR7 88092492	DANGB-TB8 88092493	DANGB-3-MW30-GW-1 88092494	DANGB-3-MW34-GW-1 88092495
3-DICHLOROPROPYLENE	ND	ND	ND	ND
1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND
1,1,2-TETRACHLOROETHANE	ND	ND	ND	ND
TRACHLOROETHYLENE	ND	ND	ND	ND
1,1-TRICHLOROETHANE	ND	ND	ND	ND
1,2-TRICHLOROETHANE	ND	ND	ND	ND
ICHLOROETHYLENE	ND	ND	ND	ND
ICHLOROFLUOROMETHANE	ND	ND	ND	ND
ICHLOROPROPANE	ND	ND	ND	ND
NYL CHLORIDE	ND	ND	ND	ND

- Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 1002
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/17/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 4, UNITS: ug/L, GROUP 8020

TEST COMPOUND	DANGB-BR7 88092492	DANGB-TB8 88092493	DANGB-3-MW30-GW-1 88092494	DANGB-3-MW34-GW-1 88092495
BENZENE	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND
ETHYL BENZENE	ND	ND	ND	ND
TOLUENE	ND	ND	ND	ND
XYLENES	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1002
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/17/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
S OAK RIDGE/DULUTH ANGB
.0 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
LL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

ONTRACT / PO # : OR001
ONTACT : BILL HAYDEN
(615)-481-3920

ASK: 4, UNITS: ug/L, GROUP 8080

EST COMPOUND	DANGB-BR7 88092492	DANGB-3-MW30-GW-1 88092494	DANGB-3-MW34-GW-1 88092495
.DRIN	NT	ND	ND
.PHA-BHC	NT	ND	ND
ETA-BHC	NT	ND	ND
ELTA-BHC	NT	ND	ND
AMMA-BHC	NT	ND	ND
HLORDANE	NT	ND	ND
4'-DDD	NT	ND	ND
.4'-DDE	NT	ND	ND
4'-DDT	NT	ND	ND
ELDRIN	NT	ND	ND
NDOSULFAN I	NT	ND	ND
NDOSULFAN II	NT	ND	ND
NDOSULFAN SULFATE	NT	ND	ND
NDRIN	NT	ND	ND
NDRIN ALDEHYDE	NT	NA	NA
EPTACHLOR	NT	ND	ND
EPTACHLOR EPOXIDE	NT	ND	ND
EPONE	NT	NA	NA
ETHOXYCHLOR	NT	ND	ND
OXAPHENE	NT	ND	ND
CB-1016	NT	ND	ND
CB-1221	NT	ND	ND
CB-1232	NT	ND	ND
CB-1242	NT	ND	ND
CB-1248	NT	ND	ND
CB-1254	NT	ND	ND
CB-1260	NT	ND	ND

- Not Detected

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

Date Received: September 19, 1988 Work Order: 1002
Date Reported: December 8, 1988 Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

Lab Number:	88082494	88082495
Sample No.:	DANGB-3-MW30-GW1	DANGB-3-MW34-GW1
Date Sampled:	09-16-88	09-16-88
Time Sampled:	14:45	15:00
Date Extracted:	09-23-88	09-23-88
Date Analyzed:	10-30-88	10-30-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
1,3-Dichlorobenzene	10	ND	ND
1,4-Dichlorobenzene	10	ND	ND
Hexachloroethane	10	ND	ND
Bis(2-chloroethyl)ether	10	ND	ND
1,2-Dichlorobenzene	10	ND	ND
N-Nitrosodimethylamine	10	ND	ND
Bis(2-chloroisopropyl)ether	10	ND	ND
N-Nitrosodi-n-propylamine	10	ND	ND
Hexachlorobutadiene	10	ND	ND
1,2,4-Trichlorobenzene	10	ND	ND
Nitrobenzene	10	ND	ND
Isophorone	10	ND	ND
Naphthalene	10	ND	ND
Bis(2-chloroethoxy)methane	10	ND	ND
2-Chloronaphthalene	10	ND	ND
Hexachlorocyclopentadiene	10	ND	ND
Acenaphthylene	10	ND	ND
Acenaphthene	10	ND	ND
Dimethyl phthalate	10	ND	ND
2,6-Dinitrotoluene	10	ND	ND
Fluorene	10	ND	ND
2,4-Dinitrotoluene	10	ND	ND
Diethyl phthalate	10	ND	ND
N-Nitrosodiphenylamine	10	ND	ND
Hexachlorobenzene	10	ND	ND

B = Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

ıte Received: September 19, 1988 Work Order: 1002
ate Reported: December 8, 1988 Job Number: OR001

)R: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ab Number:	88082494	88082495
ample No.:	DANGB-3-MW30-GW1	DANGB-3-MW34-GW1
ate Sampled:	09-16-88	09-16-88
ime Sampled:	14:45	15:00
ate Extracted:	09-23-88	09-23-88
ate Analyzed:	10-30-88	10-30-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
nenanthrene	10	ND	ND
nthracene	10	ND	ND
ibutyl phthalate	10	ND	ND
luoranthene	10	ND	ND
-Chlorophenyl phenyl ether	10	ND	ND
yrene	10	ND	ND
utyl Benzyl phthalate	10	ND	ND
is(2-ethylhexyl) phthalate	10	ND	ND
nrysene	10	ND	ND
-Bromophenyl phenyl ether	10	ND	ND
enzo(a)anthracene	10	ND	ND
i-n-octylphthalate	10	ND	ND
enzo(b)fluoranthene	10	ND	ND
enzo(k)fluoranthene	10	ND	ND
enzidine	60	ND	ND
,3'-Dichlorobenzidine	20	ND	ND
enzo(a)pyrene	10	ND	ND
ndeno(1,2,3-cd)pyrene	10	ND	ND
ibenzo(a,h)anthracene	10	ND	ND
enzo(ghi)perylene	10	ND	ND
enzyl Alcohol	20	ND	ND

= Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 19, 1988 Work Order: 1002
ate Reported: December 8, 1988 Job Number: OR001

For: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
ddress:710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

Lab Number:	88082494	88082495
ample No.:	DANGB-3-MW30-GW1	DANGB-3-MW34-GW1
ate Sampled:	09-16-88	09-16-88
Time Sampled:	14:45	15:00
ate Extracted:	09-23-88	09-23-88
ate Analyzed:	10-30-88	10-30-88

Compound	Detection Limits ug/L	Analytical Results ug/L	ug/L
cetophenone	--*	ND	ND
niline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
-Chloroaniline	20	ND	ND
-Chloronaphthalene	--*	ND	ND
Dibenzofuran	10	ND	ND
-Dimethylaminoazobenzene	--*	ND	ND
,12-Dimethylbenz(a)anthracene	--*	ND	ND
-,a-Dimethylphenethylamine	--*	ND	ND
Diphenylamine	--*	ND	ND
,2-Diphenylhydrazine	--*	ND	ND
thyl methanesulfonate	--*	ND	ND
3-Methylcholanthrene	--*	ND	ND
Methyl methanesulfonate	--*	ND	ND
-Methylnaphthalene	10	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
-Nitroaniline	50	ND	ND
3-Nitroaniline	50	ND	ND
4-Nitroaniline	50	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
2-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
,2,4,5-Tetrachlorobenzene	--*	ND	ND

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

ate Received: September 19, 1988
ate Reported: December 8, 1988

Work Order: 1002
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN:Mr. Bill Hayden

ab Number:	88082494	88082495
ample No.:	DANGB-3-MW30-GW1	DANGB-3-MW34-GW1
ate Sampled:	09-16-88	09-16-88
ime Sampled:	14:45	15:00
ate Extracted:	09-23-88	09-23-88
ate Analyzed:	10-30-88	10-30-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
lpha-BHC	--*	ND	ND
amma-BHC	__*	ND	ND
eta-BHC	20	ND	ND
eptachlor	10	ND	ND
elta-BHC	15	ND	ND
ldrin	10	ND	ND
eptachlor epoxide	10	ND	ND
ndosulfan I	--*	ND	ND
ieldrin	15	ND	ND
,4'-DDE	30	ND	ND
ndrin	--*	ND	ND
ndosulfan II	--*	ND	ND
,4'-DDD	15	ND	ND
,4'-DDT	25	ND	ND
ndosulfan Sulfate	30	ND	ND
ndrin aldehyde	--*	ND	ND
ndrin Ketone	--*	ND	ND
nlordane	60	ND	ND
ethoxychlor	--*	ND	ND
oxaphene	60	ND	ND
roclor-1016	60	ND	ND
roclor-1221	60	ND	ND
roclor-1232	60	ND	ND
roclor-1242	60	ND	ND
roclor-1248	60	ND	ND
roclor-1254	60	ND	ND
roclor-1260	60	ND	ND

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

Date Received: September 19, 1988
Date Reported: December 8, 1988

Work Order: 1002
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88082494	88082495
Sample No.:	DANGB-3-MW30-GW1	DANGB-3-MW34-GW1
Date Sampled:	09-16-88	09-16-88
Time Sampled:	14:45	15:00
Date Extracted:	09-23-88	09-23-88
Date Analyzed:	10-30-88	10-30-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
2-Chlorophenol	10	ND	ND
2-Nitrophenol	10	ND	ND
Phenol	10	ND	ND
2,4-Dimethylphenol	10	ND	ND
2,4-Dichlorophenol	10	ND	ND
2,4,6-Trichlorophenol	10	ND	ND
4-Chloro-3-methylphenol	20	ND	ND
2,4-Dinitrophenol	50	ND	ND
2,6-Dichlorophenol	--*	ND	ND
2-Methyl-4,6-Dinitrophenol	50	ND	ND
Pentachlorophenol	50	ND	ND
4-Nitrophenol	50	ND	ND
Benzoic Acid	50	ND	ND
2-Methylphenol	10	ND	ND
3- & 4-Methylphenol	10	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
2,4,5-Trichlorophenol	10	ND	ND

Analyst

Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING-SCIENCE 1002 1004

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.			ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710
SAMPLER(S): (Signature)				

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW 8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 6010, 7060, 7131	SW 7421, 7470 7191	SW 9310, 9315	SM 429	REMARKS
9-16-88	0800	DANGB-BR7	8		X	X	X	X	X			882492
9-16-88	1245	DANGB-3-MW27-GW-1	2			X		882508				Gave lab metals and VOA's for this well yesterday; this was all we got today - still lacking BOD, TOC

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	9-16-88 1800	Fed Ex Airbill # 949031004 5			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
			9/19/88 11:37	1 sample from Sam. Des DANGB-BR7 was not received, only 7 samples received.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

506

ENGINEERING-SCIENCE

1002

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.			ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710
SAMPLER(S): (Signature) Richard L Dan				

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 601	EPA 625	EPA 418.1	SW 6010, 7060, 7131	SW7421, 7470	SW9310, 9315	SM426	REMARKS
9-16-88	0800	DANGB-BR7	5	X								882492
9-13-88	0900	DANGB-TB8	3	X								882493
9-16-88	1445	DANGB-3-MW30-GW-1	5	X								882494
9-16-88	1500	DANGB-3-MW34-GW-1	5	X								882495

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Richard L Dan	9-16-88 1600	Fed Ex Airbill # 949031004S			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

507

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

1002

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature)

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 8010, 7060, 7131	SW7421, 7470, 7171	SW9310, 9315	SM429	REMARKS
9-16-88	1445	DANGB-3-MW30-GW-1	8		X	X	X	X	X			882404
9-16-88	1500	DANGB-3-MW34-GW-1	2					X	X			882405

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	9-16-88 1600	Fed Ex Airbill 9470516045			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
			9-19 10:45	Samples Cold + intact

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

508

ENGINEERING-SCIENCE

1002

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature)

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 6010, 7040, 7131	SW7421, 7470	SW9310, 9315	SM429	REMARKS
9-16-88	1500	DANG13-3-MW34-GW-1	6		X	X	X					882495

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	9-16-88 1840	Fed Ex Airbill # 874231006 45
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)
		Delores M. Navarro

Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Date/Time	Remarks
9/19/88 11:25	Samples received cold & intact. Bottles labeled DANG13-3-MW34-GW-1

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

509

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

QC Report No: AAF-W-0053-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-17-88
Date Reported: 2-27-89
Dilution Factor: NA

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092487-88092488, 88092492, 88092494-88092495
88092509-88092511, 88092513-88092516
88092523-88092528, 88092546-88092547

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	Duplicate RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Arsenic	88092487	88092487	10-15-88	NA	7060	<0.01	<0.01	<0.01	NC	0.040	<0.01	0.041	102	
Cadmium	88092487	88092487	10-20-88	NA	6010	<0.005	<0.05	<0.05	NC	0.010	<0.05	0.0114	114	
Chromium	88092487	88092487	10-16-88	NA	6010	<0.01	<0.01	<0.01	NC	0.020	<0.01	0.0216	108	
Lead	88092487	88092487	10-16-88	NA	7421	<0.005	<0.05	<0.005	NC	0.020	<0.05	0.0222	111	

510

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth_ANGB

QC Report for Laboratory Sample No(s):
88092487-88092488, 88092492, 88092494-88092495
88092509-88092511, 88092513-88092516
88092523-88092528, 88092546-88092547

QC Report No: ICP-W-0060-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-17-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Barium	88092487	88092487	10-13-88	NA	6010	<0.2	<0.2	<0.2	NC	2.0	<0.2	0.198	99	

511

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2}$ X 100

Percent Recovery (PR) = $\frac{SSR - SR}{SA}$ x 100

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092487-88092488, 88092492, 88092494-88092495
88092509-88092511, 88092513-88092516
88092523-88092528, 88092546-88092547

QC Report No: CVM-W-0031-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-17-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	PR	Notes
Mercury	88092487	88092487	10-14-88	NA	254.1	<0.0002	<0.0002	<0.0002	NC	0.0010	<0.0002	0.00091	91	

512

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092422-88092427, 88092433
88092509-88092511, 88092513, 88092515-88092516
88092346, 88092348, 88092350, 88092494-88092495

QC Report No: TPH-W-0070-88B
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-05-88
Date Analyzed: 11-01-88
Date Reported: 11-15-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1	<1	10	7.5	75	6.8	75	10	

513

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2}$ X 100

Percent Recovery (PR) = $\frac{SSR - SR}{SA}$ x 100

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
VOLATILE ORGANICS
EPA 8010/8020

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092487-88092495
88092509-88092516
88092523-88092526

QC Report No: VGC-W-0048-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: NA
Date Prepared: NA
Date Analyzed: 10-03-88
Date Reported: 10-25-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092525	1,1-Dichloroethane	10	ND	9.26	93	9.54	95	3	26	70-130
	Trichloroethene	10	ND	9.89	99	10.3	103	4	19	65-131
	Chlorobenzene	10	ND	10.4	104	10.3	103	1	40	59-137
	Aromatics: 8020									
88092525	Benzene	10	ND	8.84	88	10.6	106	18	20	56-146
	Toluene	10	ND	10.1	101	10.1	101	0	41	42-150
	Chlorobenzene	10	ND	10.1	101	10.1	101	0	36	76-133

Relative Percent Difference (PR) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Sample Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

S14

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 10-25-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
15	9-21-88	VGC	Carbopack	75-09-2	Dichloromethane	5.3	0.25	88092487-88092489 88092492
49	9-23-88	VGC	Carbopack	75-09-2	Dichloromethane	28	0.25	88092493
32	9-26-88	VGC	Vocol	75-09-2	Dichloromethane	11	0.25	88092491
				67-66-3	Chloroform	0.14	0.05	
				127-18-4	Tetrachloroethylene	0.11	0.03	
45	9-20-88	VGC	Vocol	75-09-2	Dichloromethane	4.2	0.25	88092494-88092495

515

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: OCP-W-0037-88
QC REPORT NO.: OCP-W-0037-88B

Analysis of matrix spikes resulted in a matrix interference that swamped the response for aldrin in the matrix spike duplicate. This interference was somewhat lower in the matrix spike sample, so that the response would be quantitated. Thus, the recovery of aldrin in the MSD and the RPD for aldrin could not be calculated. Analysis of spiked blanks resulted in acceptable recoveries for all spiked compounds, but the RPD was higher than EPA guidelines for endrin and diedrin. The analytical data associated with these analyses were closely examined. No errors or problems were found.

Heptachlor epoxide was inadvertently used instead of heptachlor in the matrix spiking solution.

Endrin aldehyde and Kepone were not recoverable because they were removed by the alumina column clean-up used on these samples.

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

QC Report No.: OCP-W-0037-88
QC Sample No.: 88092490
Level (Low/Med): Low
Date Reported: 11-11-88

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s).:
88092490, 88092488, 88092494-88092495
88092511, 88092513-88092517, 88092525-88092528
88092677-88092678, 88092681, 88092617

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	200	ND	0.195	99	56-123
Heptachlor epoxide	200	ND	0.214	105	40-131
Aldrin	200	ND	0.195	99	40-120
Dieldrin	500	ND	0.463	93	52-126
Endrin	500	ND	0.488	98	56-121
4,4'-DDT	500	ND	0.365	73	38-127

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.173	87	99	13	15	56-123
Heptachlor epoxide	0.224	112	105	6	20	40-131
Aldrin	ND	NC*	99	NC*	22	40-120
Dieldrin	0.461	92	93	1	18	52-126
Endrin	0.466	93	98	5	21	56-121
4,4'-DDT	0.401	80	73	9	27	38-127

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 1 out of 6 outside limits

Spike Recovery: 1 out of 12 outside limits

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No.: OCP-W-0037-88B
QC Sample No.: Blank
Level (Low/Med): Low
Date Reported: 11-11-88

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s).:
88092490, 88092488, 88092494-88092495
88092511, 88092513-88092517, 88092525-88092528
88092677-88092678, 88092681, 88092617

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	200	ND	0.184	92	56-123
Heptachlor epoxide	200	ND	0.210	105	40-131
Aldrin	200	ND	0.186	93	40-120
Dieldrin	500	ND	0.436	87	52-126
Endrin	500	ND	0.455	91	56-121
4,4'-DDT	500	ND	0.490	98	38-127

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.211	105	92	13	15	56-123
Heptachlor epoxide	0.224	112	105	6	20	40-131
Aldrin	0.210	105	93	12	22	40-120
Dieldrin	0.551	110	87	23*	18	52-126
Endrin	0.292	58	91	44*	21	56-121
4,4'-DDT	0.461	92	98	6	27	38-127

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 2 out of 6 outside limits

Spike Recovery: 0 out of 12 outside limits

518

PESTICIDE METHOD BLANK SUMMARY

Job No.:	OR001	Lab Name:	Engineering Science
		Lab Sample No.:	Blank
Client:	ES Oak Ridge		
Attn:	Bill Hayden	Matrix:	Water
Address:	710 S. Illinois Avenue	Level (low/med):	Low
	Suite F-103	Extraction:	
	Oak Ridge, Tn. 37830	(SepF/Cont/Sonc):	Sonc
		Date Reported:	11-11-88
Project:	Duluth ANGB		
Date Extracted:	9-23-88		
Date Analyzed (1):	10-16-88	Date Analyzed (2):	10-20-88
Time Analyzed (1):	06:26	Time Analyzed (2):	00:39
Instrument ID (1):	HP5890 #2	Instrument ID (2):	HP5880
GG Column ID (1):	OV-1	GC Column ID (2):	Mixed

This Method Blank applies to the following samples, MS and MSD.

EPA Sample No.	Lab Sample ID (1)	Date Analyzed 1	Lab Sample ID (2)	Date Analyzed 2
-	88092494	10-16-88	88092494	10-20-88
-	88092495	10-16-88	88092495	10-20-88
-	88092511	10-16-88		
-	88092513	10-16-88		
-	88092514	10-16-88		
-	88092515	10-16-88		
-	88092516	10-16-88		

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No: BNA-W-0061-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-17-88
Date Prepared: 9-22-88
Date Analyzed: 11-23-88
Date Reported: 03-23-89
Dilution Factor: NA

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88092490, 88092488, 88092494-88092495
88092508, 88092511, 88092573-88092579

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limits RPD	RECOVERY
	1,2,4-Trichlorobenzene	100	ND	70.4	70	66.7	67	5	28	39-98
B/N	Acenaphthene	100	ND	68.2	68	67.4	67	1	31	46-118
Laboratory	2,4-Dinitrotoluene	100	ND	62.0	62	61.5	62	1	38	24-96
Sample #	Pyrene	100	ND	78.4	78	70.2	70	11	31	26-127
	N-Nitroso-di-n-Propylamine	100	ND	73.6	74	70.2	70	5	38	41-116
88092490	1,4-Dichlorobenzene	100	ND	62.9	63	61.5	62	2	28	36-97
ACID	Pentachlorophenol	200	ND	46.7	23	62.2	31	28	50	9-103
Laboratory	Phenol	200	ND	99.0	49	115	58	15	42	12-89
Sample #	2-Chlorophenol	200	ND	120	60	128	64	2	40	27-123
	4-Chloro-3-Methylphenol	200	ND	138	69	120	60	14	42	23-97
88092490	4-Nitrophenol	200	ND	101	50	139	70	32	50	10-80

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

520

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1002

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 3-23-89

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
S0302	10-30-88	AC	1	-	None Detected	-	-	88092494, 88092495 88092508, 88092511 88092540
E6019	10-30-88	BN	2	117-81-7	Bis(2-ethylhexyl)phthalate	17	10	88092494, 88092495 88092508, 88092511 88092540

521

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: BLANK

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 1002 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Water Lab Sample ID: 88092494,95 BLAN

Sample wt/vol: 1000 (g/mL) mL Lab File ID: E6019 + S0302

Level: (low/med) low Date Received: _____

% Moisture: not dec. _____ dec. _____ Date Extracted: 9-23-88

Extraction: (SepF/Cont/Sonc) SepF Date Analyzed: 10/30/88

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1

Number TICs found: 24 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	127-18-4	tetrachloroethene	4.20	17	
2.		unknown	28.88	64	
3.		unknown	30.20	100	
4.		unknown	33.05	7	
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

DANTB-3-MW30
-GWI

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES OAKRIDGE
Attn:
Address:

Project: Duluth

TICs Found: 2

Project No:
Sample Matrix: water
Conc. Unit: ug/L
Work Order No: 1002
Lab Sample ID: 88092494
Lab File ID: 50303 + E6020
Date Received: 9-19-88
Date Extracted: 9-23-88
Date Analyzed: 10-30-88, 10-31-88
Date Reported:
Dilution Factor: N/A
% Moisture: N/A

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	UnKnown	5.64	4	
	UnKnown	28.88	25	

DANGB-3-MW34
-GW1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES OAKRIDGE
Attn:
Address:

Project: Duluth

TICs Found: 6

Project No:
Sample Matrix: Water
Conc. Unit: ug/L
Work Order No: 1002
Lab Sample ID: 8809249S
Lab File ID: S0304 + E6021
Date Received: 9-19-88
Date Extracted: 9-23-88
Date Analyzed: 10-30-88 / 10-31-88
Date Reported:
Dilution Factor: N/A
% Moisture: NA

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	C
	Unknown	4.95	10	
		5.03	9	
		30.18	60	
		3.10	4	
		4.75	5	
		28.87	18	

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 03-85
Lab File ID: 50302/E6019
Matrix: water
Level (low/med):
Date Analyzed: 10-30-88
Time Analyzed: 23:55, 20:14
Instrument ID:
Date Reported:

Project: Duluth

This Method Blank applies to the following samples, MS and MSD.

Sample Number	Lab Sample ID	Lab File ID	Date of Analysis
DANGB-3-MW30-GW-1	88092494	50303, E6020	10-31-88, 10-30-88
↓ -3-MW34-GW-1	88092495	50304, E6021	10-31-88, 10-30-88
DANGB-3-MW27-GW-1	88092508	50305/389, E6022	10-31-88, 11-6-88
↓ -3-GW3C-GW-1	88092511	50306, E6023	10-31-88 10-30-88

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 10/30/88 17:01

Lab ID)11939::03 Data Release Authorized By:

m/z	ION ABUNDANCE CRITERIA	RELATIVE ABUNDANCE	
51	[illegible] of mass 198	45.98 OK	
[illegible]	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	51.77	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	45.57 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	6.89 OK	
275	10.0 - 30.0% of mass 198	17.99 OK	
365	greater than 1.00% of mass 198	1.40 OK	
441	present, but less than mass 443	7.07 OK	
442	greater than 40.0% of mass 198	47.83 OK	
443	17.0 - 23.0% of mass 442	8.18 OK	(17.11) #2

Spoint 10/12/88

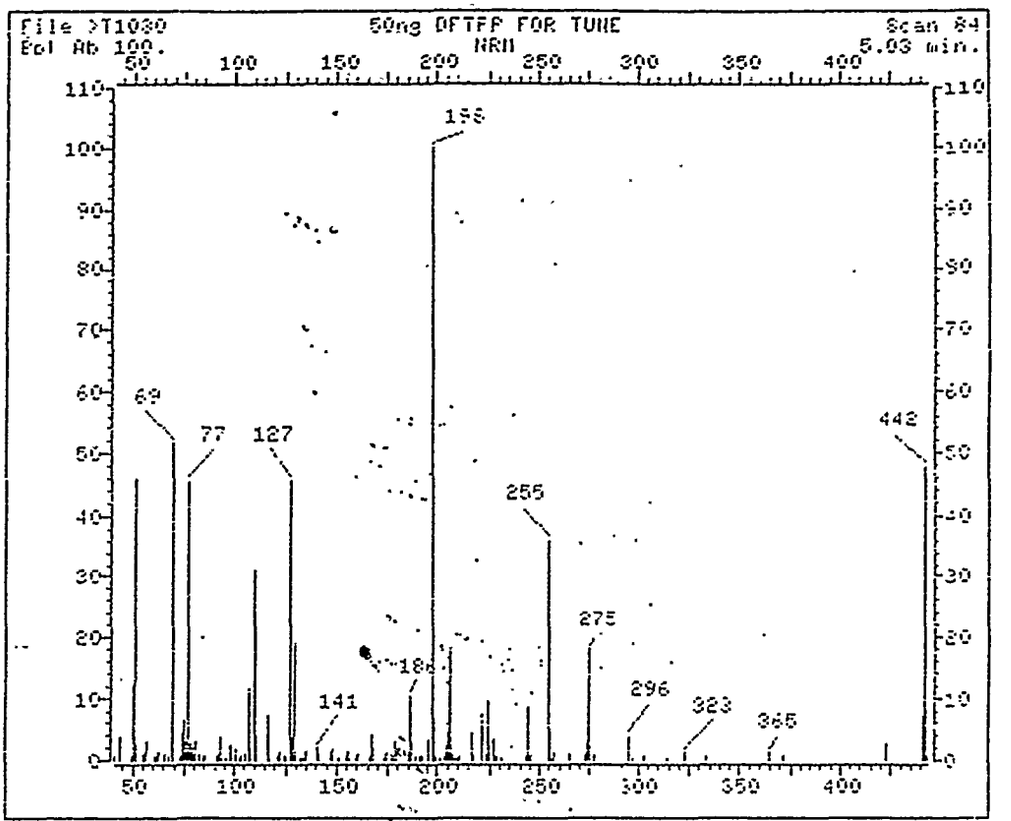
THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS
50ng DFTPP FOR TUNE	)11030	10/30/88	17:01
SSTD 060	50296		17:22
88092367	50297		18:48
88092368	50298		19:56
88092377	50299		20:56
88092377 MS	50300		21:56
88092377 MSD	50301		22:55
88092494-2450 AC	50302		23:55
88092494 AC	50303	10/31/88	00:55
88092495 AC	50304		01:54
88092508 AC	50305		02:53
88092511 AC	50306		03:53
88092540 AC	50307		04:52

another project

another project



File: >T1030 Scan #: 84 Retn. time: 5.03

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.10	.622	91.00	.829	133.95	.510	191.05	.750	244.00	2.373
44.00	3.636	92.00	.973	135.05	1.276	191.95	.861	245.00	.718
45.60	.829	93.00	3.716	141.05	1.994	193.05	.925	246.00	1.499
50.10	12.313	94.00	.526	142.05	1.005	196.10	3.397	255.00	35.061
51.10	45.981	95.90	.606	147.05	1.324	198.00	100.000	256.00	5.311
52.05	2.648	98.10	2.360	147.95	1.786	199.00	5.890	257.00	.351
53.10	1.005	99.00	2.520	151.45	.351	200.00	.702	257.90	1.356
54.10	1.372	101.00	1.611	155.05	.909	201.70	.542	265.00	1.037
57.10	3.285	103.00	.574	156.05	1.547	204.10	2.472	273.00	1.212
61.00	.797	104.00	.877	157.05	.558	205.00	4.466	273.90	1.919
61.30	.734	105.10	1.180	159.95	.702	206.10	18.054	275.05	17.990
63.10	1.388	107.00	11.563	161.05	1.260	207.00	3.796	275.95	1.360
65.10	1.037	108.10	1.543	166.05	.813	208.00	1.132	277.05	1.143
67.10	.702	110.00	31.180	167.05	4.051	209.00	.494	281.05	.358
69.30	51.770	111.00	4.306	167.95	1.962	210.20	.494	295.95	3.376
73.30	.686	117.00	7.033	172.85	.494	210.90	.877	296.95	1.526
74.00	4.338	118.05	.510	173.95	1.021	217.00	4.625	302.95	.702
75.90	6.555	122.05	.750	175.05	1.467	218.00	.781	314.95	.510
76.10	2.998	122.95	1.467	177.05	1.212	221.00	7.416	322.95	1.324
77.10	45.455	124.05	.750	177.95	.670	223.00	1.148	333.85	.654
78.00	2.743	125.05	.797	178.95	3.174	224.00	10.016	365.00	1.404
79.00	2.982	127.05	45.566	180.05	1.627	225.10	2.600	371.90	.781
80.00	2.041	128.05	3.668	181.05	1.053	227.00	3.509	423.00	2.903
81.00	3.222	129.05	19.075	185.05	1.388	228.00	.845	441.05	3.065
83.00	1.069	130.05	1.627	186.05	10.319	229.00	.766	442.05	41.831
85.00	.718	131.75	.494	187.05	3.078	231.00	.463	443.05	8.182
88.00	.861	132.95	.383	189.05	.654	243.10	.638	444.05	.261

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 10/30/88

Contractor: ENGINEERING SCIENCE Time: 17:22

Contract No: Laboratory ID: >S0296

Instrument ID: 1 Initial Calibration Date: 10/13/88

Minimum $\overline{RF}$ for SPCC is . Maximum % Diff for CCC is %

Compound	RF	$\overline{RF}$	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	.83572	7.32		
2-Fluorophenol	1.15802	1.17625	1.57		
bis(2-Chloroethyl)ether	1.11892	1.02670	8.24		
Phenol	1.41657	1.43752	1.48	*	
Phenol-d5	1.22488	1.12078	8.50		
Aniline	.54193	.61229	12.98		
2-Chlorophenol	1.23175	1.28020	3.93		
1,3-Dichlorobenzene	1.47535	1.43540	2.71		
1,4-Dichlorobenzene	1.40530	1.42603	1.47	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.42375	41.88		
1,2-Dichlorobenzene	1.32240	1.48540	12.33		
2-Methylphenol	1.17367	1.32581	12.96		
3-&-4-Methylphenol	1.07139	1.30043	21.38		
bis(2-chloroisopropyl)Ether	2.15627	2.51362	16.57		
N-Nitroso-Di-n-Propylamine	.84050	.75918	9.68	**	
Hexachloroethane	.53840	.55203	2.53		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40342	.43365	7.56		
Nitrobenzene-d5	.39137	.40357	3.12		
2-Nitrophenol	.24657	.28600	15.99	*	
Isophorone	.74170	.80381	8.37		
bis(2-Chloroethoxy)methane	.49386	.53553	8.44		
2,4-Dimethylphenol	.34849	.40893	17.34		
Benzoic Acid	.29725	.30640	3.08		
2,4-Dichlorophenol	.56733	.65904	16.16	*	
1,2,4-Trichlorobenzene	.36913	.40038	8.46		
Naphthalene	.94589	.92437	2.28		
4-Chloroaniline	.36309	.41153	13.34		
Hexachlorobutadiene	.20283	.22241	9.65	*	
4-Chloro-3-Methylphenol	.31360	.35796	14.15	*	
2-Methylnaphthalene	.56357	.62855	11.45		

RF - Response factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 10/30/88

Contractor: ENGINEERING-SCIENCE Time: 17:22

Contract No: Laboratory ID:)S0296

Instrument ID: (Initial Calibration Date: 10/23/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	RF	$\overline{RF}$	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29562	.39631	34.04		**
2,4,6-Trichlorophenol	.42280	.39207	7.27	*	
2,4,5-Trichlorophenol	.52897	.56644	7.08		
2-fluorobiphenyl	1.27220	1.12307	11.72		
2-Chloronaphthalene	1.23784	1.16228	6.10		
2-Nitroaniline	.47288	.46876	.87		
Dimethylphthalate	1.40629	1.33008	5.42		
2,6-Dinitrotoluene	.37415	.36479	2.50		
Acenaphthylene	1.68918	1.53970	8.85		
3-Nitroaniline	.44557	.44014	1.22		
2,4-Dinitrophenol	.11898	.13091	10.03		**
Acenaphthene	1.13011	.94761	16.15	*	
Dibenzofuran	1.64131	1.51275	7.83		
2,4-Dinitrotoluene	.28418	.27425	3.49		
4-Nitrophenol	.28450	.22987	19.20		**
Fluorene	1.12850	.93269	17.35		
Diethylphthalate	1.20939	1.06521	11.92		
4-Chlorophenyl-phenylether	.59183	.56993	3.70		
4-Nitroaniline	.35956	.38270	6.44		
2,4,6-Tribromophenol	.21023	.21653	2.99		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.47445	17.77	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.23971	12.53		
Hexachlorobenzene	.26273	.30092	14.54		
Pentachlorophenol	.14536	.13243	8.90	*	

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 10/[illegible]/88

Contractor: ENGINEERING-SCIENCE Time: 17:22

Contract No: _____ Laboratory ID:)S0296

Instrument ID: 1 Initial Calibration Date: 10/12/88 300

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is _____

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03451	.99811	3.50		
Anthracene	1.05155	1.07458	2.23		
Di-n-Butylphthalate	1.51556	1.56813	3.20		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.15996	2.56	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.12597	213.13		
Pyrene	1.56086	1.52780	2.12		
Terphenyl-d14	1.05235	1.03922	1.81		
Butylbenzylphthalate	1.03590	.98021	5.19		
3,3'-Dichlorobenzidine	.13689	.23668	72.90		
Chrysene	.99655	1.02360	2.71		
Benzo(a)Anthracene	1.10407	1.10923	.47		
bis(2-Ethylhexyl)Phthalate	1.21073	1.20794	.23		
Di-n-octylphthalate	3.48275	2.68039	23.29	*	
Benzo(a)Pyrene	1.33038	1.37572	3.43	*	
Benzo(b)Fluoranthene	1.60959	1.38623	13.82		
Indeno(1,2,3-cd)Pyrene	.99889	1.19470	18.25		
Dibenzo(a,h)Anthracene	.87491	1.01806	16.38		
Benzo(k)Fluoranthene	1.44370	1.31708	8.77		
Benzo(g,h,i)Perylene	.93761	1.02261	13.93		

RF - Response Factor from daily standard file at 60.00 ng/l

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI.

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

530

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR0001

Lab Code: _____ Case No.: _____ SAS No.: _____ Job No.: _____

Sample No. (Standard): SSTD060 Date Analyzed: 10/30/88

Lab File ID (Standard): S0296 Time Analyzed: 17:22

Instrument ID: 1

	IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
12 HOUR STD	59105	9.20	197020	12.81	127104	18.30
UPPER LIMIT	118210	9.70	394040	13.31	254208	18.80
LOWER LIMIT	29553	8.70	98510	12.31	63552	17.80
EPA SAMPLE NO.						
S0297 01 8809236 7	95822	9.18	399785*	12.79	229099	18.28
98 02 88092368	118945*	9.13	222366	12.80	175063	18.29
99 03 88092377	93685	9.17	227076	12.78	166049	18.28
S0300 04 88092377 MS	610866	9.12	210626	12.82	142082	18.30
1 05 88092377 MSD	75396	9.18	290484	12.79	156318	18.27
2 06 88092494-2540 BLK	61353	9.18	200561	12.83	118286	18.30
3 07 88092494 AC	55627	9.18	162040	12.86	102115	18.30
4 08 88092495 AC	58209	9.17	179777	12.82	107747	18.30
5 09 88092508 AC	59470	9.18	186070	12.83	111282	18.30
6 10 88092511 AC	62094	9.18	187379	12.83	118325	18.29
7 11 88092540 AC	63670	9.18	196469	12.84	118353	18.32
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

\# Column used to flag internal standard area values with an asterisk.

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR0001

Lab Code: _____ Case No.: _____ SAS No.: _____ Job No.: _____

Sample No. (Standard): STD060 Date Analyzed: 10/30/88

Lab File ID (Standard): 50296 Time Analyzed: 17:22

Instrument ID: 1

		IS4 (PHN) AREA #	RT	IS5 (CRY) AREA #	RT	IS6 (PRY) AREA #	RT
12 HOUR STD		194818	22.95	143889	31.43	114403	37.56
UPPER LIMIT		389636	23.45	287778	31.93	228806	38.06
LOWER LIMIT		97409	22.45	71945	30.93	57202	37.06
EPA SAMPLE NO.							
50291 01	88092367	296328	22.95	218640	31.43	137852	37.53
98 02	88092368	323340	22.95	230927	31.42	126875	37.55
99 03	88092377	292224	22.95	198602	31.41	107273	37.52
50300 04	88092377 MS	266947	22.97	201191	31.43	120121	37.58
1 05	88092377 MSD	204962	22.95	146761	31.41	77123	37.54
2 06	88092494 BLK	179865	22.98	119831	31.43	84381	37.55
3 07	88092494 AC	154793	22.99	95577	31.45	61469	37.60
4 08	88092495 AC	158650	22.98	89546	31.43	57660	37.60
5 09	88092508 AC	167319	22.97	96262	31.43	59598	37.58
6 10	88092511 AC	170136	22.95	103836	31.41	63141	37.53
7 11	88092546 AC	171654	22.99	105861	31.45	68558	37.59
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal standard area
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

Page ___ of ___

DATA PACKAGE #9

This page intentionally left blank.

ENGINEERING-SCIENCE, INC.

600 BANCROFT WAY
BERKELEY, CALIFORNIA 94710
(415) 548-7970

Job No.: OR001

Work Order No.: 1006

Client: ES Oak Ridge
Attention: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Attached are the analytical reports for the water sample(s) received by this laboratory on 9-19-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092511	DANGB-3-GW3C-GW1	AS-F	9-17-88		10-15-88	
88092511	DANGB-3-GW3C-GW1	BA-I	9-17-88		10-13-88	
88092511	DANGB-3-GW3C-GW1	CD-F	9-17-88		10-26-88	
88092511	DANGB-3-GW3C-GW1	CR-F	9-17-88		10-16-88	
88092511	DANGB-3-GW3C-GW1	HG-C	9-17-88		10-14-88	
88092511	DANGB-3-GW3C-GW1	PB-F	9-17-88		10-16-88	
88092511	DANGB-3-GW3C-GW1	418.1	9-17-88	10-03-88	10-05-88	
88092511	DANGB-3-GW3C-GW1	8010	9-17-88		9-27-88	9-21-88
88092511	DANGB-3-GW3C-GW1	8020	9-17-88		9-27-88	
88092511	DANGB-3-GW3C-GW1	8080	9-17-88	9-23-88	10-24-88	10-25-88
88092511	DANGB-3-GW3C-GW1	8270	9-17-88	9-23-88	10-30-88	
88092512	DANGB-FB11	8010	9-17-88		9-27-88	9-28-88
88092512	DANGB-FB11	8020	9-17-88		9-27-88	
88092513	DANGB-3-GW3B-GW1	AS-F	9-17-88		10-15-88	
88092513	DANGB-3-GW3B-GW1	BA-I	9-17-88		10-13-88	
88092513	DANGB-3-GW3B-GW1	CD-F	9-17-88		10-26-88	
88092513	DANGB-3-GW3B-GW1	CR-F	9-17-88		10-16-88	
88092513	DANGB-3-GW3B-GW1	HG-C	9-17-88		10-14-88	
88092513	DANGB-3-GW3B-GW1	PB-F	9-17-88		10-16-88	
88092513	DANGB-3-GW3B-GW1	418.1	9-17-88	10-03-88	10-05-88	
88092513	DANGB-3-GW3B-GW1	8010	9-17-88		9-27-88	9-21-88
88092513	DANGB-3-GW3B-GW1	8020	9-17-88		9-27-88	9-21-88
88092513	DANGB-3-GW3B-GW1	8080	9-17-88	9-23-88	10-24-88	10-25-88
88092513	DANGB-3-GW3B-GW1	8270	9-17-88	9-24-88	10-31-88	

* If applicable

Job No.: OR001

Work Order No.: 1006

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092514	DANGB-3-MW54-GW1	AS-F	9-17-88		10-15-88	
88092514	DANGB-3-MW54-GW1	BA-I	9-17-88		10-13-88	
88092514	DANGB-3-MW54-GW1	CD-F	9-17-88		10-26-88	
88092514	DANGB-3-MW54-GW1	CR-F	9-17-88		10-16-88	
88092514	DANGB-3-MW54-GW1	HG-C	9-17-88		10-14-88	
88092514	DANGB-3-MW54-GW1	PB-F	9-17-88		10-16-88	
88092514	DANGB-3-MW54-GW1	418.1	9-17-88	10-03-88	10-05-88	
88092514	DANGB-3-MW54-GW1	8010	9-17-88		9-27-88	9-21-88
88092514	DANGB-3-MW54-GW1	8020	9-17-88		9-27-88	9-21-88
88092514	DANGB-3-MW54-GW1	8080	9-17-88	9-23-88	10-24-88	10-25-88
88092514	DANGB-3-MW54-GW1	8270	9-17-88	9-24-88	10-31-88	
88092515	DANGB-3-GW3A-GW1	AS-F	9-17-88		10-15-88	
88092515	DANGB-3-GW3A-GW1	BA-I	9-17-88		10-13-88	
88092515	DANGB-3-GW3A-GW1	CD-F	9-17-88		10-26-88	
88092515	DANGB-3-GW3A-GW1	CR-F	9-17-88		10-16-88	
88092515	DANGB-3-GW3A-GW1	HG-C	9-17-88		10-14-88	
88092515	DANGB-3-GW3A-GW1	PB-F	9-17-88		10-16-88	
88092515	DANGB-3-GW3A-GW1	418.1	9-17-88	10-03-88	10-05-88	
88092515	DANGB-3-GW3A-GW1	8010	9-17-88		9-20-88	9-26-88
88092515	DANGB-3-GW3A-GW1	8020	9-17-88		9-20-88	
88092515	DANGB-3-GW3A-GW1	8080	9-17-88	9-23-88	10-24-88	10-25-88
88092515	DANGB-3-GW3A-GW1	8270	9-17-88	9-24-88	11-04-88	
88092516	DANGB-3-GW3D-GW1	BA-I	9-17-88		10-13-88	
88092516	DANGB-3-GW3D-GW1	CD-F	9-17-88		10-26-88	
88092516	DANGB-3-GW3D-GW1	CR-F	9-17-88		10-26-88	
88092516	DANGB-3-GW3D-GW1	PB-F	9-17-88		10-16-88	
88092516	DANGB-3-GW3D-GW1	418.1	9-17-88	10-03-88	10-05-88	
88092516	DANGB-3-GW3D-GW1	8010	9-17-88		9-27-88	9-20-88
88092516	DANGB-3-GW3D-GW1	8020	9-17-88		9-27-88	9-26-88
88092516	DANGB-3-GW3D-GW1	8080	9-17-88	9-23-88	10-24-88	10-25-88
88092516	DANGB-3-GW3D-GW1	8270	9-17-88	9-24-88	11-01-88	
88092517	DANGB-3-MW27-GW1	8080	9-17-88	9-23-88	10-24-88	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092511-88092517
WORK ORDER NO.: 1006

These water samples were received at the ES Berkeley Laboratory on 9-19-88. They were received cold and intact.

