INSTALLATION RESTORATION PROGRAM

(1)

REMEDIAL INVESTIGATION REPORT

MINNESOTA AIR NATIONAL GUARD BASE
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA

VOLUME 5

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

"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."

DISCLAIMER NOTICE

THIS DOCUMENT IS BEST QUALITY AVAILABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

REPORT DOCUMENTATION PAGE

1. 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 5

JANUARY 1990

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

TABLE OF CONTENTS (continued)
VOLUME 1 (continued)

TABLE OF CONTENTS (continued)
VOLUME 1 (continued)

TABLE OF CONTENTS (continued)
VOLUME 1 (continued)

TABLE OF CONTENTS (continued)
VOLUME 1 (continued)

TABLE OF CONTENTS (continued)
VOLUME 1 (continued)

TABLE OF CONTENTS (continued)
VOLUME 1 (continued)

TABLE OF CONTENTS (continued)
VOLUME 1 (continued)

TABLE OF CONTENTS (continued)
VOLUME 1 (continued)

TABLE OF CONTENTS (continued)
VOLUME 1 (continued)

TABLE OF CONTENTS (continued)
VOLUME 1 (continued)

VOLUME 2

Included is information obtained from sampling of water wells and ground water and listed in data tables. Data of pesticides and chemical contamination in soils and in runoff from watersheds is also listed.

LIST OF FIGURES

LIST OF FIGURES (continued)

LIST OF FIGURES (continued)

LIST OF FIGURES (continued)

LIST OF TABLES

LIST OF TABLES (continued)

LIST OF TABLES (continued)

LIST OF TABLES (continued)

LIST OF TABLES (continued)

LIST OF TABLES (continued)

LIST OF TABLES (continued)

This page intentionally left blank.

APPENDIX M
CONTINUED

This page intentionally left blank.

APPENDIX M
TABLE OF CONTENTS

APPENDIX M
TABLE OF CONTENTS(continued)

APPENDIX M
TABLE OF CONTENTS(continued)

This page intentionally left blank.

DATA PACKAGE #26

This page intentionally left blank.

ENGINEERING-SCIENCE, INC.

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

Job No.: OR001.02

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 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.
88092672	DANGB-BG-SL5-SD-1	AS-F	9-23-88		10-16-88	
88092672	DANGB-BG-SL5-SD-1	BA-I	9-23-88		10-17-88	
88092672	DANGB-BG-SL5-SD-1	CD-F	9-23-88		10-17-88	
88092672	DANGB-BG-SL5-SD-1	CR-F	9-23-88		10-18-88	
88092672	DANGB-BG-SL5-SD-1	HG-C	9-23-88		9-17-88	
88092672	DANGB-BG-SL5-SD-1	PB-F	9-23-88		10-16-88	
88092672	DANGB-BG-SL5-SD-1	418.1	9-23-88	10-13-88	10-22-88	
88092672	DANGB-BG-SL5-SD-1	MOIS	9-23-88		10-26-88	
88092672	DANGB-BG-SL5-SD-1	8010	9-23-88		10-04-88	10-03-88
88092672	DANGB-BG-SL5-SD-1	8020	9-23-88		10-04-88	10-03-88
88092672	DANGB-BG-SL5-SD-1	8080	9-23-88	10-04-88	10-25-88	
88092672	DANGB-BG-SL5-SD-1	8270	9-23-88	10-04-88	11-10-88	

* If applicable

ENGINEERING-SCIENCE, INC.

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

Job No.: OR001.02

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
38092673	DANGB-BG-SL4-SD-1	AS-F	9-23-88		10-16-88	
38092673	DANGB-BG-SL4-SD-1	BA-I	9-23-88		10-17-88	
38092673	DANGB-BG-SL4-SD-1	CD-F	9-23-88		10-20-88	
38092673	DANGB-BG-SL4-SD-1	CR-F	9-23-88		10-18-88	
38092673	DANGB-BG-SL4-SD-1	HG-C	9-23-88		9-17-88	
38092673	DANGB-BG-SL4-SD-1	PB-F	9-23-88		10-25-88	
38092673	DANGB-BG-SL4-SD-1	418.1	9-23-88	10-13-88	10-22-88	
38092673	DANGB-BG-SL4-SD-1	MOIS	9-23-88		10-26-88	
38092673	DANGB-BG-SL4-SD-1	8010	9-23-88		10-04-88	10-03-88
38092673	DANGB-BG-SL4-SD-1	8020	9-23-88		10-04-88	10-03-88
38092673	DANGB-BG-SL4-SD-1	8080	9-23-88	10-04-88	10-26-88	
38092673	DANGB-BG-SL4-SD-1	8270	9-23-88	10-04-88	11-10-88	
38092674	DANGB-BG-SL25-SD-1	AS-F	9-23-88		10-16-88	
38092674	DANGB-BG-SL25-SD-1	BA-I	9-23-88		10-17-88	
38092674	DANGB-BG-SL25-SD-1	CD-F	9-23-88		10-17-88	
38092674	DANGB-BG-SL25-SD-1	CR-F	9-23-88		10-18-88	
38092674	DANGB-BG-SL25-SD-1	HG-C	9-23-88		9-17-88	
38092674	DANGB-BG-SL25-SD-1	PB-F	9-23-88		10-25-88	
38092674	DANGB-BG-SL25-SD-1	418.1	9-23-88	10-13-88	10-22-88	
38092674	DANGB-BG-SL25-SD-1	MOIS	9-23-88		10-13-88	
38092674	DANGB-BG-SL25-SD-1	8010	9-23-88		10-04-88	10-03-88
38092674	DANGB-BG-SL25-SD-1	8020	9-23-88		10-04-88	10-03-88
38092674	DANGB-BG-SL25-SD-1	8080	9-23-88	10-04-88	10-25-88	
38092674	DANGB-BG-SL25-SD-1	8270	9-23-88	10-04-88	11-11-88	