ENGINEERING SCIENCE INC.
12/03/88
ANALYSIS REPORT

Work Order No.: 1006
Job Number: ZB0000000440
Work Order Date: 09/19/88

Approved by:

Laboratory Supervisor

Report Data:
ES Oak Ridge
Bill Havden
710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Client Data:
ES Oak Ridge
710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Of Report Copies: 1

Contract/P.O.#: OR001.02
Contact: Bill Havden
615/481-3920

Task: 2 Units: mg/L

TEST COMPOUND	DANGB-3-GW3C-GW1 88092511	DANGB-3-GW3B-GW1 88092513	DANGB-3-MW54-GW1 88092514	DANGB-3-GW3A-GW1 88092515	DANGB-3-GW3D-GW1 88092516
Acid Dig Flame	NA	NA	NA	NA	NA
Acid Dig Furance	NA	NA	NA	NA	NA
Arsenic	<0.01	<0.01	<0.01	<0.01	--
Barium	<0.2	<0.2	<0.2	<0.2	<0.2
Cadmium	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury	<.0002	<.0002	<.0002	<.0002	--
Lead	<0.005	<0.005	<0.005	<0.005	<0.005

NA - Not Analyzed
ND - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 1006
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/19/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 3, UNITS: mg/L

TEST COMPOUND	DANGB-3-GW3C-GW-1 88092511	DANGB-3-GW3B-GW-1 88092513	DANGB-3-MW54-GW-1 88092514	DANGB-3-GW3A-GW-1 88092515	DANGB-3-GW3D-GW-1 88092516
418.1 PETROLEUM HYDROCARBONS	<1.5	<1.5	<1	<1.5	<1.5

ND - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1006
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/19/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
S OAK RIDGE/DULUTH ANGB
10 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
ILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

ONTRACT / PO # : OR001
ONTACT : BILL HAYDEN
(615)-481-3920

ASK: 4, UNITS: ug/L, GROUP 8010

EST COMPOUND	DANGB-3-GW3C-GW-1 88092511	DANGB-FB11 88092512	DANGB-3-GW3B-GW-1 88092513	DANGB-3-MW54-GW-1 88092514	DANGB-3-GW3A-GW-1 88092515	DANGB-3-GW3D-GW-1 88092516
ENZYL CHLORIDE	ND	ND	ND	ND	ND	ND
IS (2-CHLOROETHOXY)METHANE	ND	ND	ND	ND	ND	ND
IS (2-CHLOROISOPROPYL)ETHER	ND	ND	ND	ND	ND	ND
ROMOBENZENE	ND	ND	ND	ND	ND	ND
ROMODICHLOROMETHANE	ND	ND	ND	ND	ND	ND
ROMOFORM	ND	ND	ND	ND	ND	ND
ROMOETHANE	ND	ND	ND	ND	ND	ND
ARBON TETRACHLORIDE	ND	ND	ND	ND	ND	ND
HLORACETALDEHYDE	ND	ND	ND	ND	ND	ND
HLORAL	ND	ND	ND	ND	ND	ND
HLOROBENZENE	ND	ND	ND	ND	ND	ND
HLOROETHANE	ND	ND	ND	ND	ND	ND
HLOROFORM	2.8B	14	ND	1.8	ND	ND
-CHLOROHEXANE	ND	ND	ND	ND	ND	ND
-CHLOROETHYL VINYL ETHER	ND	ND	ND	ND	ND	ND
HLOROMETHANE	ND	ND	ND	ND	ND	ND
HLOROMETHYL METHYL ETHER	ND	ND	ND	ND	ND	ND
HLOROTOLUENE	ND	ND	ND	ND	ND	ND
IBROMOCHLOROMETHANE	ND	ND	ND	ND	ND	ND
IBROMOMETHANE	ND	ND	ND	ND	ND	ND
,2-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
,3-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
,4-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
ICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND	ND
,1-DICHLOROETHANE	ND	ND	250	220	ND	20
,2-DICHLOROETHANE	ND	ND	4.4	4.4	ND	ND
,1-DICHLOROETHYLENE	ND	ND	26	26	ND	58
RANS-1,2-DICHLOROETHYLENE	ND	ND	50	24	ND	450
ICHLOROMETHANE	ND	1.2B	0.50B	0.45B	ND	0.29B
,2-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND

) - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1006

TEST COMPOUND	DANGB-3-GW3C-GW-1 88092511	DANGB-FB11 88092512	DANGB-3-GW3B-GW-1 88092513	DANGB-3-MW54-GW-1 88092514	DANGB-3-GW3A-GW-1 88092515	DANGB-3-GW3D-GW-1 88092516
,3-DICHLOROPROPYLENE	ND	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
,1,1,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
ETRACHLOROETHYLENE	280	ND	440	470	4.4	540
,1,1-TRICHLOROETHANE	28	ND	3100	3000	0.34	1300
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
RICHLOROETHYLENE	5.1	ND	6.4	6.7	ND	39
RICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND	ND
TRICHLOROPROPANE	ND	ND	ND	ND	ND	ND
NYL CHLORIDE	ND	ND	2.8	4.5	ND	3.5

ND - Not Detected

ANALYSIS REPORT

)RK ORDER NUMBER: 1006
)B NUMBER : ZB0000000440
)RK ORDER DATE : 09/19/88

APPROVED BY
Lab Supervisor

:PORT DATA:
; OAK RIDGE/DULUTH ANGB
0 S. ILLINOIS AVE. STE. S103
.K RIDGE, TN 37830
'LL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

)NTRACT / PO # : OR001
)NTACT : BILL HAYDEN
(615)-481-3920

ASK: 4, UNITS: ug/L, GROUP 8020

:ST COMPOUND	DANGB-3-GW3C-GW-1 88092511	DANGB-FB11 88092512	DANGB-3-GW3B-GW-1 88092513	DANGB-3-MW54-GW-1 88092514	DANGB-3-GW3A-GW-1 88092515	DANGB-3-GW3D-GW-1 88092516
:NZENE	ND	ND	1.1	2.8	ND	0.74
ILOROBENZENE	ND	ND	ND	ND	ND	ND
,2-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
3-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
4-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
'HYL BENZENE	ND	ND	ND	ND	ND	ND
)LUENE	ND	ND	21	20	ND	2.9
'LENES	ND	ND	ND	ND	ND	ND

- Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 1006
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/19/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 4, UNITS: ug/L, GROUP 8080

TEST COMPOUND	DANGB-3-GW3C-GW-1 88092511	DANGB-3-GW3B-GW-1 88092513	DANGB-3-MW54-GW-1 88092514	DANGB-3-GW3A-GW-1 88092515	DANGB-3-GW3D-GW-1 88092516	DANGB-3-MW27-GW-1 88092517
ALDRIN	ND	ND	ND	ND	ND	ND
ALPHA-BHC	ND	ND	ND	ND	ND	ND
BETA-BHC	ND	ND	ND	ND	ND	ND
DELTA-BHC	ND	ND	ND	ND	ND	ND
GAMMA-BHC	ND	ND	ND	ND	ND	ND
CHLORDANE	ND	ND	ND	ND	ND	ND
4,4'-DDD	ND	ND	ND	ND	ND	ND
4,4'-DDE	ND	ND	ND	ND	ND	ND
4,4'-DDT	ND	ND	ND	ND	ND	ND
DIELDRIN	ND	ND	ND	ND	ND	ND
ENDOSULFAN I	ND	ND	ND	ND	ND	ND
ENDOSULFAN II	ND	ND	ND	ND	ND	ND
ENDOSULFAN SULFATE	ND	ND	ND	ND	ND	ND
ENDRIN	ND	ND	ND	ND	ND	ND
ENDRIN ALDEHYDE	NA	NA	NA	NA	NA	NA
HEPTACHLOR	ND	ND	ND	ND	ND	ND
HEPTACHLOR EPOXIDE	ND	ND	ND	ND	ND	ND
KEPONE	ND	ND	ND	ND	ND	ND
METHOXYCHLOR	ND	ND	ND	ND	ND	ND
TOXAPHENE	ND	ND	ND	ND	ND	ND
PCB-1016	ND	ND	ND	ND	ND	ND
PCB-1221	ND	ND	ND	ND	ND	ND
PCB-1232	ND	ND	ND	ND	ND	ND
PCB-1242	45	34	44	24	26	ND
PCB-1248	ND	ND	ND	ND	ND	ND
PCB-1254	ND	ND	ND	ND	ND	ND
PCB-1260	ND	ND	ND	ND	ND	ND

ND - Not Detected
NA-Not Analyzed

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - BN 8.70
Matrix: Water

ate Received: September 19, 1988
ate Reported: December 3, 1988

Work Order: 1006
Job Number: OR961

OR: ES:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

ab Number:	88:9:511	88092513
ample No.:	DANGB-3-GW3C-GW-1	DANGB-3-GW3B-GW-1
ate Sampled:	9-17-88	9-17-88
ime Sampled:	09:15	09:20
ate Extracted:	9-23-88	9-24-88
ate Analyzed:	10-30-88	10-31-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
,3-Dichlorobenzene	10	ND	ND
,4-Dichlorobenzene	10	ND	ND
exachloroethane	10	ND	ND
is(2-chloroethyl)ether	10	ND	ND
,2-Dichlorobenzene	10	ND	ND
-Nitrosodimethylamine	10	ND	ND
is(2-chloroisopropyl)ether	10	ND	ND
-Nitrosodi-n-propylamine	10	ND	ND
exachlorobutadiene	10	ND	ND
,2,4-Trichlorobenzene	10	ND	ND
itrobenzene	10	ND	ND
sophorone	10	ND	ND
aphthalene	10	ND	22
is(2-chloroethoxy)methane	10	ND	10
-Chloronaphthalene	10	ND	ND
exachlorocyclopentadiene	10	ND	ND
cenaphthylene	10	ND	ND
cenaphthene	10	ND	ND
imethyl phthalate	10	ND	ND
,6-Dinitrotoluene	10	ND	ND
luorene	10	ND	ND
,4-Dinitrotoluene	10	ND	ND
iethyl phthalate	10	16	ND
-Nitrosodiphenylamine	10	ND	ND
exachlorobenzene	10	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 19, 1988
Date Reported: December 9, 1988

Work Order: 1006
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGP
Address: 710 S. Illinois Ave, Suite F-102
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	8809251l	8809251?
Sample No.:	DANGP-3-GW3C-GW-1	DANGP-3-GW3B-GW-1
Date Sampled:	9-17-88	9-17-88
Time Sampled:	09:15	09:20
Date Extracted:	9-23-88	9-24-88
Date Analyzed:	10-30-88	10-31-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Phenanthrene	10	ND	ND
Anthracene	10	ND	ND
Dibutyl phthalate	10	ND	ND
Fluoranthene	10	ND	ND
4-Chlorophenyl phenyl ether	10	ND	ND
Pyrene	10	ND	ND
Butyl Benzyl phthalate	10	ND	ND
Bis(2-ethylhexyl) phthalate	10	ND	17 B
Chrysene	10	ND	ND
4-Bromophenyl phenyl ether	10	ND	ND
Benzo(a)anthracene	10	ND	ND
Di-n-octylphthalate	10	ND	ND
Benzo(b)fluoranthene	10	ND	ND
Benzo(k)fluoranthene	10	ND	ND
Benzidine	60	ND	ND
3,3'-Dichlorobenzidine	20	ND	ND
Benzo(a)pyrene	10	ND	ND
Indeno(1,2,3-cd)pyrene	10	ND	ND
Dibenzo(a,h)anthracene	10	ND	ND
Benzo(ghi)perylene	10	ND	ND
Benzyl Alcohol	20	ND	ND

ate Received: September 19, 1988
ate Reported: December 9, 1988

Work Order: 1006
Job Number: OR001

:r: Es:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

ab Number:	88092511	88092513
ample No.:	DANGB-3-GW3C-GW-1	DANGB-3-GW3B-GW-1
ate Sampled:	9-17-88	9-17-88
ime Sampled:	09:15	09:20
ate Extracted:	9-23-88	9-24-88
ate Analyzed:	10-30-88	10-31-88

ompound	Detection Limits ug/L	Analytical Results (dry weight) ug/L	ug/L
cetophenone	--*	ND	ND
niline	--*	ND	ND
-Aminobiphenyl	--*	ND	ND
-Chloroaniline	20	ND	ND
-Chloronaphthalene	--*	ND	ND
benzofuran	10	ND	ND
-Dimethylaminoazobenzene	--*	ND	ND
,12-Dimethylbenz(a)anthracene	--*	ND	ND
--,a-Dimethylphenethylamine	--*	ND	ND
phenylamine	--*	ND	ND
,2-Diphenylhydrazine	--*	ND	ND
thyl methanesulfonate	--*	ND	ND
-Methylcholanthrene	--*	ND	ND
ethyl methanesulfonate	--*	ND	ND
-Methylnaphthalene	10	ND	ND
-Naphthylamine	--*	ND	ND
-Naphthylamine	--*	ND	ND
-Nitroaniline	50	ND	ND
-Nitroaniline	50	ND	ND
-Nitroaniline	50	ND	ND
-Nitroso-di-n-butylamine	--*	ND	ND
-Nitrosopiperidine	--*	ND	ND
entachlorobenzene	--*	ND	ND
entachloronitrobenzene	--*	ND	ND
henacetin	--*	ND	ND
-Picoline	--*	ND	ND
ronamide	--*	ND	ND
,3,4,5-Tetrachlorobenzene	--*	ND	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

Date Received: September 19, 1988
Date Reported: December 9, 1988

Work Order: 1006
Job Number: OR001

POk: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN:Mr. Bill Hayden

Lab Number:	88092511	88092513
Sample No.:	DANGB-3-GW3C-GW-1	DANGB-3-GW3B-GW-1
Date Sampled:	9-17-88	9-17-88
Time Sampled:	09:15	09:20
Date Extracted:	9-23-88	9-24-88
Date Analyzed:	10-30-88	10-31-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Alpha-BHC	--*	ND	ND
Gamma-BHC	--*	ND	ND
Beta-BHC	20	ND	ND
Heptachlor	10	ND	ND
Delta-BHC	15	ND	ND
Aldrin	10	ND	ND
Heptachlor epoxide	10	ND	ND
Endosulfan I	--*	ND	ND
Dieldrin	15	ND	ND
4,4'-DDE	30	ND	ND
Endrin	--*	ND	ND
Endosulfan II	--*	ND	ND
4,4'-DDD	15	ND	ND
4,4'-DDT	25	ND	ND
Endosulfan Sulfate	30	ND	ND
Endrin aldehyde	--*	ND	ND
Endrin Ketone	--*	ND	ND
Chlordane	60	ND	ND
Methoxychlor	--*	ND	ND
Toxaphene	60	ND	ND
Aroclor-1016	60	ND	ND
Aroclor-1221	60	ND	ND
Aroclor-1232	60	ND	ND
Aroclor-1242	60	ND	ND
Aroclor-1248	60	ND	ND
Aroclor-1254	60	ND	ND
Aroclor-1260	60	ND	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Acid Extractables -- SW #27
Matrix: Water

Date Received: September 19, 1988
Date Reported: December 9, 1988

Work Order: 1006
Job Number: CR001

FOR: ES:Oak Ridge/Duluth ANGE
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092511	88092513
Sample No.:	DANGB-3-GW3C-GW-1	DANGB-3-GW3B-GW-1
Date Sampled:	9-17-88	9-17-88
Time Sampled:	09:15	09:20
Date Extracted:	9-23-88	9-24-88
Date Analyzed:	10-30-88	10-31-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
4-Chlorophenol	10	ND	ND
2-Nitrophenol	10	ND	ND
Phenol	10	ND	ND
2,4-Dimethylphenol	10	ND	ND
2,4-Dichlorophenol	10	ND	ND
2,4,6-Trichlorophenol	10	ND	ND
4-Chloro-3-methylphenol	20	ND	ND
2,4-Dinitrophenol	50	ND	ND
2,6-Dichlorophenol	--*	ND	ND
2-Methyl-4,6-Dinitrophenol	50	ND	ND
Pentachlorophenol	50	ND	ND
4-Nitrophenol	50	ND	ND
Benzoic Acid	50	ND	ND
2-Methylphenol	10	ND	ND
3- & 4-Methylphenol	10	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
2,4,5-Trichlorophenol	10	ND	ND

Analyst

Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

Date Received: September 19, 1988
Date Reported: December 9, 1988

Work Order: 1006
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092514	88092515
Sample No.:	DANGB-3-MW54-GW-1	DANGB-3-GW3A-GW-1
Date Sampled:	9-17-88	9-17-88
Time Sampled:	10:00	11:00
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	11-04-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
1,3-Dichlorobenzene	10	ND	ND
1,4-Dichlorobenzene	10	ND	ND
Hexachloroethane	10	ND	ND
Bis(2-chloroethyl)ether	10	ND	ND
1,2-Dichlorobenzene	10	ND	ND
N-Nitrosodimethylamine	10	ND	ND
Bis(2-chloroisopropyl)ether	10	ND	ND
N-Nitrosodi-n-propylamine	10	ND	ND
Hexachlorobutadiene	10	ND	ND
1,2,4-Trichlorobenzene	10	ND	ND
Nitrobenzene	10	ND	ND
Isophorone	10	ND	ND
Naphthalene	10	10	ND
Bis(2-chloroethoxy)methane	10	ND	ND
2-Chloronaphthalene	10	ND	ND
Hexachlorocyclopentadiene	10	ND	ND
Acenaphthylene	10	ND	ND
Acenaphthene	10	ND	ND
Dimethyl phthalate	10	ND	ND
2,6-Dinitrotoluene	10	ND	ND
Fluorene	10	ND	ND
2,4-Dinitrotoluene	10	ND	ND
Diethyl phthalate	10	ND	ND
N-Nitrosodiphenylamine	10	ND	ND
Hexachlorobenzene	10	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8.70
Matrix: Water
(continued)

Date Received: September 19, 1988
Date Reported: December 9, 1988

Work Order: 1606
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092514	88092515
Sample No.:	DANGB-3-MW54-GW-1	DANGB-3-GW3A-GW-1
Date Sampled:	9-17-88	9-17-88
Time Sampled:	10:00	11:00
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	11-04-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Phenanthrene	10	ND	ND
Anthracene	10	ND	ND
Dibutyl phthalate	10	ND	ND
Fluoranthene	10	ND	ND
4-Chlorophenyl phenyl ether	10	ND	ND
Pyrene	10	ND	ND
Butyl Benzyl phtnalate	10	ND	ND
Bis(2-ethylhexyl) phthalate	10	19 B	ND
Chrysene	10	ND	ND
4-Bromophenyl phenyl ether	10	ND	ND
Benzo(a)anthracene	10	ND	ND
Di-n-octylphthalate	10	ND	ND
Benzo(b)fluoranthene	10	ND	ND
Benzo(k)fluoranthene	10	ND	ND
Benzidine	60	ND	ND
3,3'-Dichlorobenzidine	20	ND	ND
Benzo(a)pyrene	10	ND	ND
Indeno(1,2,3-cd)pyrene	10	ND	ND
Dibenzo(a,h)anthracene	10	ND	ND
Benzo(ghi)perylene	10	ND	ND
Benzyl Alcohol	20	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 19, 1988
Date Reported: December 9, 1988

Work Order: 1006
Job Number: OR001

For: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092514	88092515
Sample No.:	DANGB-3-MW54-GW-1	DANGB-3-GW3A-GW-1
Date Sampled:	9-17-88	9-17-88
Time Sampled:	10:00	11:00
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	11-04-88

Compound	Detection Limits ug/L	Analytical Results (dry weight) ug/L	ug/L
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
4-Chloroaniline	20	ND	ND
1-Chloronaphthalene	--*	ND	ND
Dibenzofuran	10	ND	ND
p-Dimethylaminoazobenzene	--*	ND	ND
7,12-Dimethylbenz(a)anthracene	--*	ND	ND
a-,a-Dimethylphenethylamine	--*	ND	ND
Diphenylamine	--*	ND	ND
1,2-Diphenylhydrazine	--*	ND	ND
Ethyl methanesulfonate	--*	ND	ND
3-Methylcholanthrene	--*	ND	ND
Methyl methanesulfonate	--*	ND	ND
2-Methylnaphthalene	10	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	50	ND	ND
3-Nitroaniline	50	ND	ND
4-Nitroaniline	50	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
2-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

Date Received: September 19, 1988
Date Reported: December 9, 1988

Work Order: 1008
Job Number: OR001

CR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN:Mr. Bill Hayden

Lab Number:	88092514	88092515
Sample No.:	DANGB-3-MW54-GW-1	DANGB-3-GW3A-GW-1
Date Sampled:	9-17-88	9-17-88
Time Sampled:	10:00	11:00
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	11-04-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Alpha-BHC	--*	ND	ND
Gamma-BHC	--*	ND	ND
Beta-BHC	20	ND	ND
Heptachlor	10	ND	ND
Delta-BHC	15	ND	ND
Aldrin	10	ND	ND
Heptachlor epoxide	10	ND	ND
Endosulfan I	--*	ND	ND
Dieldrin	15	ND	ND
4,4'-DDE	30	ND	ND
Endrin	--*	ND	ND
Endosulfan II	--*	ND	ND
4,4'-DDD	15	ND	ND
4,4'-DDT	25	ND	ND
Endosulfan Sulfate	30	ND	ND
Endrin aldehyde	--*	ND	ND
Endrin Ketone	--*	ND	ND
Chlordane	60	ND	ND
Methoxychlor	--*	ND	ND
Toxaphene	60	ND	ND
Aroclor-1016	60	ND	ND
Aroclor-1221	60	ND	ND
Aroclor-1232	60	ND	ND
Aroclor-1242	60	ND	ND
Aroclor-1248	60	ND	ND
Aroclor-1254	60	ND	ND
Aroclor-1260	60	ND	ND

EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Acid extractables -- SW 8270
Matrix: Water

Date Received: September 19, 1988
Date Reported: December 9, 1988

Work Order: 1006
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092514	88092515
Sample No.:	DANGB-3-MW54-GW-1	DANGB-3-GW3A-GW-1
Date Sampled:	9-17-88	9-17-88
Time Sampled:	10:00	11:00
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	11-04-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
2-Chlorophenol	10	ND	ND
2-Nitrophenol	10	ND	ND
Phenol	10	ND	ND
2,4-Dimethylphenol	10	ND	ND
2,4-Dichlorophenol	10	ND	ND
2,4,6-Trichlorophenol	10	ND	ND
4-Chloro-3-methylphenol	20	ND	ND
2,4-Dinitrophenol	50	ND	ND
2,6-Dichlorophenol	--*	ND	ND
2-Methyl-4,6-Dinitrophenol	50	ND	ND
Pentachlorophenol	50	ND	ND
4-Nitrophenol	50	ND	ND
Benzoic Acid	50	ND	ND
2-Methylphenol	10	ND	ND
3- & 4-Methylphenol	10	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
2,4,5-Trichlorophenol	10	ND	ND

Analyst

Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

Date Received: September 19, 1988
Date Reported: December 9, 1988

Work Order: 1006
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092516
Sample No.:	DANGB-3-GW3D-GW-1
Date Sampled:	9-17-88
Time Sampled:	11:00
Date Extracted:	9-24-88
Date Analyzed:	11-01-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L
1,3-Dichlorobenzene	10	ND
1,4-Dichlorobenzene	10	ND
Hexachloroethane	10	ND
Bis(2-chloroethyl)ether	10	ND
1,2-Dichlorobenzene	10	ND
N-Nitrosodimethylamine	10	ND
Bis(2-chloroisopropyl)ether	10	ND
N-Nitrosodi-n-propylamine	10	ND
Hexachlorobutadiene	10	ND
1,2,4-Trichlorobenzene	10	ND
Nitrobenzene	10	ND
Isophorone	10	ND
Naphthalene	10	ND
Bis(2-chloroethoxy)methane	10	ND
2-Chloronaphthalene	10	ND
Hexachlorocyclopentadiene	10	ND
Acenaphthylene	10	ND
Acenaphthene	10	ND
Dimethyl phthalate	10	ND
2,6-Dinitrotoluene	10	ND
Fluorene	10	ND
2,4-Dinitrotoluene	10	ND
Diethyl phthalate	10	18
N-Nitrosodiphenylamine	10	ND
Hexachlorobenzene	10	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 19, 1988
Date Reported: December 9, 1988

Work Order: 1006
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092516
Sample No.:	DANGB-3-GW3D-GW-1
Date Sampled:	9-17-88
Time Sampled:	11:00
Date Extracted:	9-24-88
Date Analyzed:	11-01-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L
Phenanthrene	10	ND
Anthracene	10	ND
Dibutyl phthalate	10	ND
Fluoranthene	10	ND
4-Chlorophenyl phenyl ether	10	ND
Pyrene	10	ND
Butyl Benzyl phthalate	10	ND
Bis(2-ethylhexyl) phthalate	10	ND
Chrysene	10	ND
4-Bromophenyl phenyl ether	10	ND
Benzo(a)anthracene	10	ND
Di-n-octylphthalate	10	ND
Benzo(b)fluoranthene	10	ND
Benzo(k)fluoranthene	10	ND
Benzidine	60	ND
3,3'-Dichlorobenzidine	20	ND
Benzo(a)pyrene	10	ND
Indeno(1,2,3-cd)pyrene	10	ND
Dibenzo(a,h)anthracene	10	ND
Benzo(ghi)perylene	10	ND
Benzyl Alcohol	20	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 19, 1988
Date Reported: December 9, 1988

Work Order: 1006
Job Number: OR001

For: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092516
Sample No.:	DANGB-3-GW3D-GW-1
Date Sampled:	9-17-88
Time Sampled:	11:00
Date Extracted:	9-24-88
Date Analyzed:	11-01-88

Compound	Detection Limits ug/L	Analytical Results (dry weight) ug/L
Acetophenone	--*	ND
Aniline	--*	ND
4-Aminobiphenyl	--*	ND
4-Chloroaniline	20	ND
1-Chloronaphthalene	--*	ND
Dibenzofuran	10	ND
p-Dimethylaminoazobenzene	--*	ND
7,12-Dimethylbenz(a)anthracene	--*	ND
a-,a-Dimethylphenethylamine	--*	ND
Diphenylamine	--*	ND
1,2-Diphenylhydrazine	--*	ND
Ethyl methanesulfonate	--*	ND
3-Methylcholanthrene	--*	ND
Methyl methanesulfonate	--*	ND
2-Methylnaphthalene	10	ND
1-Naphthylamine	--*	ND
2-Naphthylamine	--*	ND
2-Nitroaniline	50	ND
3-Nitroaniline	50	ND
4-Nitroaniline	50	ND
N-Nitroso-di-n-butylamine	--*	ND
N-Nitrosopiperidine	--*	ND
Pentachlorobenzene	--*	ND
Pentachloronitrobenzene	--*	ND
Phenacetin	--*	ND
2-Picoline	--*	ND
Pronamide	--*	ND
1,2,4,5-Tetrachlorobenzene	--*	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

Date Received: September 19, 1988
Date Reported: December 9, 1988

Work Order: 1006
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN:Mr. Bill Hayden

Lab Number:	88092516
Sample No.:	DANGB-3-GW3D-GW-1
Date Sampled:	9-17-88
Time Sampled:	11:00
Date Extracted:	9-24-88
Date Analyzed:	11-01-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L
Alpha-BHC	--*	ND
Gamma-BHC	--*	ND
Beta-BHC	20	ND
Heptachlor	10	ND
Delta-BHC	15	ND
Aldrin	10	ND
Heptachlor epoxide	10	ND
Endosulfan I	--*	ND
Dieldrin	15	ND
4,4'-DDE	30	ND
Endrin	--*	ND
Endosulfan II	--*	ND
4,4'-DDD	15	ND
4,4'-DDT	25	ND
Endosulfan Sulfate	30	ND
Endrin aldehyde	--*	ND
Endrin Ketone	--*	ND
Chlordane	60	ND
Methoxychlor	--*	ND
Toxaphene	60	ND
Aroclor-1016	60	ND
Aroclor-1221	60	ND
Aroclor-1232	60	ND
Aroclor-1242	60	ND
Aroclor-1248	60	ND
Aroclor-1254	60	ND
Aroclor-1260	60	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

Date Received: September 19, 1988
Date Reported: December 9, 1988

Work Order: 1006
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092516
Sample No.:	DANGB-3-GW3D-GW-1
Date Sampled:	9-17-88
Time Sampled:	11:00
Date Extracted:	9-24-88
Date Analyzed:	11-01-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L
2-Chlorophenol	10	ND
2-Nitrophenol	10	ND
Phenol	10	ND
2,4-Dimethylphenol	10	ND
2,4-Dichlorophenol	10	ND
2,4,6-Trichlorophenol	10	ND
4-Chloro-3-methylphenol	20	ND
2,4-Dinitrophenol	50	ND
2,6-Dichlorophenol	--*	ND
2-Methyl-4,6-Dinitrophenol	50	ND
Pentachlorophenol	50	ND
4-Nitrophenol	50	ND
Benzoic Acid	50	ND
2-Methylphenol	10	ND
3- & 4-Methylphenol	10	ND
2,3,4,6-Tetrachlorophenol	--*	ND
2,4,5-Trichlorophenol	10	ND

Analyst

Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING-SCIENCE

1006

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED	SHIP TO: ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710
OR001	Duluth ANGB/Duluth, Mn.			
SAMPLER(S): (Signature) Kurt Z. Dam				

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW846 8020	EPA 608	EPA 625	EPA 418.1	SW 8010, 7060, 7131	SW 7421, 7470 7191	SW8510, 8310	SW420	REMARKS
9-17-88	0915	DANGB-3-GW3C-GW-1	5	X								882511
9-17-88	0920	DANGB-FB11	2	X								882512
9-17-88	0920	DANGB-3-GW3B-GW-1	5	X								882513
9-17-88	1000	DANGB-3-MW54-GW-1	5	X								882514
9-17-88	1100	DANGB-3-GW3A-GW-1	5	X								882515
9-17-88	1100	DANGB-3-GW3D-GW-1	13	X	X	X	X	X	X			882516

635

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	9-17-88 1700	Fed Ex Airbill # 949031 0034			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
			09/19/88 10:25	Samples received cdd + intact.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

1006

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.			ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710
SAMPLER(S): (Signature) Kimberly L. Dan				

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 8010, 7060, 7131	SW7421, 7470 7191	SW9310, 9315	SM420	REMARKS
9-17-88	0900	DANGB-3-MW27 (-GW1)* SIM	2		X							882517
9-17-88	1100	MATRIX SPIKE	6		X	X	X		89	25	16	1/2 marked "MATRIX SPIKE"; 1/2 marked "MATRIX SPIKE DUP"
9-17-88	0915	DANGB-3-GW3C-GW-1	2					X	X			882511
	0915											

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Kimberly L Dan	9-17-88 1700	Fed Ex Airbill # 949031034			
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	
			9/19/88 14:00	Cold, INTACT * GW-1? - BOTTLES LABELED DANGB-3-MW27-GW1	

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

ENGINEERING-SCIENCE

1006

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.			ENGINEERING-SCIENCE LABORATORY, INC, 600 Bancroft Way Berkeley, CA 94710

SAMPLER(S): (Signature)

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 6010, 7000, 7131	SW7421, 7470 7191	SW9310, 9315	SM429	REMARKS
9-17-88	0915	DANGB-3-GW3C-GW-1	2			X						882511
9-17-88	1100	DANGB-3-GW3A-GW-1	8		X	X	X	X	X			882515

591

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	9-17-88 1700	Fed Ex Airbill # 944031034			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
			9/19/88 11:30	Samples RECEIVED COOL + Intact

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

ENGINEERING-SCIENCE

1006

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) Richard L. Dan

SHIP TO: ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 8010, 7000, 7131	SW7421, 7470 7/91	SW8310, 9315	SM429	REMARKS
9-17-88	0920	DANGB-3-GW3B-GW-1	2			X						882513
9-17-88	1000	DANGB-3-MW54-GW-1	8	X	X	X	X	X				882514
	5962											

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Richard L Dan	9-17-88 1700	Fed Ex Airbill # 9490310034			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		[signature]	9/19 1105	Samples Cold & Intact

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature)

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 601	EPA 625	EPA 418.1	SW 8010, 7860, 7131	SW7421, 7470 7741	SW9310, 9315	SM429	REMARKS
9-17-88	0915	DANGB-3-GW3C-GW-1	4		X		X					
9-17-88	0920	DANGB-3-GW3B-GW-1	6		X	X		X	X			

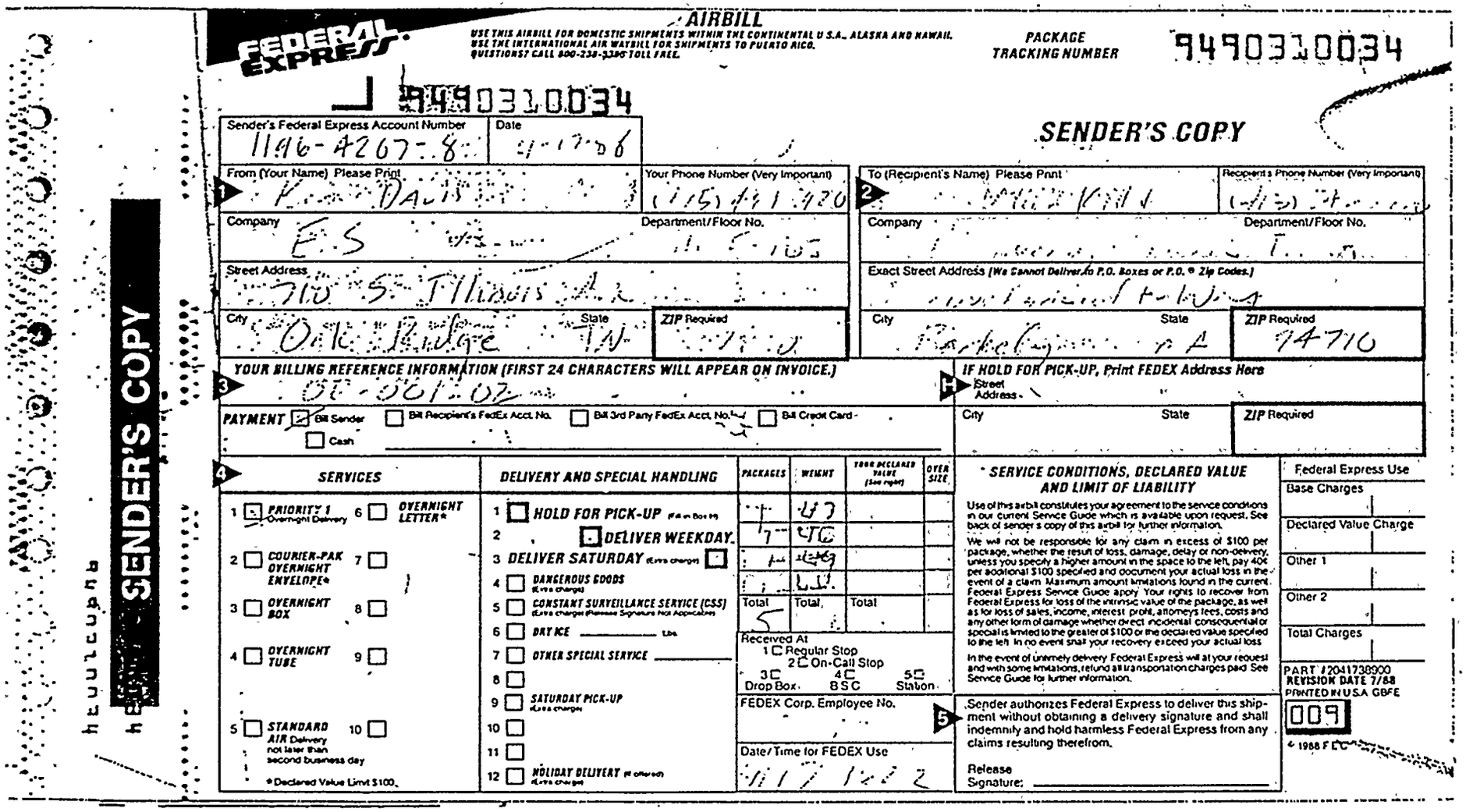
SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	9-17-88 1700				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

563



FEDERAL EXPRESS

AIRBILL

USE THIS AIRBILL FOR DOMESTIC SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 9490310034

9490310034

SENDER'S COPY

Sender's Federal Express Account Number: 1196-4267-8 | Date: 4-17-96

1 From (Your Name) Please Print: K. DAVIS | Your Phone Number (Very Important): (415) 441-320

Company: E.S | Department/Floor No.: 1 C-105

Street Address: 710 S. Illinois Ave.

City: Oak Ridge | State: TN | ZIP Required: 37830

2 To (Recipient's Name) Please Print: [illegible] | Recipient's Phone Number (Very Important): (415) [illegible]

Company: [illegible] | Department/Floor No.:

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): [illegible]

City: Parkfield | State: CA | ZIP Required: 94710

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.): ST-501-02

4 IF HOLD FOR PICK-UP, Print FEDEX Address Here
Street Address:
City | State | ZIP Required

PAYMENT: [X] Bill Sender [ ] Bill Recipient's FedEx Acct. No. [ ] Bill 3rd Party FedEx Acct. No. [ ] Bill Credit Card [ ] Cash

4 SERVICES

1 [X] PRIORITY 1 Overnight Delivery
2 [ ] COURIER-PAK OVERNIGHT ENVELOPE*
3 [ ] OVERNIGHT BOX
4 [ ] OVERNIGHT TUBE
5 [ ] STANDARD AIR Delivery not later than second business day
6 [ ] OVERNIGHT LETTER*
7 [ ]
8 [ ]
9 [ ]
10 [ ]
* Declared Value Limit $100.

DELIVERY AND SPECIAL HANDLING

1 [ ] HOLD FOR PICK-UP (If no Box No.)
2 [X] DELIVER WEEKDAY
3 DELIVER SATURDAY (Extra charges) [ ]
4 [ ] DANGEROUS GOODS (Extra charges)
5 [ ] CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charges Minimum Signature Not Applicable)
6 [ ] DRY ICE ____ Lbs.
7 [ ] OTHER SPECIAL SERVICE ____
8 [ ]
9 [ ] SATURDAY PICK-UP (Extra charges)
10 [ ]
11 [ ]
12 [ ] HOLIDAY DELIVERY (If offered) (Extra charges)

PACKAGES	WEIGHT	YOUR DECLARED VALUE (See right)	OVER SIZE
1	07		
1	4.6		
1	1.4		
1	1.1		
Total 5	Total	Total	

Received At
1 [ ] Regular Stop
2 [ ] On-Call Stop
3 [ ] Drop Box
4 [ ] BSC
5 [ ] Station

FEDEX Corp. Employee No.:

Date/Time for FEDEX Use: 4/17 1202

* SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY

Use of this airbill constitutes your agreement to the service conditions in our current Service Guide which is available upon request. See back of sender's copy of this airbill for further information.

We will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay or non-delivery, unless you specify a higher amount in the space to the left, pay 40¢ per additional $100 specified and document your actual loss in the event of a claim. Maximum amount limitations found in the current Federal Express Service Guide apply. Your rights to recover from Federal Express for loss of the intrinsic value of the package, as well as for loss of sales, income, interest profit, attorneys fees, costs and any other form of damage whether direct, incidental consequential or special is limited to the greater of $100 or the declared value specified to the left. In no event shall your recovery exceed your actual loss.

In the event of untimely delivery Federal Express will at your request and with some limitations, refund all transportation charges paid. See Service Guide for further information.

5 Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.

Release Signature: _____

Federal Express Use
Base Charges
Declared Value Charge
Other 1
Other 2
Total Charges

PART #2041738900
REVISION DATE 7/88
PRINTED IN U.S.A. GBFE

009

© 1988 FEC

SENDER'S COPY

564

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092487-88092488, 88092492, 88092494-88092495
88092509-88092511, 88092513-88092516
88092523-88092528, 88092546-88092547

QC Report No: AAF-W-0053-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-17-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Arsenic	88092487	88092487	10-15-88	NA	7060	<0.01	<0.01	<0.01	NC	0.040	<0.01	0.041	102	
Cadmium	88092487	88092487	10-20-88	NA	6010	<0.005	<0.05	<0.05	NC	0.010	<0.05	0.0114	114	
Chromium	88092487	88092487	10-16-88	NA	6010	<0.01	<0.01	<0.01	NC	0.020	<0.01	0.0216	108	
Lead	88092487	88092487	10-16-88	NA	7421	<0.005	<0.05	<0.005	NC	0.020	<0.05	0.0222	111	

565

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth_ANGB

QC Report for Laboratory Sample No(s):
88092487-88092488, 88092492, 88092494-88092495
88092509-88092511, 88092513-88092516
88092523-88092528, 88092546-88092547

QC Report No: ICP-W-0060-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-17-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	Duplicate RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Barium	88092487	88092487	10-13-88	NA	6010	<0.2	<0.2	<0.2	NC	2.0	<0.2	0.198	99	

566

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2}$ X 100

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

Percent Recovery (PR) = $\frac{SSR - SR}{SA}$ x 100

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092487-88092488, 88092492, 88092494-88092495
88092509-88092511, 88092513-88092516
88092523-88092528, 88092546-88092547

QC Report No: CVM-W-0031-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-17-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Mercury	88092487	88092487	10-14-88	NA	254.1	<0.0002	<0.0002	<0.0002	NC	0.0010	<0.0002	0.00091	91	

567

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092422, 88092424-88092427, 88092433
88092509-88092511, 88092513, 88092515-88092516
88092346, 88092348, 88092350, 88092494-88092495

QC Report No: TPH-W-0070-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 9-28-88
Date Analyzed: 10-05-88
Date Reported: 11-01-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88092516	418.1	<1.5	<1.5	39.5	29.6	75	30.4	77	3	*

568

* Reporting limit for the samples in this batch is provided by the sub-contract laboratory.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO(S).: TPH-W-0057-88
QC REPORT NO(S).: TPH-W-0057-88B

Percent recoveries for the quality control samples are lower than ES Laboratory limits. A blank spike analysis shows the laboratory to be in control.

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092514, 88092679-88092681

QC Report No: TPH-W-0057-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-19-88
Date Prepared: 10-03-88
Date Analyzed: 10-05-88
Date Reported: 10-28-88
Dilution Factor: 6

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88092516	418.1	<1	<1	10	2.9	29	2.9	29	0	*

570

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092514, 88092679-88092681

QC Report No: TPH-W-0057-88B
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-01-88
Date Analyzed: 10-05-88
Date Reported: 10-28-88
Dilution Factor: 6

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1	<1	10	7.5	75	6.8	68	10	*

571

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
VOLATILE ORGANICS
EPA 8010/8020

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092487-88092495
88092509-88092516
88092523-88092526

QC Report No: VGC-W-0048-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: NA
Date Prepared: NA
Date Analyzed: 10-03-88
Date Reported: 10-25-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092525	1,1-Dichloroethane	10	ND	9.26	93	9.54	95	3	26	70-130
	Trichloroethene	10	ND	9.89	99	10.3	103	4	19	65-131
	Chlorobenzene	10	ND	10.4	104	10.3	103	1	40	59-137
	Aromatics: 8020									
88092525	Benzene	10	ND	8.84	88	10.6	106	18	20	56-146
	Toluene	10	ND	10.1	101	10.1	101	0	41	42-150
	Chlorobenzene	10	ND	10.1	101	10.1	101	0	36	76-133

Relative Percent Difference (PR) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Sample Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 11-02-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
03	9-27-88	VGC	Carbopack	75-09-2	Dichloromethane	7.4	0.25	88092512
53	9-30-88	VGC	Carbopack	75-09-2	Dichloromethane	38	0.25	88092513-88092514 88092516
64	9-21-88	VGC	Vocol	75-09-2	Dichloromethane	3.1	0.25	88092515,
				67-66-3	Chloroform	0.37	0.05	88092511

573

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: OCP-W-0037-88
QC REPORT NO.: OCP-W-0037-88B

Analysis of matrix spikes resulted in a matrix interference that swamped the response for aldrin in the matrix spike duplicate. This interference was somewhat lower in the matrix spike sample, so that the response would be quantitated. Thus, the recovery of aldrin in the MSD and the RPD for aldrin could not be calculated. Analysis of spiked blanks resulted in acceptable recoveries for all spiked compounds, but the RPD was higher than EPA guidelines for endrin and diedrin. The analytical data associated with these analyses were closely examined. No errors or problems were found.

Heptachlor epoxide was inadvertently used instead of heptachlor in the matrix spiking solution.

Endrin aldehyde and Kepone were not recoverable because they were removed by the alumina column clean-up used on these samples.

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No.: OCP-W-0037-88
QC Sample No.: 88092490
Level (Low/Med): Low
Date Reported: 11-11-88

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s).:
88092490, 88092488, 88092494-88092495
88092511, 88092513-88092517, 88092525-88092528
88092677-88092678, 88092681, 88092617

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	200	ND	0.195	99	56-123
Heptachlor epoxide	200	ND	0.214	105	40-131
Aldrin	200	ND	0.195	99	40-120
Dieldrin	500	ND	0.463	93	52-126
Endrin	500	ND	0.488	98	56-121
4,4'-DDT	500	ND	0.365	73	38-127

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.173	87	99	13	15	56-123
Heptachlor epoxide	0.224	112	105	6	20	40-131
Aldrin	ND	NC*	99	NC*	22	40-120
Dieldrin	0.461	92	93	1	18	52-126
Endrin	0.466	93	98	5	21	56-121
4,4'-DDT	0.401	80	73	9	27	38-127

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 1 out of 6 outside limits

Spike Recovery: 1 out of 12 outside limits

575

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No.: OCP-W-0037-88B
QC Sample No.: Blank
Level (Low/Med): Low
Date Reported: 11-11-88

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s).:
88092490, 88092488, 88092494-88092495
88092511, 88092513-88092517, 88092525-88092528
88092677-88092678, 88092681, 88092617

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	200	ND	0.184	92	56-123
Heptachlor epoxide	200	ND	0.210	105	40-131
Aldrin	200	ND	0.186	93	40-120
Dieldrin	500	ND	0.436	87	52-126
Endrin	500	ND	0.455	91	56-121
4,4'-DDT	500	ND	0.490	98	38-127

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.211	105	92	13	15	56-123
Heptachlor epoxide	0.224	112	105	6	20	40-131
Aldrin	0.210	105	93	12	22	40-120
Dieldrin	0.551	110	87	23*	18	52-126
Endrin	0.292	58	91	44*	21	56-121
4,4'-DDT	0.461	92	98	6	27	38-127

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 2 out of 6 outside limits

Spike Recovery: 0 out of 12 outside limits

576

PESTICIDE METHOD BLANK SUMMARY

Job No.:	OR001	Lab Name:	Engineering Science
		Lab Sample No.:	Blank
Client:	ES Oak Ridge		
Attn:	Bill Hayden	Matrix:	Water
Address:	710 S. Illinois Avenue	Level (low/med):	Low
	Suite F-103	Extraction:	
	Oak Ridge, Tn. 37830	(SepF/Cont/Sonc):	Sonc
		Date Reported:	11-11-88
Project:	Duluth ANGB		
Date Extracted:	9-23-88		
Date Analyzed (1):	10-16-88	Date Analyzed (2):	10-20-88
Time Analyzed (1):	06:26	Time Analyzed (2):	00:39
Instrument ID (1):	HP5890 #2	Instrument ID (2):	HP5880
GG Column ID (1):	OV-1	GC Column ID (2):	Mixed

This Method Blank applies to the following samples, MS and MSD.

EPA Sample No.	Lab Sample ID (1)	Date Analyzed 1	Lab Sample ID (2)	Date Analyzed 2
-	88092494	10-16-88	88092494	10-20-88
-	88092495	10-16-88	88092495	10-20-88
-	88092511	10-16-88		
-	88092513	10-16-88		
-	88092514	10-16-88		
-	88092515	10-16-88		
-	88092516	10-16-88		

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
WORK ORDER NO(S). 1006
EPA METHOD 8270 ANALYSIS

These samples were first extracted and analyzed within holding time. Recoveries of surrogate spikes were outside of EPA QC limits for the acid fraction of 88092513 and the base neutral fractions of 88092514 and 88092515. The extract of 88092515 was re-analyzed, resulting in acceptable surrogate spike recoveries. The result of the second analysis is reported. The date of the first analysis was October 30, 1988. Re-analysis of the other two extracts did not improve surrogate recoveries; there was no more sample to re-extract.

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No: BNA-W-0061-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-17-88
Date Prepared: 9-22-88
Date Analyzed: 11-23-88
Date Reported: 03-23-89
Dilution Factor: NA

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88092490, 88092488, 88092494-88092495
88092508, 88092511, 88092573-88092579

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limits RPD	RECOVERY
	1,2,4-Trichlorobenzene	100	ND	70.4	70	66.7	67	5	28	39-98
B/N	Acenaphthene	100	ND	68.2	68	67.4	67	1	31	46-118
Laboratory	2,4-Dinitrotoluene	100	ND	62.0	62	61.5	62	1	38	24-96
Sample #	Pyrene	100	ND	78.4	78	70.2	70	11	31	26-127
	N-Nitroso-di-n-Propylamine	100	ND	73.6	74	70.2	70	5	38	41-116
88092490	1,4-Dichlorobenzene	100	ND	62.9	63	61.5	62	2	28	36-97
ACID	Pentachlorophenol	200	ND	46.7	23	62.2	31	28	50	9-103
Laboratory	Phenol	200	ND	99.0	49	115	58	15	42	12-89
Sample #	2-Chlorophenol	200	ND	120	60	128	64	2	40	27-123
	4-Chloro-3-Methylphenol	200	ND	138	69	120	60	14	42	23-97
88092490	4-Nitrophenol	200	ND	101	50	139	70	32	50	10-80

CLP

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No: BNA-W-0049-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: NA
Date Prepared: 09-20-88
Date Analyzed: 09-24-88
Date Reported: 12-13-88
Dilution Factor: NA

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88092513-88092516, 88092523-88092528
88092546-88092551

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limits RPD	RECOVERY
	1,2,4-Trichlorobenzene	100	ND	74.9	75	78.2	78	4	28	39-98
B/N	Acenaphthene	100	ND	67.9	68	72.7	73	7	31	46-118
Laboratory	2,4-Dinitrotoluene	100	ND	83.4	83	87.6	88	6	38	24-96
Sample #	Pyrene	100	ND	67.8	68	75.6	76	11	31	26-127
	N-Nitroso-di-n-Propylamine	100	ND	82.0	82	101	101	20	38	41-116
88092516	1,4-Dichlorobenzene	100	ND	62.6	63	70.7	71	12	28	36-97
ACID	Pentachlorophenol	200	ND	77.4	39	93.3	47	19	50	9-103
Laboratory	Phenol	200	ND	73.9	37	68.1	34	8	42	12-89
Sample #	2-Chlorophenol	200	ND	126	63	110	55	14	40	27-123
	4-Chloro-3-Methylphenol	200	ND	194	97	190	95	2	42	23-97
88092516	4-Nitrophenol	200	ND	53.5	27	40.9	20	29	50	10-80

$$\text{Relative Percent Difference (RPD)} = \frac{MS - MSD}{(MS + MSD)/2} \times 100$$

$$\text{Percent Recovery (PR)} = \frac{(MS \text{ or } MSD) - SR}{SA} \times 100$$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

580

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1006

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 3-23-89

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
S0302	10-30-88	AC	1	-	None Detected	-	-	88092511
E6019	10-30-88	BN	2	117-81-7	Bis(2-ethylhexyl)phthalate	17	10	88092511
E6028	10-31-88	BN	2	117-81-7	Bis(2-ethylhexyl)phthalate	18	10	88092513-88092516
E6322	11-23-88	AC	2	-	None Detected	-	-	88092513-88092516

581

* S0289 - One surrogate low, S0592 = re-analysis; SSOL

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1006
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Client Sample ID:	
Attn:	Bill Hayden	Lab Sample ID:	88092494,95 Blank
Address:	710 S. Illinois Avenue	Lab File ID:	E6019/S0302
	Suite F-103	Date Received:	NA
	Oak Ridge, Tn. 37830	Date Extracted:	09-23-88
		Date Analyzed:	10-30-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	NA
		% Moisture: dec:	
		not dec:	X
		GPC Clean up: (Y/N)	N
# TICs Found:	4	Extraction: (SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.24	17	
-	Unknown	28.88	64	
-	Unknown	30.20	100	
-	Unknown	33.05	7	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1006
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092513-2516 AC BLANK
Attn:	Bill Hayden		88092523-2528 AC BLANK
Address:	710 S. Illinois Avenue		88092546-2551 AC BLANK
	Suite F-103	Lab File ID:	E6322
	Oak Ridge, Tn. 37830	Date Received:	NA
		Date Extracted:	09-24-88
		Date Analyzed:	11-23-88
Project:	Duluth ANGB	Date Reported:	03-29-89
		Dilution Factor:	NA
		% Moisture: dec:	
		not dec:	X
		GPC Clean up: (Y/N)	N
# TICs Found:	1	Extraction: (SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.08	14	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1006
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Client Sample ID:	
Attn:	Bill Hayden	Lab Sample ID:	88092513-51 BN Blank
Address:	710 S. Illinois Avenue	Lab File ID:	E6028
	Suite F-103	Date Received:	NA
	Oak Ridge, Tn. 37830	Date Extracted:	09-24-88
		Date Analyzed:	10-31-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N).	N
		Extraction:	
# TICs Found:	2	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.24	17	
-	Unknown	28.87	6	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1006
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Client Sample ID:	
Attn:	Bill Hayden	Lab Sample ID:	88092514 AC
Address:	710 S. Illinois Avenue	Lab File ID:	E6050
	Suite F-103	Date Received:	09-19-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-24-88
		Date Analyzed:	11-01-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	8	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.99	6	
127-18-4	Tetrachloroethene	4.17	9	B
-	Unknown	22.83	4	
-	Unknown	25.05	190	
-	Unknown	25.42	7	
-	Unknown	25.90	5	
-	Unknown	27.56	5	
-	Unknown	28.34	8	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1006
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Client Sample ID:	
Attn:	Bill Hayden	Lab Sample ID:	88092514 BN
Address:	710 S. Illinois Avenue	Lab File ID:	E6026
	Suite F-103	Date Received:	09-19-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-24-88
		Date Analyzed:	10-31-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	8	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
108-88-3	Toluene	3.63	7	
-	Unknown	4.06	7	
127-18-4	Tetrachloroethene	4.27	83	B
-	Unknown	4.75	5	
-	Acid-Phosphorodithioic, o,o,s-trimethylester	11.31	5	
-	Unknown	16.82	4	
-	Unknown	28.88	5	
-	Unknown Aromatic Hydrocarbon	29.25	40	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1006
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Client Sample ID:	
Attn:	Bill Hayden	Lab Sample ID:	88092515 AC
Address:	710 S. Illinois Avenue	Lab File ID:	E6027
	Suite F-103	Date Received:	09-19-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-24-88
		Date Analyzed:	10-31-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	1	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.25	15	B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1006
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Client Sample ID:	
Attn:	Bill Hayden	Lab Sample ID:	88092515 BN
Address:	710 S. Illinois Avenue	Lab File ID:	E6080
	Suite F-103	Date Received:	09-19-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-24-88
		Date Analyzed:	11-04-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	X
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	-	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
108-88-3	Toluene	3.61	220	
127-18-4	Tetrachloroethene	4.21	29	B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1006
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Client Sample ID:	
Attn:	Bill Hayden	Lab Sample ID:	88092511 AC
Address:	710 S. Illinois Avenue	Lab File ID:	S0306
	Suite F-103	Date Received:	09-19-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-23-88
		Date Analyzed:	10-31-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	4	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	4.85	20	
127-18-4	Tetrachloroethene	5.08	17	B
-	Unknown	5.41	11	
79-34-5	1,1,2,2-Tetrachloroethene	7.05	8	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1006
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Client Sample ID:	
Attn:	Bill Hayden	Lab Sample ID:	88092511 BN
Address:	710 S. Illinois Avenue	Lab File ID:	E6023
	Suite F-103	Date Received:	09-19-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-23-88
		Date Analyzed:	10-30-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	8	(SepF/Cont/Conc)SepF	

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.09	8	
-	Unknown	4.07	21	
127-18-4	Tetrachloroethene	4.27	80	B
-	Unknown	4.58	11	
-	Unknown	4.76	8	
-	Unknown	7.05	8	
-	Unknown	28.86	5	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 9

Work Order No.: 1006
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Client Sample ID:
Lab Sample ID: 88092513 BN
Lab File ID: E6025
Date Received: 09-19-88
Date Extracted: 09-24-88
Date Analyzed: 10-31-88
Date Reported: 03-29-89
Dilution Factor: 1
% Moisture: dec:
not dec: X
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc)SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
108-88-3	Toluene	3.62	16	
127-18-4	Tetrachloroethene	4.27	100	B
-	Unknown	4.32	5	
-	Unknown	7.05	18	
-	Unknown	8.33	4	
-	Acid-Phosphorodithioic, o,o,s-trimethylester	11.32	17	
-	Methyl Naphthalene	13.72	6	
-	Unknown	34.43	5	
-	Unknown	36.03	4	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1006
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Client Sample ID:	
Attn:	Bill Hayden	Lab Sample ID:	88092516 AC
Address:	710 S. Illinois Avenue	Lab File ID:	E6047
	Suite F-103	Date Received:	09-19-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-24-88
		Date Analyzed:	11-01-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	16	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
108-88-3	Toluene	3.55	5	
-	Unknown	3.98	15	
127-18-4	Tetrachloroethene	4.17	26	B
-	Unknown	4.49	7	
-	Unknown	25.03	160	
-	Unknown	25.41	5	
-	Unknown	25.89	6	
-	Unknown	28.35	5	
-	Unknown	28.88	300	
-	Unknown	30.23	9	
-	Bis(2-ethylhexyl)phthalate	30.39	7	
-	Unknown	30.63	4	
-	Unknown	30.79	25	
-	Unknown	31.23	15	
-	Unknown	31.40	22	
-	Unknown	32.32	5	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1006
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Client Sample ID:	
Attn:	Bill Hayden	Lab Sample ID:	88092516 BN
Address:	710 S. Illinois Avenue	Lab File ID:	E6044
	Suite F-103	Date Received:	09-19-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-24-88
		Date Analyzed:	11-01-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	14	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	4.06	160	
127-18-4	Tetrachloroethene	4.20	100	B
-	Unknown	4.57	120	
-	Unknown	4.72	21	
79-34-5	1,1,2,2-Tetrachloroethene	5.97	18	
-	Unknown	25.02	51	
-	Unknown	28.80	6	
-	Unknown	29.15	11	
-	Unknown	32.99	7	
-	Unknown	34.33	9	
-	Unknown	35.89	10	
-	Unknown	37.80	10	
-	Unknown	40.13	9	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1006
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092513 AC
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	S0321
	Suite F-103	Date Received:	09-19-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-24-88
		Date Analyzed:	11-01-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	X
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	13	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	5.09	14	B
-	Unknown	24.10	7	
-	Unknown	24.34	12	
-	Unknown	25.43	6	
-	Unknown Aliphatic	26.46	380	
-	Unknown	26.85	36	
-	Unknown	27.38	41	
-	Unknown	28.87	6	
-	Unknown	29.08	15	
-	Unknown	29.23	9	
-	Unknown	29.82	21	
-	Unknown	29.93	4	
-	Unknown	32.93	5	

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 11/01/88 13:44

Lab ID >T1101::03 Data Release Authorized By:

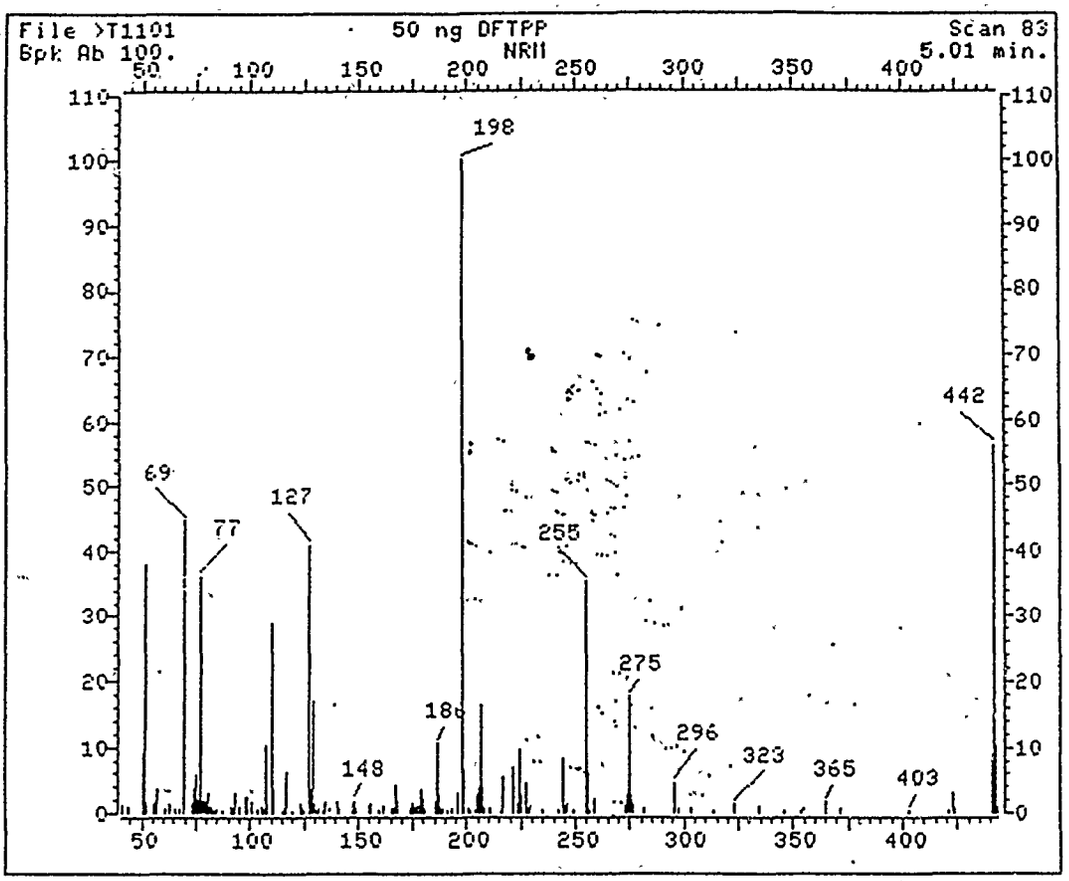
m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	38.06 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	44.64	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	40.76 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	6.52 OK	
275	10.0 - 30.0% of mass 198	17.54 OK	
365	greater than 1.00% of mass 198	1.74 OK	
441	present, but less than mass 443	8.74 OK	
442	greater than 40.0% of mass 198	56.00 OK	
443	17.0 - 23.0% of mass 442	10.09 OK	(18.01) #2

Spent 10/12/88

THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

SAMPLE ID	LAB_ID	DATE_OF_ANALYSIS	TIME_OF_ANALYSIS
50 ng DFTPP	>T1101	11/01/88	13:44
~~8809 SSTD~~	SC320		14:01
8809251 3AC	SC321		15:12
8809 3546 AC	SC322		16:18
8809 2546 BN	SC323		18:21
8809 2547 AC	SC324		19:19
8809 2547 BN	SC325		20:19
8809 3548 AC	SC326		21:19
8809 3548 BN	SC327		22:18
8809 2549 AC	SC328		23:18
8809 2549 BN	SC329	11/2/88	00:18
8809 2550 AC	SC330	"	01:18
	~~SC331~~		



File: >T1101 Scan #: 83 Retn. time: 5.01

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.10	1.553	93.00	3.193	141.05	1.858	198.00	100.000	256.00	6.111
44.00	1.190	95.10	1.002	142.05	.726	199.00	6.518	256.90	.421
50.10	9.218	98.00	2.526	147.05	1.423	200.10	.595	258.00	2.061
51.10	38.061	99.00	2.366	148.05	1.916	201.20	.508	258.90	.653
52.10	1.698	101.00	1.640	149.05	.711	203.10	.508	273.00	1.205
55.10	1.524	104.00	.842	155.05	1.089	204.00	2.831	274.05	2.918
56.00	1.858	105.10	1.205	155.95	1.423	205.00	3.890	275.05	17.535
57.10	3.702	106.10	.610	159.95	.581	206.10	16.447	275.95	2.671
61.00	.653	107.00	10.089	161.15	1.002	207.00	3.948	276.95	1.510
63.10	1.292	108.00	1.350	165.05	.842	208.10	1.219	281.05	.784
65.10	.639	110.00	28.683	166.05	.740	210.30	.755	295.95	4.645
67.10	.624	110.90	3.876	167.05	4.079	211.10	.639	297.05	.610
69.00	44.636	115.10	.537	168.05	1.756	216.10	.377	303.05	.653
73.10	1.466	116.00	.740	173.95	.653	217.00	5.472	313.95	.319
74.10	3.643	117.00	6.213	175.05	1.582	221.10	6.822	323.05	1.292
75.00	5.879	120.05	.435	176.05	.915	223.00	1.394	334.05	1.031
76.20	2.221	123.15	1.364	177.05	.973	224.00	9.639	346.05	.377
77.10	35.999	124.05	.624	178.05	1.045	225.10	2.874	353.00	.392
78.10	2.235	124.85	.508	179.05	3.469	227.00	4.326	364.90	1.742
79.00	2.250	125.05	.508	179.95	2.206	228.00	.595	372.00	.784
80.00	1.916	127.05	40.761	180.95	.929	229.00	1.103	402.90	.406
81.10	3.092	128.15	3.411	185.05	1.713	234.80	.319	420.90	.348
82.10	1.060	129.05	17.100	186.05	10.495	242.00	.581	423.00	3.063
83.00	1.132	129.95	1.495	187.05	2.758	244.00	8.318	424.00	.595
84.10	.406	131.05	.566	188.15	.726	245.10	.958	441.05	8.739
85.00	.813	132.05	.813	189.05	.711	246.00	1.364	442.05	56.002
87.00	.465	134.05	.377	190.95	.479	249.00	.450	443.05	10.089

91.10	.944	135.05	1.611	193.05	.798	255.00	35.128	444.05	1.031
92.10	.856	137.15	.639	196.00	3.063				

Continuing Calibration Check
HSL Compounds

Case No: ---------- Calibration Date: 11/01/88

Contractor: ENGINEERING-SCIENCE Time: 14:01

Contract No: ---------- Laboratory ID: >S0320

Instrument ID: 1 Initial Calibration Date: 10/~~17~~15/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	.87509	2.95		
2-Fluorophenol	1.15802	1.18507	2.34		
bis(2-Chloroethyl)ether	1.11892	.96343	13.90		
Phenol	1.41657	1.38172	2.46	*	
Phenol-d5	1.22488	1.20470	1.65		
Aniline	.54193	.58157	7.31		
2-Chlorophenol	1.23175	1.27520	3.53		
1,3-Dichlorobenzene	1.47535	1.43292	2.88		
1,4-Dichlorobenzene	1.40530	1.37513	2.15	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.77495	6.29		
1,2-Dichlorobenzene	1.32240	1.43233	8.31		
2-Methylphenol	1.17367	1.31555	12.09		
3-&-4-Methylphenol	1.07139	1.26311	17.89		
bis(2-chloroisopropyl)Ether	2.15627	2.47064	14.58		
N-Nitroso-Di-n-Propylamine	.84050	.71196	15.29		**
Hexachloroethane	.53840	.55820	3.68		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.40055	.64		
Nitrobenzene-d5	.39137	.40751	4.12		
2-Nitrophenol	.24657	.27626	12.04	*	
Isophorone	.74170	.80310	8.28		
bis(2-Chloroethoxy)methane	.49386	.51550	4.38		
2,4-Dimethylphenol	.34849	.36769	5.51		
Benzoic Acid	.29725	.23607	20.58		
2,4-Dichlorophenol	.56733	.62436	10.05	*	
1,2,4-Trichlorobenzene	.36913	.38522	4.36		
Naphthalene	.94589	.90788	4.02		
4-Chloroaniline	.36309	.39321	8.29		
Hexachlorobutadiene	.20283	.21395	5.48	*	
4-Chloro-3-Methylphenol	.31360	.34579	10.26	*	
2-Methylnaphthalene	.56397	.62245	10.37		

RF - Response Factor from daily standard file at 60.00 mg/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/01/88

Contractor: ENVIRONMENTAL SCIENCE Time: 14:01

Contract No: _____ Laboratory ID: >S0320

Instrument ID: L Initial Calibration Date: 10/13/88

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.33825	14.40		**
2,4,6-Trichlorophenol	.42280	.42977	1.65	*	
2,4,5-Trichlorophenol	.52897	.50342	4.83		
2-Fluorobiphenyl	1.27220	1.11101	12.67		
2-Chloronaphthalene	1.23784	1.18028	4.65		
2-Nitroaniline	.47288	.47259	.06		
Dimethylphthalate	1.40629	1.32834	5.69		
2,6-Dinitrotoluene	.37415	.38194	2.08		
Acenaphthylene	1.68918	1.54805	8.36		
3-Nitroaniline	.44557	.45311	1.69		
2,4-Dinitrophenol	.11898	.10346	13.05		**
Acenaphthene	1.13011	.97242	13.95	*	
Dibenzofuran	1.64131	1.53768	6.31		
2,4-Dinitrotoluene	.28418	.26783	5.75		
4-Nitrophenol	.28450	.22322	21.54		**
Fluorene	1.12850	.92731	17.83		
Diethylphthalate	1.20939	1.03688	14.26		
4-Chlorophenyl-phenylether	.59183	.56667	4.25		
4-Nitroaniline	.35956	.34593	3.79		
2,4,6-Tribromophenol	.21023	.20421	2.87		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.47676	18.34	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.23525	10.44		
Hexachlorobenzene	.26273	.28506	8.50		
Pentachlorophenol	.14536	.13244	8.89	*	

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: ---------- Calibration Date: 11/01/88

Contractor: ENGINEERING-SCIENCE Time: 14:01

Contract No: ---------- Laboratory ID: >S0320

Instrument ID: 1 Initial Calibration Date: 10/13/88

Minimum $\overline{RF}$ for SPCC is ---- Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	.99778	3.53		
Anthracene	1.05155	1.09380	4.02		
Di-n-Butylphthalate	1.51956	1.54547	1.71		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.09554	7.97	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.07837	94.81		
Pyrene	1.56086	1.69083	8.33		
Terphenyl-d14	1.05835	1.14399	8.09		
Butylbenzylphthalate	1.03390	1.12269	8.59		
3,3'-Dichlorobenzidine	.13689	.22481	64.23		
Chrysene	.99655	1.03764	4.12		
Benzo(a)Anthracene	1.10407	1.11698	1.26		
bis(2-Ethylhexyl)Phthalate	1.21073	1.35649	12.04		
Di-n-octylphthalate	3.40275	3.23212	5.01	*	
Benzo(a)Pyrene	1.32098	1.31109	.75	*	
Benzo(b)Fluoranthene	1.60850	1.49556	7.02		
Indeno(1,2,3-cd)Pyrene	.96800	1.15965	19.80		
Dibenzo(a,h)Anthracene	.87481	1.03745	18.59		
Benzo(k)Fluoranthene	1.44370	1.36775	5.26		
Benzo(g,h,i)Perylene	.89761	.99055	10.35		

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR0001

Lab Code: _____ Case No.: _____ SAS No.: _____ Job No.: _____

Sample No. (Standard): SSTD060 Date Analyzed: 11/1/88

Lab File ID (Standard): S0320 Time Analyzed: 14:01

Instrument ID: 1

		IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
	12 HOUR STD	67162	9.20	227601	12.83	136290	18.31
	UPPER LIMIT	134324	9.70	455202	13.33	272580	18.81
	LOWER LIMIT	33581	8.70	113801	12.33	68145	17.81
	EPA SAMPLE NO.						
S0321 01	8809 2513 AC	61474	9.18	190784	12.82	118050	18.28
02	8809 2546 AC	63087	9.19	237057	12.85	122986	18.33
03	8809 2546 BN	64223	9.19	216408	12.85	119856	18.33
04	8809 2547 AC	69756	9.20	255975	12.85	132530	18.31
05	8809 2547 BN	64115	9.19	211940	12.84	123819	18.31
06	8809 2548 AC	63769	9.19	237568	12.82	123090	18.30
07	8809 2548 BN	59239	9.19	178604	12.83	116283	18.32
08	8809 2549 AC	60803	9.18	209092	12.80	113129	18.29
09	8809 2549 BN	66278	9.19	219351	12.81	128120	18.29
10	8809 0550 AC	60584	9.19	185484	12.85	115407	18.32
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

page __ of __

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR001

Lab Code: _____ Case No.: _____ SAS No.: _____ Job No.: _____

Sample No. (Standard): STD0660 Date Analyzed: 11/1/88

Lab File ID (Standard): S0320 Time Analyzed: 14:01

Instrument ID: 1

		IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS6(PRY) AREA #	RT
	12 HOUR STD	206508	22.96	130218	31.43	~~89144~~ 90619	37.59
	UPPER LIMIT	413016	23.46	260436	31.93	181238	38.09
	LOWER LIMIT	103254	22.46	65109	30.93	45310	37.09
	EPA SAMPLE NO.						
01	8809 2547 AC	168143*	22.97	90782	31.42	57254	37.55
02	8809 2546 AC	171936	23.01	87709	31.49	49921	37.66
03	8809 2546 BN	161819	23.02	83095	31.50	46200	37.66
04	8809 2547 AC	184173	23.00	100130	31.47	58691	37.66
05	8809 2547 BN	166864	23.00	86491	31.46	54708	37.90
06	8809 2548 AC	189650	22.97	129736	31.44	89064	37.54
07	8809 2548 BN	169617	22.99	104730	31.45	70621	37.54
08	8809 2549 AC	164332	22.96	103108	31.40	60937	37.53
09	8809 2549 BN	186034	22.97	105926	31.44	63888	37.54
10	8809 2550 AC	162261	23.00	86032	31.48	50556	37.66
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

* Column used to flag internal standard area values with an asterisk

VOLATILE CONTINUING CALIBRATION CHECK

LabName: ENGINEERING SCIENCE Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____

Instrument ID: vocol _____ Calibration Date(s) 9/20/88

LAB FILE ID: 42,43 Init. Calib. Date(s): 9/19/88, 9/14/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzyl chloride	4.56	5.70	-25.00
bis (2-choroethoxy) methane	0.12		NA
bis (2-choroisopropyl ether	0.12		NA
Bromobenzene	3.08	2.80	9.03
Bromodichloromethane	4.72	4.00	15.32
Bromoform	3.13	2.80	10.50
Bromomethane	0.43	0.62	-43.52
Carbon tetrachloride	4.59	4.00	12.84
Chloroacetaldehyde	0.07		NA
Chlorobenzene	1.34	1.20	10.38
Chloroethane	0.73	0.88	-20.55
Chloroform	6.20	3.40	45.12
1-Chorohexane	0.82	0.75	8.98
2-Chloroethyl vinyl ether	0.12		NA
Chloromethane	1.84	2.21	-20.24
Chloromethyl methyl ether	0.02		NA
o-,m-,& p-Chlorotoluenes	3.34	3.00	10.13
Dibromochloromethane	4.42	3.90	11.75
Dibromomethane	3.06	2.70	11.71
1,2-Dichlorobenzene	2.44	2.00	17.88
1,3-Dichlorobenzene	1.53	1.60	-4.46
1,4-Dichlorobenzene	1.47	1.60	-9.02
Dichlorodifluormethane	0.54		NA
1,1-Dichloroethane	2.41	2.20	8.59
1,2-Dichloroethane	3.68	3.00	18.47
1,1-Dichloroethylene	0.77	1.10	-42.23
trans-1,2-dichloroethylene	2.15	2.20	-2.25
Dichloromethane	1.36	2.10	-54.86
1,2-Dichloropropane	3.07	2.60	15.18
1,3-Dichloropropylene	0.47	0.44	7.17
1,1,2,2-Tetrachloroethane	4.08	3.20	21.53
1,1,1,2-Tetrachloroethane	4.83	4.20	13.04
Tetrachloroethylene	4.65	4.00	14.04
1,1,1-Trichloroethane	2.62	2.30	12.12
1,1,2-Trichloroethane	4.42	4.40	0.36
Trichloroethylene	3.90	3.40	12.79
Trichlorofluormethane	0.66	0.63	3.91
Trichloropropane	3.08	2.80	9.03
Vinyl chloride	1.84	1.35	26.41

VOLATILE CONTINUING CALIBRATION CHECK

LabName:ENGINEERING SCIENCE_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____ SDG No.:____

Instrument ID.:VOCOL___ Calibration Date(s):9/20/88 _____

LAB FILE ID: RRF 50 ___42___ Inilcal = 9/19/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	4.42	7.00	58.20
Chlorobenzene	4.67	7.30	56.28
1,2_Dichlorobenzene	3.72	6.00	61.48
1,3_Dichlorobenzene	4.09	6.60	61.19
1,4_Dichorobenzene	3.28	5.30	61.36
Ethyl Bezene	3.05	4.80	57.51
Toluene	3.60	5.60	55.66
Xylenes	10.15	16.00	57.61

File: CONTCHL
24 Oct 88

8809 2523 2511 2512 2513 2514 2516 2527 2531 2540 2549

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____ SDG No.:_____

Instrument ID.: CARbopak Calibration Date(s): 9/27/88 _____

LAB FILE ID: 78,79 Init. Calib. Date(s): 9/19/88 9/23/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzyl chloride	0.3	0.5	(67)
bis (2-chloroethoxy methane	—	—	—
bis (2-chloroisopropyl ether	—	—	—
Bromobenzene	1.4	1.1	21
Bromodichloromethane	3.7	3.6	2.7
Bromoform	1.7	1.8	5.9
Bromomethane	0.40	0.17	58
Carbon tetrachloride	4.2	3.9	7.1
Chloroacetaldehyde	—	—	—
Chlorobenzene	1.4	1.3	7.1
Chloroethane	0.72	0.43	40
Chloroform	5.6	3.9	30
1·Chorohexane	1.2	0.92	23
2-Chloroethyl vinyl ether	—	—	—
Chloromethane	0.46	0.37	20
Chloromethyl methyl ether	—	—	—
o_,m_,& p_Chlorotoluenes	4.6	3.7	20
Dibromochloromethane	3.7	3.6	2.7
Dibromomethane	3.2	2.4	25
1,2_Dichlorobenzene	2.5	2.1	16
1,3_Dichlorobenzene	2.1	1.9	9.5
1,4_Dichlorobenzene	1.9	1.8	5
Dichlorodifluormethane	—	—	—
1,1_Dichloroethane	2.4	2.0	17
1,2_Dichloroethane	2.6	2.2	15
1,1_Dichloroethylene	2.6	2.1	19
trans_1,2_dichloroethylene	2.4	2.2	8.3
Dichloromethane	4.1	3.1	24
1,2_Dichloropropane	2.5	2.2	12
1,3_Dichloropropylene	5.9	4.8	19
1,1,2,2_Tetrachloroethane	7.5	6.6	12
1,1,1,2_Tetrachloroethane	5.2	4.2	19
Tetrachloroethylene	7.5	6.6	12
1,1,1_Trichloroethane	3.0	2.8	7
1,1,2_Trichloroethane	5.9	4.8	19
Trichloroethylene	4.6	4.5	13
Trichlorofluormethane	2.3	2.0	13
Trichloropropane	2.7	1.6	24
Vinyl chloride	0.94	[illegible]	21

file: CONTCAL
21 Oct 88

88092540

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____ SDG No.:_____

Instrument ID.: CAR Calibration Date(s): 9/27/88 _____

LAB FILE ID: 78 Init. Calib. Date(s): 9/19/88 _____

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	4.9	4.6	6
Chlorobenzene	5.3	5.1	4
1,2_Dichlorobenzene	4.4	3.9	11
1,3_Dichlorobenzene	5.0	4.7	6
1,4_Dichorobenzene	4.1	3.7	10
Ethyl Bezene	4.4	3.3	25
Toluene	3.9	3.7	5
Xylenes	13	12	8

DATA PACKAGE #10

This page intentionally left blank.

ENGINEERING-SCIENCE, INC.

600 BANCROFT WAY
BERKELEY, CALIFORNIA 94710
(415) 548-7970

Job No.: OR001

Work Order No.: 1014

Client: ES Oak Ridge
Attention: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Attached are the analytical reports for the water sample(s) received by this laboratory on 9-20-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092546	DANGB-BR9	BA-I	9-20-88		10-13-88	
88092546	DANGB-BR9	CD-F	9-20-88		10-26-88	
88092546	DANGB-BR9	CR-F	9-20-88		10-16-88	
88092546	DANGB-BR9	PB-F	9-20-88		10-21-88	
88092546	DANGB-BR9	418.1	9-20-88	10-05-88	10-08-88	
88092546	DANGB-BR9	8010	9-20-88		9-26-88	9-27-88
88092546	DANGB-BR9	8020	9-20-88		9-23-88	
88092546	DANGB-BR9	8270	9-20-88	9-24-88	11-01-88	
88092547	DANGB-2-MW37-GW1	BA-I	9-20-88		10-13-88	
88092547	DANGB-2-MW37-GW1	CD-F	9-20-88		10-26-88	
88092547	DANGB-2-MW37-GW1	CR-F	9-20-88		10-16-88	
88092547	DANGB-2-MW37-GW1	PB-F	9-20-88		10-21-88	
88092547	DANGB-2-MW37-GW1	418.1	9-20-88	10-05-88	10-08-88	
88092547	DANGB-2-MW37-GW1	8010	9-20-88		9-23-88	9-27-88
88092547	DANGB-2-MW37-GW1	8020	9-20-88		9-23-88	
88092547	DANGB-2-MW37-GW1	8270	9-20-88	9-24-88	11-01-88	
88092548	DANGB-2-MW41-GW1	BA-I	9-20-88		10-13-88	
88092548	DANGB-2-MW41-GW1	CD-F	9-20-88		10-26-88	
88092548	DANGB-2-MW41-GW1	CR-F	9-20-88		10-16-88	
88092548	DANGB-2-MW41-GW1	PB-F	9-20-88		10-21-88	
88092548	DANGB-2-MW41-GW1	418.1	9-20-88	10-05-88	10-08-88	
88092548	DANGB-2-MW41-GW1	8010	9-20-88		9-23-88	9-27-88
88092548	DANGB-2-MW41-GW1	8020	9-20-88		9-23-88	
88092548	DANGB-2-MW41-GW1	8270	9-20-88	9-24-88	11-01-88	

* If applicable

Job No.: OR001

Work Order No.: 1014

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092549	DANGB-2-GW2E-GW1	BA-I	9-20-88		10-13-88	
88092549	DANGB-2-GW2E-GW1	CD-F	9-20-88		10-26-88	
88092549	DANGB-2-GW2E-GW1	CR-F	9-20-88		10-26-88	
88092549	DANGB-2-GW2E-GW1	PB-F	9-20-88		10-21-88	
88092549	DANGB-2-GW2E-GW1	418.1	9-20-88	10-05-88	10-08-88	
88092549	DANGB-2-GW2E-GW1	8010	9-20-88		9-27-88	9-28-88
88092549	DANGB-2-GW2E-GW1	8020	9-20-88		9-27-88	9-28-88
88092549	DANGB-2-GW2E-GW1	8270	9-20-88	9-24-88	11-02-88	
88092550	DANGB-2-MW40-GW1	BA-I	9-20-88		10-13-88	
88092550	DANGB-2-MW40-GW1	CD-F	9-20-88		10-26-88	
88092550	DANGB-2-MW40-GW1	CR-F	9-20-88		10-16-88	
88092550	DANGB-2-MW40-GW1	PB-F	9-20-88		10-21-88	
88092550	DANGB-2-MW40-GW1	418.1	9-20-88	10-05-88	10-08-88	
88092550	DANGB-2-MW40-GW1	8010	9-20-88		9-28-88	9-26-88
88092550	DANGB-2-MW40-GW1	8020	9-20-88		9-28-88	
88092550	DANGB-2-MW40-GW1	8270	9-20-88	9-24-88	11-03-88	
88092551	DANGB-2-MW55-GW1	BA-I	9-20-88		10-13-88	
88092551	DANGB-2-MW55-GW1	CD-F	9-20-88		10-26-88	
88092551	DANGB-2-MW55-GW1	CR-F	9-20-88		10-16-88	
88092551	DANGB-2-MW55-GW1	PB-F	9-20-88		10-21-88	
88092551	DANGB-2-MW55-GW1	418.1	9-20-88	10-05-88	10-08-88	
88092551	DANGB-2-MW55-GW1	8010	9-20-88		9-23-88	9-28-88
88092551	DANGB-2-MW55-GW1	8020	9-20-88		9-23-88	
88092551	DANGB-2-MW55-GW1	8270	9-20-88	9-24-88	11-23-88	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092546-88092551
WORK ORDER NO.: 1014

These water samples were received at the ES Berkeley Laboratory on 9-20-88. They were received cold and intact.

ENGINEERING-SCIENCE INC. PAGE 1
12/27/88

ANALYSIS REPORT

ORK ORDER NUMBER: 1014
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/20/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
S OAK RIDGE/DULUTH ANGB
10 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
ILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

ONTRACT / PO # : OR001
ONTACT : BILL HAYDEN
(615)-481-3920

ASK: 2, UNITS: mg/L

EST COMPOUND	DANGB-BR9 88092546	DANGB-2-MW37-GW1 88092547	DANGB-2-MW41-GW1 88092548	DANGB-2-GW2E-GW1 88092549	DANGB-2-MW40-GW1 88092550	DANGB-2-MW55-GW1 88092551
CID DIG FLAME	NA	NA	NA	NA	NA	NA
CID DIG FURNACE	NA	NA	NA	NA	NA	NA
ARIUM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
ADMIUM	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
HROMIUM	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
EAD	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

) - Not Detected

ENGINEERING-SCIENCE INC.
12/27/88

ANALYSIS REPORT

ORK ORDER NUMBER: 1014
OB NUMBER : ZB0000000440
WORK ORDER DATE : 09/20/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
S OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
ILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

ONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

ASK: 3, UNITS: mg/L

EST COMPOUND	DANGB-BR9 88092546	DANGB-2-MW37-GW1 88092547	DANGB-2-MW41-GW1 88092548	DANGB-2-GW2E-GW1 88092549	DANGB-2-MW40-GW1 88092550	DANGB-2-MW55-GW1 88092551
18.1 PETROLEUM HYDROCARBONS	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5

ND - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1014
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/20/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
S OAK RIDGE/DULUTH ANGB
10 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
LL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

ONTRACT / PO # : OR001
ONTACT : BILL HAYDEN
(615)-481-3920

ASK: 4, UNITS: ug/L, GROUP 8010

EST COMPOUND	DANGB-BR9 88092546	DANGB-2-MW37-GW1 88092547	DANGB-2-MW41-GW1 88092548	DANGB-2-GW2E-GW1 88092549	DANGB-2-MW40-GW1 88092550	DANGB-2-MW55-GW1 88092551
ENZYL CHLORIDE	ND	ND	ND	ND	ND	ND
IS (2-CHLOROETHOXY)METHANE	ND	ND	ND	ND	ND	ND
IS (2-CHLOROISOPROPYL)ETHER	ND	ND	ND	ND	ND	ND
ROMOBENZENE	ND	ND	ND	ND	ND	ND
ROMODICHLOROMETHANE	ND	ND	ND	ND	ND	ND
ROMOFORM	ND	ND	ND	ND	ND	ND
ROMOETHANE	ND	ND	ND	ND	ND	ND
ARBON TETRACHLORIDE	ND	ND	ND	ND	ND	ND
HLORACETALDEHYDE	ND	ND	ND	ND	ND	ND
HLORAL	ND	ND	ND	ND	ND	ND
HLOROBENZENE	ND	ND	ND	ND	ND	ND
HLOROETHANE	ND	ND	ND	ND	ND	ND
HLOROFORM	14B	0.32B	0.15B	ND	ND	ND
-CHLOROHEXANE	ND	ND	ND	ND	ND	ND
-CHLOROETHYL VINYL ETHER	ND	ND	ND	ND	ND	ND
HLOROMETHANE	ND	ND	ND	ND	ND	ND
HLOROMETHYL METHYL ETHER	ND	ND	ND	ND	ND	ND
HLOROTOLUENE	ND	ND	ND	ND	ND	ND
IBROMOCHLOROMETHANE	ND	ND	ND	ND	ND	ND
IBROMOMETHANE	ND	ND	ND	ND	ND	ND
,2-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
,3-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
,4-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
ICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND	ND
,1-DICHLOROETHANE	ND	ND	ND	ND	ND	ND
,2-DICHLOROETHANE	ND	ND	ND	ND	ND	ND
,1-DICHLOROETHYLENE	ND	ND	ND	0.61	ND	ND
RANS-1,2-DICHLOROETHYLENE	ND	ND	ND	330	ND	ND
.CHLOROMETHANE	0.34B	ND	ND	0.80B	0.85B	ND
2-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND

) - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1014

TEST COMPOUND	DANGB-BR9 88092546	DANGB-2-MW37-GW1 88092547	DANGB-2-MW41-GW1 88092548	DANGB-2-GW2E-GW1 88092549	DANGB-2-MW40-GW1 88092550	DANGB-2-MW55-GW1 88092551
,3-DICHLOROPROPYLENE	ND	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
,1,1,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
ETRACHLOROETHYLENE	ND	ND	ND	ND	ND	ND
,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
RICHLOROETHYLENE	ND	ND	ND	33	ND	ND
RICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND	ND
TRICHLOROPROPANE	ND	ND	ND	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT

)RK ORDER NUMBER: 1014
)B NUMBER : ZB0000000440
)RK ORDER DATE : 09/20/88

APPROVED BY _____
Lab Supervisor

'PORT DATA:
: OAK RIDGE/DULUTH ANGB
.0 S. ILLINOIS AVE. STE. S103
.K RIDGE, TN 37830
LL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

)NTRACT / PO # : OR001
)NTACT : BILL HAYDEN
(615)-481-3920

\SK: 4, UNITS: ug/L, GROUP 8020

:ST COMPOUND	DANGB-BR9 88092546	DANGB-2-MW37-GW1 88092547	DANGB-2-MW41-GW1 88092548	DANGB-2-GW2E-GW1 88092549	DANGB-2-MW40-GW1 88092550	DANGB-2-MW55-GW1 88092551
:NZENE	ND	ND	ND	1.2	ND	ND
ILOROBENZENE	ND	ND	ND	ND	ND	ND
.2-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
3-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
4-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
'HYL BENZENE	ND	ND	ND	ND	ND	ND
)LUENE	ND	ND	ND	ND	ND	ND
'LENES	ND	ND	ND	ND	ND	ND

- Not Detected

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

Date Received: September 21, 1988
Date Reported: December 9, 1988

Work Order: 1014
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092546	88092547
Sample No.:	DANGB-BR9	DANGB-2-MW37-GW1
Date Sampled:	9-20-88	9-20-88
Time Sampled:	08:00	08:45
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	11-01-88	11-01-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
1,3-Dichlorobenzene	10	ND	ND
1,4-Dichlorobenzene	10	ND	ND
Hexachloroethane	10	ND	ND
Bis(2-chloroethyl)ether	10	ND	ND
1,2-Dichlorobenzene	10	ND	ND
N-Nitrosodimethylamine	10	ND	ND
Bis(2-chloroisopropyl)ether	10	ND	ND
N-Nitrosodi-n-propylamine	10	ND	ND
Hexachlorobutadiene	10	ND	ND
1,2,4-Trichlorobenzene	10	ND	ND
Nitrobenzene	10	ND	ND
Isophorone	10	ND	ND
Naphthalene	10	ND	ND
Bis(2-chloroethoxy)methane	10	ND	ND
2-Chloronaphthalene	10	ND	ND
Hexachlorocyclopentadiene	10	ND	ND
Acenaphthylene	10	ND	ND
Acenaphthene	10	ND	ND
Dimethyl phthalate	10	ND	ND
2,6-Dinitrotoluene	10	ND	ND
Fluorene	10	ND	ND
2,4-Dinitrotoluene	10	ND	ND
Diethyl phthalate	10	ND	ND
N-Nitrosodiphenylamine	10	ND	ND
Hexachlorobenzene	10	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 21, 1988 Work Order: 1014
Date Reported: December 9, 1988 Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

Lab Number:	88092546	88092547
Sample No.:	DANGB-BR9	DANGB-2-MW37-GW1
Date Sampled:	9-20-88	9-20-88
Time Sampled:	08:00	08:45
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	11-01-88	11-01-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Phenanthrene	10	ND	ND
Anthracene	10	ND	ND
Dibutyl phthalate	10	ND	ND
Fluoranthene	10	ND	ND
4-Chlorophenyl phenyl ether	10	ND	ND
Pyrene	10	ND	ND
Butyl Benzyl phthalate	10	ND	ND
Bis(2-ethylhexyl) phthalate	10	ND	ND
Chrysene	10	ND	ND
4-Bromophenyl phenyl ether	10	ND	ND
Benzo(a)anthracene	10	ND	ND
Di-n-octylphthalate	10	ND	ND
Benzo(b)fluoranthene	10	ND	ND
Benzo(k)fluoranthene	10	ND	ND
Benzidine	60	ND	ND
3,3'-Dichlorobenzidine	20	ND	ND
Benzo(a)pyrene	10	ND	ND
Indeno(1,2,3-cd)pyrene	10	ND	ND
Dibenzo(a,h)anthracene	10	ND	ND
Benzo(ghi)perylene	10	ND	ND
Benzyl Alcohol	20	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 21, 1988
Date Reported: December 9, 1988

Work Order: 1014
Job Number: OR001

For: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092546	88092547
Sample No.:	DANGB-BR9	DANGB-2-MW37-GW1
Date Sampled:	9-20-88	9-20-88
Time Sampled:	08:00	08:45
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	11-01-88	11-01-88

Compound	Detection Limits ug/L	Analytical Results (dry weight) ug/L	ug/L
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
4-Chloroaniline	20	ND	ND
1-Chloronaphthalene	--*	ND	ND
Dibenzofuran	10	ND	ND
p-Dimethylaminoazobenzene	--*	ND	ND
7,12-Dimethylbenz(a)anthracene	--*	ND	ND
a-,a-Dimethylphenethylamine	--*	ND	ND
Diphenylamine	--*	ND	ND
1,2-Diphenylhydrazine	--*	ND	ND
Ethyl methanesulfonate	--*	ND	ND
3-Methylcholanthrene	--*	ND	ND
Methyl methanesulfonate	--*	ND	ND
2-Methylnapnthalene	10	ND	ND
1-Napnthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	50	ND	ND
3-Nitroaniline	50	ND	ND
4-Nitroaniline	50	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
2-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

Date Received: September 21, 1988
Date Reported: December 9, 1988

Work Order: 1014
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN:Mr. Bill Hayden

Lab Number:	88092546	88092547
Sample No.:	DANGB-BR9	DANGB-2-MW37-GW1
Date Sampled:	9-20-88	9-20-88
Time Sampled:	08:00	08:45
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	11-01-88	11-01-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Alpha-BHC	--*	ND	ND
Gamma-BHC	--*	ND	ND
Beta-BHC	20	ND	ND
Heptachlor	10	ND	ND
Delta-BHC	15	ND	ND
Aldrin	10	ND	ND
Heptachlor epoxide	10	ND	ND
Endosulfan I	--*	ND	ND
Dieldrin	15	ND	ND
4,4'-DDE	30	ND	ND
Endrin	--*	ND	ND
Endosulfan II	--*	ND	ND
4,4'-DDD	15	ND	ND
4,4'-DDT	25	ND	ND
Endosulfan Sulfate	30	ND	ND
Endrin aldehyde	--*	ND	ND
Endrin Ketone	--*	ND	ND
Chlordane	60	ND	ND
Methoxychlor	--*	ND	ND
Toxaphene	60	ND	ND
Aroclor-1016	60	ND	ND
Aroclor-1221	60	ND	ND
Aroclor-1232	60	ND	ND
Aroclor-1242	60	ND	ND
Aroclor-1248	60	ND	ND
Aroclor-1254	60	ND	ND
Aroclor-1260	60	ND	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

Date Received: September 21, 1988
Date Reported: December 9, 1988

Work Order: 1014
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092546	88092547
Sample No.:	DANGB-BR9	DANGB-2-MW37-GW1
Date Sampled:	9-20-88	9-20-88
Time Sampled:	08:00	08:45
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	11-01-88	11-01-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
2-Chloropnenol	10	ND	ND
2-Nitrophenol	10	ND	ND
Phenol	10	ND	ND
2,4-Dimethylphenol	10	ND	ND
2,4-Dichlorophenol	10	ND	ND
2,4,6-Trichlorophenol	10	ND	ND
4-Chloro-3-methylphenol	20	ND	ND
2,4-Dinitrophenol	50	ND	ND
2,6-Dichlorophenol	--*	ND	ND
2-Methyl-4,6-Dinitrophenol	50	ND	ND
Pentachlorophenol	50	ND	ND
4-Nitrophenol	50	ND	ND
Benzoic Acid	50	ND	ND
2-Methylphenol	10	ND	ND
3- & 4-Methylphenol	10	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
2,4,5-Trichlorophenol	10	ND	ND

Analyst

Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

Date Received: September 21, 1988
Date Reported: December 9, 1988

Work Order: 1014
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092548	88092549
Sample No.:	DANGB-2-MW41-GW1	DANGB-2-GW2E-GW1
Date Sampled:	9-20-88	9-20-88
Time Sampled:	11:15	11:50
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	11-01-88	11-02-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
1,3-Dichlorobenzene	10	ND	ND
1,4-Dichlorobenzene	10	ND	ND
Hexachloroethane	10	ND	ND
Bis(2-chloroethyl)ether	10	ND	ND
1,2-Dichlorobenzene	10	ND	ND
N-Nitrosodimethylamine	10	ND	ND
Bis(2-chloroisopropyl)ether	10	ND	ND
N-Nitrosodi-n-propylamine	10	ND	ND
Hexachlorobutadiene	10	ND	ND
1,2,4-Trichlorobenzene	10	ND	ND
Nitrobenzene	10	ND	ND
Isophorone	10	ND	ND
Naphthalene	10	ND	ND
Bis(2-chloroethoxy)methane	10	ND	ND
2-Chloronaphthalene	10	ND	ND
Hexachlorocyclopentadiene	10	ND	ND
Acenaphthylene	10	ND	ND
Acenaphthene	10	ND	ND
Dimethyl phthalate	10	ND	ND
2,6-Dinitrotoluene	10	ND	ND
Fluorene	10	ND	ND
2,4-Dinitrotoluene	10	ND	ND
Diethyl phthalate	10	ND	ND
N-Nitrosodiphenylamine	10	ND	ND
Hexachlorobenzene	10	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 21, 1988 Work Order: 1014
Date Reported: December 9, 1988 Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

Lab Number:	88092548	88092549
Sample No.:	DANGB-2-MW41-GW1	DANGB-2-GW2E-GW1
Date Sampled:	9-20-88	9-20-88
Time Sampled:	11:15	11:50
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	11-01-88	11-02-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Phenanthrene	10	ND	ND
Anthracene	10	ND	ND
Dibutyl phthalate	10	ND	ND
Fluoranthene	10	ND	ND
4-Chlorophenyl phenyl ether	10	ND	ND
Pyrene	10	ND	ND
Butyl Benzyl phthalate	10	ND	ND
Bis(2-ethylhexyl) phthalate	10	ND	ND
Chrysene	10	ND	ND
4-Bromophenyl phenyl ether	10	ND	ND
Benzo(a)anthracene	10	ND	ND
Di-n-octylphthalate	10	ND	ND
Benzo(b)fluoranthene	10	ND	ND
Benzo(k)fluoranthene	10	ND	ND
Benzidine	60	ND	ND
3,3'-Dichlorobenzidine	20	ND	ND
Benzo(a)pyrene	10	ND	ND
Indeno(1,2,3-cd)pyrene	10	ND	ND
Dibenzo(a,h)anthracene	10	ND	ND
Benzo(ghi)perylene	10	ND	ND
Benzyl Alcohol	20	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 21, 1988
Date Reported: December 9, 1988

Work Order: 1014
Job Number: OR001

For: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092548	88092549
Sample No.:	DANGB-2-MW41-GW1	DANGB-2-GW2E-GW1
Date Sampled:	9-20-88	9-20-88
Time Sampled:	11:15	11:50
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	11-01-88	11-02-88

Compound	Detection Limits ug/L	Analytical Results (dry weight) ug/L	ug/L
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
4-Chloroaniline	20	ND	ND
1-Chloronaphthalene	--*	ND	ND
Dibenzofuran	10	ND	ND
p-Dimethylaminoazobenzene	--*	ND	ND
7,12-Dimethylbenz(a)anthracene	--*	ND	ND
a-,a-Dimethylphenethylamine	--*	ND	ND
Diphenylamine	--*	ND	ND
1,2-Diphenylhydrazine	--*	ND	ND
Ethyl methanesulfonate	--*	ND	ND
3-Methylcholanthrene	--*	ND	ND
Methyl methanesulfonate	--*	ND	ND
2-Methylnaphthalene	10	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	50	ND	ND
3-Nitroaniline	50	ND	ND
4-Nitroaniline	50	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
2-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

Date Received: September 21, 1988
Date Reported: December 9, 1988

Work Order: 1014
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN:Mr. Bill Hayden

Lab Number:	88092548	88092549
Sample No.:	DANGB-2-MW41-GW1	DANGB-2-GW2E-GW1
Date Sampled:	9-20-88	9-20-88
Time Sampled:	11:15	11:50
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-01-88	10-02-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Alpha-BHC	--*	ND	ND
Gamma-BHC	--*	ND	ND
Beta-BHC	20	ND	ND
Heptachlor	10	ND	ND
Delta-BHC	15	ND	ND
Aldrin	10	ND	ND
Heptachlor epoxide	10	ND	ND
Endosulfan I	--*	ND	ND
Dieldrin	15	ND	ND
4,4'-DDE	30	ND	ND
Endrin	--*	ND	ND
Endosulfan II	--*	ND	ND
4,4'-DDD	15	ND	ND
4,4'-DDT	25	ND	ND
Endosulfan Sulfate	30	ND	ND
Endrin aldehyde	--*	ND	ND
Endrin Ketone	--*	ND	ND
Chlordane	60	ND	ND
Methoxychlor	--*	ND	ND
Toxaphene	60	ND	ND
Aroclor-1016	60	ND	ND
Aroclor-1221	60	ND	ND
Aroclor-1232	60	ND	ND
Aroclor-1242	60	ND	ND
Aroclor-1248	60	ND	ND
Aroclor-1254	60	ND	ND
Aroclor-1260	60	ND	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

Date Received: September 21, 1988
Date Reported: December 9, 1988

Work Order: 1014
Job Number: OR001

FOR: ES:Oak Ridge/Dululth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092548	88092549
Sample No.:	DANGB-2-MW41-GW1	DANGB-2-GW2E-GW1
Date Sampled:	9-20-88	9-20-88
Time Sampled:	11:15	11:50
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	11-01-88	11-02-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
2-Chlorophenol	10	ND	ND
2-Nitrophenol	10	ND	ND
Phenol	10	ND	ND
2,4-Dimethylphenol	10	ND	ND
2,4-Dichlorophenol	10	ND	ND
2,4,6-Trichlorophenol	10	ND	ND
4-Chloro-3-methylphenol	20	ND	ND
2,4-Dinitrophenol	50	ND	ND
2,6-Dichlorophenol	--*	ND	ND
2-Methyl-4,6-Dinitrophenol	50	ND	ND
Pentachlorophenol	50	ND	ND
4-Nitrophenol	50	ND	ND
Benzoic Acid	50	ND	ND
2-Methylphenol	10	ND	ND
3- & 4-Methylphenol	10	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
2,4,5-Trichlorophenol	10	ND	ND

Analyst

Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

626

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

Date Received: September 21, 1988
Date Reported: December 9, 1988

Work Order: 1014
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092550	88092551
Sample No.:	DANGB-2-MW40-GW1	DANGB-2-MW55-GW1
Date Sampled:	9-20-88	9-20-88
Time Sampled:	15:00	15:30
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	11-03-88	11-23-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
1,3-Dichlorobenzene	10	ND	ND
1,4-Dichlorobenzene	10	ND	ND
Hexachloroethane	10	ND	ND
Bis(2-chloroethyl)ether	10	ND	ND
1,2-Dichlorobenzene	10	ND	ND
N-Nitrosodimethylamine	10	ND	ND
Bis(2-chloroisopropyl)ether	10	ND	ND
N-Nitrosodi-n-propylamine	10	ND	ND
Hexachlorobutadiene	10	ND	ND
1,2,4-Trichlorobenzene	10	ND	ND
Nitrobenzene	10	ND	ND
Isophorone	10	ND	ND
Naphthalene	10	ND	ND
Bis(2-chloroethoxy)methane	10	ND	ND
2-Chloronaphthalene	10	ND	ND
Hexachlorocyclopentadiene	10	ND	ND
Acenaphthylene	10	ND	ND
Acenaphthene	10	ND	ND
Dimethyl phthalate	10	ND	ND
2,6-Dinitrotoluene	10	ND	ND
Fluorene	10	ND	ND
2,4-Dinitrotoluene	10	ND	ND
Diethyl phthalate	10	ND	ND
N-Nitrosodiphenylamine	10	ND	ND
Hexachlorobenzene	10	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 21, 1988 Work Order: 1014
Date Reported: December 9, 1988 Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

Lab Number:	88092550	88092551
Sample No.:	DANGB-2-MW40-GW1	DANGB-2-MW55-GW1
Date Sampled:	9-20-88	9-20-88
Time Sampled:	15:00	15:30
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	11-03-88	11-23-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Phenanthrene	10	ND	ND
Anthracene	10	ND	ND
Dibutyl phthalate	10	ND	ND
Fluoranthene	10	ND	ND
4-Chlorophenyl phenyl ether	10	ND	ND
Pyrene	10	ND	ND
Butyl Benzyl phthalate	10	ND	ND
Bis(2-ethylhexyl) phtnalate	10	ND	ND
Chrysene	10	ND	ND
4-Bromophenyl phenyl ether	10	ND	ND
Benzo(a)anthracene	10	ND	ND
Di-n-octylphthalate	10	ND	ND
Benzo(b)fluoranthene	10	ND	ND
Benzo(k)fluoranthene	10	ND	ND
Benzidine	60	ND	ND
3,3'-Dichlorobenzidine	20	ND	ND
Benzo(a)pyrene	10	ND	ND
Indeno(1,2,3-cd)pyrene	10	ND	ND
Dibenzo(a,h)anthracene	10	ND	ND
Benzo(ghi)perylene	10	ND	ND
Benzyl Alcohol	20	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 21, 1988
Date Reported: December 9, 1988

Work Order: 1014
Job Number: OR001

For: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092550	88092551
Sample No.:	DANGB-2-MW40-GW1	DANGB-2-MW55-GW1
Date Sampled:	9-20-88	9-20-88
Time Sampled:	15:00	15:30
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	11-03-88	11-23-88

Compound	Detection Limits ug/L	Analytical Results (dry weight) ug/L	ug/L
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
4-Chloroaniline	20	ND	ND
1-Chloronaphthalene	--*	ND	ND
Dibenzofuran	10	ND	ND
p-Dimethylaminoazobenzene	--*	ND	ND
7,12-Dimethylbenz(a)anthracene	--*	ND	ND
a-,a-Dimethylphenethylamine	--*	ND	ND
Diphenylamine	--*	ND	ND
1,2-Diphenylhydrazine	--*	ND	ND
Ethyl methanesulfonate	--*	ND	ND
3-Methylcholanthrene	--*	ND	ND
Methyl methanesulfonate	--*	ND	ND
2-Methylnaphthalene	10	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	50	ND	ND
3-Nitroaniline	50	ND	ND
4-Nitroaniline	50	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
2-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

Date Received: September 21, 1988
Date Reported: December 9, 1988

Work Order: 1014
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN:Mr. Bill Hayden

Lab Number:	88092550	88092551
Sample No.:	DANGB-2-MW40-GW1	DANGB-2-MW55-GW1
Date Sampled:	9-20-88	9-20-88
Time Sampled:	15:00	15:30
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	11-03-88	11-23-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Alpha-BHC	--*	ND	ND
Gamma-BHC	--*	ND	ND
Beta-BHC	20	ND	ND
Heptachlor	10	ND	ND
Delta-BHC	15	ND	ND
Aldrin	10	ND	ND
Heptachlor epoxide	10	ND	ND
Endosulfan I	--*	ND	ND
Dieldrin	15	ND	ND
4,4'-DDE	30	ND	ND
Endrin	--*	ND	ND
Endosulfan II	--*	ND	ND
4,4'-DDD	15	ND	ND
4,4'-DDT	25	ND	ND
Endosulfan Sulfate	30	ND	ND
Endrin aldehyde	--*	ND	ND
Endrin Ketone	--*	ND	ND
Chlordane	60	ND	ND
Methoxychlor	--*	ND	ND
Toxaphene	60	ND	ND
Aroclor-1016	60	ND	ND
Aroclor-1221	60	ND	ND
Aroclor-1232	60	ND	ND
Aroclor-1242	60	ND	ND
Aroclor-1248	60	ND	ND
Aroclor-1254	60	ND	ND
Aroclor-1260	60	ND	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

Date Received: September 21, 1988
Date Reported: December 9, 1988

Work Order: 1014
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092550	88092551
Sample No.:	DANGB-2-MW40-GW1	DANGB-2-MW55-GW1
Date Sampled:	9-20-88	9-20-88
Time Sampled:	15:00	15:30
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	11-03-88	11-23-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
2-Chlorophenol	10	ND	ND
2-Nitrophenol	10	ND	ND
Phenol	10	ND	ND
2,4-Dimethylphenol	10	ND	ND
2,4-Dichlorophenol	10	ND	ND
2,4,6-Trichlorophenol	10	ND	ND
4-Chloro-3-methylphenol	20	ND	ND
2,4-Dinitrophenol	50	ND	ND
2,6-Dichlorophenol	--*	ND	ND
2-Methyl-4,6-Dinitrophenol	50	ND	ND
Pentachlorophenol	50	ND	ND
4-Nitrophenol	50	ND	ND
Benzoic Acid	50	ND	ND
2-Methylphenol	10	ND	ND
3- & 4-Methylphenol	10	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
2,4,5-Trichlorophenol	10	ND	ND

Analyst

Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING-SCIENCE

1014

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) Johanna Burke

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 6010, 7060, 7131	SW7421, 7470	SW9030, 9315	SM423	REMARKS
9/20/88	0800	DANGB-BR9	5	5								882546
9/20/88	0845	DANGB-2-MW37-GW1	5	5								882547
9/20/88	1115	DANGB-2-MW41-GW1	5	5								882548
9/20/88	1150	DANGB-2-GWZE-GW1	5	5								882549
9/20/88	1500	DANGB-2-MW90-GW1	5	5								882550
9/20/88	1530	DANGB-2-MW55-GW1	5	5								882551

632

Johanna Burke 9-20-88

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Johanna Burke	9-20-88 1730	FEC AirBill# 9990310001			Floyd Abney 9/21 1200hrs
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks SAMPLES RECEIVED COLD AND INTACT	

White - Return to Coordinator with Analysis Report; Yellow - Accompanies Shipment; Copy to Coordinator Field Files

ENGINEERING-SCIENCE

1614

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature)

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 6010, [illegible], 7131	SW7421, [illegible] 7141	SW3510, 9315	SM429	REMARKS
9/20/88	0800	DANGB-BR9	6			2	2	1	1			88546
9/20/88	0815	DANGB-2-MW27-GW1	6			2	2	1	1			88547

633

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Johanna Burke	9-20-88 1730	FEC Airbill #9490310001			9/21 1015 Fred Abney
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks SAMPLES RECEIVED COOL & IN TACT	

Distribution: Original Accompanies Sh

DRAFT

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) Johanna Burke

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 6010, 7000, 7131	SW7421, 7470, 7741	SW9030, 9315	SM429	REMARKS
9-20-88	1115	DANG3-2-MW91-GW1	6			2	2	1	1			
9-20-88	1150	DANG3-2-GWZE-GW1	6			2	2	1	1			

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Johanna Burke	9-20-88 1720	FEC Airbill #949031.001			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

634

DRAFT ENGINEERING SCIENCE

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.			ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710
SAMPLER(S): (Signature)				

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 8010, 7131	SW7421, 7141	SW9310, 9315	SM429	REMARKS
9/20/88	0300	DANGB-BK4	6			2	2	1	1			
9/20/88	0845	DANGB-2-MW07-GW1	6			2	2	1	1			

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Johanna Burke	9-21-88 1130	FEC Airbill # 419031C001			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

635

FEDERAL EXPRESS

AIRBILL

USE THIS AIRBILL FOR DOMESTIC SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 9490310001

9490310001

SENDER'S COPY

Sender's Federal Express Account Number: 1196-42672 | Date: 11-20-92

1 From (Your Name) Please Print: Kim Davis | Your Phone Number (Very Important): (615) 781-5000

Company: Engineering Solutions, Inc. Ste 103 | Department/Floor No.:

Street Address: 711 Illinois Ave

City: Oak Ridge | State: TN | ZIP Required: 37830

2 To (Recipient's Name) Please Print: Kim Davis | Recipient's Phone Number (Very Important): (415) 442-7

Company: Engineering Solutions Inc. | Department/Floor No.:

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. # ZIP Codes.): 6015 Pacific Ave

City: Richmond | State: CA | ZIP Required: 94710

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE)

PAYMENT: [X] Bill Sender [ ] Bill Recipient's FedEx Acct. No. [ ] Bill 3rd Party FedEx Acct. No. [ ] Bill Credit Card [ ] Cash

H IF HOLD FOR PICK-UP, Print FEDEX Address Here
Street Address:
City | State | ZIP Required

4 SERVICES

1 [X] PRIORITY 1 Overnight Delivery
2 [ ] COURIER-PAK OVERNIGHT ENVELOPE*
3 [ ] OVERNIGHT BOX
4 [ ] OVERNIGHT TUBE
5 [ ] STANDARD AIR Delivery not later than second business day
6 [ ] OVERNIGHT LETTER*
7 [ ]
8 [ ]
9 [ ]
10 [ ]
*Declared Value Limit $100

DELIVERY AND SPECIAL HANDLING

1 [ ] HOLD FOR PICK-UP
2 [X] DELIVER WEEKDAY
3 [ ] DELIVER SATURDAY (Extra charge)
4 [ ] DANGEROUS GOODS (Extra charge)
5 [ ] CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charge) (Requires Signature Not Available)
6 [ ] DRY ICE ____ Lbs.
7 [ ] OTHER SPECIAL SERVICE ____
8 [ ]
9 [ ] SATURDAY PICK-UP (Extra Charge)
10 [ ]
11 [ ]
12 [ ] HOLIDAY DELIVERY (If offered) (Extra charge)

PACKAGES	WEIGHT	YOUR DECLARED VALUE (See right)	OVER SIZE
	.33		
	.12		
	.83		
	.07		
Total 4	Total .35	Total	

Received At
1 [ ] Regular Stop
2 [ ] On-Call Stop
3 [ ] Drop Box
4 [ ] BSC.
5 [X] Station

FEDEX Corp Employee No.:

Date/Time for FEDEX Use:

SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY

Use of this airbill constitutes your agreement to the service conditions in our current Service Guide which is available upon request. See back of sender's copy of this airbill for further information.

We will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay or non-delivery, unless you specify a higher amount in the space to the left. pay 40¢ per additional $100 specified and document your actual loss in the event of a claim. Maximum amount limitations found in the current Federal Express Service Guide apply. Your rights to recover from Federal Express for loss of the intrinsic value of the package as well as for loss of sales, income, interest, profit, attorneys fees, costs and any other form of damage whether direct, incidental, consequential or special is limited to the greater of $100 or the declared value specified to the left. In no event shall your recovery exceed your actual loss.

In the event of untimely delivery Federal Express will at your request and with some limitations refund all transportation charges paid. See Service Guide for further information.

5 Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.

Release Signature: _____

Federal Express Use

Base Charges	
Declared Value Charge	
Other 1	
Other 2	
Total Charges	

PART #2041738900
REVISION DATE 7/88
PRINTED IN U.S.A. GBFE
009
© 1988 F.E.C.

939

FOR FEDEX USE ONLY SENDER'S COPY

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092487-88092488, 88092492, 88092494-88092495
88092509-88092511, 88092513-88092516
88092523-88092528, 88092546-88092547

QC Report No: AAF-W-0053-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-17-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	SA	Spike Recovery SR	Spike Recovery SSR	PR	Notes
Arsenic	88092487	88092487	10-15-88	NA	7060	<0.01	<0.01	<0.01	NC	0.040	<0.01	0.041	102	
Cadmium	88092487	88092487	10-20-88	NA	6010	<0.005	<0.05	<0.05	NC	0.010	<0.05	0.0114	114	
Chromium	88092487	88092487	10-16-88	NA	6010	<0.01	<0.01	<0.01	NC	0.020	<0.01	0.0216	108	
Lead	88092487	88092487	10-16-88	NA	7421	<0.005	<0.05	<0.005	NC	0.020	<0.05	0.0222	111	

634

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth_ANGB

QC Report for Laboratory Sample No(s):
88092548-88092551, 88092573-88092579
88092677-88092681, 88092695, 88092612-88092614

QC Report No: AAF-W-0052-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	PR	Notes
Arsenic	88092677	88092677	10-16-88	NA	7060	<0.01	<0.01	<0.01	NC	0.040	<0.01	0.0383	96	
Cadmium	88092677	88092677	10-26-88	NA	6010	<0.005	<0.005	<0.005	NC	0.010	<0.005	0.011	110	
Chromium	88092677	88092677	10-19-88	NA	6010	<0.01	<0.01	<0.01	NC	0.020	<0.01	0.0218	109	
Lead	88092677	88092677	10-21-88	NA	7421	<0.005	<0.005	<0.005	NC	0.020	<0.005	0.0227	114	

638

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092487-88092488, 88092492, 88092494-88092495
88092509-88092511, 88092513-88092516
88092523-88092528, 88092546-88092547

QC Report No: ICP-W-0060-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-17-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	Duplicate RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Barium	88092487	88092487	10-13-88	NA	6010	<0.2	<0.2	<0.2	NC	2.0	<0.2	0.198	99	

639

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092548-88092551, 88092573-88092579
88092677-88092681, 88092695, 88092612-88092614

QC Report No: ICP-W-0059-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-24-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	Duplicate RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Barium	88092677	88092677	10-13-88	NA	6010	<0.2	<0.2	<0.2	NC	2.0	<0.2	1.96	98	

640

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092487-88092488, 88092492, 88092494-88092495
88092509-88092511, 88092513-88092516
88092523-88092528, 88092546-88092547

QC Report No: CVM-W-0031-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-17-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	PR	Notes
Mercury	88092487	88092487	10-14-88	NA	254.1	<0.0002	<0.0002	<0.0002	NC	0.0010	<0.0002	0.00091	91	

941

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2}$ X 100

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

Percent Recovery (PR) = $\frac{SSR - SR}{SA}$ x 100

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

QC Report No: CVM-W-0030-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Reported: 2-27-89
Dilution Factor: NA

Project: Duluth_ANGB

QC Report for Laboratory Sample No(s):
88092548-88092551, 88092573-88092579
88092677-88092681, 88092695,. 88092612-88092614

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	PR	Notes
Mercury	88092677	88092677	10-14-88	NA	7471	<0.0002	<0.0002	<0.0002	NC	0.0010	<0.0002	0.00087	87	

642

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: TPH-W-0073-88

Insufficient sample was available for quality control purposes. The laboratory control sample is designated as a quality control sample for this batch.

The reporting limit for the samples in this batch is provided by the sub-contract laboratory.

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092523-88092530
88092546-88092551

QC Report No: TPH-W-0073-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-05-88
Date Analyzed: 10-08-88
Date Reported: 11-01-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1.5	<1.5	39.5	42.6	108	38.2	97	11	*

944

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
VOLATILE ORGANICS
EPA 8010/8020

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092527-88092528, 88092531-88092532
88092546-88092551, 88092573-88092577

QC Report No: VGC-W-0044-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-22-88
Date Prepared: NA
Date Analyzed: 10-03-88
Date Reported: 10-25-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092576	1,1-Dichloroethane	10	ND	9.82	98	9.96	100	1	26	70-130
	Trichloroethene	10	ND	10.3	103	10.2	102	1	19	65-131
	Chlorobenzene	10	ND	10.5	105	10.3	103	2	40	59-137
	Aromatics: 8020									
88092576	Benzene	10	ND	10.0	100	10.1	101	1	20	56-146
945	Toluene	10	ND	10.1	101	9.85	98	3	41	42-150
	Chlorobenzene	10	ND	10.6	106	9.71	97	9	36	76-133

Relative Percent Difference (PR) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Sample Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 10-25-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
03	9-27-88	VGC	Carbopack	75-09-2	Dichloromethane	7.4	0.25	88092549-88092550
08	9-23-88	VGC	Vocol	75-09-2	Dichloromethane	11	0.25	88092546-88092548
				67-66-3	Chloroform	0.18	0.05	88092551
				127-18-4	Tetrachloroethylene	0.46	0.03	

648

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
WORK ORDER NO(S). 1014
EPA METHOD 8270 ANALYSIS

These samples were first extracted on September 24, 1988 and analyzed on November1-3, 1988, all within holing times. Area counts for one or more internal standards in the base neutral extract of 88092551 were outside EPA QC limits. The extract was re-analyzed. The internal standard area counts met EPA criteria in the second analysis. Results of the second analysis are reported. Two or more surrogate spike recoveries in the acid extract of 88092549 and the base neutral extract of 88092550 were outside of EPA QC limits. There was no more of either sample left for re-extraction.

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Havden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No: BNA-W-0049-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: NA
Date Prepared: 09-20-88
Date Analyzed: 09-24-88
Date Reported: 12-13-88
Dilution Factor: NA

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88092513-88092516, 88092523-88092528
88092546-88092551

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limits RPD	RECOVERY
	1,2,4-Trichlorobenzene	100	ND	74.9	75	78.2	78	4	28	39-98
B/N	Acenaphthene	100	ND	67.9	68	72.7	73	7	31	46-118
Laboratory	2,4-Dinitrotoluene	100	ND	83.4	83	87.6	88	6	38	24-96
Sample #	Pyrene	100	ND	67.8	68	75.6	76	11	31	26-127
	N-Nitroso-di-n-Propylamine	100	ND	82.0	82	101	101	20	38	41-116
88092516	1,4-Dichlorobenzene	100	ND	62.6	63	70.7	71	12	28	36-97
ACID	Pentachlorophenol	200	ND	77.4	39	93.3	47	19	50	9-103
Laboratory	Phenol	200	ND	73.9	37	68.1	34	8	42	12-89
Sample #	2-Chlorophenol	200	ND	126	63	110	55	14	40	27-123
	4-Chloro-3-Methylphenol	200	ND	194	97	190	95	2	42	23-97
88092516	4-Nitrophenol	200	ND	53.5	27	40.9	20	29	50	10-80

$$\text{Relative Percent Difference (RPD)} = \frac{MS - MSD}{(MS + MSD)/2} \times 100$$

$$\text{Percent Recovery (PR)} = \frac{(MS \text{ or } MSD) - SR}{SA} \times 100$$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1014

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 3-23-89

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E6322	11-23-88	AC	2	-	None Found	-	-	88092546-88092551
E6028	10-30-88	BN	2	117-81-7	Bis(2-ethylhexyl)phthalate	18	10	88092546-88092551

649

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Blank
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 2

Work Order No.: 1014
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092513 BN

Lab File ID: E6028
Date Received: NA
Date Extracted: 09-24-88
Date Analyzed: 10-31-88
Date Reported: 04-04-89
Dilution Factor: 1
% Moisture: dec:
not dec:
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.24	17	
-	Unknown	28.87	6	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1014
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092513-16,
2523-28			
Attn:	Bill Hayden		2546-51 AC
Blank			
Address:	710 S. Illinois Avenue	Lab File ID:	E6322
	Suite F-103	Date Received:	NA
	Oak Ridge, Tn. 37830	Date Extracted:	09-24-88
		Date Analyzed:	11-23-88
		Date Reported:	04-04-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	N
		GPC Clean up: (Y/N)	N
# TICs Found:	1	Extraction: (SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.08	14	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 1

Work Order No.: 1014
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092546-AC

Lab File ID: S0322
Date Received: 09-21-88
Date Extracted: 09-24-88
Date Analyzed: 11-01-88
Date Reported: 04-04-89
Dilution Factor: 1
% Moisture: dec:
not dec: N
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	5.08	17	B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 2

Work Order No.: 1014
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092546-BN

Lab File ID: S0323
Date Received: 09-21-88
Date Extracted: 09-24-88
Date Analyzed: 11-01-88
Date Reported: 04-04-89
Dilution Factor: 1
% Moisture: dec:
not dec: N
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
108-8803	Toluene	4.38	5	
127-18-4	Tetrachloroethene	5.09	34	B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 1

Work Order No.: 1014
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092547-AC

Lab File ID: S0324
Date Received: 09-21-88
Date Extracted: 09-24-88
Date Analyzed: 11-01-88
Date Reported: 04-04-89
Dilution Factor: 1
% Moisture: dec:
not dec: N
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	5.10	19	B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 2

Work Order No.: 1014
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092547-BN

Lab File ID: S0325
Date Received: 09-21-88
Date Extracted: 09-24-88
Date Analyzed: 11-01-88
Date Reported: 04-04-89
Dilution Factor: 1
% Moisture: dec:
not dec: N
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
108-88-3	Toluene	4.39	5	
127-18-4	Tetrachloroethene	5.10	28	B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1014
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092548-AC
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	S0326
	Suite F-103	Date Received:	09-21-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-24-88
		Date Analyzed:	11-01-88
		Date Reported:	04-04-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	N
		GPC Clean up: (Y/N)	N
# TICs Found:	2	Extraction: (SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	4.84	5	
127-18-4	Tetrachloroethene	5.09	14	B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 4

Work Order No.: 1014
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092548-BN

Lab File ID: S0327
Date Received: 09-21-88
Date Extracted: 09-24-88
Date Analyzed: 11-01-88
Date Reported: 04-04-89
Dilution Factor: 1
% Moisture: dec:
not dec: N
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	4.17	4	
127-18-4	Tetrachloroethene	5.08	23	B
-	Unknown	23.69	7	
-	Unknown	28.99	9	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1014
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092549-AC
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	S0328
	Suite F-103	Date Received:	09-21-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-24-88
		Date Analyzed:	11-01-88
		Date Reported:	04-04-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	N
		GPC Clean up: (Y/N)	N
# TICs Found:	14	Extraction: (SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	4.86	14	
127-18-4	Tetrachloroethene	5.10	26	B
-	Unknown	5.42	5	
79-34-5	1,1,2,2-Tetrachloroethane	7.07	12	
-	Unknown	11.21	12	
-	Unknown	11.53	50	
-	Unknown	11.81	4	
-	Unknown	12.18	4	
-	Unknown	13.26	17	
-	Unknown	14.60	5	
-	Unknown	15.22	5	
-	Unknown	16.93	370	
-	2,4,6-Trimethylbenzoic acid	17.54	14	
-	Unknown	27.16	4	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 2

Work Order No.: 1014
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092549-BN

Lab File ID: S0329
Date Received: 09-21-88
Date Extracted: 09-24-88
Date Analyzed: 11-02-88
Date Reported: 04-04-89
Dilution Factor: 1
% Moisture: dec:
not dec: N
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
108-88-3	Toluene	4.38	4	
127-18-4	Tetrachloroethene	5.09	22	B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1014
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092350-AC
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	S0330
	Suite F-103	Date Received:	09-21-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-24-88
		Date Analyzed:	11-02-88
		Date Reported:	04-04-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	N
		GPC Clean up: (Y/N)	N
# TICs Found:	3	Extraction: (SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	4.37	5	
127-18-4	Tetrachloroethene	5.08	30	B
-	Unknown	28.22	8	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 1

Work Order No.: 1014
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092550-BN

Lab File ID: E6078
Date Received: 09-21-88
Date Extracted: 09-24-88
Date Analyzed: 11-03-88
Date Reported: 04-04-89
Dilution Factor: 1
% Moisture: dec:
not dec: N
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.19	7	B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 3

Work Order No.: 1014
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092551-AC

Lab File ID: E6052
Date Received: 09-21-88
Date Extracted: 09-24-88
Date Analyzed: 11-01-88
Date Reported: 04-04-89
Dilution Factor: 1
% Moisture: dec:
not dec: N
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.98	7	
127-18-4	Tetrachloroethene	4.17	14	B
-	Unknown	34.31	4	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 3

Work Order No.: 1014
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092551-BN

Lab File ID: E6053
Date Received: 09-21-88
Date Extracted: 09-24-88
Date Analyzed: 11-01-88
Date Reported: 04-04-89
Dilution Factor: 1
% Moisture: dec:
not dec: N
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	5.74	64	
-	Unknown	9.82	9	
-	Unknown	27.61	4	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1014
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092551-BN
Attn:	Bill Hayden		Re-analysis
Address:	710 S. Illinois Avenue	Lab File ID:	E6323
	Suite F-103	Date Received:	09-21-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-24-88
		Date Analyzed:	11-23-88
		Date Reported:	04-04-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	N
		GPC Clean up: (Y/N)	N
# TICs Found:	4	Extraction: (SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.07	22	B
-	Unknown	5.64	66	
-	Unknown	9.71	4	
-	Unknown	27.41	4	

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 11/03/88 13:14

Lab ID >01103::SC Data Release Authorized By: Laura Kuk

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	52.42 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	71.88	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	46.13 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	6.43 OK	
275	10.0 - 30.0% of mass 198	20.32 OK	
365	greater than 1.00% of mass 198	1.57 OK	
441	present, but less than mass 443	9.21 OK	
442	greater than 40.0% of mass 198	75.44 OK	
443	17.0 - 23.0% of mass 442	13.80 OK	(18.29) #2

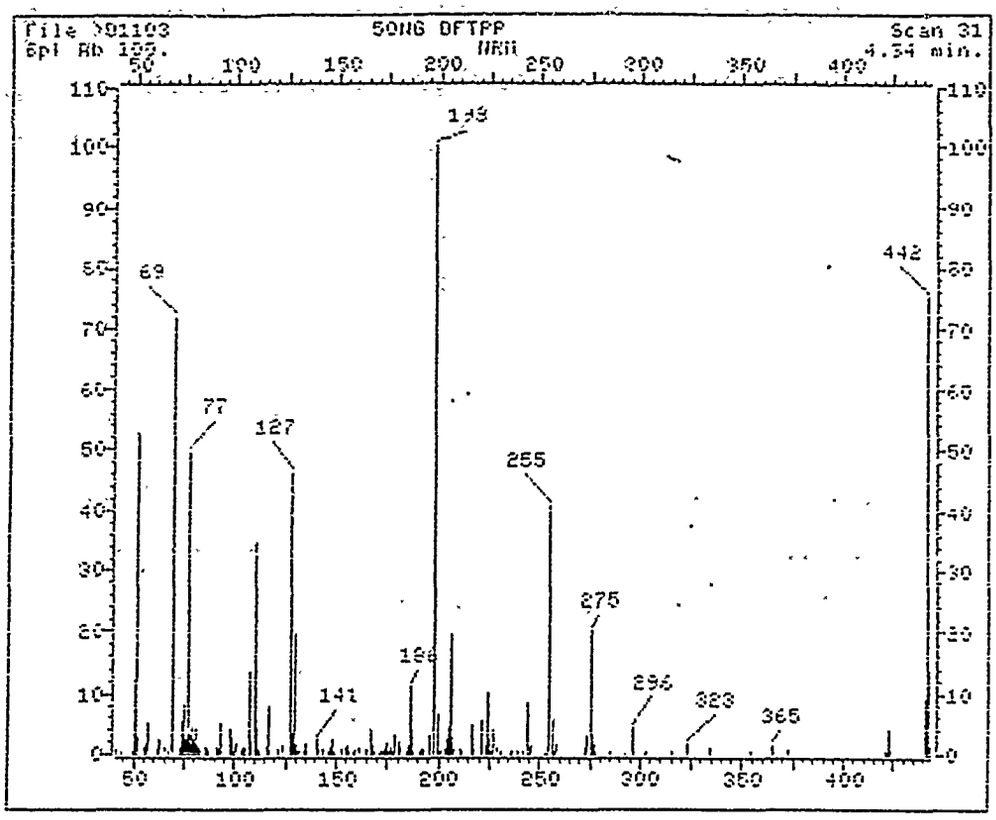
5 pt. 1 10/12/88

all IS good

THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS	
50NG DFTPP	>01103	11/03/88	13:14	
60ng/Lstd	>E6069	11/3/88	14:28	
8807250BN	>E6078	↓	23:19	- SS out, reext - none left, use
8807250 AC	>E6079	11/4/88	00:04	use
8804250 BN	>E6080	↓	01:10	use



File: X01103 Scan #: 31 Retn. time: 4.34

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.00	.774	96.00	4.126	147.95	2.321	198.00	100.000	256.00	5.364
43.20	.554	93.00	2.669	148.95	.516	199.00	6.435	257.00	.554
49.20	.525	99.90	.374	149.95	.219	200.00	.464	257.90	1.896
50.00	12.263	101.00	2.257	152.95	.606	201.50	.516	272.90	1.173
51.10	52.418	103.00	.671	155.05	1.199	202.95	.645	274.00	3.211
52.00	2.692	104.00	1.019	156.05	1.470	203.95	2.424	275.00	20.322
55.10	1.161	105.00	1.096	157.05	.503	204.95	4.449	276.00	3.069
55.95	1.921	107.00	13.540	158.85	.554	205.95	19.626	276.95	1.805
57.05	5.093	108.00	2.063	159.95	.787	206.95	2.656	277.85	.258
60.05	.219	110.00	34.610	161.05	1.096	207.65	.619	284.95	.361
62.05	.916	111.00	4.449	164.95	.916	210.95	.735	292.95	.245
63.05	2.373	112.00	.903	167.00	3.662	211.45	.438	295.95	4.423
65.05	1.173	113.10	.361	168.00	1.380	216.95	4.977	296.95	.516
67.05	.438	116.00	.954	169.00	.297	217.95	.709	302.15	.206
68.95	71.676	117.00	7.840	170.80	.155	220.95	5.635	302.45	.142
73.05	.954	117.90	.516	172.00	.464	222.95	1.302	302.95	.529
74.05	5.442	122.00	.877	173.00	.400	223.95	10.316	313.90	.245
75.05	8.168	123.00	1.418	173.90	.890	224.95	2.308	314.90	.503
76.15	2.566	123.90	.735	175.00	1.857	225.95	.309	323.00	1.612
77.05	49.491	125.60	.206	176.00	.374	226.95	3.933	326.80	.219
78.05	3.275	127.00	46.125	176.90	.941	228.95	1.057	332.90	.232
79.05	4.320	128.00	3.301	177.90	.387	230.95	.400	334.00	1.109
79.95	2.476	129.00	19.807	178.90	2.966	233.95	.193	353.95	.477
81.05	4.023	129.95	1.792	180.00	2.012	235.95	.193	364.95	1.573
81.95	1.444	130.55	.567	181.00	1.161	236.95	.348	371.95	.696
83.05	.567	131.95	.400	183.90	.258	238.95	.400	420.60	.438
83.55	.297	133.95	.451	185.00	1.509	241.90	.322	421.90	.361

67.05	.190	140.55	2.321	168.00	.413	245.90	1.599	440.95	9.207
91.05	1.225	141.55	.696	191.00	.374	252.30	.168	441.95	75.435
92.05	.825	142.55	.619	192.00	.928	253.70	.245	442.95	13.738
93.00	5.184	145.95	.387	193.00	.928	255.90	40.903	443.95	1.360
94.00	.580	146.95	1.212	196.00	3.069				

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/03/88

Contractor: _____ Time: 14:26

Contract No: _____ Laboratory ID: 26065

Instrument ID: _____ Initial Calibration Date: 10/13/88

Minimum $\overline{RF}$ for SPCC is _____ Maximum %Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	1.24043	1.30563	5.26		
2-Fluorophenol	1.41912	1.50639	6.15		
bis(2-Chloroethyl)ether	1.41737	1.34161	5.43		
Phenol	1.78269	1.91762	7.60	*	
Phenol-d5	1.35470	1.56806	17.23		
Aniline	.74553	.62883	15.65		
2-Chlorophenol	1.32089	1.37788	4.31		
1,3-Dichlorobenzene	1.51101	1.48721	1.58		
1,4-Dichlorobenzene	1.51574	1.51482	.06	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.56944	.42085	26.09		
1,2-Dichlorobenzene	1.45179	1.51741	4.52		
2-Methylphenol	1.42392	1.44957	1.80		
3-&-4-Methylphenol	1.58422	1.44957	8.50		
bis(2-chloroisopropyl)Ether	2.35722	2.61717	11.03		
N-Nitroso-Di-n-Propylamine	1.13410	1.38746	22.34		**
Hexachloroethane	.70056	.71044	1.41		
Dibromochloropropane	-	-	-		
Nitrobenzene	.56683	.64055	13.01		
Nitrobenzene-d5	.49338	.53183	6.50		
2-Nitrophenol	.22040	.25227	14.46	*	
Isophorone	.87207	.99102	13.64		
bis(2-Chloroethoxy)methane	.56240	.62608	7.84		
2,4-Dimethylphenol	.40862	.45565	11.51		
Benzoic Acid	.29595	.36398	22.99		
2,4-Dichlorophenol	.53135	.51879	2.36	*	
1,2,4-Trichlorobenzene	.31739	.33383	5.18		
Naphthalene	.98196	.99743	1.58		
4-Chloroaniline	.33116	.36830	11.21		
Hexachlorobutadiene	.18652	.18247	2.17	*	
4-Chloro-3-Methylphenol	.28631	.34193	19.42	*	
2-Methylnaphthalene	.54168	.59437	9.72		

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL-Compounds

Case No: Calibration Date: 11/03/88

Contractor: Time: 14:28

Contract No: Laboratory ID: 26869

Instrument ID: Initial Calibration Date: 10/13/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.33269	.35175	5.67		**
2,4,6-Trichlorophenol	.32256	.35033	8.63	*	
2,4,5-Trichlorophenol	.49533	.40613	18.02		
2-Fluorobiphenyl	1.26659	1.11266	12.18		
2-Chloronaphthalene	1.24653	1.14836	7.83		
2-Nitroaniline	.63125	.66017	4.57		
Dimethylphthalate	1.33033	1.31556	1.11		
2,6-Dinitrotoluene	.31816	.38436	20.81		
Acenaphthylene	1.65820	1.52832	7.83		
3-Nitroaniline	.63702	.66886	5.14		
2,4-Dinitrophenol	.65753	.61565	20.30		**
Acenaphthene	1.12644	1.05336	6.49	*	
Dibenzofuran	1.50201	1.48730	.98		
2,4-Dinitrotoluene	.32699	.39504	23.07		
4-Nitrophenol	.18425	.16118	12.52		**
Fluorene	1.09532	1.07173	1.97		
Diethylphthalate	1.32354	1.25654	5.06		
4-Chlorophenyl-phenylether	.46214	.43019	10.78		
4-Nitroaniline	.27495	.34275	24.66		
2,4,6-Tribromophenol	.14216	.20041	40.96		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.44983	.45452	1.04	*	
4,6-Dinitro-2-methylphenol	.08606	-	-		
4-Bromophenyl-phenylether	.22979	.24500	6.62		
Hexachlorobenzene	.28768	.30321	5.40		
Pentachlorophenol	.11390	.11906	4.53	*	

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve.

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

669

Continuing Calibration Check
HSL Compounds

Case No: ---------- Calibration Date: 11/03/86 ----------

Contractor: ---------- Time: 14:28 ----------

Contract No: ---------- Laboratory ID: X66069 ----------

Instrument ID: ---------- Initial Calibration Date: 10/13/86 ----------

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.07960	1.03227	4.38		
Anthracene	1.13334	1.17185	3.40		
Di-n-Butylphthalate	1.71746	1.95536	13.85		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.17566	1.15428	1.82	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.03775	.01484	60.69		
Pyrene	1.65647	1.51084	8.79		
Terphenyl-d14	1.09647	1.04944	4.29		
Butylbenzylphthalate	1.15097	1.25339	8.90		
3,3'-Dichlorobenzidine	.12950	.21122	62.61		
Chrysene	1.01423	.97755	3.62		
Benzo(a)Anthracene	1.09006	1.20009	10.09		
bis(2-Ethylhexyl)Phthalate	1.34247	1.47474	9.85		
Di-n-octylphthalate	3.72331	3.38204	9.17	*	
Benzo(a)Pyrene	1.27071	1.27228	.12	*	
Benzo(b)Fluoranthene	1.48902	1.40791	5.45		
Indeno(1,2,3-cd)Pyrene	.82543	1.19537	44.82		
Dibenzo(a,h)Anthracene	.78966	.95572	21.03		
Benzo(k)Fluoranthene	1.51900	1.23502	18.70		
Benzo(g,h,i)Perylene	.74560	.88242	18.32		

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR0401

Lab Code: _____ Case No.: _____ SAS No.: _____ Job No.: _____

Sample No. (Standard): _____ Date Analyzed: _____

Lab File ID (Standard): _____ Time Analyzed: _____

Instrument ID: 1

	IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
12 HOUR STD	78924	8.06	271405	11.59	151711	16.99
UPPER LIMIT	157848		542810		303422	
LOWER LIMIT	39462		135702		75856	
EPA SAMPLE NO.						
01 8809255 BN	61306	8.04	216653	11.53	116428	16.95
02 8809255 AC	63891	8.05	214495	11.55	125810	16.95
03 8809257 BN	65642	8.06	226482	11.56	133068	16.96
04						
05						
06						
07						
08						
09						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

SC

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR0001

Lab Code: _____ Case No.: _____ SAS No.: _____ Job No.: _____

Sample No.(Standard): _____ Date Analyzed: _____

Lab File ID (Standard): _____ Time Analyzed: _____

Instrument ID: _____

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS4(PRY) AREA #	RT
12 HOUR STD	204869	21.60	151735	29.99	119327	35.01
UPPER LIMIT	409738		303470		238654	
LOWER LIMIT	102434		75867		59663	
EPA SAMPLE NO.						
01 8809255BNU	188380	21.52	167540	29.95	122975	34.95
02 8809255AC	192526	21.56	162779	29.95	103345	34.95
03 8809255BLU	208373	21.59	179619	29.95	119619	34.91
04						
05						
06						
07						
08						
09						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

File: CONTCAL
24 Oct 88

50.d continuing check
9/23/88

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____ SDG No.:_____

Instrument ID.: CARbopak Calibration Date(s): 9/23/88 _____

LAB FILE ID: 45, 52 Init. Calib. Date(s): 9/19/88 9/23/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzyl chloride	0.32	0.34	6
bis (2-chloroethoxy methane			
bis (2-chloroisopropyl ether			
Bromobenzene	1.4	1.2	14
Bromodichloromethane	3.7	3.7	0
Bromoform	1.9	2.0	5
Bromomethane	—	0.16	
Carbon tetrachloride	4.2	4.1	2
Chloroacetaldehyde	—		
Chlorobenzene	1.4	1.4	0
Chloroethane	0.72	0.45	38
Chloroform	5.4	4.1	24
1-Chorohexane	1.2	1.0	17
2-Chloroethyl vinyl ether	—		
Chloromethane	0.47	0.43	9
Chloromethyl methyl ether	—		
o_,m_,& p_Chlorotoluenes	4.6	4.0	13
Dibromochloromethane	3.7	3.8	3
Dibromomethane	3.2	2.8	13
1,2_Dichlorobenzene	2.5	2.0	20
1,3_Dichlorobenzene	2.1	2.1	0
1,4_Dichlorobenzene	2.1	2.4	14
Dichlorodifluormethane	~~2.~~		
1,1_Dichloroethane	2.4	2.2	8
1,2_Dichloroethane	2.6	2.4	8
1,1_Dichloroethylene	2.6	2.3	12
trans_1,2_dichloroethylene	2.4	2.3	4
Dichloromethane	4.1	1.0	76
1,2_Dichloropropane	2.4	2.3	4
1,3_Dichloropropylene	5.4	5.2	12
1,1,2,2_Tetrachloroethane	7.5	7.1	5
1,1,1,2_Tetrachloroethane	5.2	4.5	13
Tetrachloroethylene	7.5	7.1	5
1,1,1_Trichloroethane	3.0	2.9	3
1,1,2_Trichloroethane	5.9	5.2	12
Trichloroethylene	4.0	3.8	5
Trichlorofluormethane	2.3	2.0	13
Trichloropropane	2.1	1.8	14
Vinyl chloride	0.44	0.38	17

2493
2524

file: 8020CONT
3 Nov 88

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____ SDG No.:_____

Instrument ID.: CARbopak Calibration Date(s): 9/23/88 _____

LAB FILE ID: 45 Init. Calib. Date(s): 9/19/88 _____

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	4.9	4.6	6
Chlorobenzene	5.3	5.8	9
1,2_Dichlorobenzene	4.7	3.9	17
1,3_Dichlorobenzene	4.7	4.4	6
1,4_Dichorobenzene	4.0	3.5	13
Ethyl Bezene	4.4	4.8	9
Toluene	3.4	4.2	8
Xylenes	13	11	15

DATA PACKAGE #11

This page intentionally left blank.

ENGINEERING-SCIENCE, INC.

600 SANCROFT WAY
BERKELEY, CALIFORNIA 94710
(415) 548-7970

Job No.: OR001

Work Order No.: 1020

Client: ES Oak Ridge
Attention: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Attached are the analytical reports for the water sample(s) received by this laboratory on 9-22-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092573	DANGB-2-GW2A-GW1	BA-I	9-21-88		10-13-88	
88092573	DANGB-2-GW2A-GW1	CD-F	9-21-88		10-26-88	
88092573	DANGB-2-GW2A-GW1	CR-F	9-21-88		10-16-88	
88092573	DANGB-2-GW2A-GW1	PB-F	9-21-88		10-21-88	
88092573	DANGB-2-GW2A-GW1	418.1	9-21-88	10-04-88	10-08-88	
88092573	DANGB-2-GW2A-GW1	8010	9-21-88		9-23-88	
88092573	DANGB-2-GW2A-GW1	8020	9-21-88		9-23-88	
88092573	DANGB-2-GW2A-GW1	8270	9-21-88	9-27-88	11-05-88	
88092574	DANGB-2-MW56-GW1	BA-I	9-21-88		10-13-88	
88092574	DANGB-2-MW56-GW1	CD-F	9-21-88		10-26-88	
88092574	DANGB-2-MW56-GW1	CR-F	9-21-88		10-16-88	
88092574	DANGB-2-MW56-GW1	PB-F	9-21-88		10-21-88	
88092574	DANGB-2-MW56-GW1	418.1	9-21-88	10-01-88	10-10-88	
88092574	DANGB-2-MW56-GW1	8010	9-21-88		9-23-88	
88092574	DANGB-2-MW56-GW1	8020	9-21-88		9-23-88	
88092574	DANGB-2-MW56-GW1	8270	9-21-88	9-27-88	11-05-/11-30-88	
88092575	DANGB-2-MW4-GW1	BA-I	9-21-88		10-13-88	
88092575	DANGB-2-MW4-GW1	CD-F	9-21-88		10-26-88	
88092575	DANGB-2-MW4-GW1	CR-F	9-21-88		10-16-88	
88092575	DANGB-2-MW4-GW1	PB-F	9-21-88		10-21-88	
88092575	DANGB-2-MW4-GW1	418.1	9-21-88	10-01-88	10-10-88	
88092575	DANGB-2-MW4-GW1	8010	9-21-88		9-23-88	
88092575	DANGB-2-MW4-GW1	8020	9-21-88		9-23-88	
88092575	DANGB-2-MW4-GW1	8270	9-21-88	9-27-88	11-05-88	

* If applicable

Job No.: OR001

Work Order No.: 1020

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092576	DANGB-2-GW2C-GW1	BA-I	9-21-88		10-13-88	
88092576	DANGB-2-GW2C-GW1	CD-F	9-21-88		10-26-88	
88092576	DANGB-2-GW2C-GW1	CR-F	9-21-88		10-16-88	
88092576	DANGB-2-GW2C-GW1	PB-F	9-21-88		10-21-88	
88092576	DANGB-2-GW2C-GW1	418.1	9-21-88	10-01-88	10-10-88	
88092576	DANGB-2-GW2C-GW1	8010	9-21-88		9-23-88	
88092576	DANGB-2-GW2C-GW1	8020	9-21-88		9-23-88	
88092576	DANGB-2-GW2C-GW1	8270	9-21-88	9-27-88	11-05-/11-30-88	
88092577	DANGB-2-GW2D-GW1	BA-I	9-21-88		10-13-88	
88092577	DANGB-2-GW2D-GW1	CD-F	9-21-88		10-26-88	
88092577	DANGB-2-GW2D-GW1	CR-F	9-21-88		10-16-88	
88092577	DANGB-2-GW2D-GW1	PB-F	9-21-88		10-21-88	
88092577	DANGB-2-GW2D-GW1	418.1	9-21-88	10-01-88	10-08-88	
88092577	DANGB-2-GW2D-GW1	8010	9-21-88		9-23-88	
88092577	DANGB-2-GW2D-GW1	8020	9-21-88		9-23-88	
88092577	DANGB-2-GW2D-GW1	8270	9-21-88	9-27-88	11-05-88	
88092578	DANGB-2-MW39-GW1	BA-I	9-21-88		10-13-88	
88092578	DANGB-2-MW39-GW1	CD-F	9-21-88		10-26-88	
88092578	DANGB-2-MW39-GW1	CR-F	9-21-88		10-19-88	
88092578	DANGB-2-MW39-GW1	PB-F	9-21-88		10-21-88	
88092578	DANGB-2-MW39-GW1	418.1	9-21-88	10-01-88	10-10-88	
88092578	DANGB-2-MW39-GW1	8010	9-21-88		9-23-88	
88092578	DANGB-2-MW39-GW1	8020	9-21-88		9-23-88	
88092578	DANGB-2-MW39-GW1	8270	9-21-88	9-27-88	11-06-88	
88092579	DANGB-BR10	BA-I	9-21-88		10-13-88	
88092579	DANGB-BR10	CD-F	9-21-88		10-26-88	
88092579	DANGB-BR10	CR-F	9-21-88		10-16-88	
88092579	DANGB-BR10	PB-F	9-21-88		10-21-88	
88092579	DANGB-BR10	418.1	9-21-88	Not Given	10-10-88	
88092579	DANGB-BR10	8010	9-21-88		9-23-88	9-28-88
88092579	DANGB-BR10	8020	9-21-88		9-23-88	
88092579	DANGB-BR10	8270	9-21-88	9-27-88	11-06-88	
88092580	DANGB-FB13	8010	9-21-88		9-26-88	
88092580	DANGB-FB13	8020	9-21-88		9-26-88	
88092581	DANGB-FB14	8010	9-21-88		9-28-88	9-30-88
88092581	DANGB-FB14	8020	9-21-88		9-28-88	
88092582	DANGB-TB10	8010	9-21-88		9-28-88	9-29-88
88092582	DANGB-TB10	8020	9-21-88		9-28-88	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092573-88092579
WORK ORDER NO.: 1020

These water samples were received at the ES Berkeley Laboratory on 9-22-88. They were received cold and intact.

ANALYSIS REPORT

RK ORDER NUMBER: 1020
B NUMBER : ZB0000000440
RK ORDER DATE : 09/22/88

APPROVED BY _____
Lab Supervisor

PORT DATA:
OAK RIDGE/DULUTH ANGB
0 S. ILLINOIS AVE. STE. S103
K RIDGE, TN 37830
LL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

NTRACT / PO # : OR001
NTACT : BILL HAYDEN
(615)-481-3920

SK: 2, UNITS: mg/L

ST COMPOUND	DANGB-2-GW2A-GW1 88092573	DANGB-2-MW56-GW1 88092574	DANGB-2-MW4-GW1 88092575	DANGB-2-GW2C-GW1 88092576	DANGB-2-GW2D-GW1 88092577	DANGB-2-MW39-GW1 88092578
ID DIG FLAME	NA	NA	NA	NA	NA	NA
ID DIG FURNACE	NA	NA	NA	NA	NA	NA
RIUM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DMIUM	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
ROMIUM	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
AD	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

- Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1020

ASK: 2, UNITS: mg/L

TEST COMPOUND	DANGB-BR10 88092579
CID DIG FLAME	NA
CID DIG FURNACE	NA
BARIUM	<0.2
CADMIUM	<0.005
CHROMIUM	<0.01
LEAD	<0.005

ND - Not Detected

ANALYSIS REPORT

)RK ORDER NUMBER: 1020
)B NUMBER : ZB0000000440
)RK ORDER DATE : 09/22/88

APPROVED BY _____
Lab Supervisor

:PORT DATA:
; OAK RIDGE/DULUTH ANGB
·0 S. ILLINOIS AVE. STE. S103
\K RIDGE, TN 37830
'LL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

)NTRACT / PO # : OR001
)NTACT : BILL HAYDEN
· (615)-481-3920

\SK: 3, UNITS: mg/L

:ST COMPOUND	DANGB-2-GW2A-GW1 88092573	DANGB-2-MW56-GW1 88092574	DANGB-2-MW4-GW1 88092575	DANGB-2-GW2C-GW1 88092576	DANGB-2-GW2D-GW1 88092577	DANGB-2-MW39-GW1 88092578
18.1 PETROLEUM HYDROCARBONS	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5

) - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1020

ASK: 3, UNITS: mg/L

EST COMPOUND	DANGB-BR10 88092579
18.1 PETROLEUM HYDROCARBONS	<1.5

ND - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1020
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/22/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
S OAK RIDGE/DULUTH ANGB
10 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
ILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

ONTRACT / PO # : OR001
ONTACT : BILL HAYDEN
(615)-481-3920

ASK: 4, UNITS: ug/L, GROUP 8010

EST COMPOUND	DANGB-2-GW2A-GW1 88092573	DANGB-2-MW56-GW1 88092574	DANGB-2-MW4-GW1 88092575	DANGB-2-GW2C-GW1 88092576	DANGB-2-GW2D-GW1 88092577	DANGB-2-MW39-GW1 88092578
ENZYL CHLORIDE	ND	ND	ND	ND	ND	ND
IS (2-CHLOROETHOXY)METHANE	ND	ND	ND	ND	ND	ND
IS (2-CHLOROISOPROPYL)ETHER	ND	ND	ND	ND	ND	ND
ROMOBENZENE	ND	ND	ND	ND	ND	ND
ROMODICHLOROMETHANE	ND	ND	ND	ND	ND	ND
ROMOFORM	ND	ND	ND	ND	ND	ND
ROMOETHANE	ND	ND	ND	ND	ND	ND
ARBON TETRACHLORIDE	ND	ND	ND	ND	ND	ND
HLORACETALDEHYDE	ND	ND	ND	ND	ND	ND
HLORAL	ND	ND	ND	ND	ND	ND
HLOROBENZENE	ND	ND	ND	ND	ND	ND
HLOROETHANE	ND	ND	ND	ND	ND	ND
HLOROFORM	ND	ND	ND	ND	ND	ND
-CHLOROHEXANE	ND	ND	ND	ND	ND	ND
-CHLOROETHYL VINYL ETHER	ND	ND	ND	ND	ND	ND
HLOROMETHANE	ND	ND	ND	ND	ND	ND
HLOROMETHYL METHYL ETHER	ND	ND	ND	ND	ND	ND
HLOROTOLUENE	ND	ND	ND	ND	ND	ND
IBROMOCHLOROMETHANE	ND	ND	ND	ND	ND	ND
IBROMOMETHANE	ND	ND	ND	ND	ND	ND
,2-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
,3-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
,4-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
ICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND	ND
,1-DICHLOROETHANE	ND	ND	ND	ND	ND	ND
,2-DICHLOROETHANE	ND	ND	ND	ND	ND	ND
,1-DICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
RANS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
ICHLOROMETHANE	ND	ND	ND	ND	ND	ND
,2-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND

) - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1020

TEST COMPOUND	DANGB-2-GW2A-GW1 88092573	DANGB-2-MW56-GW1 88092574	DANGB-2-MW4-GW1 88092575	DANGB-2-GW2C-GW1 88092576	DANGB-2-GW2D-GW1 88092577	DANGB-2-MW39-GW1 88092578
,3-DICHLOROPROPYLENE	ND	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
,1,1,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
ETRACHLOROETHYLENE	ND	ND	ND	ND	ND	ND
,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
RICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
RICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND	ND
TRICHLOROPROPANE	ND	ND	ND	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1020

ASK: 4, UNITS: ug/L, GROUP 8010

EST COMPOUND	DANGB-BR10 88092579	DANGB-FB13 88092580	DANGB-FB14 88092581	DANGB-TB10 88092582
ENZYL CHLORIDE	ND	ND	ND	ND
S (2-CHLOROETHOXY)METHANE	ND	ND	ND	ND
S (2-CHLOROISOPROPYL)ETHER	ND	ND	ND	ND
OMOBENZENE	ND	ND	ND	ND
ROMODICHLOROMETHANE	ND	ND	ND	ND
ROMOFORM	ND	ND	ND	8.1
ROMOETHANE	ND	ND	ND	ND
ARBON TETRACHLORIDE	ND	ND	ND	ND
HLORACETALDEHYDE	ND	ND	ND	ND
HLORAL	ND	ND	ND	ND
HLOROBENZENE	ND	ND	ND	ND
HLOROETHANE	ND	ND	ND	ND
HLOROFORM	9.2B	23*B	15B	ND
-CHLOROHEXANE	ND	ND	ND	ND
-CHLOROETHYL VINYL ETHER	ND	ND	ND	ND
HLOROMETHANE	ND	ND	ND	ND
HLOROMETHYL METHYL ETHER	ND	ND	ND	ND
HLOROTOLUENE	ND	ND	ND	ND
BROMOCHLOROMETHANE	ND	ND	ND	1.3
BROMOMETHANE	ND	ND	ND	ND
2-DICHLOROBENZENE	ND	ND	ND	ND
3-DICHLOROBENZENE	ND	ND	ND	ND
4-DICHLOROBENZENE	ND	ND	ND	ND
CHLORODIFLUOROMETHANE	ND	ND	ND	ND
,1-DICHLOROETHANE	ND	ND	ND	ND
,2-DICHLOROETHANE	ND	ND	ND	ND
1-DICHLOROETHYLENE	ND	ND	ND	ND
RANS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND
CHLOROMETHANE	ND	0.40*B	0.80B	1.3B
2-DICHLOROPROPANE	ND	ND	ND	ND
3-DICHLOROPROPYLENE	ND	ND	ND	ND
1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND
1,1,2-TETRACHLOROETHANE	ND	ND	ND	ND
TRACHLOROETHYLENE	ND	0.43*B	ND	ND
1,1-TRICHLOROETHANE	ND	ND	ND	ND
,1,2-TRICHLOROETHANE	ND	ND	ND	ND
RICHLOROETHYLENE	ND	ND	ND	ND
RICHLOROFLUOROMETHANE	ND	ND	ND	ND
RICHLOROPROPANE	ND	ND	ND	ND
NYL CHLORIDE	ND	ND	ND	ND

- Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1020
OB NUMBER : ZB0000000440
WORK ORDER DATE : 09/22/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
ILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

ONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

ASK: 4, UNITS: ug/L, GROUP 8020

EST COMPOUND	DANGB-2-GW2A-GW1 88092573	DANGB-2-MW56-GW1 88092574	DANGB-2-MW4-GW1 88092575	DANGB-2-GW2C-GW1 88092576	DANGB-2-GW2D-GW1 88092577	DANGB-2-MW39-GW1 88092578
ENZENE	ND	ND	ND	ND	ND	ND
HLOROBENZENE	ND	ND	ND	ND	ND	ND
,2-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
,4-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
THYL BENZENE	ND	ND	ND	ND	ND	ND
TOLUENE	ND	ND	ND	ND	ND	ND
XYLENES	ND	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1020

ASK: 4, UNITS: ug/L, GROUP 8020

TEST COMPOUND	DANGB-BR10 88092579	DANGB-FB13 88092580	DANGB-FB14 88092581	DANGB-TB10 88092582
ENZENE	ND	ND	ND	ND
HLOROBENZENE	ND	ND	ND	ND
2-DICHLOROBENZENE	ND	ND	ND	ND
3-DICHLOROBENZENE	ND	ND	ND	ND
4-DICHLOROBENZENE	ND	ND	ND	ND
THYL BENZENE	ND	ND	ND	ND
OLUENE	ND	ND	ND	ND
YLENES	ND	ND	ND	ND

ND - Not Detected

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

Date Received: September 22, 1988
Date Reported: December 9, 1988

Work Order: 1020
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092573	88092574
Sample No.:	DANGB-2-GW2A-GW1	DANGB-2-MW56-GW1
Date Sampled:	09-21-88	09-21-88
Time Sampled:	08:45	09:15
Date Extracted:	09-27-88	09-27-88
Date Analyzed:	11-05-88	11-05-88/11-30-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
1,3-Dichlorobenzene	10	ND	ND
1,4-Dichlorobenzene	10	ND	ND
Hexachloroethane	10	ND	ND
Bis(2-chloroethyl)ether	10	ND	ND
1,2-Dichlorobenzene	10	ND	ND
N-Nitrosodimethylamine	10	ND	ND
Bis(2-chloroisopropyl)ether	10	ND	ND
N-Nitrosodi-n-propylamine	10	ND	ND
Hexachlorobutadiene	10	ND	ND
1,2,4-Trichlorobenzene	10	ND	ND
Nitrobenzene	10	ND	ND
Isophorone	10	ND	ND
Naphthalene	10	ND	ND
Bis(2-chloroethoxy)methane	10	ND	ND
2-Chloronaphthalene	10	ND	ND
Hexachlorocyclopentadiene	10	ND	ND
Acenaphthylene	10	ND	ND
Acenaphthene	10	ND	ND
Dimethyl phthalate	10	ND	ND
2,6-Dinitrotoluene	10	ND	ND
Fluorene	10	ND	ND
2,4-Dinitrotoluene	10	ND	ND
Diethyl phthalate	10	144	ND
N-Nitrosodiphenylamine	10	ND	ND
Hexachlorobenzene	10	ND	ND

B = Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

ate Received: September 22, 1988
ate Reported: December 9, 1988

Work Order: 1020
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

ab Number:	88092573	88092574
ample No.:	DANGB-2-GW2A-GW1	DANGB-2-MW56-GW1
ate Sampled:	09-21-88	09-21-88
ime Sampled:	08:45	09:15
ate Extracted:	09-27-88	09-27-88
ate Analyzed:	11-05-88	11-05-88/11-30-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
henanthrene	10	ND	ND
nthracene	10	ND	ND
ibutyl phthalate	10	ND	ND
luoranthene	10	ND	ND
-Chlorophenyl phenyl ether	10	ND	ND
yrene	10	ND	ND
utyl Benzyl phthalate	10	ND	ND
is(2-ethylhexyl) phthalate	10	ND	11 B
hrysene	10	ND	ND
-Bromophenyl phenyl ether	10	ND	ND
enzo(a)anthracene	10	ND	ND
i-n-octylphthalate	10	ND	ND
enzo(b)fluoranthene	10	ND	ND
enzo(k)fluoranthene	10	ND	ND
enzidine	60	ND	ND
,3'-Dichlorobenzidine	20	ND	ND
enzo(a)pyrene	10	ND	ND
ndeno(1,2,3-cd)pyrene	10	ND	ND
ibenzo(a,h)anthracene	10	ND	ND
enzo(ghi)perylene	10	ND	ND
enzyl Alcohol	20	ND	ND

= Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 22, 1988 Work Order: 1020
Date Reported: December 9, 1988 Job Number: OR001

For: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

Lab Number:	88092573	88092574
Sample No.:	DANGB-2-GW2A-GW1	DANGB-2-MW56-GW1
Date Sampled:	09-21-88	09-21-88
Time Sampled:	08:45	09:15
Date Extracted:	09-27-88	09-27-88
Date Analyzed:	11-05-88	11-05-88/11-30-88

Compound	Detection Limits ug/L	Analytical Results ug/L	ug/L
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
4-Chloroaniline	20	ND	ND
2-Chloronaphthalene	--*	ND	ND
Dibenzofuran	10	ND	ND
p-Dimethylaminoazobenzene	--*	ND	ND
7,12-Dimethylbenz(a)anthracene	--*	ND	ND
a-,a-Dimethylphenethylamine	--*	ND	ND
Diphenylamine	--*	ND	ND
1,2-Diphenylhydrazine	--*	ND	ND
Ethyl methanesulfonate	--*	ND	ND
3-Methylcholanthrene	--*	ND	ND
Methyl methanesulfonate	--*	ND	ND
2-Methylnaphthalene	10	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	50	ND	ND
3-Nitroaniline	50	ND	ND
4-Nitroaniline	50	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
2-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

ate Received: September 22, 1988
ate Reported: December 9, 1988

Work Order: 1020
Job Number: OR001

)R: ES:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN:Mr. Bill Hayden

ab Number:	88092573	88092574
ample No.:	DANGB-2-GW2A-GW1	DANGB-2-MW56-GW1
ate Sampled:	09-21-88	09-21-88
ime Sampled:	08:45	09:15
ate Extracted:	09-27-88	09-27-88
ate Analyzed:	11-05-88	11-05-88/11-30-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
lpha-BHC	--*	ND	ND
amma-BHC	__*	ND	ND
eta-BHC	20	ND	ND
eptachlor	10	ND	ND
elta-BHC	15	ND	ND
ldrin	10	ND	ND
eptachlor epoxide	10	ND	ND
ndosulfan I	--*	ND	ND
ieldrin	15	ND	ND
,4'-DDE	30	ND	ND
ndrin	--*	ND	ND
ndosulfan II	--*	ND	ND
,4'-DDD	15	ND	ND
,4'-DDT	25	ND	ND
ndosulfan Sulfate	30	ND	ND
ndrin aldehyde	--*	ND	ND
ndrin Ketone	--*	ND	ND
nlordane	60	ND	ND
ethoxychlor	--*	ND	ND
oxaphene	60	ND	ND
roclor-1016	60	ND	ND
roclor-1221	60	ND	ND
roclor-1232	60	ND	ND
roclor-1242	60	ND	ND
roclor-1248	60	ND	ND
roclor-1254	60	ND	ND
roclor-1260	60	ND	ND

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

Date Received: September 22, 1988
Date Reported: December 9, 1988

Work Order: 1020
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092573	88092574
Sample No.:	DANGB-2-GW2A-GW1	DANGB-2-MW56-GW1
Date Sampled:	09-21-88	09-21-88
Time Sampled:	08:45	09:15
Date Extracted:	09-27-88	09-27-88
Date Analyzed:	11-05-88	11-05-88/11-30-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
2-Chlorophenol	10	ND	ND
2-Nitrophenol	10	ND	ND
Phenol	10	ND	ND
2,4-Dimethylphenol	10	ND	ND
2,4-Dichlorophenol	10	ND	ND
2,4,6-Trichlorophenol	10	ND	ND
4-Chloro-3-methylphenol	20	ND	ND
2,4-Dinitrophenol	50	ND	ND
2,6-Dichlorophenol	--*	ND	ND
2-Methyl-4,6-Dinitrophenol	50	ND	ND
Pentachlorophenol	50	ND	ND
4-Nitrophenol	50	ND	ND
Benzoic Acid	50	ND	ND
2-Methylphenol	10	ND	ND
3- & 4-Methylphenol	10	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
2,4,5-Trichlorophenol	10	ND	ND

Analyst

Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

ate Received: September 22, 1988
ate Reported: December 9, 1988

Work Order: 1020
Job Number: OR001

DR: ES:Oak Ridge/Duluth ANGB
idress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

ab Number:	88092575	88092576
ample No.:	DANGB-2-MW4-GW1	DANGB-2-GW2C-GW1
ate Sampled:	09-21-88	09-21-88
ime Sampled:	11:30	10:30
ate Extracted:	09-27-88	09-27-88
ate Analyzed:	11-05-88/11-30-88	11-05-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
,3-Dichlorobenzene	10	ND	ND
,4-Dichlorobenzene	10	ND	ND
exachloroethane	10	ND	ND
is(2-chloroethyl)ether	10	ND	ND
,2-Dichlorobenzene	10	ND	ND
-Nitrosodimethylamine	10	ND	ND
is(2-chloroisopropyl)ether	10	ND	ND
-Nitrosodi-n-propylamine	10	ND	ND
exachlorobutadiene	10	ND	ND
,2,4-Trichlorobenzene	10	ND	ND
itrobenzene	10	ND	ND
sophorone	10	ND	ND
aphthalene	10	ND	ND
is(2-chloroethoxy)methane	10	ND	ND
-Chloronaphthalene	10	ND	ND
exachlorocyclopentadiene	10	ND	ND
cenaphthylene	10	ND	ND
cenaphthene	10	ND	ND
imethyl phthalate	10	ND	ND
,6-Dinitrotoluene	10	ND	ND
luorene	10	ND	ND
,4-Dinitrotoluene	10	ND	ND
iethyl phthalate	10	ND	ND
-Nitrosodiphenylamine	10	ND	ND
exachlorobenzene	10	ND	ND

= Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

ate Received: September 22, 1988 Work Order: 1020
ate Reported: December 9, 1988 Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ab Number:	88092575	88092576
ample No.:	DANGB-2-MW4-GW1	DANGB-2-GW2C-GW1
Date Sampled:	09-21-88	09-21-88
ime Sampled:	11:30	10:30
ate Extracted:	09-27-88	09-27-88
Date Analyzed:	11-05-88/11-30-88	11-05-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
henanthrene	10	ND	ND
Anthracene	10	ND	ND
ibutyl phthalate	10	ND	ND
luoranthene	10	ND	ND
4-Chlorophenyl phenyl ether	10	ND	ND
Pyrene	10	ND	ND
utyl Benzyl phthalate	10	ND	ND
is(2-ethylhexyl) phthalate	10	ND	ND
Chrysene	10	ND	ND
-Bromophenyl phenyl ether	10	ND	ND
enzo(a)anthracene	10	ND	ND
Di-n-octylphthalate	10	ND	ND
Benzo(b)fluoranthene	10	ND	ND
enzo(k)fluoranthene	10	ND	ND
Benzidine	60	ND	ND
3,3'-Dichlorobenzidine	20	ND	ND
enzo(a)pyrene	10	ND	ND
ndeno(1,2,3-cd)pyrene	10	ND	ND
Dibenzo(a,h)anthracene	10	ND	ND
enzo(ghi)perylene	10	ND	ND
enzyl Alcohol	20	ND	ND

= Compound was detected in the blank.

ate Received: September 22, 1988
ate Reported: December 9, 1988

Work Order: 1020
Job Number: OR001

or: ES:Oak Ridge/Duluth ANGB
ddress:710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

ab Number:	88092575	88092576
ample No.:	DANGB-2-MW4-GW1	DANGB-2-GW2C-GW1
ate Sampled:	09-21-88	09-21-88
ime Sampled:	11:30	10:30
ate Extracted:	09-27-88	09-27-88
ate Analyzed:	11-05-88/11-30-88	11-05-88

ompound	Detection Limits ug/L	Analytical Results ug/L	ug/L
cetophenone	--*	ND	ND
niline	--*	ND	ND
-Aminobiphenyl	--*	ND	ND
-Chloroaniline	20	ND	ND
-Chloronaphthalene	--*	ND	ND
ibenzofuran	10	ND	ND
-Dimethylaminoazobenzene	--*	ND	ND
,12-Dimethylbenz(a)anthracene	--*	ND	ND
-,a-Dimethylphenethylamine	--*	ND	ND
iphenylamine	--*	ND	ND
,2-Diphenylhydrazine	--*	ND	ND
thyl methanesulfonate	--*	ND	ND
-Methylcholanthrene	--*	ND	ND
ethyl methanesulfonate	--*	ND	ND
-Methylnaphthalene	10	ND	ND
-Naphthylamine	--*	ND	ND
-Naphthylamine	--*	ND	ND
-Nitroaniline	50	ND	ND
-Nitroaniline	50	ND	ND
-Nitroaniline	50	ND	ND
-Nitroso-di-n-butylamine	--*	ND	ND
-Nitrosopiperidine	--*	ND	ND
entachlorobenzene	--*	ND	ND
entachloronitrobenzene	--*	ND	ND
henacetin	--*	ND	ND
-Picoline	--*	ND	ND
ronamide	--*	ND	ND
,2,4,5-Tetrachlorobenzene	--*	ND	ND

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

Date Received: September 22, 1988
Date Reported: December 9, 1988

Work Order: 1020
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN:Mr. Bill Hayden

Lab Number:	88092575	88092576
Sample No.:	DANGB-2-MW4-GW1	DANGB-2-GW2C-GW1
Date Sampled:	09-21-88	09-21-88
Time Sampled:	11:30	10:30
Date Extracted:	09-27-88	09-27-88
Date Analyzed:	11-05-88/11-30-88	11-05-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
Alpha-BHC	--*	ND	ND
Gamma-BHC	__*	ND	ND
Beta-BHC	20	ND	ND
Heptachlor	10	ND	ND
Delta-BHC	15	ND	ND
Aldrin	10	ND	ND
Heptachlor epoxide	10	ND	ND
Endosulfan I	--*	ND	ND
Dieldrin	15	ND	ND
4,4'-DDE	30	ND	ND
Endrin	--*	ND	ND
Endosulfan II	--*	ND	ND
4,4'-DDD	15	ND	ND
4,4'-DDT	25	ND	ND
Endosulfan Sulfate	30	ND	ND
Endrin aldehyde	--*	ND	ND
Endrin Ketone	--*	ND	ND
Chlordane	60	ND	ND
Methoxychlor	--*	ND	ND
Toxaphene	60	ND	ND
Aroclor-1016	60	ND	ND
Aroclor-1221	60	ND	ND
Aroclor-1232	60	ND	ND
Aroclor-1242	60	ND	ND
Aroclor-1248	60	ND	ND
Aroclor-1254	60	ND	ND
Aroclor-1260	60	ND	ND

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

ate Received: September 22, 1988
ate Reported: December 9, 1988

Work Order: 1020
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
ddress:710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

ab Number:	88092575	88092576
ample No.:	DANGB-2-MW4-GW1	DANGB-2-GW2C-GW1
ate Sampled:	09-21-88	09-21-88
ime Sampled:	11:30	10:30
ate Extracted:	09-27-88	09-27-88
ate Analyzed:	11-05-88/11-30-88	11-05-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
-Chlorophenol	10	ND	ND
-Nitrophenol	10	ND	ND
henol	10	ND	ND
,4-Dimethylphenol	10	ND	ND
,4-Dichlorophenol	10	ND	ND
,4,6-Trichlorophenol	10	ND	ND
-Chloro-3-methylphenol	20	ND	ND
,4-Dinitrophenol	50	ND	ND
,6-Dichlorophenol	--*	ND	ND
-Methyl-4,6-Dinitrophenol	50	ND	ND
entachlorophenol	50	ND	ND
-Nitrophenol	50	ND	ND
enzoic Acid	50	ND	ND
-Methylphenol	10	ND	ND
- & 4-Methylphenol	10	ND	ND
,3,4,6-Tetrachlorophenol	--*	ND	ND
,4,5-Trichlorophenol	10	ND	ND

Analyst

Laboratory Supervisor

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

OTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

Date Received: September 22, 1988
Date Reported: December 9, 1988

Work Order: 1020
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092577	88092578
Sample No.:	DANGB-2-GW2D-GW1	DANGB-2-MW39-GW1
Date Sampled:	09-21-88	09-21-88
Time Sampled:	14:15	15:45
Date Extracted:	09-27-88	09-27-88
Date Analyzed:	11-05-88	11-06-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
1,3-Dichlorobenzene	10	ND	ND
1,4-Dichlorobenzene	10	ND	ND
Hexachloroethane	10	ND	ND
Bis(2-chloroethyl)ether	10	ND	ND
1,2-Dichlorobenzene	10	ND	ND
N-Nitrosodimethylamine	10	ND	ND
Bis(2-chloroisopropyl)ether	10	ND	ND
N-Nitrosodi-n-propylamine	10	ND	ND
Hexachlorobutadiene	10	ND	ND
1,2,4-Trichlorobenzene	10	ND	ND
Nitrobenzene	10	ND	ND
Isophorone	10	ND	ND
Naphthalene	10	ND	ND
Bis(2-chloroethoxy)methane	10	ND	ND
2-Chloronaphthalene	10	ND	ND
Hexachlorocyclopentadiene	10	ND	ND
Acenaphthylene	10	ND	ND
Acenaphthene	10	ND	ND
Dimethyl phthalate	10	ND	ND
2,6-Dinitrotoluene	10	ND	ND
Fluorene	10	ND	ND
2,4-Dinitrotoluene	10	ND	ND
Diethyl phthalate	10	ND	20
N-Nitrosodiphenylamine	10	ND	ND
Hexachlorobenzene	10	ND	ND

B = Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

ate Received: September 22, 1988
ate Reported: December 9, 1988

Work Order: 1020
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

ab Number:	88092577	88092578
ample No.:	DANGB-2-GW2D-GW1	DANGB-2-MW39-GW1
ate Sampled:	09-21-88	09-21-88
ime Sampled:	14:15	15:45
ate Extracted:	09-27-88	09-27-88
ate Analyzed:	11-05-88	11-06-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
henanthrene	10	ND	ND
nthracene	10	ND	ND
ibutyl phthalate	10	ND	ND
luoranthene	10	ND	ND
-Chlorophenyl phenyl ether	10	ND	ND
yrene	10	ND	ND
utyl Benzyl phthalate	10	ND	ND
is(2-ethylhexyl) phthalate	10	ND	100 B
hrysene	10	ND	ND
-Bromophenyl phenyl ether	10	ND	ND
enzo(a)anthracene	10	ND	ND
i-n-octylphthalate	10	ND	ND
enzo(b)fluoranthene	10	ND	ND
enzo(k)fluoranthene	10	ND	ND
enzidine	60	ND	ND
,3'-Dichlorobenzidine	20	ND	ND
enzo(a)pyrene	10	ND	ND
ndeno(1,2,3-cd)pyrene	10	ND	ND
ibenzo(a,h)anthracene	10	ND	ND
enzo(ghi)perylene	10	ND	ND
enzyl Alcohol	20	ND	ND

= Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 22, 1988
Date Reported: December 9, 1988

Work Order: 1020
Job Number: OR001

For: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092577	88092578
Sample No.:	DANGB-2-GW2D-GW1	DANGB-2-MW39-GW1
Date Sampled:	09-21-88	09-21-88
Time Sampled:	14:15	15:45
Date Extracted:	09-27-88	09-27-88
Date Analyzed:	11-05-88	11-06-88

Compound	Detection Limits ug/L	Analytical Results ug/L	ug/L
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
4-Chloroaniline	20	ND	ND
-Chloronaphthalene	--*	ND	ND
Dibenzofuran	10	ND	ND
p-Dimethylaminoazobenzene	--*	ND	ND
7,12-Dimethylbenz(a)anthracene	--*	ND	ND
a-,a-Dimethylphenethylamine	--*	ND	ND
Diphenylamine	--*	ND	ND
1,2-Diphenylhydrazine	--*	ND	ND
Ethyl methanesulfonate	--*	ND	ND
3-Methylcholanthrene	--*	ND	ND
Methyl methanesulfonate	--*	ND	ND
2-Methylnaphthalene	10	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	50	ND	ND
3-Nitroaniline	50	ND	ND
4-Nitroaniline	50	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
2-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

ate Received: September 22, 1988
ate Reported: December 9, 1988

Work Order: 1020
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN:Mr. Bill Hayden

ab Number:	88092577	88092578
ample No.:	DANGB-2-GW2D-GW1	DANGB-2-MW39-GW1
ate Sampled:	09-21-88	09-21-88
ime Sampled:	14:15	15:45
ate Extracted:	09-27-88	09-27-88
ate Analyzed:	11-05-88	11-06-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
lpha-BHC	--*	ND	ND
amma-BHC	__*	ND	ND
eta-BHC	20	ND	ND
eptachlor	10	ND	ND
elta-BHC	15	ND	ND
ldrin	10	ND	ND
eptachlor epoxide	10	ND	ND
ndosulfan I	--*	ND	ND
ieldrin	15	ND	ND
,4'-DDE	30	ND	ND
ndrin	--*	ND	ND
ndosulfan II	--*	ND	ND
,4'-DDD	15	ND	ND
,4'-DDT	25	ND	ND
ndosulfan Sulfate	30	ND	ND
ndrin aldehyde	--*	ND	ND
ndrin Ketone	--*	ND	ND
nlordane	60	ND	ND
ethoxychlor	--*	ND	ND
oxaphene	60	ND	ND
roclor-1016	60	ND	ND
roclor-1221	60	ND	ND
roclor-1232	60	ND	ND
roclor-1242	60	ND	ND
roclor-1248	60	ND	ND
roclor-1254	60	ND	ND
roclor-1260	60	ND	ND

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

Date Received: September 22, 1988
Date Reported: December 9, 1988

Work Order: 1020
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address:710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092577	88092578
Sample No.:	DANGB-2-GW2D-GW1	DANGB-2-MW39-GW1
Date Sampled:	09-21-88	09-21-88
Time Sampled:	14:15	15:45
Date Extracted:	09-27-88	09-27-88
Date Analyzed:	11-05-88	11-06-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
2-Chlorophenol	10	ND	ND
2-Nitrophenol	10	ND	ND
Phenol	10	ND	ND
2,4-Dimethylphenol	10	ND	ND
2,4-Dichlorophenol	10	ND	ND
2,4,6-Trichlorophenol	10	ND	ND
4-Chloro-3-methylphenol	20	ND	ND
2,4-Dinitrophenol	50	ND	ND
2,6-Dichlorophenol	--*	ND	ND
2-Methyl-4,6-Dinitrophenol	50	ND	ND
Pentachlorophenol	50	ND	ND
4-Nitrophenol	50	ND	ND
Benzoic Acid	50	ND	ND
2-Methylphenol	10	ND	ND
3- & 4-Methylphenol	10	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
2,4,5-Trichlorophenol	10	ND	ND

Analyst

Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

ate Received: September 22, 1988
ate Reported: December 9, 1988

Work Order: 1020
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

ab Number:	88092579
ample No.:	DANGB-BR10
ate Sampled:	09-21-88
ime Sampled:	07:30
ate Extracted:	09-27-88
ate Analyzed:	11-06-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L
,3-Dichlorobenzene	10	ND
,4-Dichlorobenzene	10	ND
exachloroethane	10	ND
is(2-chloroethyl)ether	10	ND
,2-Dichlorobenzene	10	ND
-Nitrosodimethylamine	10	ND
is(2-chloroisopropyl)ether	10	ND
-Nitrosodi-n-propylamine	10	ND
exachlorobutadiene	10	ND
,2,4-Trichlorobenzene	10	ND
itrobenzene	10	ND
sophorone	10	ND
aphthalene	10	ND
is(2-chloroethoxy)methane	10	ND
-Chloronaphthalene	10	ND
exachlorocyclopentadiene	10	ND
cenaphthylene	10	ND
cenaphthene	10	ND
imethyl phthalate	10	ND
,6-Dinitrotoluene	10	ND
luorene	10	ND
,4-Dinitrotoluene	10	ND
iethyl phthalate	10	ND
-Nitrosodiphenylamine	10	ND
exachlorobenzene	10	ND

= Compound was detected in the blank.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 22, 1988
Date Reported: December 9, 1988

Work Order: 1020
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092579
Sample No.:	DANGB-BR10
Date Sampled:	09-21-88
Time Sampled:	07:30
Date Extracted:	09-27-88
Date Analyzed:	11-06-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L
Phenanthrene	10	ND
Anthracene	10	ND
Dibutyl phthalate	10	ND
Fluoranthene	10	ND
4-Chlorophenyl phenyl ether	10	ND
Pyrene	10	ND
Butyl Benzyl phthalate	10	ND
Bis(2-ethylhexyl) phthalate	10	ND
Chrysene	10	ND
4-Bromophenyl phenyl ether	10	ND
Benzo(a)anthracene	10	ND
Di-n-octylphthalate	10	ND
Benzo(b)fluoranthene	10	ND
Benzo(k)fluoranthene	10	ND
Benzidine	60	ND
3,3'-Dichlorobenzidine	20	ND
Benzo(a)pyrene	10	ND
Indeno(1,2,3-cd)pyrene	10	ND
Dibenzo(a,h)anthracene	10	ND
Benzo(ghi)perylene	10	ND
Benzyl Alcohol	20	ND

B = Compound was detected in the blank.

ate Received: September 22, 1988
ate Reported: December 9, 1988

Work Order: 1020
Job Number: OR001

or: ES:Oak Ridge/Duluth ANGB
ddress:710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

ab Number:	88092579
ample No.:	DANGB-BR10
ate Sampled:	09-21-88
ime Sampled:	07:30
ate Extracted:	09-27-88
ate Analyzed:	11-06-88

ompound	Detection Limits ug/L	Analytical Results ug/L
cetophenone	--*	ND
niline	--*	ND
-Aminobiphenyl	--*	ND
-Chloroaniline	20	ND
-Chloronaphthalene	--*	ND
ibenzofuran	10	ND
-Dimethylaminoazobenzene	--*	ND
,12-Dimethylbenz(a)anthracene	--*	ND
-,a-Dimethylphenethylamine	--*	ND
iphenylamine	--*	ND
,2-Diphenylhydrazine	--*	ND
thyl methanesulfonate	--*	ND
-Methylcholanthrene	--*	ND
ethyl methanesulfonate	--*	ND
-Methylnaphthalene	10	ND
-Naphthylamine	--*	ND
-Naphthylamine	--*	ND
-Nitroaniline	50	ND
-Nitroaniline	50	ND
-Nitroaniline	50	ND
-Nitroso-di-n-butylamine	--*	ND
-Nitrosopiperidine	--*	ND
entachlorobenzene	--*	ND
entachloronitrobenzene	--*	ND
nenacetin	--*	ND
-Picoline	--*	ND
ronamide	--*	ND
,2,4,5-Tetrachlorobenzene	--*	ND

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

Date Received: September 22, 1988
Date Reported: December 9, 1988

Work Order: 1020
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN:Mr. Bill Hayden

Lab Number:	88092579
Sample No.:	DANGB-BR10
Date Sampled:	09-21-88
Time Sampled:	07:30
Date Extracted:	09-27-88
Date Analyzed:	11-06-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L
Alpha-BHC	--*	ND
Gamma-BHC	--*	ND
Beta-BHC	20	ND
Heptachlor	10	ND
Delta-BHC	15	ND
Aldrin	10	ND
Heptachlor epoxide	10	ND
Endosulfan I	--*	ND
Dieldrin	15	ND
4,4'-DDE	30	ND
Endrin	--*	ND
Endosulfan II	--*	ND
4,4'-DDD	15	ND
4,4'-DDT	25	ND
Endosulfan Sulfate	30	ND
Endrin aldehyde	--*	ND
Endrin Ketone	--*	ND
Chlordane	60	ND
Methoxychlor	--*	ND
Toxaphene	60	ND
Aroclor-1016	60	ND
Aroclor-1221	60	ND
Aroclor-1232	60	ND
Aroclor-1242	60	ND
Aroclor-1248	60	ND
Aroclor-1254	60	ND
Aroclor-1260	60	ND

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

ate Received: September 22, 1988
ate Reported: December 9, 1988

Work Order: 1020
Job Number: OR001

)R: ES:Oak Ridge/Duluth ANGB
ddress:710 S. Illinois Avenue Suite F-103
Oak Ridge, Tennessee 37830

ATTN: Mr. Bill Hayden

ab Number:	88092579
ample No.:	DANGB-BR10
ate Sampled:	09-21-88
ime Sampled:	07:30
ate Extracted:	09-27-88
ate Analyzed:	11-06-88

ɔmpound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L
-Chlorophenol	10	ND
-Nitrophenol	10	ND
ıenol	10	ND
,4-Dimethylphenol	10	ND
,4-Dichlorophenol	10	ND
,4,6-Trichlorophenol	10	ND
-Chloro-3-methylphenol	20	ND
,4-Dinitrophenol	50	ND
,6-Dichlorophenol	--*	ND
-Methyl-4,6-Dinitrophenol	50	ND
entachlorophenol	50	ND
-Nitrophenol	50	ND
enzoic Acid	50	ND
-Methylphenol	10	ND
- & 4-Methylphenol	10	ND
,3,4,6-Tetrachlorophenol	--*	ND
,4,5-Trichlorophenol	10	ND

Analyst

Laboratory Supervisor

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

)TE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) Johanna Burke

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 6010, 7000, 7131	SW7421, 7131 7041	SW335*, 9315	SM423	REMARKS
9-21-88	0730	DANGB-BR10	5	5								882579
9-21-88	0845	DANGB-2-GW2A-GW1	5	5								882573
9-21-88	0915	DANGB-2-MW56-GW1	5	5								882574
9-21-88	0960	DANGB-FB13	2	2								882580
9-21-88	1025	DANGB-FB14	2	2								882581
9-21-88	1630	DANGB-2-GW2S-GW1	5	5								882576
9-21-88	1130	DANGB-2-MW4-GW1 (Burke 9-21-88)	5	5								882575
9-21-88	0730	DANGB-BR10	6			2	2	1	1			882579
9-21-88	1415	DANGB-2-GW2D-GW-1	5	5								882577
9-21-88	1545	DANGB-2-MW39-GW-1	5	5								882578
9-16-88	1236	DANGB-TB10	2	3								882582

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Johanna Burke	9-21-88 1730	FEC AIRBILL #9190309990			9/22/88 1045 Floyd C. Abney
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks: SAMPLES RECEIVED COLD + INTACT	

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.			ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710
SAMPLER(S): (Signature) Johanna Burke				

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8240, 8020	EPA 601	EPA 625	EPA 418.1	SW 6010, 7000, 7131	SW7421, 7420 7111	SW9230, 9315	SM429	REMARKS
9-21-88	0915	DANGB-2-GW2A-GW1	6			2	2	1	1			
9-21-88	0915	DANGB-2-MW5R-GW1	6			2	2	1	1			

Johanna Burke 9-21-88

710

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.			ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710
SAMPLER(S): (Signature) Robert L. Davis				

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 601	EPA 625	EPA 418.1	SW 8015, 7681, 7131	SW7421, 7420, 7191	SW9310, 9315	SM429	REMARKS
9-21-88	1415	DANGB-2-GW2D-GW-1	6			X	X	X	X			(1) FIELD DUPLICATE BOTTLE IS ONLY ½ FULL DUE TO DIFFICULTY IN FILTERING
9-21-88	1545	DANGB-2-MW39-GW-1	6			X	X	X	X			

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Johanna Burke	9-11-88 1400	FEC AIRBILL 4919030449 90			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

CHAIN OF CUSTODY RECORD

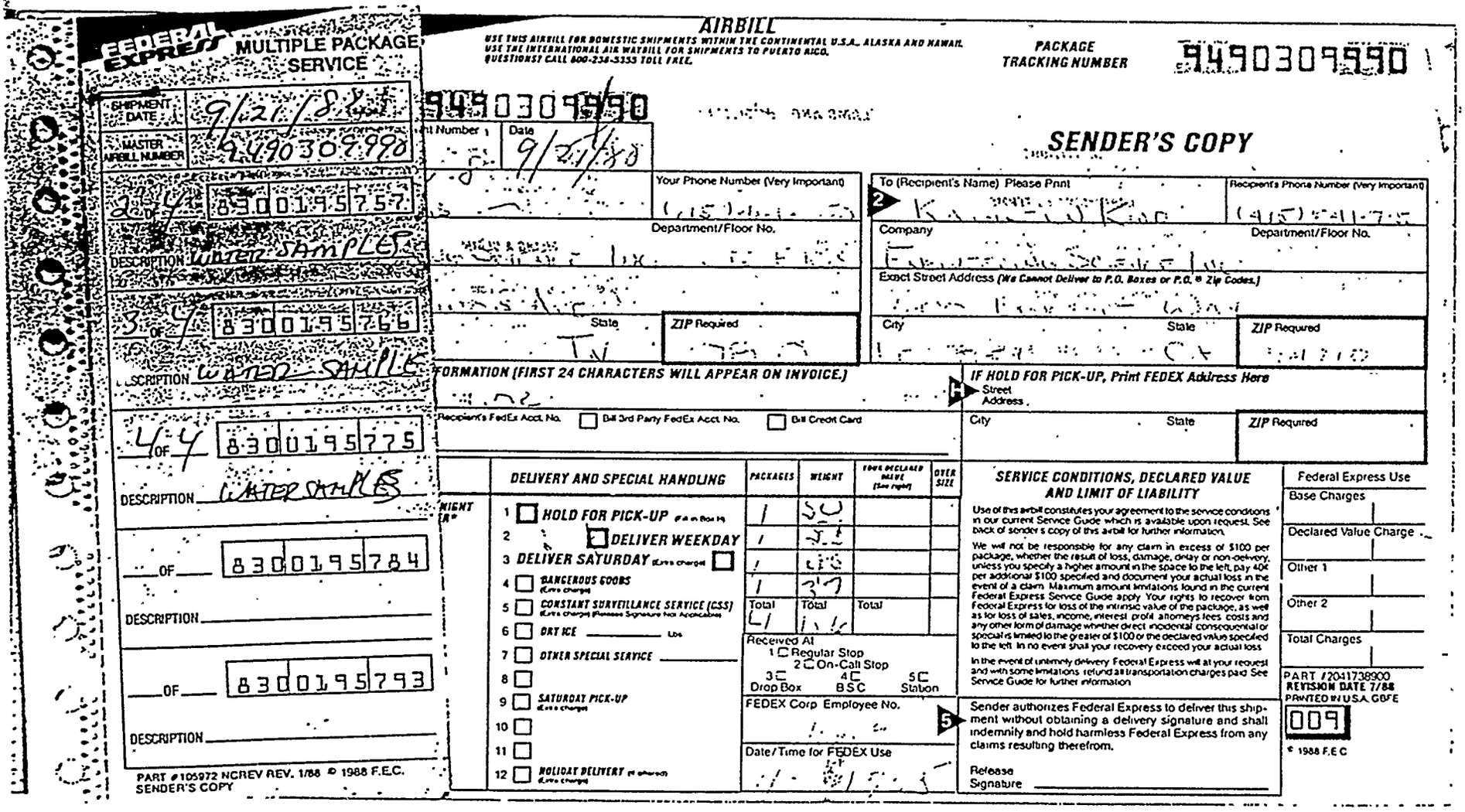
ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED								SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.		SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 8010; 7000; 7131	SW7421; 7470 7141	SW8310, 8315	SM429	ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710
SAMPLER(S): (Signature) Johanna Beebe											
DATE	TIME	SAMPLE DESCRIPTION									REMARKS
9-21-88	1130	DANGB-2-MW4-GW1	6			2	2	1	1		
9-21-88	1020	DANGB-2-GW2C	6			2	2	1	1		

Johanna Beebe 9-21-88

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Johanna Beebe	9/21/88 1730	FEC. Airbill # 9-1905-9440			
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

212



FEDERAL EXPRESS MULTIPLE PACKAGE SERVICE

AIRBILL

USE THIS AIRBILL FOR DOMESTIC SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 9490309990

SENDER'S COPY

SHIPMENT DATE 9/21/84

MASTER AIRBILL NUMBER 9490309990

Express Mail Number | Date 9/21/84

1 OF 4 830019575 7

DESCRIPTION WATER SAMPLES

2 OF 4 830019575 66

DESCRIPTION WATER SAMPLES

3 OF 4 830019577 5

DESCRIPTION WATER SAMPLES

4 OF 4 830019578 4

DESCRIPTION WATER SAMPLES

OF 830019579 3

DESCRIPTION

OF 830019579 2

DESCRIPTION

PART #105972 NCREV REV. 1/88 © 1988 F.E.C.
SENDER'S COPY

Your Phone Number (Very Important)

Department/Floor No.

State | ZIP Required

2 To (Recipient's Name) Please Print | Recipient's Phone Number (Very Important)

Company | Department/Floor No.

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. # Zip Codes.)

City | State | ZIP Required

FORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.)

3 IF HOLD FOR PICK-UP, Print FEDEX Address Here
Street Address

City | State | ZIP Required

Recipient's FedEx Acct. No. ☐ Bill 3rd Party FedEx Acct. No. ☐ Bill Credit Card

	DELIVERY AND SPECIAL HANDLING	PACKAGES	WEIGHT	VALUE DECLARED (See right)	OVER SIZE
NIGHT R*	1 ☐ HOLD FOR PICK-UP (If in Box 3)	1	50		
	2 ☐ DELIVER WEEKDAY ☐	1	31		
	3 DELIVER SATURDAY (Extra charge) ☐	1	25		
	4 ☐ DANGEROUS GOODS (Extra charge)	1	37		
	5 ☐ CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charge) (Release Signature Not Applicable)	Total 4	Total 143	Total	
	6 ☐ DRY ICE ____ Lbs				
	7 ☐ OTHER SPECIAL SERVICE ____				
	8 ☐				
	9 ☐ SATURDAY PICK-UP (Extra charge)				
	10 ☐				
	11 ☐				
	12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)				

Received At
1 ☐ Regular Stop
2 ☐ On-Call Stop
3 ☐ Drop Box 4 ☐ BSC 5 ☐ Station

FEDEX Corp Employee No.

Date/Time for FEDEX Use

5 Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.

Release Signature ____

SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY

Use of this airbill constitutes your agreement to the service conditions in our current Service Guide which is available upon request. See back of sender's copy of this airbill for further information.

We will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay or non-delivery, unless you specify a higher amount in the space to the left, pay 40¢ per additional $100 specified and document your actual loss in the event of a claim. Maximum amount limitations found in the current Federal Express Service Guide apply. Your rights to recover from Federal Express for loss of the intrinsic value of the package, as well as for loss of sales, income, interest, profit, attorneys fees, costs and any other form of damage whether direct, incidental, consequential or special is limited to the greater of $100 or the declared value specified to the left. In no event shall your recovery exceed your actual loss.

In the event of untimely delivery Federal Express will at your request and with some limitations, refund all transportation charges paid. See Service Guide for further information.

Federal Express Use

Base Charges

Declared Value Charge

Other 1

Other 2

Total Charges

PART #2041738900
REVISION DATE 7/88
PRINTED IN U.S.A. GBFE

009

© 1988 F.E.C.

713

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

QC Report No: AAF-W-0052-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Reported: 2-27-89
Dilution Factor: NA

Project: Duluth ANGB

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88092548-88092551, 88092573-88092579
88092677-88092681, 88092695, 88092612-88092614

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Arsenic	88092677	88092677	10-16-88	NA	7060	<0.01	<0.01	<0.01	NC	0.040	<0.01	0.0383	96	
Cadmium	88092677	88092677	10-26-88	NA	6010	<0.005	<0.005	<0.005	NC	0.010	<0.005	0.011	110	
Chromium	88092677	88092677	10-19-88	NA	6010	<0.01	<0.01	<0.01	NC	0.020	<0.01	0.0218	109	
Lead	88092677	88092677	10-21-88	NA	7421	<0.005	<0.005	<0.005	NC	0.020	<0.005	0.0227	114	

214

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092548-88092551, 88092573-88092579
88092677-88092681, 88092695, 88092612-88092614

QC Report No: ICP-W-0059-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-24-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Barium	88092677	88092677	10-13-88	NA	6010	<0.2	<0.2	<0.2	NC	2.0	<0.2	1.96	98	

715

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth_ANGB

QC Report for Laboratory Sample No(s):
88092548-88092551, 88092573-88092579
88092677-88092681, 88092695, 88092612-88092614

QC Report No: CVM-W-0030-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	PR	Notes
Mercury	88092677	88092677	10-14-88	NA	7471	<0.0002	<0.0002	<0.0002	NC	0.0010	<0.0002	0.00087	87	

716

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY

QC REPORT NO.: TPH-W-0069-88

Insufficient sample was available for quality control purposes. The laboratory control sample is designated as a quality control sample for this batch.

The reporting limit for the samples in this batch is provided by the sub-contract laboratory.

ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092573
88092577-88092579

QC Report No: TPH-W-0069-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-04-88
Date Analyzed: 10-08-88
Date Reported: 11-01-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1.5	<1.5	39.5	39.5	100	32.0	81	21	*

7.8

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY

QC REPORT NO.: TPH-W-0066-88

Insufficient sample was available for quality control purposes. The laboratory control sample is designated as a quality control sample for this batch.

The reporting limit for the samples in this batch is provided by the sub-contract laboratory.

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092574-88092576
88092612-88092617

QC Report No: TPH-W-0066-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-01-88
Date Analyzed: 10-10-88
Date Reported: 11-01-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1.5	<1.5	39.5	37.8	96	37.8	96	0	*

720

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLENO(S).: 88092580

This sample was analyzed as part of an overnight run using an autosampler. When the analyst went to get the second bottle for confirmatory analysis, it was found to be broken. Thus, no confirmatory analysis was possible. The first analysis was performed using a megabore capillary column; this minimizes the possibility of false positives.

QUALITY CONTROL RESULTS SUMMARY
VOLATILE ORGANICS
EPA 8010/8020

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092527-88092528, 88092531-88092532
88092546-88092551, 88092573-88092577

QC Report No: VGC-W-0044-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-22-88
Date Prepared: NA
Date Analyzed: 10-03-88
Date Reported: 10-25-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092576	1,1-Dichloroethane	10	ND	9.82	98	9.96	100	1	26	70-130
	Trichloroethene	10	ND	10.3	103	10.2	102	1	19	65-131
	Chlorobenzene	10	ND	10.5	105	10.3	103	2	40	59-137
	Aromatics: 8020									
88092576	Benzene	10	ND	10.0	100	10.1	101	1	20	56-146
	Toluene	10	ND	10.1	101	9.85	98	3	41	42-150
	Chlorobenzene	10	ND	10.6	106	9.71	97	9	36	76-133

Relative Percent Difference (PR) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Sample Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

722

QUALITY CONTROL RESULTS SUMMARY
VOLATILE ORGANICS
EPA 8010/8020

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092612-88092619
88092578-88092582

QC Report No: VGC-W-0046-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-23-88
Date Prepared: NA
Date Analyzed: 10-05-88
Date Reported: 10-25-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092614	1,1-Dichloroethane	10	ND	9.85	98	9.04	90	9	26	70-130
	Trichloroethene	10	ND	9.73	97	8.79	88	10	19	65-131
	Chlorobenzene	10	ND	10.0	100	8.94	89	11	40	59-137
	Aromatics: 8020									
88092614	Benzene	10	ND	10.8	108	9.71	97	11	20	56-146
	Toluene	10	ND	10.0	100	9.84	98	2	41	42-150
	Chlorobenzene	10	ND	10.0	100	9.85	98	2	36	76-133

Relative Percent Difference (PR) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Sample Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 10-26-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
32	9-26-88	VGC	Vocol	75-09-2	Dichloromethane	11	0.25	88092580
				67-66-3	Chloroform	0.14	0.05	
				127-18-4	Tetrachloroethylene	0.11	0.03	
18	9-28-88	VGC	Carbopack	75-09-2	Dichloromethane	1.0	0.25	88092581-88092582
				67-66-3	Chloroform	0.74	0.05	
08	9-23-88	VGC	Vocol	75-09-2	Dichloromethane	11	0.25	88092573-88092579
				67-66-3	Chloroform	0.18	0.05	
				127-18-4	Tetrachloroethylene	0.46	0.03	

724

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
WORK ORDER NO(S). 1020
EPA METHOD 8270 ANALYSIS

The samples in this work order were first extracted on September 27, 1988 and analyzed on November 5-6, 1988, all within holing times. Surrogate spike recoveries in the base neutral fraction of sample 88092577 were below EPA QC limits. There was no more sample remaining to re-extract. Area counts for the sixth internal standard were lower than EPA QC limits for the acid extracts of samples 88092574 and 88092575, and both extracts of 88092576. When the former two were re-analyzed, good internal standard area counts were obtained. Target compound results did not change. When the extracts of sample 88092576 were re-analyzed, the results did not change. The first set of analyses are reported.

The base neutral fraction of the matrix spike duplicate sample was analyzed just beyond the 12-hour time period.

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No: BNA-W-0061-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-17-88
Date Prepared: 9-22-88
Date Analyzed: 11-23-88
Date Reported: 03-23-89
Dilution Factor: NA

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88092490, 88092488, 88092494-88092495
88092508, 88092511, 88092573-88092579

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limits RPD	RECOVERY
	1,2,4-Trichlorobenzene	100	ND	70.4	70	66.7	67	5	28	39-98
B/N	Acenaphthene	100	ND	68.2	68	67.4	67	1	31	46-118
Laboratory	2,4-Dinitrotoluene	100	ND	62.0	62	61.5	62	1	38	24-96
Sample #	Pyrene	100	ND	78.4	78	70.2	70	11	31	26-127
	N-Nitroso-di-n-Propylamine	100	ND	73.6	74	70.2	70	5	38	41-116
88092490	1,4-Dichlorobenzene	100	ND	62.9	63	61.5	62	2	28	36-97
ACID	Pentachlorophenol	200	ND	46.7	23	62.2	31	28	50	9-103
Laboratory	Phenol	200	ND	99.0	49	115	58	15	42	12-89
Sample #	2-Chlorophenol	200	ND	120	60	128	64	2	40	27-123
	4-Chloro-3-Methylphenol	200	ND	138	69	120	60	14	42	23-97
88092490	4-Nitrophenol	200	ND	101	50	139	70	32	50	10-80

924

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Work Order No.: 1020

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 3-23-89

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
S0372	11-05-88	AC	1	-	None Detected	-	-	88092575-88092579
S0373	11-05-88	BN	1	117-81-7	Bis(2-ethylhexyl)phthalate	17	10	88092575-88092579

727

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Blank
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 13

Work Order No.: 1020
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092556-75

Lab File ID: S0372/S0701
Date Received: NA
Date Extracted: 09-27-88
Date Analyzed: 11-05-88/12-12-88

Date Reported: 04-04-89
Dilution Factor: NA
% Moisture: dec:
not dec:
GPC Clean up: (Y/N)
Extraction:
(SepF/Cont/Conc)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.29	210	
-	Unknown	3.36	190	
-	Unknown	3.46	23	
-	Unknown	4.44	4	
-	Unknown	5.16	22	
-	Unknown	9.06	4	
-	Unknown	37.90	88	
-	Unknown	3.25	100	
-	Unknown	13.14	6	
-	Unknown	34.80	7	
-	Unknown	36.45	10	
-	Unknown	40.90	12	
-	Unknown	43.87	10	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1020
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092573-AC
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	S0366
	Suite F-103	Date Received:	09-22-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-27-88
		Date Analyzed:	11-05-88
		Date Reported:	04-04-89
Project:	Duluth ANGB	Dilution Factor:	NA
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	3	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	4.89	7	
127-18-4	Tetrachloroethene	5.13	25	
-	Unknown	26.81	9	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 5

Work Order No.: 1020
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092573-BN 2ml
Re-analysis
Lab File ID: S0709
Date Received: 09-22-88
Date Extracted: 09-27-88
Date Analyzed: 12-13-88
Date Reported: 04-04-89
Dilution Factor: NA
% Moisture: dec:
not dec:
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.24	100	
-	Unknown	3.29	200	
-	Unknown	3.40	18	
127-18-4	Tetrachloroethene	5.04	14	
-	Unknown	28.89	16	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 11

Work Order No.: 1020
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092573-BN

Lab File ID: S0367
Date Received: 09-22-88
Date Extracted: 09-27-88
Date Analyzed: 11-05-88
Date Reported: 04-04-89
Dilution Factor: NA
% Moisture: dec:
not dec: N
GPC Clean up: (Y/N)
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.31	440	
-	Unknown	3.37	590	
-	Unknown	3.41	31	
79-01-6	Trichloroethene	3.48	59	
-	Unknown	4.02	5	
108-88-3	Toluene	4.44	9	
127-18-4	Tetrachloroethene	5.16	53	
-	Unknown	6.57	21	
-	Unknown	8.97	7	
-	Unknown	26.52	67	
-	Unknown	29.33	26	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1020
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092574-AC
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	S0368
	Suite F-103	Date Received:	09-22-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-27-88
		Date Analyzed:	11-05-88
		Date Reported:	04-04-89
Project:	Duluth ANGB	Dilution Factor:	NA
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	4	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.31	66	
79-01-6	Trichloroethene	3.49	23	
-	Unknown	4.92	6	
127-18-4	Tetrachloroethene	5.17	21	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1020
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092574-AC
Attn:	Bill Hayden		Re-analysis
Address:	710 S. Illinois Avenue	Lab File ID:	S0612
	Suite F-103	Date Received:	09-22-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-27-88
		Date Analyzed:	11-30-88
		Date Reported:	04-04-89
Project:	Duluth ANGB	Dilution Factor:	NA
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	6	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
79-01-6	Trichloroethene	3.37	22	
127-18-4	Tetrachloroethene	5.01	20	
-	Unknown Aliphatic	36.40	4	
-	Unknown Aliphatic	38.39	5	
-	Unknown Aliphatic	40.83	6	
-	Unknown Aliphatic	43.81	5	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 4

Work Order No.: 1020
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092574-BN

Lab File ID: S0369
Date Received: 09-22-88
Date Extracted: 09-27-88
Date Analyzed: 11-05-88
Date Reported: 04-04-89
Dilution Factor: NA
% Moisture: dec:
not dec: N
GPC Clean up: (Y/N)
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.34	690	
-	Unknown	4.02	5	
108-88-3	Toluene	4.44	9	
127-18-4	Tetrachloroethene	5.15	52	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1020
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092575-AC
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	S0370
	Suite F-103	Date Received:	09-22-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-27-88
		Date Analyzed:	11-05-88
		Date Reported:	04-04-89
Project:	Duluth ANGB	Dilution Factor:	NA
		% Moisture: dec:	
		not dec:	N
		GPC Clean up: (Y/N)	
		Extraction:	
# TICs Found:	5	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.29	39	
-	Unknown	3.45	20	
-	Unknown	4.91	5	
127-18-4	Tetrachloroethene	5.15	23	
-	Unknown	41.35	6	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 4

Work Order No.: 1020
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092575-BN

Lab File ID: S03/1
Date Received: 09-22-88
Date Extracted: 09-27-88
Date Analyzed: 11-05-88
Date Reported: 04-04-89
Dilution Factor: NA
% Moisture: dec:
not dec: N
GPC Clean up: (Y/N)
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.25	130	
-	Unknown	3.32	110	
127-18-4	Tetrachloroethene	5.13	17	
-	Unknown	26.82	5	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1020
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092576-AC
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	S0374
	Suite F-103	Date Received:	09-22-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-27-88
		Date Analyzed:	11-05-88
		Date Reported:	04-04-89
Project:	Duluth ANGB	Dilution Factor:	NA
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
# TICs Found:	5	Extraction: (SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.28	150	
-	Unknown	3.35	170	
79-01-6	Trichloroethene	3.46	15	
127-18-4	Tetrachloroethene	5.16	23	
-	Unknown	6.87	4	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 6

Work Order No.: 1020
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092576-BN

Lab File ID: S0375
Date Received: 09-22-88
Date Extracted: 09-27-88
Date Analyzed: 11-05-88
Date Reported: 04-04-89
Dilution Factor: 1
% Moisture: dec:
not dec:
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
71-43-2	Benzene	3.24	8	
79-01-6	Trichloroethene	3.60	16	
-	Unknown	4.24	5	
-	Unknown	5.01	71	
127-18-4	Tetrachloroethene	5.23	41	
-	Unknown	14.84	5	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 10

Work Order No.: 1020
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092577-AC

Lab File ID: S0377
Date Received: 09-22-88
Date Extracted: 09-27-88
Date Analyzed: 11-05-88
Date Reported: 04-04-89
Dilution Factor: 1
% Moisture: dec:
not dec:
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.30	92	
-	Unknown	3.36	130	
-	Unknown	3.41	20	
79-01-6	Trichloroethene	3.48	30	
108-88-3	Toluene	4.44	5	
-	Unknown	4.93	27	
127-18-4	Tetrachloroethene	5.17	30	
-	Unknown	5.51	16	
79-34-5	1,1,2,2-Tetrachloroethane	7.15	18	
-	Unknown	12.82	6	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 4

Work Order No.: 1020
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092577-BN

Lab File ID: S0378
Date Received: 09-22-88
Date Extracted: 09-27-88
Date Analyzed: 11-05-88
Date Reported: 04-04-89
Dilution Factor: 1
% Moisture: dec: .
not dec: N
GPC Clean up: (Y/N)
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.34	280	
-	Unknown	3.39	230	
-	Unknown	3.51	12	
127-18-4	Tetrachloroethene	5.19	8	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 4

Work Order No.: 1020
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092578-AC

Lab File ID: S0379
Date Received: 09-22-88
Date Extracted: 09-27-88
Date Analyzed: 11-06-88
Date Reported: 04-04-89
Dilution Factor: 1
% Moisture: dec:
not dec:
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.31	280	
79-01-6	Trichloroethene	3.50	25	
108-88-3	Toluene	4.45	4	
127-18-4	Tetrachloroethene	5.17	28	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 7

Work Order No.: 1020
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092578-BN

Lab File ID: S0380
Date Received: 09-22-88
Date Extracted: 09-27-88
Date Analyzed: 11-06-88
Date Reported: 04-04-89
Dilution Factor: 1
% Moisture: dec:
not dec:
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
71-43-2	Benzene	3.24	13	
-	Unknown	3.46	94	
79-01-6	Trichloroethene	3.61	11	
127-18-4	Tetrachloroethene	5.22	29	
-	Unknown	5.75	9	
-	Unknown	36.74	5	
-	Unknown	38.80	7	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 6

Work Order No.: 1020
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092579-AC

Lab File ID: S0381
Date Received: 09-22-88
Date Extracted: 09-27-88
Date Analyzed: 11-06-88
Date Reported: 04-04-89
Dilution Factor: 1
% Moisture: dec:
not dec:
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.29	220	
-	Unknown	3.35	280	
79-01-6	Trichloroethene	3.48	22	
108-88-3	Toluene	4.44	4	
-	Unknown	4.95	6	
127-18-4	Tetrachloroethene	5.16	26	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1020
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092579-BN
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	S0382
	Suite F-103	Date Received:	09-22-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-27-88
		Date Analyzed:	11-06-88
		Date Reported:	04-04-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	6	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.28	60	
-	Unknown	3.34	220	
79-01-6	Trichloroethene	3.47	19	
128-17-4	Tetrachloroethene	5.15	20	
-	Unknown	18.77	5	
-	Unknown	45.28	11	

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Project: Duluth

Work Order No.:
Lab Sample No.: 03-89
Lab File ID: S0372, S0373
Matrix: water
Level (low/med):
Date Analyzed: 11-5-88
Time Analyzed: 16:01, 17:00
Instrument ID:
Date Reported:

This Method Blank applies to the following samples, MS and MSD.

Sample Number	Lab Sample ID	Lab File ID	Date of Analysis
DANGB-2-GW2A-GW1	88092573	S0366/67, S0709	11-5-88, 12-13-88
-2-MW56-GW1	88092574	S0368/69, S0612	11-5-88 11-30-88
-2-MW4-GW1	88092575	S0370/71, E6360	11-5-88 11-30-88
-2-GW2C-GW1	88092576	S0374/75, S0702/03	11-5-88 12-12-88
-2-GW2D-GW1	88092577	S0377, S0378	11-5-88
-2-MW39-GW1	88092578	S0379, S0380	11-6-88
-BRIO	88092579	S0381, S0382	11-6-88

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092574-88092576
88092612-88092617

QC Report No: TPH-W-0066-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-01-88
Date Analyzed: 10-10-88
Date Reported: 11-01-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1.5	<1.5	39.5	37.8	96	37.8	96	0	*

746

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092573
88092577-88092579

QC Report No: TPH-W-0069-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-04-88
Date Analyzed: 10-08-88
Date Reported: 11-01-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1.5	<1.5	39.5	39.5	100	32.0	81	21	*

747

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 11/05/88 7:31

Lab ID >T1105::01 Data Release Authorized By: _____

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	44.18 OK
68	less than 2.0% of mass 69	0.00 OK (0.00) #1
69	mass 69 relative abundance	55.57
70	less than 2.0% of mass 69	0.00 OK (0.00; #1
127	40.0 - 60.0% of mass 198	41.11 Ok
197	less than 1.0% of mass 198	0.00 OK
198	base peak, 100% relative abundance	100.00 OK
199	5.0 - 9.0% of mass 198	7.03 OK
275	10.0 - 30.0% of mass 198	17.57 OK
365	greater than 1.00% of mass 198	1.81 OK
441	present, but less than mass 443	7.56 OK
442	greater than 40.0% of mass 198	54.09 OK
443	17.0 - 23.0% of mass 442	10.22 OK (18.89) #2

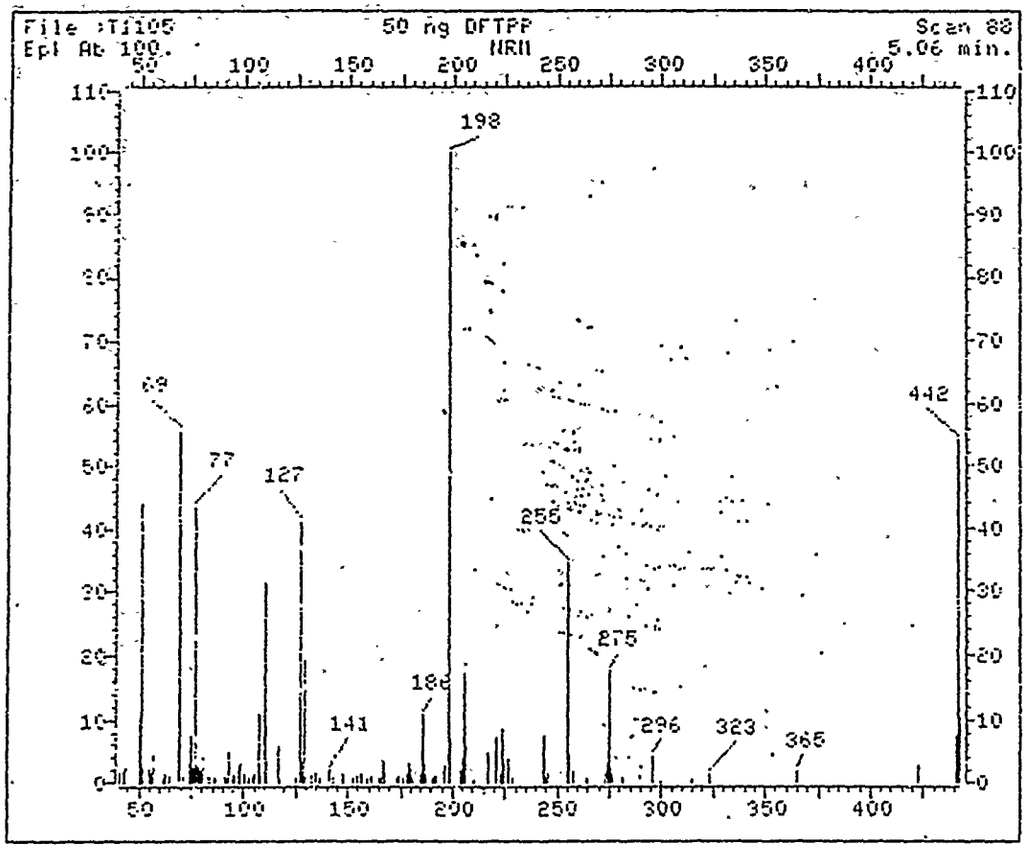
Sp-1 11/2/88

THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

SAMPLE ID	LAB_ID	DATE_OF_ANALYSIS	TIME_OF_ANALYSIS
50 ng DFTPP	>T1105	11/05/88 7:31	
CSTD@ 4	50364		07:53
8809 2568 BN	50365		09:04
8809 2573 AC	50366		10:04
8809 2573 BN	50367		11:03
8809 2574 AC	50368		12:03
8809 2574 BN	50369		13:04
8809 2575 AC	50370		14:03
8809 2575 BN	50371		15:02
8809 2576 AC	50372		16:01
8809 2576 BN	50373		17:00
8809 2576 AC	50374		18:00
8809 2576 BN	50375		19:00

another project



File: T1105 Scan #: 88 Retn. time: 5.06

m/z	Int.	m/z	Int	m/z	Int.	m/z	Int.	m/z	Int.
41.10	1.807	83.10	1.255	130.05	1.230	180.95	1.180	229.00	.653
43.10	1.357	86.00	.904	133.05	1.054	184.95	1.556	244.00	7.605
44.00	2.510	91.00	1.255	134.95	1.531	186.05	10.743	245.00	1.255
50.10	10.291	91.90	.853	137.05	.853	187.05	2.987	245.90	1.381
51.10	44.177	93.00	5.171	141.05	2.058	188.05	1.481	255.00	34.513
51.90	2.385	95.20	1.029	142.95	.803	190.95	.853	256.00	4.769
52.10	2.385	96.00	1.255	148.05	1.606	191.95	1.079	258.00	1.782
55.10	2.510	98.10	2.736	153.05	.728	192.95	1.230	264.90	.879
56.10	1.280	99.90	3.263	155.05	1.155	196.10	2.912	273.00	1.531
57.10	4.543	100.90	1.857	156.15	1.556	198.00	100.000	274.05	3.138
62.00	.653	102.80	.803	159.05	.828	199.00	7.028	275.05	17.570
63.00	1.431	104.00	1.180	161.05	1.155	204.00	2.234	275.95	2.359
65.00	1.079	105.00	1.581	164.95	.929	205.00	4.217	276.95	1.305
69.00	55.572	107.00	10.944	165.85	.879	206.10	17.269	281.15	.753
71.00	1.054	107.90	1.732	166.95	3.464	207.00	5.823	295.95	4.292
74.00	3.037	110.00	31.878	167.95	1.632	210.80	.577	314.85	.577
75.00	7.354	111.10	3.740	173.95	.929	217.00	4.769	323.05	1.406
76.10	2.485	116.90	5.899	174.95	1.180	221.00	7.179	364.90	1.807
77.10	43.372	118.05	.879	175.95	.703	223.00	1.381	423.00	2.836
78.10	2.811	125.05	.628	178.15	1.456	224.00	8.409	441.05	7.555
79.10	3.564	127.05	41.114	178.95	3.138	225.00	2.987	442.05	54.091
80.10	2.134	128.15	3.589	179.95	2.083	227.00	3.966	443.05	10.216
81.10	4.618	129.05	19.729						

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/05/88

Contractor: ENGINEERING-SCIENCE Time: 07:53

Contract No: _____ Laboratory ID: >S0364

Instrument ID: 1 Initial Calibration Date: 10/13/88 (10)

Minimum $\overline{RF}$ for SPCC is: _____ Maximum % Diff for CCC is %

Compound	RF	$\overline{RF}$	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	.92598	2.69		
2-Fluorophenol	1.15802	1.35049	16.61		
bis(2-Chloroethyl)ether	1.11892	1.00114	10.52		
Phenol	1.41657	1.49032	5.21	*	
Phenol-d5	1.22488	1.40547	14.58		
Aniline	.54193	.58191	7.38		
2-Chlorophenol	1.23175	1.32168	7.30		
1,3-Dichlorobenzene	1.47535	1.42675	3.29		
1,4-Dichlorobenzene	1.40530	1.43901	2.40	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.80852	10.87		
1,2-Dichlorobenzene	1.32240	1.43198	8.29		
2-Methylphenol	1.17367	1.41036	20.17		
3-&-4-Methylphenol	1.07139	1.55580	45.21		
bis(2-chloroisopropyl)Ether	2.15627	2.67652	24.13		
N-Nitroso-Di-n-Propylamine	.84050	.95747	13.92		**
Hexachloroethane	.53840	.58588	8.82		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.42633	5.76		
Nitrobenzene-d5	.39137	.43116	10.17		
2-Nitrophenol	.24657	.25931	5.17	*	
Isophorone	.74170	.79431	7.09		
bis(2-Chloroethoxy)methane	.49386	.52572	6.45		
2,4-Dimethylphenol	.34849	.37729	8.26		
Benzoic Acid	.29725	.31061	4.50		
2,4-Dichlorophenol	.56733	.59343	4.60	*	
1,2,4-Trichlorobenzene	.36913	.33774	8.51		
Naphthalene	.94589	.89996	4.86		
4-Chloroaniline	.36309	.36473	.45		
Hexachlorobutadiene	.20263	.17782	12.33	*	
4-Chloro-3-Methylphenol	.31360	.33794	7.76	*	
2-Methylnaphthalene	.56397	.58048	2.93		

RF - Response Factor from daily standard file at 60.00 mg/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/05/89

Contractor: Engineering Science Time: 07:53

Contract No: _____ Laboratory ID: >S0364

Instrument ID: 3 Initial Calibration Date: 10/12/89

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is _____ %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29569	.31279	5.79		**
2,4,6-Trichlorophenol	.42280	.38499	8.94	*	
2,4,5-Trichlorophenol	.52897	.49968	5.54		
2-Fluorobiphenyl	1.27220	1.10393	13.23		
2-Chloronaphthalene	1.23784	1.13275	8.49		
2-Nitroaniline	.47283	.50259	6.28		
Dimethylphthalate	1.40629	1.31229	6.68		
2,6-Dinitrotoluene	.37415	.37697	.73		
Acenaphthylene	1.68918	1.59151	5.78		
3-Nitroaniline	.44557	.46754	4.93		
2,4-Dinitrophenol	.11898	.12240	2.87		**
Acenaphthene	1.13911	.98229	13.08	*	
Dibenzofuran	1.64131	1.53047	6.75		
2,4-Dinitrotoluene	.28418	.28970	1.94		
4-Nitrophenol	.28450	.20341	28.50		**
Fluorene	1.12850	.92649	17.90		
Diethylphthalate	1.20939	1.12391	7.07		
4-Chlorophenyl-phenylether	.59183	.52005	12.13		
4-Nitroaniline	.35956	.31859	11.39		
2,4,6-Tribromophenol	.21023	.17989	14.43		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.48229	19.72	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.21919	2.90		
Hexachlorobenzene	.26273	.27109	3.18		
Pentachlorophenol	.14536	.13787	5.15	*	

RF - Response Factor from daily standard file at 60.00 mg/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/05/88

Contractor: ENGINEERING SCIENCE Time: 07:53

Contract No: _____ Laboratory ID: >S0364

Instrument ID: 1 Initial Calibration Date: 10/13/88 (DE)

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is _____ %

Compound	RF	$\overline{RF}$	%Diff	CCC	SPCC
Phenanthrene	1.03431	.99964	3.35		
Anthracene	1.05155	1.16312	10.61		
Di-n-Butylphthalate	1.51956	1.69768	11.72		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.14095	4.23	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.04837	20.24		
Pyrene	1.56086	1.71075	9.60		
Terphenyl-d14	1.05835	1.09041	3.03		
Butylbenzylphthalate	1.03390	1.17604	13.75		
3,3'-Dichlorobenzidine	.13689	.21184	54.75		
Chrysene	.99655	1.01956	2.31		
Benzo(a)Anthracene	1.10407	1.09545	.78		
bis(2-Ethylhexyl)Phthalate	1.21073	1.34906	11.43		
Di-n-octylphthalate	3.40275	3.31156	2.68	*	
Benzo(a)Pyrene	1.32098	1.33322	.93	*	
Benzo(b)Fluoranthene	1.60850	1.40996	12.34		
Indeno(1,2,3-cd)Pyrene	.96900	.57378	40.77		
Dibenzo(a,h)Anthracene	.87481	.96522	10.33		
Benzo(k)Fluoranthene	1.44370	1.34193	7.05		
Benzo(g,h,i)Perylene	.89761	.33117	63.11		

RF - Response Factor from daily standard file at 60.00 mg/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*), SPCC -, System Performance Check Compounds (**)

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR01

Lab Code: _____ Case No.: _____ SAS No.: _____ Job No.: _____

Sample No. (Standard): SSTD360 Date Analyzed: 11/5/88

Lab File ID (Standard): SQ364 Time Analyzed: 07:53

Instrument ID: 1

		IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
	12 HOUR STD	81784	9.28	282650	12.91	162761	18.38
	UPPER LIMIT	163568	9.78	565300	13.41	325522	18.88
	LOWER LIMIT	40892	8.78	141325	12.41	81381	17.88
	EPA SAMPLE NO.						
SQ365 01	8809255S BN	76124	9.30	228991	12.95	136348	18.45
6 02	88092573 AC	68597	9.26	257392	12.95	129509	18.40
7 03	88092573 BN	75577	9.29	246541	12.92	131448	18.38
8 04	88092574 AC	69699	9.26	258874	12.94	121908	18.41
9 05	88092574 BN	62925	9.29	183110	12.97	114615	18.43
10 06	88092575 AC	65877	9.27	193216	12.99	118855	18.40
1 07	88092575 BN	67873	9.33	215319	12.93	126294	18.41
2 08	88092576 BLK AC	61649	9.28	227975	13.01	113758	18.41
3 09	88092576 BLK BN	54771	9.35	206326	12.97	103810	18.44
4 11	88092576 AC	60451	9.28	221867	13.01	108121	18.42
5 11	88092576 BN	77432	9.27	252331	12.90	127911	18.41
	12						
	13						
	14						
	15						
	16						
	17						
	18						
	19						
	20						
	21						
	22						

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk.

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR01

Lab Code: _____ Case No.: _____ SAS No.: _____ Job No.: _____

Sample No. (Standard): SSTD060 Date Analyzed: 11/5/88

Lab File ID (Standard): S0364 Time Analyzed: 07:53

Instrument ID: 5

	IS4 (PHN) AREA #	RT	IS5 (CRY) AREA #	RT	IS4 (PRY) AREA #	RT
12 HOUR STD	231489	23.03	146787	31.50	98145	37.68
UPPER LIMIT	462978	23.53	293574	32.00	196290	38.18
LOWER LIMIT	115745	22.53	73394	31.00	49073	37.18
EPA SAMPLE NO.			91230	31.65		
50765 01 88092558 BN	172529	23.17	~~249568~~	~~28.27~~	51813	37.91
02 88092573 AC	169799	23.09	94604	31.58	54011	37.83
03 88092573 BN	173106	23.09	97093	31.54	54073	37.78
04 88092574 AC	157868	23.09	74692	31.59	39528 *	37.86
05 88092574 BN	152654	23.16	92342	31.58	55764	37.80
06 88092575 AC	152529	23.08	82731	31.59	46478 *	37.84
07 88092575 BN	168449	23.11	101421	31.52	59900	37.69
08 88092576 AC	152951	23.09	91684	31.59	54848	37.84
09 88092577 BN	132626	23.20	72974 *	31.62	40358 *	37.89
10 88092576 AC	125729	23.11	75485	31.62	41240 *	37.89
11 88092576 BN	179864	23.12	96688	31.56	50839 *	37.83
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS4 (PHN = Phenanthrene-d10
IS5 (CRY = Chrysene-d12
IS8 (PRY = Perylene-d12

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

* Column used to flag internal standard area values with an asterisk

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 11/05/88 20:58

Lab ID >T3105::DI Data Release Authorized By: _____

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	52.23 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	60.88	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	49.17 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	6.04 OK	
275	10.0 - 30.0% of mass 198	17.65 OK	
365	greater than 1.00% of mass 198	2.13 OK	
441	present, but less than mass 443	7.10 OK	
442	greater than 40.0% of mass 198	48.00 OK	
443	17.0 - 23.0% of mass 442	8.17 OK	(17.01) #2

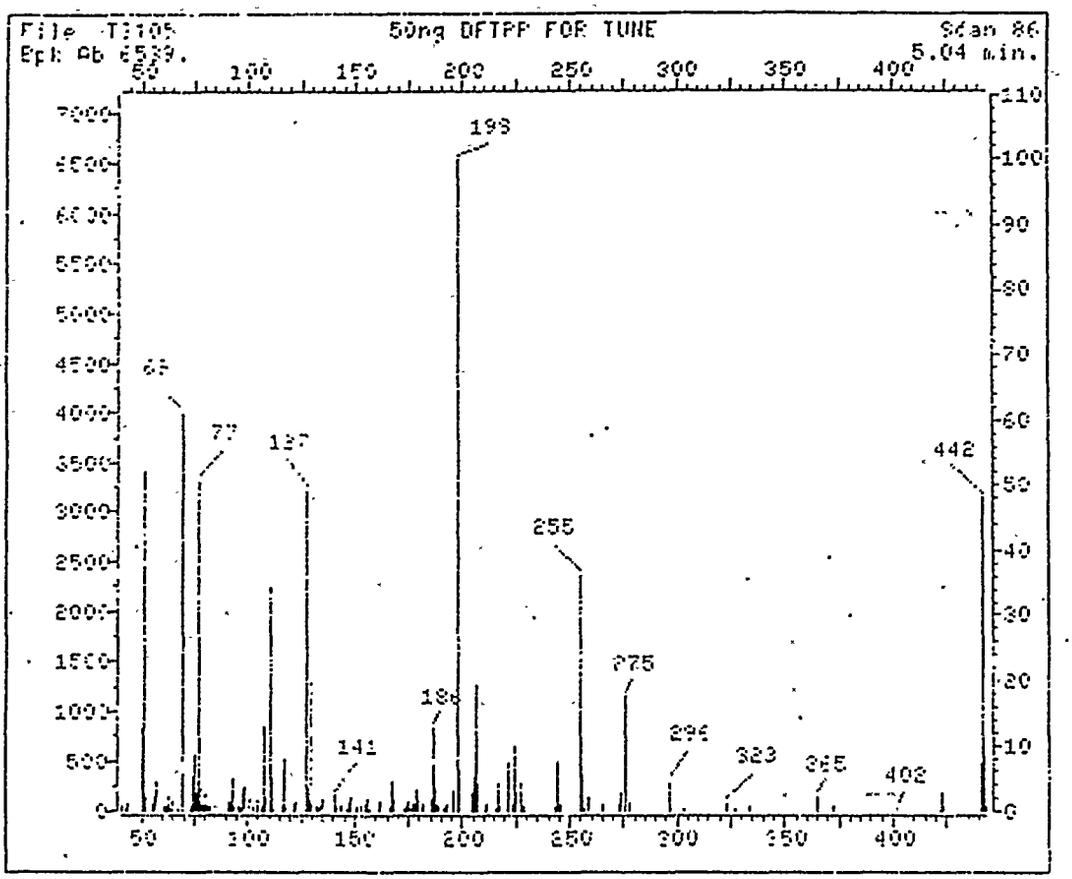
5 point 10/12/88

THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

SAMPLE ID	LAB_ID	DATE_OF_ANALYSIS	TIME_OF_ANALYSIS
50ng DFTPP FOR TUN	>T3105	11/05/88	20:58
SSTZ-9607	90376		21:34
SSC9-2577 AL	50377		22:34
SSC9-2577 BN	50378		23:33
SSC9-2578 AC	50379	11/6/88	00:33
SSC9-2578 BN	50380		01:33
SSC9-2579 AC	50381		02:31
SSC9-2579 BN	50382		03:30
SSC9-2579 AC	50383		04:29
SSC9-2579 BN	50384		05:28
SSC9-2565 AC	50385		06:27
SSC9-2565 BN	50386		07:27
SSC9-2569 AC	50387		08:26

Mothe-Project



File: >T3105 Scan #: 86 Retn. time: 5.04

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.10	.841	92.00	1.346	133.15	1.239	181.05	.994	244.10	7.402
43.20	.535	93.00	5.053	133.95	.551	185.95	1.728	245.00	1.055
44.10	1.086	94.10	.643	134.05	.627	186.05	12.601	246.00	1.590
50.10	12.647	95.00	.872	135.05	1.774	187.05	3.395	255.00	35.984
51.10	52.225	96.90	.459	141.05	2.294	188.15	1.225	256.00	5.398
52.10	2.172	97.20	.459	142.05	.719	189.05	.688	257.00	.581
55.20	1.049	98.10	3.380	143.05	.703	191.05	.459	258.10	2.080
56.20	1.952	99.00	3.456	146.05	.352	192.15	.856	265.10	.948
57.10	4.511	101.00	2.263	147.15	1.392	193.05	.979	273.10	1.086
61.00	.668	103.00	.872	148.05	2.156	196.10	3.135	274.05	2.768
62.00	.918	104.10	1.361	151.15	.627	198.10	100.000	275.15	17.648
63.10	2.019	105.00	1.789	153.05	.872	199.10	6.041	276.05	2.325
64.10	.474	106.10	.642	155.15	1.132	204.10	2.676	277.05	1.376
65.10	1.376	107.00	12.831	156.05	1.636	205.10	4.985	296.05	4.267
67.00	.382	108.00	1.988	156.75	.306	206.10	19.208	303.05	.398
69.05	60.883	110.00	34.164	157.95	.443	207.10	4.282	323.15	1.116
73.20	.841	111.10	5.169	161.15	1.269	211.00	1.040	327.05	.428
74.10	5.184	112.00	.520	166.05	.841	215.90	.581	334.05	.856
75.00	8.396	116.00	.811	167.05	4.557	217.00	4.282	365.10	2.126
76.10	2.676	117.10	7.845	168.05	1.835	218.00	.596	372.10	.811
77.10	50.589	118.05	.642	172.95	.566	221.10	7.524	402.00	.367
78.15	3.319	122.05	.979	174.05	.780	223.10	.994	422.20	.489

79.16	3.456	123.05	1.433	175.05	1.529	224.10	10.032	423.10	2.646
82.16	3.139	125.15	.673	176.05	.566	225.10	2.768	424.10	.658
81.00	4.297	127.05	49.167	177.05	1.086	227.00	4.221	441.15	7.096
82.16	.887	128.15	3.634	178.15	1.162	228.10	.795	442.15	48.004
85.16	.948	129.05	20.951	179.05	3.166	229.10	.994	443.15	8.166
85.50	.765	130.05	1.468	180.05	1.927	243.20	.688	444.15	.822
91.00	1.300								

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/05/88

Contractor: ENGINEERING-SCIENCE Time: 21:34

Contract No: Laboratory ID:)S0376

Instrument ID: 1 Initial Calibration Date: 10/12/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	.99162	9.97		
2-Fluorophenol	1.15802	1.34440	16.09		
bis(2-Chloroethyl)ether	1.11892	1.09768	1.90		
Phenol	1.41657	1.44823	2.24	*	
Phenol-d5	1.22488	1.53820	25.56		
Aniline	.54193	.45561	15.93		
2-Chlorophenol	1.23175	1.34987	9.59		
1,3-Dichlorobenzene	1.47535	1.44730	1.90		
1,4-Dichlorobenzene	1.40530	1.45559	3.58	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.31043	57.42		
1,2-Dichlorobenzene	1.32240	1.46456	10.75		
2-Methylphenol	1.17367	1.39005	18.44		
3-&-4-Methylphenol	1.07139	1.36916	27.79		
bis(2-chloroisopropyl)Ether	2.15627	2.54840	18.19		
N-Nitroso-Di-n-Propylamine	.84050	.92781	10.39	**	
Hexachloroethane	.53840	.58848	9.30		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.48311	19.84		
Nitrobenzene-d5	.39137	.41117	5.06		
2-Nitrophenol	.24657	.25629	3.94	*	
Isophorone	.74170	.80031	7.90		
bis(2-Chloroethoxy)methane	.49386	.55442	12.26		
2,4-Dimethylphenol	.34819	.37937	8.86		
Benzoic Acid	.29725	.31864	7.20		
2,4-Dichlorophenol	.56733	.52794	6.94	*	
1,2,4-Trichlorobenzene	.36913	.32900	10.87		
Naphthalene	.94589	.94935	.37		
4-Chloroaniline	.36309	.34009	6.33		
Hexachlorobutadiene	.20283	.16060	20.82	*	
4-Chloro-3-Methylphenol	.31360	.32813	4.63	*	
2-Methylnaphthalene	.56397	.58992	4.60		

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**).

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/05/88

Contractor: ENGINEERING SCIENCE Time: 21:34

Contract No: Laboratory ID: 250376

Instrument ID: 1 Initial Calibration Date: 10/13/88 12 PSO

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.24288	17.86		**
2,4,6-Trichlorophenol	.42280	.31814	24.75	*	
2,4,5-Trichlorophenol	.52897	.55699	5.30		
2-Fluorobiphenyl	1.27220	1.17888	7.33		
2-Chloronaphthalene	1.23784	1.17949	4.71		
2-Nitroaniline	.47288	.48482	2.53		
Dimethylphthalate	1.40629	1.34413	4.42		
2,6-Dinitrotoluene	.37415	.36087	3.55		
Acenaphthylene	1.68918	1.66956	1.16		
3-Nitroaniline	.44557	.45551	2.23		
2,4-Dinitrophenol	.11898	.09978	16.14		**
Acenaphthene	1.13011	1.04208	7.79	*	
Dibenzofuran	1.64131	1.50556	8.27		
2,4-Dinitrotoluene	.28418	.28448	.11		
4-Nitrophenol	.28450	.24515	13.83		**
Fluorene	1.12850	1.01374	10.17		
Diethylphthalate	1.20939	1.20386	.46		
4-Chlorophenyl-phenylether	.59183	.52862	10.68		
4-Nitroaniline	.35956	.27585	23.28		
2,4,6-Tribromophenol	.21023	.14152	32.68		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.49878	23.81	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.21414	.53		
Hexachlorobenzene	.26273	.24922	5.14		
Pentachlorophenol	.14536	.11749	19.18	*	

RF - Response factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/05/88

Contractor: ENGINEERING - SCIENCE Time: 21:34

Contract No: _____ Laboratory ID:)S0376

Instrument ID: 1 Initial Calibration Date: 10/17/88

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is _____ %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	1.00115	2.89		
Anthracene	1.05155	1.16120	10.43		
Di-n-Butylphthalate	1.51956	1.75280	15.35		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.08265	9.06	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.03264	18.88		
Pyrene	1.56086	1.86172	19.28		
Terphenyl-d14	1.05835	1.13352	7.10		
Butylbenzylphthalate	1.03390	1.29793	25.54		
3,3'-Dichlorobenzidine	.13689	.18031	31.72		
Chrysene	.99655	1.13123	13.81		
Benzo(a)Anthracene	1.10107	1.02505	7.16		
bis(2-Ethylhexyl)Phthalate	1.21073	1.51584	25.20		
Di-n-octylphthalate	3.40275	3.79944	11.66	*	
Benzo(a)Pyrene	1.32098	1.36276	3.16	*	
Benzo(b)Fluoranthene	1.60850	1.05379	34.49		
Indeno(1,2,3-cd)Pyrene	.96800	1.07919	11.49		
Dibenzo(a,h)Anthracene	.87481	.89145	1.90		
Benzo(k)Fluoranthene	1.44370	1.92303	33.20		
Benzo(g,h,i)Perylene	.89761	.79672	11.24		

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

760

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR01

Lab Code: _____ Case No.: _____ SAS No.: _____ Job No.: _____

Sample No. (Standard): SSTD060 Date Analyzed: 11/5/88

Lab File ID (Standard): 3974 Time Analyzed: 21:34

Instrument ID: 1

		IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
	12 HOUR STD	68485	9.28	237228	12.90	127304	18.36
	UPPER LIMIT	136970	9.78	474456	13.40	254608	18.86
	LOWER LIMIT	34243	8.78	118614	12.40	63652	17.86
	EPA SAMPLE NO.						
1037701	8809257701 AC	55244	9.29	153607	12.98	100640	18.39
802	8809257702 BN	85545	9.29	319622	12.98	158956	18.41
903	8809257803 AC	58483	9.29	215467	13.02	102329	18.40
804	8809257804 BN	61867	9.28	189628	12.96	111187	18.43
105	8809257905 AC	57871	9.29	214105	13.01	101238	18.42
206	8809257906 BN	59271	9.38	187063	12.96	88147	18.44
307	8809257907 AC	59436	9.31	213710	13.10	101493	18.48
408	8809257908 BN	57631	9.35	185009	12.94	103005	18.37
509	8809256809 AC	82958	9.28	300414	12.98	143069	18.40
610	8809256810 BN	75249	9.29	222955	12.96	129072	18.43
711	8809256411 AC	71705	9.28	200623	12.96	124955	18.37
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR0001

Lab Code: _____ Case No.: _____ SAS No.: _____ Job No.: _____

Sample No. (Standard): SSTD060 Date Analyzed: 11/5/88

Lab File ID (Standard): S0376 Time Analyzed: 21:34

Instrument ID: 1

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS6(PRY) AREA #	RT
12 HOUR STD	175855	23.01	97130	31.48	60208	37.72
UPPER LIMIT	351710	23.51	194260	31.98	120416	38.22
LOWER LIMIT	87928	22.51	48565	30.98	30104	37.22
EPA SAMPLE NO.						
S0377 01 88092577 AC	128525	23.06	75735	31.51	35977	37.73
02 88092577 BN	214826	23.15	122431	31.56	76893	37.80
03 88092578 AC	133693	23.12	72716	31.64	37780	37.94
04 88092578 BN	141684	23.15	73750	31.56	40914	37.76
05 88092579 AC	134329	23.12	74710	31.61	33341	37.91
06 88092579 BN	144418	23.17	82964	31.61	47223	37.90
07 88092599 AC	97287	23.24	72884	31.66	44504	37.97
08 88092599 BN	132507	23.15	71626	31.66	37186	38.00
09 88092568 AC	180106	23.10	94076	31.62	49918	37.93
10 88092568 BN	171108	23.19	93319	31.61	48470	37.91
11 88092569 AC	169042	23.03	104058	31.54	40379	37.83
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

5B

SEMIVOLATILE ORGANIC GC/MS TUNING AND MASS CALIBRATION - DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

Lab Name: Engineering Science Contract: _____.

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____.

Lab File ID: >T1130 DFTPP Injection Date: 11/30/88

Instrument ID: 70 1 DFTPP Injection Time: 12:48

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	46.2
68	Less than 2.0% of mass 69	0.0(0.0)1
69	Mass 69 relative abundance	52.
70	Less than 2.0% of mass 69	0.0(0.0)1
127	40.0 -.60.0% of mass 198	41.5
197	Less than 1.0% of mass 198	.8
198	Base Peak, 100% relative abundance	100.
199	5.0 - 9.0% of mass 198	7.0
275	10.0 - 30.0% of mass 198	19.8
365	Greater than 1.00% of mass 198	1.76
441	Present, but less than mass 443	9.1
442	Greater than 40.0% of mass 198	58.5
443	17.0 - 23.0% of mass 442	10.3(17.6)2

1-Value is % mass 69 2-Value is % mass 442

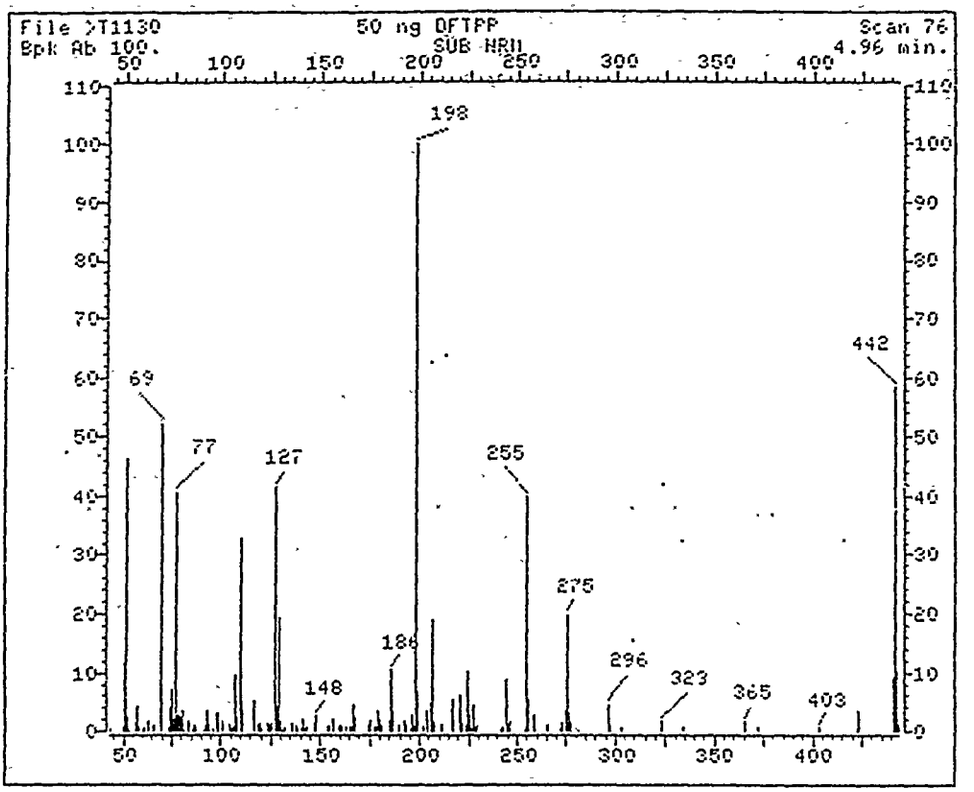
5 point 10/12

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	80 ug/ml BNA STD	>S0606	11/30/88	13:07
02	88092198 1ml REANAL.	>S0607	11/30/88	14:13
03	88092130 1ml REANAL.	>S0608	11/30/88	15:12
04	88092133 1ml REANAL.	>S0609	11/30/88	16:16
05	88092162 1ml REANAL.	>S0610	11/30/88	17:16
06	88092186 1ml REANAL.	>S0611	11/30/88	18:15
07	88092574 AC REANAL.	>S0612	11/30/88	19:15
08	88092766 BN REANAL.	>S0613	11/30/88	20:15
09	8809230! 1ml REANAL.	>S0614	11/30/88	21:14
10	88092122 AC REANAL.	>S0615	11/30/88	22:13
11	88092732 1ml REANAL.	>S0616	11/30/88	23:12
12	88091976 REX 1ml .	>S0617	12/01/88	0:11
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

another prob

763



File: >T1130 Scan #: 76 Retn. time: 4.96

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.10	.572	91.10	.212	137.05	.275	189.15	.974	245.10	1.249
49.20	.889	92.00	1.143	137.25	1.080	191.95	1.630	246.10	1.842
50.10	11.624	93.00	3.494	138.15	.826	193.05	1.249	254.00	.487
51.10	46.221	94.10	1.016	140.15	.550	195.25	.508	255.10	39.848
52.20	2.414	96.10	.318	141.05	2.160	196.00	2.625	256.10	5.399
53.00	.169	98.00	3.239	142.35	.529	196.70	.826	258.10	2.795
56.20	1.334	99.00	3.155	142.95	.805	198.10	100.000	265.00	1.059
57.10	3.981	101.00	1.800	147.15	1.313	199.10	6.966	272.00	.487
58.10	.741	104.10	1.228	148.15	2.625	201.40	.699	273.00	1.419
60.00	.318	105.00	.275	153.15	.720	201.60	.678	274.15	3.367
60.70	.868	106.20	.720	154.05	.656	203.20	.741	275.15	19.797
60.90	.106	107.00	9.697	156.15	2.160	204.10	3.345	276.15	3.028
63.10	1.927	108.00	2.371	158.75	.720	205.10	4.912	277.15	1.524
65.10	1.101	110.00	32.839	160.05	1.186	206.20	18.886	281.15	.233
69.00	52.149	111.10	3.959	161.05	.593	207.10	1.736	296.15	4.531
73.10	.826	117.00	5.103	163.05	.614	211.10	1.249	297.05	1.249
74.00	3.981	118.15	.953	165.15	.593	217.00	5.526	303.05	.783
75.10	7.135	119.15	1.270	165.85	.783	221.10	6.013	303.25	.805
76.10	2.096	120.05	.614	167.15	1.362	221.80	1.503	323.15	1.757
77.10	10.716	123.15	1.270	168.05	2.308	223.20	1.249	334.15	.910
78.10	2.922	124.05	.995	174.15	1.037	224.10	10.248	365.20	1.757
79.00	2.774	125.15	1.270	175.15	1.694	225.10	2.752	372.10	.805
80.10	2.562	127.15	41.541	176.95	.593	226.00	.572	403.20	.593

63.10	1.651	130.05	1.605	160.05	2.011	225.10	.535	441.25	5.101
64.00	.042	131.15	.146	161.15	1.037	241.10	.445	442.25	58.543
65.20	.550	132.15	.656	165.05	1.842	242.10	.866	443.25	10.290
66.00	1.143	133.15	1.292	166.05	10.396	244.10	8.787	444.15	1.207
67.05	.605	135.95	.550	187.05	3.367				

HSL Compounds

Case No: Calibration Date: 11/30/88

Contractor: ENGINEERING-SCIENCE Time: 13:07

Contract No: Laboratory ID: >S0606

Instrument ID: 1 Initial Calibration Date: 10/13/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	.97337	7.95		
2-Fluorophenol	1.15802	1.27080	9.74		
bis(2-Chloroethyl)ether	1.11892	1.17761	5.25		
Phenol	1.41657	1.46679	3.55	*	
Phenol-d5	1.22488	1.24768	1.86		
Aniline	.54193	.54600	.75		
2-Chlorophenol	1.23175	1.22921	.21		
1,3-Dichlorobenzene	1.47535	1.39593	5.38		
1,4-Dichlorobenzene	1.40530	1.37607	2.08	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.74005	1.51		
1,2-Dichlorobenzene	1.32240	1.39494	5.49		
2-Methylphenol	1.17367	1.36240	16.08		
3-&-4-Methylphenol	1.07139	1.29827	21.18		
bis(2-chloroisopropyl)Ether	2.15627	3.36908	56.25		
N-Nitroso-Di-n-Propylamine	.84050	.94366	12.27		**
Hexachloroethane	.53840	.58714	9.05		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.47247	17.21		
Nitrobenzene-d5	.39137	.45847	17.14		
2-Nitrophenol	.24657	.25098	1.79	*	
Isophorone	.74170	.86068	16.04		
bis(2-Chloroethoxy)methane	.49386	.54850	11.07		
2,4-Dimethylphenol	.34849	.39683	13.87		
Benzoic Acid	.29725	.36556	22.98		
2,4-Dichlorophenol	.56733	.56864	.23	*	
1,2,4-Trichlorobenzene	.36913	.33939	8.06		
Naphthalene	.94589	.91765	2.99		
4-Chloroaniline	.36309	.35462	2.33		
Hexachlorobutadiene	.20283	.20391	.53	*	
4-Chloro-3-Methylphenol	.31360	.38168	21.71	*	
2-Methylnaphthalene	.56397	.58983	4.58		

RF - Response Factor from daily standard file at 80.00 mg/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: ---------- Calibration Date: 11/30/88

Contractor: Environmental Science Time: 13:07

Contract No: ---------- Laboratory ID: >S0606

Instrument ID: 1 Initial Calibration Date: 10/13/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.31497	6.52		**
2,4,6-Trichlorophenol	.42280	.37315	11.74	*	
2,4,5-Trichlorophenol	.52897	.43693	17.40		
2-Fluorobiphenyl	1.27220	1.01763	20.01		
2-Chloronaphthalene	1.23784	1.07732	12.97		
2-Nitroaniline	.47288	.61515	30.08		
Dimethylphthalate	1.40629	1.25232	10.95		
2,6-Dinitrotoluene	.37415	.35614	4.81		
Acenaphthylene	1.68918	1.48674	11.98		
3-Nitroaniline	.44557	.57056	28.05		
2,4-Dinitrophenol	.11898	.10674	10.29		**
Acenaphthene	1.13011	.92383	18.25	*	
Dibenzofuran	1.64131	1.50133	8.53		
2,4-Dinitrotoluene	.28418	.33918	19.36		
4-Nitrophenol	.28450	.30420	6.92		**
Fluorene	1.12850	.92206	18.29		
Diethylphthalate	1.20939	1.03857	14.12		
4-Chlorophenyl-phenylether	.59183	.52517	11.26		
4-Nitroaniline	.35956	.35467	1.36		
2,4,6-Tribromophenol	.21023	.22367	6.39		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.43802	8.73	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.22286	4.62		
Hexachlorobenzene	.26273	.27616	5.11		
Pentachlorophenol	.14536	.15977	9.91	*	

RF - Response Factor from daily standard file at 80.00 mg/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

HSL Compounds

Case No: Calibration Date: 11/30/88

Contractor: ENGINEERING-SCIENCE Time: 13:07

Contract No: Laboratory ID: >S0606

Instrument ID: 1 Initial Calibration Date: 10/13/88 (D6)

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	1.01660	1.71		
Anthracene	1.05155	.99355	5.51		
Di-n-Butylphthalate	1.51956	1.40248	7.70		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.12977	5.10	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.03588	10.81		
Pyrene	1.56086	1.36766	12.38		
Terphenyl-d14	1.05835	.99564	5.93		
Butylbenzylphthalate	1.03390	.90180	12.78		
3,3'-Dichlorobenzidine	.13689	.22429	63.85		
Chrysene	.99655	.99267	.39		
Benzo(a)Anthracene	1.10407	1.10086	.29		
bis(2-Ethylhexyl)Phthalate	1.21073	1.06473	12.06		
Di-n-octylphthalate	3.40275	2.57819	24.23	*	
Benzo(a)Pyrene	1.32098	1.31996	.08	*	
Benzo(b)Fluoranthene	1.60850	1.61742	.55		
Indeno(1,2,3-cd)Pyrene	.96800	.88866	8.20		
Dibenzo(a,h)Anthracene	.87481	1.06109	21.29		
Benzo(k)Fluoranthene	1.44370	1.23486	14.47		
Benzo(g,h,i)Perylene	.89761	1.09695	22.21		

RF - Response Factor from daily standard file at 80.00 mg/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: _____.

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____.

Lab File ID (Standard): >S0606 Date Analyzed:11/30/88

Instrument ID: 70 1 Time Analyzed: 13:07

	IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
12 HOUR STD	110671.	9.11	389852.	12.73	244062.	18.20
UPPER LIMIT	221342.		779704.		488124.	
LOWER LIMIT	55335.		194926.		122031.	
SAMPLE NO.						
01 88092198 1ml	100089.	9.07	390200.	12.70	221026.	18.18
02 88092130 1ml	96458.	9.07	367060.	12.69	210105.	18.18
03 88092133 1ml	94476.	9.07	359915.	12.70	208824.	18.18
04 88092162 1ml	91675.	9.09	350433.	12.71	201940.	18.19
05 88092186 1ml	98081.	9.07	378637.	12.69	222160.	18.18
06 88092574 AC	96301.	9.09	347940.	12.74	203153.	18.18
07 88092766 BN	120776.	9.09	457904.	12.69	227529.	18.17
08 88092301 1ml	115080.	9.07	463142.	12.68	249602.	18.17
09 88092122 AC	213815.	9.10	843428.*	12.71	430033.	18.20
10 88092732 1ml	106202.	9.04	397365.	12.70	214955.	18.18
11 88091976 REX	103544.	9.10	406331.	12.70	228799.	18.19
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100%
of internal stansard area.
LOWER LIMIT = - 50%
of internal standard area.

Column used to flag internal standard area values with an asterisk

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: _____.

Lab Code: ES01 Case No.: _____ SAS No.: _____ SDG No.: ____.

Lab File ID (Standard): >S0606 Date Analyzed: 11/30/88

Instrument ID: 70 1 Time Analyzed: 13:07

		IS4(PHN)		IS5(CRY)		IS3(PRY)	
		AREA #	RT	AREA #	RT	AREA #	RT
	12 HOUR STD	398583.	22.85	323333.	31.32	245167.	37.31
	UPPER LIMIT	797166.		646666.		490334.	
	LOWER LIMIT	199291.		161666.		122584.	
	EPA SAMPLE NO.						
01	88092198 1ml	363463.	22.84	308891.	31.28	148561.	37.29
02	88092130 1ml	322867.	22.84	275135.	31.28	67536.*	37.31
03	88092133 1ml	341401.	22.84	281286.	31.27	108142.*	37.31
04	88092162 1ml	326830.	22.85	278444.	31.27	131941.	37.30
05	88092186 1ml	356156.	22.84	282466.	31.28	140968.	37.29
06	88092574 AC	334654.	22.86	272080.	31.29	147575.	37.32
07	88092766 BN	416923.	22.83	329995.	31.28	0.*	0.00
08	88092301 1ml	409603.	22.83	329772.	31.28	80672.*	37.32
09	88092122 AC	793152.	22.86	641909.	31.31	433144.	37.33
10	88092732 1ml	298745.	22.83	250100.	31.28	137026.	37.32
11	88091976 REX	361228.	22.85	263307.	31.30	137813.	37.32
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal stansard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

5b

SEMIVOLATILE ORGANIC GC/MS TUNING AND MASS CALIBRATION - DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

Lab Name: Engineering Science Contract: _____.

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____.

Lab File ID: >T1213 DFTPP Injection Date: 12/13/88

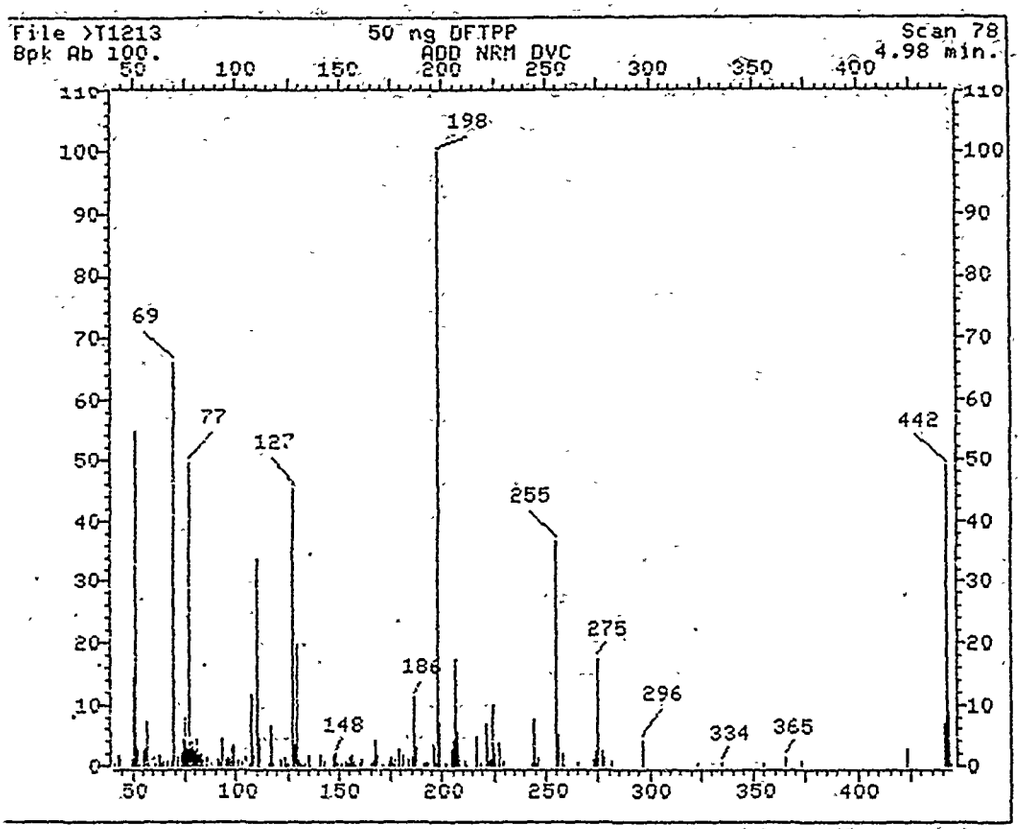
Instrument ID: 70 1 DFTPP Injection Time: 11:31

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	54.9
68	Less than 2.0% of mass 69	.7(1.0)
69	Mass 69 relative abundance	66.
70	Less than 2.0% of mass 69	0.0(0.0)
127	40.0 - 60.0% of mass 198	45.5
197	Less than 1.0% of mass 198	.4
198	Base Peak, 100% relative abundance	100.
199	5.0 - 9.0% of mass 198	7.1
275	10.0 - 30.0% of mass 198	17.4
365	Greater than 1.00% of mass 198	1.47
441	Present, but less than mass 443	6.9
442	Greater than 40.0% of mass 198	49.0
443	17.0 - 23.0% of mass 442	8.9(18.2)

1-Value is % mass 69 2-Value is % mass 442 5p

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS

	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	60 mg/L BNA STD + IS	>S0708	12/13/88	11:59
02	88092573 BN 2ml + IS	>S0709	12/13/88	12:58
03	88113090 AC 1ml + IS	>S0710	12/13/88	13:58
04	88113090 BN 1ml + IS	>S0711	12/13/88	14:58
05	88113091 AC 1ml + IS	>S0712	12/13/88	15:58
06	88113091 BN 1ml + IS	>S0713	12/13/88	16:58
07	88113092 AC 1ml + IS	>S0714	12/13/88	17:58
08	88113092 BN 1ml + IS	>S0715	12/13/88	18:57
09	88113113 AC 1ml + IS	>S0716	12/13/88	19:57
10	88113113 BN 1ml + IS	>S0717	12/13/88	20:56
11	88113113 AC BLANK	>S0718	12/13/88	21:56
12	88113113 BN BLANK	>S0719	12/13/88	22:55
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				



File: >T1213 Scan #: 78 Retn. time: 4.98

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.10	.569	84.10	1.139	129.05	19.609	177.05	1.091	225.10	2.268
43.20	1.708	85.10	1.357	130.15	1.120	179.05	2.942	227.10	3.635
44.10	1.224	86.00	.560	131.05	.266	180.15	1.908	229.00	.826
49.20	.930	87.10	.408	132.45	.190	181.05	.541	242.90	.313
50.10	14.151	91.10	1.129	133.15	.465	183.25	1.082	244.20	7.489
51.10	54.926	92.00	.484	135.05	1.784	185.15	1.500	245.20	.437
52.00	2.942	93.00	4.622	136.25	.237	186.05	11.086	246.00	1.510
53.10	.313	95.10	.949	141.05	1.775	187.05	3.151	255.10	36.636
55.00	2.582	96.00	1.538	142.15	.902	191.05	.418	256.10	5.296
56.10	2.752	97.00	1.054	142.95	.342	192.05	.513	257.30	.323
57.00	7.327	98.10	3.284	147.15	1.727	193.05	.902	258.00	1.984
58.10	.380	99.00	3.550	148.05	1.946	196.10	3.597	259.00	.228
61.00	.304	101.00	1.063	148.95	.285	196.90	.370	265.00	.503
63.20	1.870	103.10	.902	151.05	.266	198.10	100.000	273.10	1.101
63.90	.313	104.10	.959	153.05	.883	199.10	7.147	274.05	2.620
65.10	.873	105.00	1.376	154.05	.361	201.40	.408	275.15	17.416
67.00	.674	[illegible]	.465	155.05	1.490	204.10	2.705	276.15	2.344
68.10	.664	[illegible]	11.418	156.15	1.775	205.20	4.157	277.15	1.357
69.00	66.059	108.10	1.851	157.15	.683	206.10	17.407	281.05	.731
71.20	1.405	110.00	33.855	157.95	.209	207.10	5.476	296.15	4.195
73.20	1.965	111.00	4.470	159.95	.399	208.10	1.386	323.25	.494
74.10	4.594	116.10	.560	161.05	1.054	211.10	.883	334.15	.513
75.00	7.688	117.00	6.549	164.95	.456	212.10	.190	354.20	.342
76.10	2.781	118.15	.361	166.05	.835	217.10	4.727	365.10	1.471
77.10	49.440	122.05	.987	167.05	4.024	218.20	.294	372.20	.674
78.10	3.673	123.15	1.414	168.05	1.614	221.10	6.748	423.20	2.923

80.10	2.994	129.05	.479	174.15	.731	222.00	.680	447.25	47.019
81.00	4.632	127.15	45.501	175.05	1.329	223.10	.978	443.25	8.941
82.10	1.670	128.15	3.303	176.15	.475	224.10	9.975	444.25	.408
83.10	1.974								

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 12/13/88

Contractor: Environmental Science Time: 11:59

Contract No: _____ Laboratory ID: >S0708

Instrument ID: 5 Initial Calibration Date: 10/13/88 DAP

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	1.09970	21.96		
2-Fluorophenol	1.15802	1.43896	24.26		
bis(2-Chloroethyl)ether	1.11892	1.20243	7.46		
Phenol	1.41657	1.59954	12.92	*	
Phenol-d5	1.22488	1.48672	21.38		
Aniline	.54193	.61300	13.11		
2-Chlorophenol	1.23175	1.28368	4.22		
1,3-Dichlorobenzene	1.47535	1.38929	5.83		
1,4-Dichlorobenzene	1.40530	1.34819	4.06	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.78224	7.29		
1,2-Dichlorobenzene	1.32240	1.44950	9.61		
2-Methylphenol	1.17367	1.36409	16.22		
3-&-4-Methylphenol	1.07139	1.38221	29.01		
bis(2-chloroisopropyl)Ether	2.15627	3.52591	63.52		
N-Nitroso-Di-n-Propylamine	.84050	1.07114	27.44		**
Hexachloroethane	.53840	.60060	11.55		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.49495	22.78		
Nitrobenzene-d5	.39137	.46217	18.09		
2-Nitrophenol	.24657	.26593	7.85	*	
Isophorone	.74170	.89234	20.31		
bis(2-Chloroethoxy)methane	.49386	.60136	21.77		
2,4-Dimethylphenol	.34849	.34691	.45		
Benzoic Acid	.29725	.41169	38.50		
2,4-Dichlorophenol	.56733	.55204	2.70	*	
1,2,4-Trichlorobenzene	.36913	.31909	13.56		
Naphthalene	.94589	.92828	1.86		
4-Chloroaniline	.36309	.36253	.15		
Hexachlorobutadiene	.20283	.18916	6.74	*	
4-Chloro-3-Methylphenol	.31360	.33866	7.99	*	
2-Methylnaphthalene	.56397	.57940	2.73		

RF - Response Factor from daily standard file at 80.00 ug/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 12/13/88

Contractor: ENGINEERING-SCIENCE Time: 11:59

Contract No: _____ Laboratory ID: >S0708

Instrument ID: 2 Initial Calibration Date: 10/~~13~~12/88

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is _____ %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.28065	5.08		**
2,4,6-Trichlorophenol	.42280	.38546	8.83	*	
2,4,5-Trichlorophenol	.52897	.47553	10.10		
2-Fluorobiphenyl	1.27220	1.05422	17.13		
2-Chloronaphthalene	1.23784	1.02377	17.29		
2-Nitroaniline	.47288	.59225	25.24		
Dimethylphthalate	1.40629	1.18893	15.46		
2,6-Dinitrotoluene	.37415	.35767	4.40		
Acenaphthylene	1.68918	1.39698	17.30		
3-Nitroaniline	.44557	.62923	41.22		
2,4-Dinitrophenol	.11898	.13442	12.98		**
Acenaphthene	1.13011	.93525	17.42	*	
Dibenzofuran	1.64131	1.44062	12.23		
2,4-Dinitrotoluene	.28418	.32749	15.24		
4-Nitrophenol	.28450	.21678	23.80		**
Fluorene	1.12850	.83982	25.58		
Diethylphthalate	1.20939	.97795	19.14		
4-Chlorophenyl-phenylether	.59183	.47226	20.20		
4-Nitroaniline	.35956	.25536	28.98		
2,4,6-Tribromophenol	.21023	.17450	17.09		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.44313	10.00	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.21802	2.35		
Hexachlorobenzene	.26273	.25618	2.49		
Pentachlorophenol	.14536	.14065	3.24	*	

RF - Response Factor from daily standard file at 80.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: _____.

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____.

Lab File ID (Standard): >S0708 Date Analyzed:12/13/88

Instrument ID: 70 1 Time Analyzed: 11:59

	IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
12 HOUR STD	150984.	9.11	533943.	12.74	349801.	18.21
UPPER LIMIT	301968.		1067886.		699602.	
LOWER LIMIT	75492.		266972.		174901.	
SAMPLE NO.						
01 88092573 BN	156149.	9.14	623104.	12.81	324382.	18.24
02 88113090 AC	155939.	9.13	621007.	12.76	322686.	18.22
03 88113090 BN	139998.	9.13	490426.	12.80	287512.	18.27
04 88113091 AC	129684.	9.15	507152.	12.82	267359.	18.25
05 88113091 BN	133600.	9.16	464759.	12.82	264005.	18.28
06 88113092 AC	1500.*	9.61	203465.*	13.12	219223.	18.43
07 88113092 BN	139546.	9.14	477501.	12.81	275861.	18.26
08 88113113 AC	111205.	9.16	426043.	12.85	220256.	18.27
09 88113113 BN	118210.	9.20	477713.	12.89	246655.	18.31
10 88113113 AC	148686.	9.14	577283.	12.86	293163.	18.29
11 88113113 BN	165054.	9.16	598202.	12.79	326793.	18.30
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal stansard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: _____

Lab Code: ES01 Case No.: ____ SAS No.: ____ SDG No.: ____

Lab File ID (Standard): >S0708 Date Analyzed: 12/13/88

Instrument ID: 70 1 Time Analyzed: 11:59

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS3(PRY) AREA #	RT
12 HOUR STD	519611.	22.86	358461.	31.35	264057.	37.44
UPPER LIMIT	1039222.		716922.		528114.	
LOWER LIMIT	259806.		179230.		132028.	
EPA SAMPLE NO.						
01 88092573 BN	519966.	22.95	325616.	31.40	151305.	37.52
02 88113090 AC	504717.	22.90	309277.	31.36	206282.	37.46
03 88113090 BN	434759.	22.92	251032.	31.38	162076.	37.50
04 88113091 AC	401095.	22.94	219925.	31.39	139050.	37.53
05 88113091 BN	397280.	22.95	217009.	31.40	135226.	37.53
06 88113092 AC	362647.	23.10	199485.	31.56	123034.*	37.70
07 88113092 BN	414869.	22.93	224044.	31.39	141425.	37.51
08 88113113 AC	335984.	22.95	195017.	31.40	113507.*	37.54
09 88113113 BN	354505.	23.03	195245.	31.43	120685.*	37.58
10 88113113 AC	440901.	22.97	244010.	31.43	149144.	37.55
11 88113113 BN	489864.	22.99	282896.	31.43	161786.	37.57
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal stansard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____

Instrument IDVOCAL_____ Calibration Date(s):_9/26/88

LAB FILE ID:_~~34~~ 33, 34 Init. Calib. Date(s):_9/22/88

COMPOUND	RRF	RRF50	%D
Benzyl chloride	4.43	6.10	-37.70
bis (2-choroethoxy) methane	0.12		100.00
bis (2-choroisopropyl ether	0.12		100.00
Bromobenzene	3.08	3.20	-3.90
Bromodichloromethane	4.91	4.40	10.39
Bromoform	3.32	3.10	6.63
Bromomethane	0.43	0.62	-44.19
Carbon tetrachloride	5.00	4.40	12.00
Chloroacetaldehyde	0.07		100.00
Chlorobenzene	1.38	1.30	5.80
Chloroethane	0.73	0.88	-20.55
Chloroform	4.22	3.60	14.69
1-Chorohexane	0.82	0.82	0.00
2-Chloroethyl vinyl ether	0.12		100.00
Chloromethane	1.84	2.21	-20.11
Chloromethyl methyl ether	0.02		100.00
o-,m-,& p-Chlorotoluenes	3.34	3.40	-1.80
Dibromochloromethane	4.68	4.30	8.12
Dibromomethane	3.06	3.00	1.96
1,2-Dichlorobenzene	2.22	2.10	5.41
1,3-Dichlorobenzene	1.79	1.70	5.03
1,4-Dichlorobenzene	1.83	1.80	1.64
Dichlorodifluormethane	0.54		100.00
1,1-Dichloroethane	2.74	2.40	12.41
1,2-Dichloroethane	3.74	3.20	14.44
1,1-Dichloroethylene	1.32	1.40	-6.06
trans-1,2-dichloroethylene	2.96	2.70	8.78
Dichloromethane	4.72	5.50	-16.53
1,2-Dichloropropane	3.18	2.80	11.95
1,3-Dichloropropylene	0.47	0.48	-2.13
1,1,2,2-Tetrachloroethane	4.04	3.60	10.89
1,1,1,2-Tetrachloroethane	4.83	3.80	21.33
Tetrachloroethylene	5.06	4.40	13.04
1,1,1-Trichloroethane	2.77	2.50	9.75
1,1,2-Trichloroethane	4.42	4.80	-8.60
Trichloroethylene	4.06	3.70	8.87
Trichlorofluormethane	0.78	0.76	2.56
Trichloropropane	3.08	3.20	-3.90
Vinyl chloride	1.84	1.35	26.63

VOLATILE CONTINUING CALIBRATION CHECK

LabName: ENGINEERING SCIENCE Contract:

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

Instrument ID.: Vcal Calibration Date(s): 9/26/88

LAB FILE ID: RRF 50 33

Inital = 9/22/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	4.45	3.50	-21.35
Chlorobenzene	4.74	4.20	-11.39
1,2_Dichlorobenzene	3.79	3.30	-12.93
1,3_Dichlorobenzene	4.18	3.70	-11.48
1,4_Dichorobenzene	3.35	3.00	-10.45
Ethyl Benzene	3.10	2.70	-12.90
Toluene	3.55	3.20	-9.86
Xylenes	10.40	9.00	-13.46

This page intentionally left blank.

DATA PACKAGE #12

This page intentionally left blank.

ENGINEERING-SCIENCE, INC.

600 BANCROFT WAY
BERKELEY, CA 94710
Tel: (415) 548-7970 Fax: (415) 548-7635

Job No.: OR001

Work Order No.: 1028

Client: ES Oak Ridge
Attention: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Attached are the analytical reports for the water sample(s) received by this laboratory on 9-23-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092612	DANGB-2-MW7-GW1	BA-I	9-22-88		10-13-88	
88092612	DANGB-2-MW7-GW1	CD-F	9-22-88		10-26-88	
88092612	DANGB-2-MW7-GW1	CR-F	9-22-88		10-19-88	
88092612	DANGB-2-MW7-GW1	PB-F	9-22-88		10-24-88	
88092612	DANGB-2-MW7-GW1	418.1	9-22-88	10-01-88	10-10-88	
88092612	DANGB-2-MW7-GW1	8010	9-22-88		9-27-88	9-30-88
88092612	DANGB-2-MW7-GW1	8020	9-22-88		9-27-88	
88092612	DANGB-2-MW7-GW1	8270	9-22-88	9-28-88	11-06-88	
88092613	DANGB-2-MW6-GW1	BA-I	9-22-88		10-13-88	
88092613	DANGB-2-MW6-GW1	CD-F	9-22-88		10-26-88	
88092613	DANGB-2-MW6-GW1	CR-F	9-22-88		10-19-88	
88092613	DANGB-2-MW6-GW1	PB-F	9-22-88		10-24-88	
88092613	DANGB-2-MW6-GW1	418.1	9-22-88	10-01-88	10-10-88	
88092613	DANGB-2-MW6-GW1	8010	9-22-88		9-27-88	9-30-88
88092613	DANGB-2-MW6-GW1	8020	9-22-88		9-27-88	
88092613	DANGB-2-MW6-GW1	8270	9-22-88	9-28-88	11-07-88	
88092614	DANGB-2-MW5-GW1	BA-I	9-22-88		10-13-88	
88092614	DANGB-2-MW5-GW1	CD-F	9-22-88		10-26-88	
88092614	DANGB-2-MW5-GW1	CR-F	9-22-88		10-19-88	
88092614	DANGB-2-MW5-GW1	PB-F	9-22-88		10-24-88	
88092614	DANGB-2-MW5-GW1	418.1	9-22-88	10-01-88	10-10-88	
88092614	DANGB-2-MW5-GW1	8010	9-22-88		9-29-88	9-27-88
88092614	DANGB-2-MW5-GW1	8020	9-22-88		9-29-88	
88092614	DANGB-2-MW5-GW1	8270	9-22-88	9-28-88	11-07-88	

* If applicable

Job No.: OR001

Work Order No.: 1028

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092615	DANGB-2-MW38-GW1	BA-I	9-22-88		10-21-88	
88092615	DANGB-2-MW38-GW1	CD-F	9-22-88		10-27-88	
88092615	DANGB-2-MW38-GW1	CR-F	9-22-88		10-21-88	
88092615	DANGB-2-MW38-GW1	PB-F	9-22-88		10-22-88	
88092615	DANGB-2-MW38-GW1	418.1	9-22-88	10-01-88	10-10-88	
88092615	DANGB-2-MW38-GW1	8010	9-22-88		9-29-88	9-27-88
88092615	DANGB-2-MW38-GW1	8020	9-22-88		9-29-88	
88092615	DANGB-2-MW38-GW1	8270	9-22-88	9-28-88	11-07-88	
88092616	DANGB-2-GW2B-GW1	BA-I	9-22-88		10-13-88	
88092616	DANGB-2-GW2B-GW1	CD-F	9-22-88		10-26-88	
88092616	DANGB-2-GW2B-GW1	CR-F	9-22-88		10-19-88	
88092616	DANGB-2-GW2B-GW1	PB-F	9-22-88		10-24-88	
88092616	DANGB-2-GW2B-GW1	418.1	9-22-88	10-01-88	10-10-88	
88092616	DANGB-2-GW2B-GW1	8010	9-22-88		9-27-88	10-03-88
88092616	DANGB-2-GW2B-GW1	8020	9-22-88		9-27-88	
88092616	DANGB-2-GW2B-GW1	8270	9-22-88	9-28-88	11-06-88	
88092617	MATRIX SPIKE DUP MW6	418.1	9-22-88	10-01-88	10-10-88	
88092617	DANGB-2-MW5-GW1	8080	9-22-88	9-28-88	10-24-88	
88092617	DANGB-2-MW5-GW1	8270	9-22-88	9-28-88	11-07-88	
88092618	DANGB-FB15	8010	9-22-88		9-29-88	9-30-88
88092618	DANGB-FB15	8020	9-22-88		9-29-88	
88092619	DANGB-TB11	8010	9-16-88		9-28-88	9-29-88
88092619	DANGB-TB11	8020	9-16-88		9-28-88	
88092620	DANGB-8-GW8C-GW1	418.1	9-22-88	10-01-88	10-10-88	
88092621	DANGB-4-MW8-GW1	418.1	9-22-88	10-01-88	10-10-88	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092612-88092621
WORK ORDER NO.: 1028

These water samples were received at the ES Berkeley Laboratory on 9-23-88. They were received cold and intact.

ANALYSIS REPORT

ORK ORDER NUMBER: 1028
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/23/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
S OAK RIDGE/DULUTH ANGB
10 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
ILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

ONTRACT / PO # : OR001
ONTACT : BILL HAYDEN
(615)-481-3920

ASK: 2, UNITS: mg/L

EST COMPOUND	DANGB-2-MW7-GW1 88092612	DANGB-2-MW6-GW1 88092613	DANGB-2-MW5-GW1 88092614	DANGB-2-MW38-GW1 88092615	DANGB-2-GW2B-GW1 88092616
CID DIG FLAME	NA	NA	NA	NA	NA
CID DIG FURNACE	NA	NA	NA	NA	NA
ARIUM	<0.2	<0.2	<0.2	<0.2	<0.21
ADMIUM	<0.005	<0.005	<0.005	<0.005	<0.005
HROMIUM	<0.01	<0.01	<0.01	<0.01	<0.01
EAD	<0.005	<0.005	<0.005	<0.005	<0.005

) - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1028
JOB NUMBER : ZB0000000440
ORK ORDER DATE : 09/23/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
10 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 3, UNITS: mg/L

TEST COMPOUND	DANGB-2-MW7-GW1 88092612	DANGB-2-MW6-GW1 88092613	DANGB-2-MW5-GW1 88092614	DANGB-2-MW38-GW1 88092615	DANGB-2-GW2B-GW1 88092616	MATRIX SPIKE/DUP MW6 88092617
418.1 PETROLEUM HYDROCARBONS	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1028

ASK: 3, UNITS: mg/L

EST COMPOUND	DANGB-8-GW8C-GW1 88092620	DANGB-4-MW8-GW1 88092621
18.1 PETROLEUM HYDROCARBONS	<1.5	<1.5

) - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 1028
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/23/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT / PO # : OR001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 4, UNITS: ug/L, GROUP 8010

TEST COMPOUND	DANGB-2-MW7-GW1 88092612	DANGB-2-MW6-GW1 88092613	DANGB-2-MW5-GW1 88092614	DANGB-2-MW38-GW1 88092615	DANGB-2-GW2B-GW1 88092616	DANGB-FB15 88092618
BENZYL CHLORIDE	ND	ND	ND	ND	ND	ND
BIS (2-CHLOROETHOXY)METHANE	ND	ND	ND	ND	ND	ND
BIS (2-CHLOROISOPROPYL)ETHER	ND	ND	ND	ND	ND	ND
BROMOBENZENE	ND	ND	ND	ND	ND	ND
BROMODICHLOROMETHANE	ND	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND	ND
BROMOETHANE	ND	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND	ND
CHLORACETALDEHYDE	ND	ND	ND	ND	ND	ND
CHLORAL	ND	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND	ND
CHLOROFORM	ND	ND	ND	0.86B	ND	ND
1-CHLOROHEXANE	ND	ND	ND	ND	ND	ND
2-CHLOROETHYL VINYL ETHER	ND	ND	ND	ND	ND	ND
CHLOROMETHANE	ND	ND	ND	ND	ND	ND
CHLOROMETHYL METHYL ETHER	ND	ND	ND	ND	ND	ND
CHLOROTOLUENE	ND	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND	ND
DIBROMOMETHANE	ND	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	ND	ND	ND	ND
1,2-DICHLOROETHANE	ND	ND	ND	0.22	ND	ND
1,1-DICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHYLENE	ND	ND	ND	5.5	ND	ND
DICHLOROMETHANE	ND	ND	0.53B	0.96B	ND	1.7B
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1028

EST COMPOUND	DANGB-2-MW7-GW1 88092612	DANGB-2-MW6-GW1 88092613	DANGB-2-MW5-GW1 88092614	DANGB-2-MW38-GW1 88092615	DANGB-2-GW2B-GW1 88092616	DANGB-FB15 88092618
,3-DICHLOROPROPYLENE	ND	ND	ND	ND	ND	ND
,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
,1,1,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
ETRACHLOROETHYLENE	ND	ND	ND	ND	ND	ND
,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
RICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
RICHLOROFLUOROMETHANE	ND	ND	ND	16	ND	ND
RICHLOROPROPANE	ND	ND	ND	ND	ND	ND
INYL CHLORIDE	ND	ND	ND	ND	ND	ND
				ND	ND	ND

D - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1028

TASK: 4, UNITS: ug/L, GROUP 8010

TEST COMPOUND	DANGB-TB11 88092619
NZYL CHLORIDE	ND
BIS (2-CHLOROETHOXY)METHANE	ND
BIS (2-CHLOROISOPROPYL)ETHER	ND
OMOBENZENE	ND
OMODICHLOROMETHANE	ND
BROMOFORM	14
ROMOETHANE	ND
RBON TETRACHLORIDE	ND
HLORACETALDEHYDE.	ND
CHLORAL	ND
HLOROBENZENE	ND
HLOROETHANE	ND
CHLOROFORM	ND
1-CHLOROHEXANE	ND
-CHLOROETHYL VINYL ETHER	ND
HLOROMETHANE	ND
CHLOROMETHYL METHYL ETHER	ND
CHLOROTOLUENE	ND
IBROMOCHLOROMETHANE	2.0
IBROMOMETHANE	ND
1,2-DICHLOROBENZENE	ND
,3-DICHLOROBENZENE	ND
,4-DICHLOROBENZENE	ND
DICHLORODIFLUOROMETHANE	ND
1,1-DICHLOROETHANE	ND
,2-DICHLOROETHANE	ND
,1-DICHLOROETHYLENE	ND
TRANS-1,2-DICHLOROETHYLENE	ND
DICHLOROMETHANE	0.61B
,2-DICHLOROPROPANE	ND
,3-DICHLOROPROPYLENE	ND
1,1,2,2-TETRACHLOROETHANE	ND
1,1,1,2-TETRACHLOROETHANE	ND
ETRACHLOROETHYLENE	ND
,1,1-TRICHLOROETHANE	ND
1,1,2-TRICHLOROETHANE	ND
RICHLOROETHYLENE	ND
RICHLOROFLUOROMETHANE	ND
TRICHLOROPROPANE	ND
VINYL CHLORIDE	ND

ND - Not Detected

ANALYSIS REPORT

)RK ORDER NUMBER: 1028
:B NUMBER : ZB0000000440
:RK ORDER DATE : 09/23/88

APPROVED BY
Lab Supervisor

:PORT DATA:
; OAK RIDGE/DULUTH ANGB
0 S. ILLINOIS AVE. STE. S103
.K RIDGE, TN 37830
LL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

)NTRACT / PO # : OR001
)NTACT : BILL HAYDEN
(615)-481-3920

\SK: 4, UNITS: ug/L, GROUP 8020

:ST COMPOUND	DANGB-2-MW7-GW1 88092612	DANGB-2-MW6-GW1 88092613	DANGB-2-MW5-GW1 88092614	DANGB-2-MW38-GW1 88092615	DANGB-2-GW2B-GW1 88092616	DANGB-FB15 88092618
:NZENE	ND	ND	ND	ND	ND	ND
:LOROBENZENE	ND	ND	ND	ND	ND	ND
2-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
3-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
4-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
'HYL BENZENE	ND	ND	ND	ND	ND	ND
)LUENE	ND	ND	ND	ND	ND	ND
'LENES	ND	ND	ND	ND	ND	ND

- Not Detected

ENGINEERING-SCIENCE INC.
12/27/88

ANALYSIS REPORT FOR WORK ORDER NUMBER 1028

TASK: 4, UNITS: ug/L, GROUP 8020

TEST COMPOUND	DANGB-TB11 88092619
ENZENE	ND
CHLOROBENZENE	ND
1,2-DICHLOROBENZENE	ND
3-DICHLOROBENZENE	ND
,4-DICHLOROBENZENE	ND
ETHYL BENZENE	ND
OLUENE	ND
YLENES	ND

D - Not Detected

ANALYSIS REPORT

RK ORDER NUMBER: 1028
B NUMBER : ZB0000000440
RK ORDER DATE : 09/23/88

APPROVED BY _____
Lab Supervisor

PORT DATA:
OAK RIDGE/DULUTH ANGB
0 S. ILLINOIS AVE. STE. S103
K RIDGE, TN 37830
LL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

NTRACT / PO # : OR001
NTACT : BILL HAYDEN
(615)-481-3920

SK: 4, UNITS: ug/L, GROUP 8080

ST COMPOUND	MATRIX SPIKE/ DUP MW6 88092617
DRIN	ND
PHA-BHC	ND
TA-BHC	ND
LTA-BHC	ND
HMA-BHC	ND
LORDANE	ND
4'-DDD	ND
4'-DDE	ND
4'-DDT	ND
ELDRIN	ND
DOSULFAN I	ND
DOSULFAN II	ND
DOSULFAN SULFATE	ND
DRIN	ND
DRIN ALDEHYDE	NA
PTACHLOR	ND
PTACHLOR EPOXIDE	ND
PONE	ND
THOXYCHLOR	ND
XAPHENE	ND
B-1016	ND
B-1221	ND
B-1232	ND
B-1242	ND
B-1248	ND
B-1254	ND
B-1260	ND

- Not Detected

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

Date Received: September 23, 1988
Date Reported: December 9, 1988

Work Order: 1028
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092612	88092613
Sample No.:	DANGB-2-MW7-GW1	DANGB-2-MW6-GW1
Date Sampled:	9-22-88	9-22-88
Time Sampled:	08:45	11:00
Date Extracted:	9-28-88	9-28-88
Date Analyzed:	11-06-88	11-07-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
1,3-Dichlorobenzene	10	ND	ND
1,4-Dichlorobenzene	10	ND	ND
Hexachloroethane	10	ND	ND
Bis(2-chloroethyl)ether	10	ND	ND
1,2-Dichlorobenzene	10	ND	ND
N-Nitrosodimethylamine	10	ND	ND
Bis(2-chloroisopropyl)ether	10	ND	ND
N-Nitrosodi-n-propylamine	10	ND	ND
Hexachlorobutadiene	10	ND	ND
1,2,4-Trichlorobenzene	10	ND	ND
Nitrobenzene	10	ND	ND
Isophorone	10	ND	ND
Naphthalene	10	ND	ND
Bis(2-chloroethoxy)methane	10	ND	ND
2-Chloronaphthalene	10	ND	ND
Hexachlorocyclopentadiene	10	ND	ND
Acenaphthylene	10	ND	ND
Acenaphthene	10	ND	ND
Dimethyl phthalate	10	ND	ND
2,6-Dinitrotoluene	10	ND	ND
Fluorene	10	ND	ND
2,4-Dinitrotoluene	10	ND	ND
Diethyl phthalate	10	ND	63 B
N-Nitrosodiphenylamine	10	ND	ND
Hexachlorobenzene	10	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 23, 1988 Work Order: 1028
Date Reported: December 9, 1988 Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

Lab Number:	88092612	88092613
Sample No.:	DANGB-2-MW7-GW1	DANGB-2-MW6-GW1
Date Sampled:	9-22-88	9-22-88
Time Sampled:	08:45	11:00
Date Extracted:	9-28-88	9-28-88
Date Analyzed:	11-06-88	11-07-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Phenanthrene	10	ND	ND
Anthracene	10	ND	ND
Dibutyl phthalate	10	ND	ND
Fluoranthene	10	ND	ND
4-Chlorophenyl phenyl ether	10	ND	ND
Pyrene	10	ND	ND
Butyl Benzyl phthalate	10	ND	ND
Bis(2-ethylhexyl) phthalate	10	ND	ND
Chrysene	10	ND	ND
4-Bromophenyl phenyl ether	10	ND	ND
Benzo(a)anthracene	10	ND	ND
Di-n-octylphthalate	10	ND	ND
Benzo(b)fluoranthene	10	ND	ND
Benzo(k)fluoranthene	10	ND	ND
Benzidine	60	ND	ND
3,3'-Dichlorobenzidine	20	ND	ND
Benzo(a)pyrene	10	ND	ND
Indeno(1,2,3-cd)pyrene	10	ND	ND
Dibenzo(a,h)anthracene	10	ND	ND
Benzo(ghi)perylene	10	ND	ND
Benzyl Alcohol	20	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 23, 1988
Date Reported: December 9, 1988

Work Order: 1028
Job Number: OR001

For: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092612	88092613
Sample No.:	DANGB-2-MW7-GW1	DANGB-2-MW6-GW1
Date Sampled:	9-22-88	9-22-88
Time Sampled:	08:45	11:00
Date Extracted:	9-28-88	9-28-88
Date Analyzed:	11-06-88	11-07-88

Compound	Detection Limits ug/L	Analytical Results (dry weight) ug/L	ug/L
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
4-Chloroaniline	20	ND	ND
1-Chloronaphthalene	--*	ND	ND
Dibenzofuran	10	ND	ND
p-Dimethylaminoazobenzene	--*	ND	ND
7,12-Dimethylbenz(a)anthracene	--*	ND	ND
a-,a-Dimethylphenethylamine	--*	ND	ND
Diphenylamine	--*	ND	ND
1,2-Diphenylhydrazine	--*	ND	ND
Ethyl methanesulfonate	--*	ND	ND
3-Methylcholanthrene	--*	ND	ND
Methyl methanesulfonate	--*	ND	ND
2-Methylnaphthalene	10	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	50	ND	ND
3-Nitroaniline	50	ND	ND
4-Nitroaniline	50	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
2-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

Date Received: September 23, 1988
Date Reported: December 9, 1988

Work Order: 1028
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN:Mr. Bill Hayden

Lab Number:	88092612	88092613
Sample No.:	DANGB-2-MW7-GW1	DANGB-2-MW6-GW1
Date Sampled:	9-22-88	9-22-88
Time Sampled:	08:45	11:00
Date Extracted:	9-28-88	9-28-88
Date Analyzed:	11-06-88	11-07-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Alpha-BHC	--*	ND	ND
Gamma-BHC	--*	ND	ND
Beta-BHC	20	ND	ND
Heptachlor	10	ND	ND
Delta-BHC	15	ND	ND
Aldrin	10	ND	ND
Heptachlor epoxide	10	ND	ND
Endosulfan I	--*	ND	ND
Dieldrin	15	ND	ND
4,4'-DDE	30	ND	ND
Endrin	--*	ND	ND
Endosulfan II	--*	ND	ND
4,4'-DDD	15	ND	ND
4,4'-DDT	25	ND	ND
Endosulfan Sulfate	30	ND	ND
Endrin aldehyde	--*	ND	ND
Endrin Ketone	--*	ND	ND
Chlordane	60	ND	ND
Methoxychlor	--*	ND	ND
Toxaphene	60	ND	ND
Aroclor-1016	60	ND	ND
Aroclor-1221	60	ND	ND
Aroclor-1232	60	ND	ND
Aroclor-1242	60	ND	ND
Aroclor-1248	60	ND	ND
Aroclor-1254	60	ND	ND
Aroclor-1260	60	ND	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

Date Received: September 23, 1988
Date Reported: December 9, 1988

Work Order: 1028
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address:710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092612	88092613
Sample No.:	DANGB-2-MW7-GW1	DANGB-2-MW6-GW1
Date Sampled:	9-22-88	9-22-88
Time Sampled:	08:45	11:00
Date Extracted:	9-28-88	9-28-88
Date Analyzed:	11-06-88	11-07-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
2-Chlorophenol	10	ND	ND
2-Nitrophenol	10	ND	ND
Phenol	10	ND	ND
2,4-Dimethylphenol	10	ND	ND
2,4-Dichlorophenol	10	ND	ND
2,4,6-Trichlorophenol	10	ND	ND
4-Chloro-3-methylphenol	20	ND	ND
2,4-Dinitrophenol	50	ND	ND
2,6-Dichlorophenol	--*	ND	ND
2-Methyl-4,6-Dinitrophenol	50	ND	ND
Pentachlorophenol	50	ND	ND
4-Nitrophenol	50	ND	ND
Benzoic Acid	50	ND	ND
2-Methylphenol	10	ND	ND
3- & 4-Methylphenol	10	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
2,4,5-Trichlorophenol	10	ND	ND

Analyst

Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

ate Received: September 23, 1988
ate Reported: December 9, 1988

Work Order: 1028
Job Number: OR001

OR: ES:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

ab Number:	88092614	88092615
ample No.:	DANGB-2-MW5-GW1	DANGB-2-MW38-GW1
ate Sampled:	9-22-88	9-22-88
ime Sampled:	12:00	13:15
ate Extracted:	9-28-88	9-28-88
ate Analyzed:	11-07-88	11-07-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
,3-Dichlorobenzene	10	ND	ND
,4-Dichlorobenzene	10	ND	ND
exachloroethane	10	ND	ND
is(2-chloroethyl)ether	10	ND	ND
,2-Dichlorobenzene	10	ND	ND
-Nitrosodimethylamine	10	ND	ND
is(2-chloroisopropyl)ether	10	ND	ND
-Nitrosodi-n-propylamine	10	ND	ND
exachlorobutadiene	10	ND	ND
,2,4-Trichlorobenzene	10	ND	ND
itrobenzene	10	ND	ND
sophorone	10	ND	ND
aphthalene	10	ND	ND
is(2-chloroethoxy)methane	10	ND	ND
-Chloronaphthalene	10	ND	ND
exachlorocyclopentadiene	10	ND	ND
cenaphthylene	10	ND	ND
cenaphthene	10	ND	ND
imethyl phthalate	10	ND	ND
,6-Dinitrotoluene	10	ND	ND
luorene	10	ND	ND
,4-Dinitrotoluene	10	ND	ND
iethyl phthalate	10	79 B	ND
-Nitrosodiphenylamine	10	ND	ND
exachlorobenzene	10	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 23, 1988 Work Order: 1028
Date Reported: December 9, 1988 Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

Lab Number:	88092614	88092615
Sample No.:	DANGB-2-MW5-GW1	DANGB-2-MW38-GW1
Date Sampled:	9-22-88	9-22-88
Time Sampled:	12:00	13:15
Date Extracted:	9-28-88	9-28-88
Date Analyzed:	11-07-88	11-07-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Phenanthrene	10	ND	ND
Anthracene	10	ND	ND
Dibutyl phthalate	10	ND	ND
Fluoranthene	10	ND	ND
4-Chlorophenyl phenyl ether	10	ND	ND
Pyrene	10	ND	ND
Butyl Benzyl phthalate	10	ND	ND
Bis(2-ethylhexyl) phthalate	10	14 B	ND
Chrysene	10	ND	ND
4-Bromophenyl phenyl ether	10	ND	ND
Benzo(a)anthracene	10	ND	ND
Di-n-octylphthalate	10	ND	ND
Benzo(b)fluoranthene	10	ND	ND
Benzo(k)fluoranthene	10	ND	ND
Benzidine	60	ND	ND
3,3'-Dichlorobenzidine	20	ND	ND
Benzo(a)pyrene	10	ND	ND
Indeno(1,2,3-cd)pyrene	10	ND	ND
Dibenzo(a,h)anthracene	10	ND	ND
Benzo(ghi)perylene	10	ND	ND
Benzyl Alcohol	20	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 23, 1988
Date Reported: December 9, 1988

Work Order: 1028
Job Number: OR001

For: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092614	88092615
Sample No.:	DANGB-2-MW5-GW1	DANGB-2-MW38-GW1
Date Sampled:	9-22-88	9-22-88
Time Sampled:	12:00	13:15
Date Extracted:	9-28-88	9-28-88
Date Analyzed:	11-07-88	11-07-88

Compound	Detection Limits ug/L	Analytical Results (dry weight) ug/L	ug/L
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
4-Chloroaniline	20	ND	ND
1-Chloronaphthalene	--*	ND	ND
Dibenzofuran	10	ND	ND
p-Dimethylaminoazobenzene	--*	ND	ND
7,12-Dimethylbenz(a)anthracene	--*	ND	ND
a-,a-Dimethylphenethylamine	--*	ND	ND
Diphenylamine	--*	ND	ND
1,2-Diphenylhydrazine	--*	ND	ND
Ethyl methanesulfonate	--*	ND	ND
3-Methylcholanthrene	--*	ND	ND
Methyl methanesulfonate	--*	ND	ND
2-Methylnaphthalene	10	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	50	ND	ND
3-Nitroaniline	50	ND	ND
4-Nitroaniline	50	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
2-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

Date Received: September 23, 1988
Date Reported: December 9, 1988

Work Order: 1028
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN:Mr. Bill Hayden

Lab Number:	88092614	88092615
Sample No.:	DANGB-2-MW5-GW1	DANGB-2-MW38-GW1
Date Sampled:	9-22-88	9-22-88
Time Sampled:	12:00	13:15
Date Extracted:	9-28-88	9-28-88
Date Analyzed:	11-07-88	11-07-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Alpha-BHC	--*	ND	ND
Gamma-BHC	--*	ND	ND
Beta-BHC	20	ND	ND
Heptachlor	10	ND	ND
Delta-BHC	15	ND	ND
Aldrin	10	ND	ND
Heptachlor epoxide	10	ND	ND
Endosulfan I	--*	ND	ND
Dieldrin	15	ND	ND
4,4'-DDE	30	ND	ND
Endrin	--*	ND	ND
Endosulfan II	--*	ND	ND
4,4'-DDD	15	ND	ND
4,4'-DDT	25	ND	ND
Endosulfan Sulfate	30	ND	ND
Endrin aldehyde	--*	ND	ND
Endrin Ketone	--*	ND	ND
Chlordane	60	ND	ND
Methoxychlor	--*	ND	ND
Toxaphene	60	ND	ND
Aroclor-1016	60	ND	ND
Aroclor-1221	60	ND	ND
Aroclor-1232	60	ND	ND
Aroclor-1242	60	ND	ND
Aroclor-1248	60	ND	ND
Aroclor-1254	60	ND	ND
Aroclor-1260	60	ND	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

Date Received: September 23, 1988
Date Reported: December 9, 1988

Work Order: 1028
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092614	88092615
Sample No.:	DANGB-2-MW5-GW1	DANGB-2-MW38-GW1
Date Sampled:	9-22-88	9-22-88
Time Sampled:	12:00	13:15
Date Extracted:	9-28-88	9-28-88
Date Analyzed:	11-07-88	11-07-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
2-Chlorophenol	10	ND	ND
2-Nitrophenol	10	ND	ND
Phenol	10	ND	ND
2,4-Dimethylphenol	10	ND	ND
2,4-Dichlorophenol	10	ND	ND
2,4,6-Trichlorophenol	10	ND	ND
4-Chloro-3-methylphenol	20	ND	ND
2,4-Dinitrophenol	50	ND	ND
4,6-Dichlorophenol	--*	ND	ND
2-Methyl-4,6-Dinitrophenol	50	ND	ND
Pentachlorophenol	50	ND	ND
4-Nitrophenol	50	ND	ND
Benzoic Acid	50	ND	ND
2-Methylphenol	10	ND	ND
3- & 4-Methylphenol	10	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
2,4,5-Trichlorophenol	10	ND	ND

Laura Kurk
Analyst

Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING SCIENCE
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water

Date Received: September 23, 1988
Date Reported: December 9, 1988

Work Order: 1028
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092616	88092617
Sample No.:	DANGB-2-GW2B-GW1	MATRIX SPIKE AND DUPLICATE
Date Sampled:	9-22-88	9-22-88
Time Sampled:	15:45	11:05
Date Extracted:	9-28-88	9-28-88
Date Analyzed:	11-06-88	11-07-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
1,3-Dichlorobenzene	10	ND	ND
1,4-Dichlorobenzene	10	ND	ND
Hexachloroethane	10	ND	ND
Bis(2-chloroethyl)ether	10	ND	ND
1,2-Dichlorobenzene	10	ND	ND
N-Nitrosodimethylamine	10	ND	ND
Bis(2-chloroisopropyl)ether	10	ND	ND
N-Nitrosodi-n-propylamine	10	ND	ND
Hexachlorobutadiene	10	ND	ND
1,2,4-Trichlorobenzene	10	ND	ND
Nitrobenzene	10	ND	ND
Isophorone	10	ND	ND
Naphthalene	10	ND	ND
Bis(2-chloroethoxy)methane	10	ND	ND
2-Chloronaphthalene	10	ND	ND
Hexachlorocyclopentadiene	10	ND	ND
Acenaphthylene	10	ND	ND
Acenaphthene	10	ND	ND
Dimethyl phthalate	10	ND	ND
2,6-Dinitrotoluene	10	ND	ND
Fluorene	10	ND	ND
2,4-Dinitrotoluene	10	ND	ND
Diethyl phthalate	10	ND	ND
N-Nitrosodiphenylamine	10	ND	ND
Hexachlorobenzene	10	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 23, 1988 Work Order: 1028
Date Reported: December 9, 1988 Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB ATTN: Mr. Bill Hayden
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

Lab Number:	88092616	88092617
Sample No.:	DANGB-2-GW2B-GW1	MATRIX SPIKE AND DUPLICATE
Date Sampled:	9-22-88	9-22-88
Time Sampled:	15:45	11:05
Date Extracted:	9-28-88	9-28-88
Date Analyzed:	11-06-88	11-07-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Phenanthrene	10	ND	ND
Anthracene	10	ND	ND
Dibutyl phthalate	10	ND	ND
Fluoranthene	10	ND	ND
4-Chlorophenyl phenyl ether	10	ND	ND
Pyrene	10	ND	ND
Butyl Benzyl phthalate	10	ND	ND
Bis(2-ethylhexyl) phthalate	10	ND	ND
Chrysene	10	ND	ND
4-Bromophenyl phenyl ether	10	ND	ND
Benzo(a)anthracene	10	ND	ND
Di-n-octylphthalate	10	ND	ND
Benzo(b)fluoranthene	10	ND	ND
Benzo(k)fluoranthene	10	ND	ND
Benzidine	60	ND	ND
3,3'-Dichlorobenzidine	20	ND	ND
Benzo(a)pyrene	10	ND	ND
Indeno(1,2,3-cd)pyrene	10	ND	ND
Dibenzo(a,h)anthracene	10	ND	ND
Benzo(ghi)perylene	10	ND	ND
Benzyl Alcohol	20	ND	ND

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 23, 1988
Date Reported: December 9, 1988

Work Order: 1028
Job Number: OR001

For: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092616	88092617
Sample No.:	DANGB-2-GW2B-GW1	MATRIX SPIKE AND DUPLICATE
Date Sampled:	9-22-88	9-22-88
Time Sampled:	15:45	11:05
Date Extracted:	9-28-88	9-28-88
Date Analyzed:	11-06-88	11-07-88

Compound	Detection Limits ug/L	Analytical Results (dry weight) ug/L	ug/L
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
4-Chloroaniline	20	ND	ND
1-Chloronaphthalene	--*	ND	ND
Dibenzofuran	10	ND	ND
p-Dimethylaminoazobenzene	--*	ND	ND
7,12-Dimethylbenz(a)anthracene	--*	ND	ND
a-,a-Dimethylphenethylamine	--*	ND	ND
Diphenylamine	--*	ND	ND
1,2-Diphenylhydrazine	--*	ND	ND
Ethyl methanesulfonate	--*	ND	ND
3-Methylcholanthrene	--*	ND	ND
Methyl methanesulfonate	--*	ND	ND
2-Methylnaphthalene	10	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	50	ND	ND
3-Nitroaniline	50	ND	ND
4-Nitroaniline	50	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
2-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Pesticides and PCBs - SW 8270
Matrix: Water

Date Received: September 23, 1988
Date Reported: December 9, 1988

Work Order: 1028
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN:Mr. Bill Hayden

Lab Number:	88092616	88092617
Sample No.:	DANGB-2-GW2B-GW1	MATRIX SPIKE AND DUPLICATE
Date Sampled:	9-22-88	9-22-88
Time Sampled:	15:45	11:05
Date Extracted:	9-28-88	9-28-88
Date Analyzed:	11-06-88	11-07-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Alpha-BHC	--*	ND	ND
Gamma-BHC	--*	ND	ND
Beta-BHC	20	ND	ND
Heptachlor	10	ND	ND
Delta-BHC	15	ND	ND
Aldrin	10	ND	ND
Heptachlor epoxide	10	ND	ND
Endosulfan I	--*	ND	ND
Dieldrin	15	ND	ND
4,4'-DDE	30	ND	ND
Endrin	--*	ND	ND
Endosulfan II	--*	ND	ND
4,4'-DDD	15	ND	ND
4,4'-DDT	25	ND	ND
Endosulfan Sulfate	30	ND	ND
Endrin aldehyde	--*	ND	ND
Endrin Ketone	--*	ND	ND
Chlordane	60	ND	ND
Methoxychlor	--*	ND	ND
Toxaphene	60	ND	ND
Aroclor-1016	60	ND	ND
Aroclor-1221	60	ND	ND
Aroclor-1232	60	ND	ND
Aroclor-1242	60	ND	ND
Aroclor-1248	60	ND	ND
Aroclor-1254	60	ND	ND
Aroclor-1260	60	ND	ND

* EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Acid Extractables -- SW 8270
Matrix: Water

Date Received: September 23, 1988
Date Reported: December 9, 1988

Work Order: 1028
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address:710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88092616	88092617
Sample No.:	DANGB-2-GW2B-GW1	MATRIX SPIKE AND DUPLICATE
Date Sampled:	9-22-88	9-22-88
Time Sampled:	15:45	11:05
Date Extracted:	9-28-88	9-28-88
Date Analyzed:	11-06-88	11-07-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
2-Chlorophenol	10	ND	ND
2-Nitrophenol	10	ND	ND
Phenol	10	ND	ND
2,4-Dimethylphenol	10	ND	ND
2,4-Dichlorophenol	10	ND	ND
2,4,6-Trichlorophenol	10	ND	ND
4-Chloro-3-methylphenol	20	ND	ND
2,4-Dinitrophenol	50	ND	ND
2,6-Dichlorophenol	--*	ND	ND
2-Methyl-4,6-Dinitrophenol	50	ND	ND
Pentachlorophenol	50	ND	ND
4-Nitrophenol	50	ND	ND
Benzoic Acid	50	ND	ND
2-Methylphenol	10	ND	ND
3- & 4-Methylphenol	10	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
2,4,5-Trichlorophenol	10	ND	ND

Analyst

Laboratory Supervisor

* EPA has not yet determined detection limits for these compounds.

B = Compound was detected in the blank.

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

1028

CHAIN OF CUSTODY RECORD

E-S JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) J. Lance Beck

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 8010, 7060, 7131	SW7421, 7470	SW9310, 9315	SM429	REMARKS
9-22-88	1705	DANGB-8-GWBC-GW1	2				2	88262				RE-SAMPLE *
9-22-88	1713	DANGB-X-4-MW8-GW1	2				2	88261				RE-SAMPLE

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
J. Lance Beck	9-22-88 1730	FEC AIR BILL # 9490305964			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Kathy Clifton	9-23-88 10:50	Samples RECIEVED Cold & Intact

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

* 1 sample bottle received unpreserved.

ENGINEERING-SCIENCE

1028

CHAIN OF CUSTODY RECORD

JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) Johanna Beck

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 601	EPA 625	EPA 418.1	SW 5010, 7060, 7131	SW7421, 7470	SW9310, 9315	SM426	REMARKS
9-22-88	0895	DANGB-2-MW7-GW1	4			2	2					882612
9-22-88	1100	DANGB-2-MW6-GW1	4			2	2					* 882613 ~~882612~~
9-22-88	1200	DANGB-2-MW5-GW1	4			2	2					882614 ~~882613~~

811

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Johanna Beck	9-22-88 1730	FEC AIR BILL # 999030999964			
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	
			9-23-88 11:00	RECIEVED COLD & INTACT	

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

* one sample bottle for 625 preserved with acid.

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED								SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.										ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710
SAMPLER(S): (Signature) Johanna Burke											
DATE	TIME	SAMPLE DESCRIPTION									REMARKS
			SW8010, 8020	EPA 602	EPA 625	EPA 418.1	SW 8010, 7060, 7131	SW7421, 7420, 7191	SW9310, 9315	SM423	
9-22-88	1315	DANGB-2-MW38-GW1			2	2	1	1			
9-22-88	1200	DANGB-2-MW05-GW1					1	1			
9-22-88	1515	DANGB-2-GW2B-GW1			2	2					

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Johanna Burke	9-22-88 1730	FEC AIRBILL # 949030976 7			
Relinquished by: (Signature)	**Date/Time**	**Received for Laboratory by: (Signature)**	**Date/Time**	**Remarks**	
		Kelly Chandler	9-23-88 1124	6 Containers Received in the DANGB-2-MW38-GW1 Series including 2 Plastic containers for 6010, 7131, 7191, 7421	

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

ENGINEERING-SCIENCE

1028

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) Robert L. Davis

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 8010, 7060, 7131	SW7421, 2420, 7191	SW9310, 9315	SM429	REMARKS
9-22-88	0845	DANGB-2-MW7-GW1	5	5								382612
9-22-88	1100	DANGB-2-MW6-GW1	5	5								382613
9-22-88	1315	DANGB-2-MW36-GW1	5	5								382615
9-22-88	1230	DANGB-FB15	2	2								382618
9-22-88	1200	DANGB-2-MW5-GW1	5	5								382614
9-22-88	1545	DANGB-2-GW2B-GW1	7	5				1	1			382616
9-16-88	1300	DANGB-TB11	3	3								382619

8813

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Robert L. Davis	9-22-88 1730	Fed Ex Airbill # 940903099 64			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Kathy Chiba	9-23-88 10:20	Recieved Cold + Intact

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

1028

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
OR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) Johanna Barker

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 602	EPA 625	EPA 418.1	SW 8010, 7000, 7131	SW7421, 7420, 7131	SW8310, 9315	SM429	REMARKS
9-21-88	1415	DANGB-2-GW20-GW1	1					X	X			882577 REMAINDER OF SAMPLE
9-22-88	1105	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	6		Z	Z	Z		882617 SHIPPED 9-21-88			
9-22-88	0845	DANGB-2-MW7-GW1	2	882612				1	1			FEC AIR BILL #999030997 5
9-22-88	1100	DANGB-2-MW6-GW1	2					1	1			882613

814

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Johanna Barker	9-21-88 1730	FEC AIR BILL #999030996 4			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Cindy Chester	92388 12:40	Samples RECIEVED Cold & Intact

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

DRAFT

FEDERAL EXPRESS — AIRBILL

USE THIS AIRBILL FOR DOMESTIC SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 949030998 4

949030998 4

SENDER'S COPY

Sender's Federal Express Account Number: 1196 4207 5 | Date: 9-17-98

1 From (Your Name) Please Print: Kim Davis | Your Phone Number (Very Important): (615) 361 8920

Company: ENGINEERING SCIENCE | Department/Floor No.: STE 103

Street Address: 105 S. Illinois Ave

City: Oak Ridge | State: TN | ZIP Required: 37830

2 To (Recipient's Name) Please Print: KATHLEEN KIDD | Recipient's Phone Number (Very Important): ( )

Company: ENGINEERING SCIENCE | Department/Floor No.:

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): 1600 VARIAN WAY

City: [illegible] | State: CA | ZIP Required: 94[illegible]

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE): 0[illegible]

4 IF HOLD FOR PICK-UP, Print FEDEX Address Here

Street Address:

City | State | ZIP Required

PAYMENT: [X] Bill Sender [ ] Bill Recipient's FedEx Acct. No. [ ] Bill 3rd Party FedEx Acct. No. [ ] Bill Credit Card [ ] Cash

5 SERVICES

1 [X] PRIORITY 1 Overnight Delivery
2 [ ] COURIER-PAK OVERNIGHT ENVELOPE*
3 [ ] OVERNIGHT BOX
4 [ ] OVERNIGHT TUBE
5 [ ] STANDARD AIR Delivery not later than second business day
6 [ ] OVERNIGHT LETTER*
7 [ ]
8 [ ]
9 [ ]
10 [ ]

*Declared Value Limit $100.

DELIVERY AND SPECIAL HANDLING

1 [ ] HOLD FOR PICK-UP
2 [X] DELIVER WEEKDAY
3 DELIVER SATURDAY
4 [ ] DANGEROUS GOODS
5 [ ] CONSTANT SURVEILLANCE SERVICE (CSS)
6 [ ] DRY ICE ____ Lbs.
7 [ ] OTHER SPECIAL SERVICE
8 [ ]
9 [ ] SATURDAY PICK-UP
10 [ ]
11 [ ]
12 [ ] HOLIDAY DELIVERY

PACKAGES	WEIGHT	DECLARED VALUE	OVER SIZE
5	LBS		
	LBS		
	LBS		
	LBS		
Total 5	Total 1	Total	

Received At: 1 [ ] Regular Stop 2 [ ] On-Call Stop 3 [ ] Drop Box 4 [ ] B.S.C. 5 [ ] Station

FEDEX Corp. Employee No.: [illegible]

Date/Time for FEDEX Use: 9/23 1731

SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY

Use of this airbill constitutes your agreement to the service conditions in our current Service Guide which is available upon request. See back of sender's copy of this airbill for further information.

We will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay or non-delivery, unless you specify a higher amount in the space to the left, pay 40¢ per additional $100 specified and document your actual loss in the event of a claim. Maximum amount limitations found in the current Federal Express Service Guide apply. Your rights to recover from Federal Express for loss of the intrinsic value of the package, as well as for loss of sales, income, interest, profit, attorney's fees, costs and any other form of damage whether direct, incidental, consequential or special is limited to the greater of $100 or the declared value specified to the left. In no event shall your recovery exceed your actual loss.

In the event of untimely delivery, Federal Express will at your request and with some limitations, refund all transportation charges paid. See Service Guide for further information.

5 Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.

Release Signature: _____

Federal Express Use	
Base Charges	
Declared Value Charge	
Other 1	
Other 2	
Total Charges	

PART #2041738900
REVISION DATE 7/98
PRINTED IN U.S.A. GOFE

009

© 1995 F.E.C.

SENDER'S COPY

M-209

815

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY

QC REPORT NO.: TPH-W-0066-88

Insufficient sample was available for quality control purposes. The laboratory control sample is designated as a quality control sample for this batch.

The reporting limit for the samples in this batch is provided by the sub-contract laboratory.

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092548-88092551, 88092573-88092579
88092677-88092681, 88092695, 88092612-88092614

QC Report No: AAF-W-0052-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	PR	Notes
Arsenic	88092677	88092677	10-16-88	NA	7060	<0.01	<0.01	<0.01	NC	0.040	<0.01	0.0383	96	
Cadmium	88092677	88092677	10-26-88	NA	6010	<0.005	<0.005	<0.005	NC	0.010	<0.005	0.011	110	
Chromium	88092677	88092677	10-19-88	NA	6010	<0.01	<0.01	<0.01	NC	0.020	<0.01	0.0218	109	
Lead	88092677	88092677	10-21-88	NA	7421	<0.005	<0.005	<0.005	NC	0.020	<0.005	0.0227	114	

817

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092615-88092616, 88092719-88092722
88092724-88092725, 88092763-88092764
88092768-88092771, 88092777-88092780

QC Report No: AAF-W-0054-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-27-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	PR	Notes
Arsenic	88092724	88092724	10-21-88	NA	7060	<0.01	<0.01	<0.01	NC	0.040	<0.01	0.0364	91	
Cadmium	88092724	88092724	10-27-88	NA	6010	<0.005	<0.005	<0.005	NC	0.010	<0.005	0.010	100	
Chromium	88092724	88092724	10-21-88	NA	6010	<0.01	<0.01	<0.01	NC	0.020	<0.01	0.0199	100	
Lead	88092724	88092724	10-22-88	NA	7421	<0.005	<0.0063	<0.0063	0	0.020	0.0063	0.0252	94	

818

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092548-88092551, 88092573-88092579
88092677-88092681, 88092695, 88092612-88092614

QC Report No: LCP-W-0059-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-24-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	SA	Spike Recovery SR	Spike Recovery SSR	PR	Notes
Barium	88092677	88092677	10-13-88	NA	6010	<0.2	<0.2	<0.2	NC	2.0	<0.2	1.96	98	

819

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2}$ X 100

Percent Recovery (PR) = $\frac{SSR - SR}{SA}$ x 100

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QC-FRM04W

Job No.: OR001.02

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092615-88092616, 88092719-88092722
88092724-88092725, 88092763-88092764
88092768-88092771, 88092777-88092780

QC Report No: TCP-W-0061-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-27-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	Duplicate RPD	SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Barium	88092724	88092724	10-27-88	NA	6010	<0.2	<0.2	<0.2	NC	2.0	<0.2	0.190	95	

028

Relative Percent Difference (RPD) = $\frac{C1 - C2}{(C1 + C2)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

C1 = Concentration One
C2 = Concentration Two

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY

QC REPORT NO.: TPH-W-0065-88

Insufficient sample was available for quality control purposes. The laboratory control sample is designated as a quality control sample for this batch.

Reporting limit for the samples in this batch is provided by the sub-contract laboratory.

ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092620-88092621, 88092719-88092724
88092726-88092727

QC Report No: TPH-W-0065-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-10-88
Date Analyzed: 10-12-88
Date Reported: 11-01-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1.5	<1.5	39.5	41.9	106	40.7	103	3	*

228

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092574-88092576
88092612-88092617

QC Report No: TPH-W-0066-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-01-88
Date Analyzed: 10-10-88
Date Reported: 11-01-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1.5	<1.5	39.5	37.8	96	37.8	96	0	*

823

* See Case Narrative attached.

Relative Percent Difference (RPD) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

QUALITY CONTROL RESULTS SUMMARY
VOLATILE ORGANICS
EPA 8010/8020

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092612-88092619
88092578-88092582

QC Report No: VGC-W-0046-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-23-88
Date Prepared: NA
Date Analyzed: 10-05-88
Date Reported: 10-25-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092614	1,1-Dichloroethane	10	ND	9.85	98	9.04	90	9	26	70-130
	Trichloroethene	10	ND	9.73	97	8.79	88	10	19	65-131
	Chlorobenzene	10	ND	10.0	100	8.94	89	11	40	59-137
	Aromatics: 8020									
88092614	Benzene	10	ND	10.8	108	9.71	97	11	20	56-146
	Toluene	10	ND	10.0	100	9.84	98	2	41	42-150
	Chlorobenzene	10	ND	10.0	100	9.85	98	2	36	76-133

Relative Percent Difference (PR) = $\frac{MS - MSD}{(MS + MSD)/2} \times 100$

Percent Recovery (PR) = $\frac{(MS \text{ or } MSD) - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Sample Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 10-26-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
34	9-29-88	VGC	Carbopack	75-09-2	Dichloromethane	2.5	0.25	88092614-88092615
				67-66-3	Chloroform	0.65	0.05	88092618, 88092622
56	9-27-88	VGC	Vocol	75-09-2	Dichloromethane	3.4	0.25	88092612-88092613
				67-66-3	Chloroform	0.27	0.05	88092616
18	9-28-88	VGC	Carbopack	75-09-2	Dichloromethane	1.0	0.25	88092169
				67-66-3	Chloroform	0.74	0.05	

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report No: BNA-W-0054-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-23-88
Date Prepared: 9-28-88
Date Analyzed: 11-07-88
Date Reported: 12-28-88
Dilution Factor: 1.0

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88092612-88092617, 88092677-88092678
88092681, 88092694-88092695, 88092724,
88092765-88092766, 88092768-88092770, 88092772, 88092777

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limits RPD	RECOVERY
	1,2,4-Trichlorobenzene	100	ND	63.3	63	71.6	72	13	28	39-98
B/N	Acenaphthene	100	ND	71.2	71	73.9	74	4	31	46-118
Laboratory	2,4-Dinitrotoluene	100	ND	71.3	71	68.0	68	4	38	24-96
Sample #	Pyrene	100	ND	91.7	92	80.6	81	13	31	26-127
	N-Nitroso-di-n-Propylamine	100	ND	80.0	80	80.9	81	1	38	41-116
88092617	1,4-Dichlorobenzene	100	ND	70.4	70	76.7	77	10	28	36-97
ACID	Pentachlorophenol	200	ND	53.4	27	74.5	37	31	50	9-103
Laboratory	Phenol	200	ND	59.4	30	68.0	34	12	42	12-89
Sample #	2-Chlorophenol	200	ND	118	59	129	64	8	40	27-123
	4-Chloro-3-Methylphenol	200	ND	132	66	135	68	3	42	23-97
88092617	4-Nitrophenol	200	ND	81.1	41	88.0	44	7	50	10-80

$$\text{Relative Percent Difference (RPD)} = \frac{MS - MSD}{(MS + MSD)/2} \times 100$$

$$\text{Percent Recovery (PR)} = \frac{(MS \text{ or } MSD) - SR}{SA} \times 100$$

MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

NA = Not Applicable
NC = Not Calculated
ND = Not Detected

METHOD BLANK SUMMARY

Job No: OR001

Work Order No.: 1028

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 3-23-89

Laboratory Supervisor Approval:

Project: Duluth ANGB

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
S0390	11-06-88	AC	1	-	None Detected	-	-	88092612-88092617
E6109	11-05-88	BN	2	117-81-7	Bis(2-ethylhexyl)phthalate	12	10	88092612-88092617

827

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1028
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092612-2617
Attn:	Bill Hayden	BN BJank	88092677-2681
	710 S. Illinois Avenue		88092583-2587
Address:	Suite F-103	Lab File ID:	E6109
	Oak Ridge, Tn. 37830	Date Received:	NA
		Date Extracted:	09-28-88
		Date Analyzed:	11-05-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	NA
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	2	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.19	8	
-	Unknown	35.94	23	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1028
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092612-2617
Attn:	Bill Hayden	AC Blank	88092677-2681
	710 S. Illinois Avenue		88092583-2587
Address:	Suite F-103	Lab File ID:	S0390
	Oak Ridge, Tn. 37830	Date Received:	NA
		Date Extracted:	09-28-88
		Date Analyzed:	11-06-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	NA
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	4	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.30	120	
-	Unknown	3.34	7	
128-17-4	Tetrachloroethene	5.14	50	
-	Unknown	30.24	60	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
710 S. Illinois Avenue
Address: Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 8

Work Order No.: 1028
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092612-AC

Lab File ID: S0401
Date Received: 09-23-88
Date Extracted: 09-28-88
Date Analyzed: 11-07-88
Date Reported: 04-05-89
Dilution Factor: NA
% Moisture: dec:
not dec: N
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.31	150	
-	Unknown	4.74	6	
-	Unknown	4.99	100	
-	Unknown	5.09	8	
127-18-4	Tetrachloroethene	5.15	21	B
-	Unknown	5.22	6	
-	Unknown	5.56	76	
79-34-5	1,1,2,2-Tetrachloroethane	7.18	56	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1028
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092612-BN
Attn:	Bill Hayden		
	710 S. Illinois Avenue		
Address:	Suite F-103	Lab File ID:	E6112
	Oak Ridge, Tn. 37830	Date Received:	09-23-88
		Date Extracted:	09-28-88
		Date Analyzed:	11-06-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	NA
		% Moisture: dec:	
		not dec:	N
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	-	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.19	9	B
-	Unknown	25.92	19	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1028
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092613-AC
Attn:	Bill Hayden		
	710 S. Illinois Avenue		
Address:	Suite F-103	Lab File ID:	S0402
	Oak Ridge, Tn. 37830	Date Received:	09-23-88
		Date Extracted:	09-28-88
		Date Analyzed:	11-07-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	NA
		% Moisture: dec:	
		not dec:	N
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	6	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.27	140	
-	Unknown	3.32	170	
127-18-4	Tetrachloroethene	5.16	14	B
79-34-5	1,1,2,2-Tetrachloroethane	7.17	5	
-	Unknown	27.05	13	
-	Unknown	29.64	22	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1028
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092613-BN
Attn:	Bill Hayden		
	710 S. Illinois Avenue		
Address:	Suite F-103	Lab File ID:	E6117
	Oak Ridge, Tn. 37830	Date Received:	09-23-88
		Date Extracted:	09-28-88
		Date Analyzed:	11-07-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	N
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	2	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.21	14	B
-	Unknown	28.82	9	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1028
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092614-AC
Attn:	Bill Hayden		
	710 S. Illinois Avenue		
Address:	Suite F-103	Lab File ID:	S0403
	Oak Ridge, Tn. 37830	Date Received:	09-23-88
		Date Extracted:	09-28-88
		Date Analyzed:	11-07-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	N
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	7	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.22	25	
-	Unknown	3.28	120	
-	Unknown	3.35	200	
-	Unknown	4.94	16	
127-18-4	Tetrachloroethene	5.17	17	B
-	Unknown	5.52	9	
-	Unknown	7.18	12	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1028
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092614-BN
Attn:	Bill Hayden		
	710 S. Illinois Avenue		
Address:	Suite F-103	Lab File ID:	E6118
	Oak Ridge, Tn. 37830	Date Received:	09-23-88
		Date Extracted:	09-28-88
		Date Analyzed:	11-07-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	N
		GPC Clean up: (Y/N)	N
# TICs Found:	4	Extraction: (SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.45	5	
-	Unknown	3.93	14	
127-18-4	Tetrachloroethene	4.23	16	B
-	Unknown	25.32	18	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
710 S. Illinois Avenue
Address: Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 6

Work Order No.: 1028
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092615-AC

Lab File ID: S0404
Date Received: 09-23-88
Date Extracted: 09-28-88
Date Analyzed: 11-07-88
Date Reported: 04-05-89
Dilution Factor: 1
% Moisture: dec:
not dec: N
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.22	17	
-	Unknown	3.28	99	
-	Unknown	3.34	150	
-	Unknown	3.37	45	
-	Unknown	4.93	7	
127-18-4	Tetrachloroethene	5.17	13	B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
710 S. Illinois Avenue
Address: Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 4

Work Order No.:	1028
Matrix: (soil/water)	Water
Sample Wt/vol:	1000 ml
Lab Sample ID:	88092615-BN
Lab File ID:	E6119
Date Received:	09-23-88
Date Extracted:	09-28-88
Date Analyzed:	11-07-88
Date Reported:	04-05-89
Dilution Factor:	1
% Moisture: dec:	
not dec:	N
GPC Clean up: (Y/N)	N
Extraction: (SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.10	5	
127-18-4	Tetrachloroethene	4.19	15	B
-	Unknown	25.19	16	
-	Unknown	35.88	13	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1028
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092616-AC
Attn:	Bill Hayden		
	710 S. Illinois Avenue		
Address:	Suite F-103	Lab File ID:	S0398
	Oak Ridge, Tn. 37830	Date Received:	09-23-88
		Date Extracted:	09-28-88
		Date Analyzed:	11-06-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	N
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	14	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.22	61	
-	Unknown	3.28	140	
-	Unknown	3.36	210	
79-01-6	Trichloroethene	3.46	12	
-	Unknown	4.26	5	
-	Unknown	4.73	7	
-	Unknown	4.97	71	
-	Unknown	5.08	5	
127-18-4	Tetrachloroethene	5.16	17	B
-	Unknown	5.54	56	
-	Unknown	7.18	30	
-	Unknown	27.00	5	
-	Unknown	29.44	5	
-	Unknown	34.95	10	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
710 S. Illinois Avenue
Address: Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 7

Work Order No.: 1028
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092616-BN

Lab File ID: S0399
Date Received: 09-23-88
Date Extracted: 09-28-88
Date Analyzed: 11-06-88
Date Reported: 04-05-89
Dilution Factor: 1
% Moisture: dec:
not dec: N
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.32	400	
-	Unknown	3.35	25	
-	Unknown	4.95	210	
127-18-4	Tetrachloroethene	5.15	14	B
-	Unknown	5.52	140	
79-34-5	1,1,2,2-Trichloroethane	7.16	33	
-	Unknown	27.01	8	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1028
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092617-AC
Attn:	Bill Hayden		
	710 S. Illinois Avenue		
Address:	Suite F-103	Lab File ID:	S0405
	Oak Ridge, Tn. 37830	Date Received:	09-23-88
		Date Extracted:	09-28-88
		Date Analyzed:	11-07-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	N
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	10	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.27	64	
-	Unknown	3.34	18	
79-01-6	Trichloroethene	3.46	19	
108-88-3	Toluene	4.45	4	
-	Unknown	4.95	10	
127-18-4	Tetrachloroethene	5.17	25	B
-	Unknown	5.52	5	
79-34-5	1,1,2,2-Trichloroethane	7.17	7	
-	Unknown Alkane	21.59	4	
-	Unknown Alkane	24.22	17	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
710 S. Illinois Avenue
Address: Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 4

Work Order No.:	1028
Matrix: (soil/water)	Water
Sample Wt/vol:	1000 ml
Lab Sample ID:	88092617-BN
Lab File ID:	S0406
Date Received:	09-23-88
Date Extracted:	09-28-88
Date Analyzed:	11-07-88
Date Reported:	04-05-89
Dilution Factor:	1
% Moisture: dec:	
not dec:	N
GPC Clean up: (Y/N)	N
Extraction: (SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.30	230	
-	Unknown	3.33	240	
127-18-4	Tetrachloroethene	5.17	31	B
-	Unknown	26.17	16	

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 03-92
Lab File ID: S0390/E6109
Matrix: water
Level (low/med):
Date Analyzed: 11-6-88
Time Analyzed: 14:11, 21:28
Instrument ID:
Date Reported:

Project: Duluth

This Method Blank applies to the following samples, MS and MSD.

Sample Number	Lab Sample ID	Lab File ID	Date of Analysis
DANGB-2-MW7-GW1	88092612	S0401, E6112/20	11-7-88, 11-7-88
-2-MW6-GW1	88092613	S0402, E6117	11-7-88, 11-7-88
-2-MW5-GW1	88092614	S0403, E6118	11-7-88, 11-7-88
-2-MW38-GW1	88092615	S0404, E6119	11-7-88, 11-7-88
-2-GW2B-GW1	88092616	S0398/99	11-6-88
MATRIX SPIKE/MATRIX SPIKE DUPLICATE	88092617	S0405, S0406	11-7-88
	88092617MS	S0407, S0409	11-7-88
	88092617MSD	S0408, S0410	11-7-88

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 11/07/88 0:07

Lab ID >T3106::01 Data Release Authorized By:

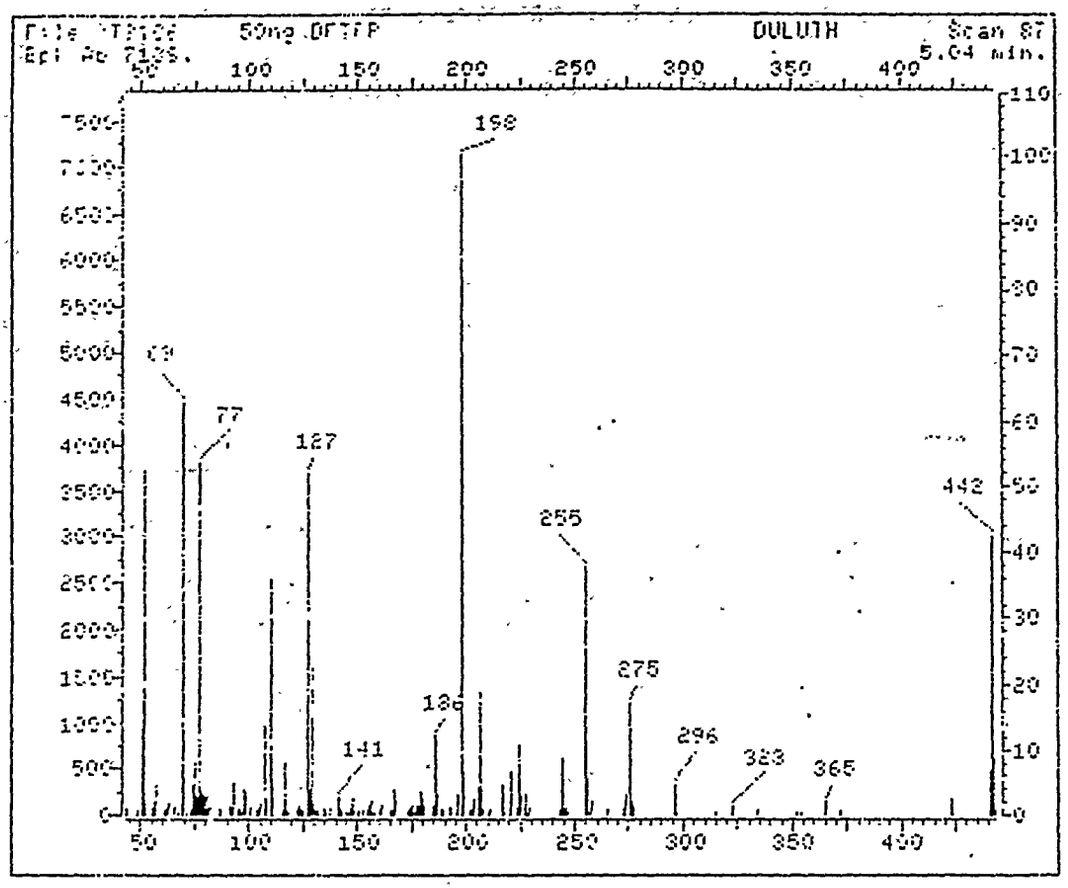
m/e	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	52.84 OK	
68	less than 2.0% of mass 69	5.0% OK	(0.60) #1
69	mass 69 relative abundance	62.79	
70	less than 2.0% of mass 69	0.0% OK	(0.00) #1
127	40.0 - 60.0% of mass 198	51.81 OK	
197	less than 1.0% of mass 198	0.90 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	6.65 OK	
275	10.0 - 30.0% of mass 198	17.25 OK	
365	greater than 1.00% of mass 198	2.00 OK	
441	present, but less than mass 443	6.74 OK	
442	greater than 40.0% of mass 198	42.43 OK	
443	17.0 - 23.0% of mass 442	8.47 OK	(19.96) #2

5 point
10/12/88

THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

SAMPLE ID	LAB_ID	DATE_OF_ANALYSIS	TIME_OF_ANALYSIS
50ng DFTPP	>T3106	11/07/88	0:07
ESTD050	50400		00:23
8809367 AC	50401		01:22
8809367 AC	50402		02:20
8809367 AC	50403		03:19
8809367 AC	50404		04:18
8809367 AC	50405		05:16
8809367 BN	50406		06:16
8809367MS AC	50407		07:16
8809367MSD AC	50408		08:14
8809367MS BN	50409		09:13
8809367MSD BN	50410		10:13
88081977	50411		11:19



File: 13106 Scan #: 87 Retn. time: 5.04

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.20	1.196	93.00	4.755	137.15	1.055	181.05	1.337	243.10	.746
44.10	.802	95.10	.619	141.05	2.631	185.05	1.533	244.10	8.413
49.10	.802	96.10	1.055	142.15	1.069	186.05	12.254	245.00	.985
50.10	13.661	97.20	.478	143.05	.619	187.05	3.039	246.10	1.210
51.10	52.842	98.10	3.883	145.05	.394	188.15	.985	247.00	.366
52.10	2.096	99.10	3.419	145.95	.394	189.05	.661	255.00	37.437
55.00	1.379	101.00	1.941	147.15	1.210	192.05	1.069	256.00	5.853
56.10	2.068	103.10	.872	147.95	2.434	193.05	1.252	257.00	.549
57.10	4.361	104.10	1.111	149.05	.774	196.10	3.236	258.05	2.251
61.10	.647	105.05	1.913	151.15	.605	198.00	100.000	265.10	.886
62.10	.921	107.00	13.590	152.95	.760	199.00	6.626	273.00	1.083
63.10	1.829	108.00	2.392	154.05	.929	201.50	.718	274.05	3.123
65.20	1.256	110.00	35.439	155.05	1.393	203.10	.647	275.05	17.248
67.10	.535	111.00	4.418	156.05	2.040	204.10	2.617	276.05	2.096
69.00	62.704	116.00	.830	157.15	.506	205.10	4.249	277.05	1.337
71.10	.422	117.00	7.822	157.95	.492	206.10	18.613	296.05	4.600
73.10	.802	117.95	.689	160.05	.633	207.10	3.799	297.05	.563
74.10	4.469	119.05	.406	161.05	1.491	208.10	.914	315.05	.450
75.00	7.935	122.05	.914	165.05	.929	210.00	.352	323.05	1.337
76.10	2.698	123.05	1.590	165.95	.746	211.00	.689	333.95	.858
77.10	53.334	124.05	.816	167.05	3.742	217.00	4.629	351.85	.422
78.10	3.967	124.95	.886	167.95	2.026	218.00	.535	354.10	.422

79.00	3.354	127.05	51.815	173.05	.619	221.10	6.345	365.00	1.598
80.00	2.858	128.05	3.714	173.95	.999	223.10	.985	372.00	.703
81.00	4.755	129.00	22.355	175.05	1.519	224.10	10.692	423.00	2.364
82.00	1.224	130.05	2.110	176.15	.577	225.10	2.828	424.10	.563
83.10	1.543	131.15	.633	177.05	1.421	227.00	3.630	441.05	6.739
86.00	1.055	132.05	.830	178.05	1.407	227.90	.366	442.05	42.431
87.00	.732	133.05	.718	179.05	3.405	228.10	.408	443.05	8.469
91.00	1.379	135.05	1.843	179.95	2.378	229.00	1.182	444.05	.661
92.10	1.083	136.05	.732						

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/07/88

Contractor: ENGINEERING - SCIENCE Time: 00:23

Contract No: _____ Laboratory ID: >50400

Instrument ID: 1 Initial Calibration Date: 10/13/88

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is _____%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	1.04203	15.56		
2-Fluorophenol	1.15802	1.39176	20.18		
bis(2-Chloroethyl)ether	1.11892	1.09283	2.33		
Phenol	1.41657	1.65020	16.49	*	
Phenol-d5	1.22488	1.51859	23.98		
Aniline	.54193	.56755	4.73		
2-Chlorophenol	1.23175	1.35348	9.88		
1,3-Dichlorobenzene	1.47535	1.47385	.10		
1,4-Dichlorobenzene	1.40530	1.52151	8.27	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.27334	62.51		
1,2-Dichlorobenzene	1.32240	1.45286	9.87		
2-Methylphenol	1.17367	1.47167	25.39		
3-&-4-Methylphenol	1.07139	1.48209	38.33		
bis(2-chloroisopropyl)Ether	2.15627	2.52004	16.87		
N-Nitroso-Di-n-Propylamine	.84050	.94326	12.22		**
Hexachloroethane	.53840	.60826	12.98		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.40980	1.66		
Nitrobenzene-d5	.39137	.41820	6.85		
2-Nitrophenol	.24657	.26543	7.65	*	
Isophorone	.74170	.79727	7.49		
bis(2-Chloroethoxy)methane	.49386	.52607	6.52		
2,4-Dimethylphenol	.34849	.37864	8.65		
Benzoic Acid	.29725	.30160	1.47		
2,4-Dichlorophenol	.56733	.59225	4.39	*	
1,2,4-Trichlorobenzene	.36913	.31633	14.30		
Naphthalene	.94589	.93226	1.44		
4-Chloroaniline	.36309	.33345	8.16		
Hexachlorobutadiene	.20283	.16160	20.33	*	
4-Chloro-3-Methylphenol	.31360	.31624	.84	*	
2-Methylnaphthalene	.56397	.57935	2.73		

RF - Response Factor from daily standard file at 60.00 mg/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/07/88

Contractor: ENGINEERING SCIENCE Time: 00:23

Contract No: _____ Laboratory ID: >S0400

Instrument ID: 1 Initial Calibration Date: 10/12/88

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is _____ %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.26975	8.77		**
2,4,6-Trichlorophenol	.42280	.34854	17.56	*	
2,4,5-Trichlorophenol	.52897	.52552	.65		
2-Fluorobiphenyl	1.27220	1.14404	10.07		
2-Chloronaphthalene	1.23784	1.15576	6.63		
2-Nitroaniline	.47288	.49216	4.08		
Dimethylphthalate	1.40629	1.33012	5.42		
2,6-Dinitrotoluene	.37415	.36785	1.68		
Acenaphthylene	1.68918	1.61036	4.67		
3-Nitroaniline	.44557	.46832	5.11		
2,4-Dinitrophenol	.11898	.11360	4.52		**
Acenaphthene	1.13011	1.03776	8.17	*	
Dibenzofuran	1.64131	1.52788	6.91		
2,4-Dinitrotoluene	.28418	.29599	4.16		
4-Nitrophenol	.28450	.23998	15.65		**
Fluorene	1.12850	1.02472	9.20		
Diethylphthalate	1.20939	1.21826	.73		
4-Chlorophenyl-phenylether	.59183	.52758	10.86		
4-Nitroaniline	.35956	.31131	13.42		
2,4,6-Tribromophenol	.21023	.16365	22.16		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.49480	22.82	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.21865	2.65		
Hexachlorobenzene	.26273	.25181	4.16		
Pentachlorophenol	.14536	.12676	12.79	*	

RF - Response Factor from daily standard file at 60.00 mg/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/07/88

Contractor: ENGINEERING-SCIENCE Time: 00:23

Contract No: _____ Laboratory ID: >S0400

Instrument ID: 1 Initial Calibration Date: 10/12/88

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is _____ %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	.99882	3.43		
Anthracene	1.05155	1.18711	12.89		
Di-n-Butylphthalate	1.51956	1.81595	19.51		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.14619	3.72	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.05067	25.95		
Pyrene	1.56086	1.73154	10.93		
Terphenyl-d14	1.05835	1.12522	6.32		
Butylbenzylphthalate	1.03390	1.28747	24.53		
3,3'-Dichlorobenzidine	.13689	.19565	42.93		
Chrysene	.99655	1.09923	10.30		
Benzo(a)Anthracene	1.10407	1.05381	4.55		
bis(2-Ethylhexyl)Phthalate	1.21073	1.55203	28.19		
Di-n-octylphthalate	3.40275	3.90428	14.74	*	
Benzo(a)Pyrene	1.32098	1.36455	3.30	*	
Benzo(b)Fluoranthene	1.60850	1.18940	26.06		
Indeno(1,2,3-cd)Pyrene	.96800	.98931	2.20		
Dibenzo(a,h)Anthracene	.87481	.90958	3.97		
Benzo(k)Fluoranthene	1.44370	1.80517	25.04		
Benzo(g,h,i)Perylene	.89761	.84288	6.10		

RF - Response Factor from daily standard file at 60.00 ng/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR00 01

Lab Code: _____ Case No.: _____ SAS No.: _____ Job No.: _____

Sample No. (Standard): SSTD060 Date Analyzed: 11/7/88

Lab File ID (Standard): S0400 Time Analyzed: 00:23

Instrument ID: 1

		IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
	12 HOUR STD	70321	9.29	247642	12.91	131557	18.38
	UPPER LIMIT	140642	9.79	495284	13.41	263114	18.88
	LOWER LIMIT	35161	8.79	123821	12.41	65779	17.88
	EPA SAMPLE NO.						
S0401 01	88092613 AC	70816	9.28	207120	12.95	124971	18.39
02	88092613 AC	67948	9.30	265401	13.01	132310	18.42
03	88092614 AC	76769	9.30	289369	12.97	146736	18.41
04	88092615 AC	75251	9.30	218147	12.98	129796	18.39
05	88092617 AC	79216	9.30	299285	12.96	146385	18.39
06	88092617 BN	67751	9.36	213114	12.95	122689	18.43
07	88092617 MS AC	76905	9.30	255623	12.95	143318	18.37
08	88092617 MSD AC	72238	9.30	261098	12.97	138324	18.37
09	88092617 MS BN	69179	9.28	263564	12.92	134221	18.38
10	88092617 MSD BN	74017	9.29	267371	12.90	143747	18.37
11	88081977	77846	9.36	267014	12.97	137783	18.45
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d8

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

* = Column used to flag internal standard area values with an asterisk.

Page __ of __

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: ORØØ1

Lab Code: _____ Case No.: _____ SAS No.: _____ Job No.: _____

Sample No.(Standard): SSTDØ6Ø Date Analyzed: 11/7/88

Lab File ID (Standard): S84ØØ Time Analyzed: ØØ:23

Instrument ID: |

	IS4 (PHN) AREA #	RT	IS5 (CRY) AREA #	RT	IS4 (PRY) AREA #	RT
12 HOUR STD	184678	23.03	113849	31.49	73531	37.72
UPPER LIMIT	369356	23.53	227698	31.99	147062	38.22
LOWER LIMIT	92339	22.53	56925	30.99	36766	37.22
EPA SAMPLE NO.						
SWLCL 01 8809 2612 AC	164726	23.07	88249	31.51	39896	37.71
02 8809 2613 AC	173619	23.08	89365	31.58	47873	37.87
03 8809 2614 AC	197049	23.07	110829	31.53	58403	37.74
04 8809 2615 AC	175394	23.04	101753	31.51	56156	37.73
05 8809 2617 AC	193407	23.04	109645	31.55	50220	37.81
06 8809 2617 BN	164239	23.14	90714	31.57	45668	37.78
07 8809 2617 MS AC	187216	23.05	99205	31.58	40169	37.85
08 8809 2617 MSD AC	184814	23.05	103301	31.57	45761	37.85
09 8809 3617 MS BN	197693	23.10	106913	31.56	51644	37.71
10 8809 2617 MSD BN	209345	23.10	125682	31.53	71067	37.72
11 8808 1977	186027	23.12	101126	31.57	17584 *	37.87
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____

Instrument IDVOCAL_____ Calibration Date(s):_9/27/88

LAB FILE ID:_53,54_____ Init. Calib. Date(s):_9/22/88 , 9/14/88

COMPOUND	RRF	RRF50	%D
Benzyl chloride	4.43	9.80	-121.22
bis (2-choroethoxy) methane	0.12		100.00
bis (2-choroisopropyl ether	0.12		100.00
Bromobenzene	3.08	4.80	-55.84
Bromodichloromethane	4.91	4.20	14.46
Bromoform	3.32	3.00	9.64
Bromomethane	0.43	0.00	100.00
Carbon tetrachloride	5.00	4.20	16.00
Chloroacetaldehyde	0.07		100.00
Chlorobenzene	1.38	1.90	-37.68
Chloroethane	0.73	0.00	100.00
Chloroform	4.22	3.60	14.69
1-Chorohexane	0.82	1.30	-58.54
2-Chloroethyl vinyl ether	0.12		100.00
Chloromethane	1.84	0.00	100.00
Chloromethyl methyl ether	0.02	0.00	100.00
o_,m_,& p_Chlorotoluenes	3.34	5.10	-52.69
Dibromochloromethane	4.68	4.10	12.39
Dibromomethane	3.06	4.40	-43.79
1,2_Dichlorobenzene	2.22	1.90	14.41
1,3_Dichlorobenzene	1.79	1.60	10.61
1,4_Dichlorobenzene	1.83	1.60	12.57
Dichlorodifluormethane	0.54		100.00
1,1_Dichloroethane	2.74	2.20	19.71
1,2_Dichloroethane	3.74	3.00	19.79
1,1_Dichloroethylene	1.32	1.30	1.52
trans_1,2_dichloroethylene	2.96	2.40	18.92
Dichloromethane	4.72	2.80	40.68
1,2_Dichloropropane	3.18	2.70	15.09
1,3_Dichloropropylene	0.47	0.71	-51.06
1,1,2,2_Tetrachloroethane	4.04	3.40	15.84
1,1,1,2_Tetrachloroethane	4.83	6.90	-42.86
Tetrachloroethylene	5.06	4.20	17.00
1,1,1_Trichloroethane	2.77	2.40	13.36
1,1,2_Trichloroethane	4.42	7.30	-65.16
Trichloroethylene	4.06	3.40	16.26
Trichlorofluormethane	0.78	0.67	14.10
Trichloropropane	3.08	4.80	-55.84
Vinyl chloride	1.84	0.00	100.00

Lab Code:_____ Case No.:_____ SAS No.:_____ SDG No.:_____

Instrument ID.: Vical Calibration Date(s): 4/27/88

LAB FILE ID: RRF 50 53

Int Calibration = 9/22/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	4.45	3.60	-19.10
Chlorobenzene	4.74	4.10	-13.50
1,2_Dichlorobenzene	3.79	3.20	-15.57
1,3_Dichlorobenzene	4.18	3.60	-13.88
1,4_Dichorobenzene	3.35	2.80	-16.42
Ethyl Benzene	3.10	2.60	-16.13
Toluene	3.55	3.10	-12.68
Xylenes	10.40	8.80	-15.38

24 OCT 88

SOL 9/28/88

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____ SDG No.:_____

Instrument ID.: CARbopak Calibration Date(s): 9/28/88 _____

LAB FILE ID: 15, 16 Init. Calib. Date(s): 9/19/88 9/23/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzyl chloride	0.32	0.24	25
bis (2-chloroethoxy methane			
bis (2-chloroisopropyl ether			
Bromobenzene	1.4	1.0	28
Bromodichloromethane	3.7	3.4	8
Bromoform	1.7	2.3	35
Bromomethane	0.40	0.13	68
Carbon tetrachloride	4.2	3.7	12
Chloroacetaldehyde			
Chlorobenzene	1.4	1.3	7
Chloroethane	0.72	0.43	40
Chloroform	5.6	3.7	34
1-Chorohexane	1.2	0.87	28
2-Chloroethyl vinyl ether			
Chloromethane	0.46	0.25	46
Chloromethyl methyl ether			
o_,m_,& p_Chlorotoluenes	4.6	3.4	26
Dibromochloromethane	3.7	3.7	0
Dibromomethane	3.2	2.1	34
1,2_Dichlorobenzene o	2.5	2.4	4
1,3_Dichlorobenzene m	2.1	2.0	5
1,4_Dichlorobenzene p	1.8	2.0	11
Dichlorodifluormethane	~~2.4~~		
1,1_Dichloroethane	~~8~~62.4	2.0	17
1,2_Dichloroethane	~~8~~62.6	2.4	8
1,1_Dichloroethylene	~~2~~42.6	2.2	15
trans_1,2_dichloroethylene	~~4~~42.4	2.2	8
Dichloromethane	~~2.5~~ 4.1	7.2	77
1,2_Dichloropropane	~~5~~92.5	2.1	16
1,3_Dichloropropylene	~~7~~5.59	4.2	29
1,1,2,2_Tetrachloroethane	~~5~~27.5	7.3	3
1,1,1,2_Tetrachloroethane	~~4~~65.2	3.7	29
Tetrachloroethylene	~~3~~07.5	7.3	3
1,1,1_Trichloroethane	~~5~~93.0	2.7	10
1,1,2_Trichloroethane	~~4~~05.9	4.2	29
Trichloroethylene	~~2~~34.0	3.5	12
Trichlorofluormethane	23	1.7	26
Trichloropropane	2.1	2.7	28
Vinyl chloride	0.94	0.74	21

file: 8020CONT
3 Nov 88

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____ SDG No.:_____

Instrument ID.: CARbopak Calibration Date(s): 9/28/88 _____

LAB FILE ID: 15 Init. Calib. Date(s): 9/19/88 _____

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	4.9	5.0	2
Chlorobenzene	5.3	4.8	9
1,2_Dichlorobenzene	4.4	3.8	14
1,3_Dichlorobenzene	5.0	4.2	16
1,4_Dichorobenzene	4.1	3.4	17
Ethyl Bezene	4.4	3.1	3/16
Toluene	3.9	3.5	10
Xylenes	13	11	15

File: CONTINUE
24 Oct 88

88-0252 7
2627
2670
2599

2618
2622
2679
2696
2695
2680

47 - 299

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____ SDG No.:_____

Instrument ID.: CARbopak Calibration Date(s): 9/20/88 _____

LAB FILE ID: 31,32 Init. Calib. Date(s): 9/19/88 9/23/88

COMPOUND	RRF	RRF50	%D
Benzyl chloride	0.32	0.38	19
bis (2-chloroethoxy methane	—	—	
bis (2-chloroisopropyl ether	—	—	
Bromobenzene	1.4	1.1	21
Bromodichloromethane	3.7	3.8	2.7
Bromoform	1.7	1.9	12
Bromomethane	0.40	0.18	22
Carbon tetrachloride	4.2	4.1	2.4
Chloroacetaldehyde	—	—	
Chlorobenzene	1.4	1.4	0
Chloroethane	0.32	0.41	43
Chloroform	3.9	4.1	5.1
1-Chorohexane	1.2	0.89	26
2-Chloroethyl vinyl ether	—	—	
Chloromethane	0.46	0.44	4.3
Chloromethyl methyl ether	—	—	
o_,m_,& p_Chlorotoluenes	4.6	3.5	24
Dibromochloromethane	3.7	3.8	2.7
Dibromomethane	2.3	2.3	28
1,2_Dichlorobenzene	2.5	2.3	8
1,3_Dichlorobenzene	2.1	2.1	0
1,4_Dichlorobenzene	2.3	2.0	13
Dichlorodifluormethane	—	—	
1,1_Dichloroethane	2.5	2.3	4.2
1,2_Dichloroethane	2.6	2.7	4
1,1_Dichloroethylene	2.6	2.4	8
trans_1,2_dichloroethylene	2.5	2.4	0
Dichloromethane	—	—	
1,2_Dichloropropane	2.5	2.3	8
1,3_Dichloropropylene	5.4	4.7	20
1,1,2,2_Tetrachloroethane	2.5	6.9	8
1,1,1,2_Tetrachloroethane	5.2	3.9	25
Tetrachloroethylene	7.5	6.9	8
1,1,1_Trichloroethane	3.0	3.0	0
1,1,2_Trichloroethane	5.9	4.7	20
Trichloroethylene	4.0	3.8	5
Trichlorofluormethane	2.3	2.2	4
Trichloropropane	2.0	1.7	19
Vinyl chloride	0.30	0.27	18

file: CONTCAL
21 Oct 88

88092599

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

Lab Code:_____ Case No.:_____ SAS No.:_____ SDG No.:_____

Instrument ID.: CAR Calibration Date(s): 9/29/88 _____

LAB FILE ID: 31 Init. Calib. Date(s): 9/19/88 _____

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	4.9	4.8	2
Chlorobenzene	5.3	5.5	4
,2_Dichlorobenzene	4.4	4.2	5
,3_Dichlorobenzene	5.0	4.7	6
,4_Dichorobenzene	4.1	4.0	2
Ethyl Bezene	1.4	3.6	18
Toluene	39	4.1	5
Xylenes	13	12	8