* If applicable

ES
ENGINEERING-SCIENCE, INC.

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

Job No.: OR001.02

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092675	DANGB-4-SL11-SD-1	BA-I	9-23-88		10-17-88	
88092675	DANGB-4-SL11-SD-1	CD-F	9-23-88		10-17-88	
88092675	DANGB-4-SL11-SD-1	CR-F	9-23-88		10-18-88	
88092675	DANGB-4-SL11-SD-1	PB-F	9-23-88		10-16-88	
88092675	DANGB-4-SL11-SD-1	418.1	9-23-88	10-13-88	10-22-88	
88092675	DANGB-4-SL11-SD-1	MOIS	9-23-88		10-13-88	
88092675	DANGB-4-SL11-SD-1	8010	9-23-88		10-04-88	10-06-88
88092675	DANGB-4-SL11-SD-1	8020	9-23-88		10-04-88	10-06-88
88092676	DANGB-4-SL12-SD-1	BA-I	9-23-88		10-17-88	
88092676	DANGB-4-SL12-SD-1	CD-F	9-23-88		10-27-88	
88092676	DANGB-4-SL12-SD-1	CR-F	9-23-88		10-18-88	
88092676	DANGB-4-SL12-SD-1	PB-F	9-23-88		10-16-88	
88092676	DANGB-4-SL12-SD-1	418.1	9-23-88	10-13-88	10-22-88	
88092676	DANGB-4-SL12-SD-1	MOIS	9-23-88		10-13-88	
88092676	DANGB-4-SL12-SD-1	8010	9-23-88		10-06-88	10-04-88
88092676	DANGB-4-SL12-SD-1	8020	9-23-88		10-04-88	10-06-88

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092672-88092676
WORK ORDER NO.: 1036

These soil samples were received at the ES Berkeley Laboratory on 9-24-88. They were received cold and intact.

ENGINEERING-SCIENCE INC. PAGE 1
11/09/88

ANALYSIS REPORT

WORK ORDER NUMBER: 1036
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/24/88

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/KG

TEST COMPOUND	DANGB-BG-SL5-SD-1 88092672	DANGB-BG-SL4-SD-1 88092673	DANGB-BG-SL25-SD-1 88092674	DANGB-4-SL11-SD-1 88092675	DANGB-4-SL12-SD-1 88092676
ACID DIG SOIL	NA	NA	NA	NA	NA
ARSENIC	<1.2	<1.2	1.7 B		
BARIUM	41.1	33.2	29.2	57.8	42.1
CADMIUM	<0.62	<0.59	<0.59	<0.61	1.3
CHROMIUM	14.2 N	16.3 N	15.1 N	16.9 N	8.7 N
MERCURY	<0.12	<0.12	<0.12		
LEAD	4.0	4.8	7.9 S	6.1	13.8

ND - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1036
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: 3, UNITS: mg/Kg

EST COMPOUND	DANGB-BG-SL5-SD-1 88092672	DANGB-BG-SL4-SD-1 88092673	DANGB-BG-SL25-SD-1 88092674	DANGB-4-SL11-SD-1 88092675	DANGB-4-SL12-SD-1 88092676
418.1 PETROLEUM HYDROCARBONS	<100	<100	<100	210	1600
MOISTURE	24.3	23.5	15.4	21.4	13.0

) - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 1036
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/24/88

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/Kg, GROUP 8010

TEST COMPOUND	DANGB-BG-SL5-SD-1 88092672	DANGB-BG-SL4-SD-1 88092673	DANGB-BG-SL2>-SD-1 88092674	DANGB-4-SL11-SD-1 88092675	DANGB-4-SL12-SD-1 88092676
BENZYL CHLORIDE	ND	ND	ND	ND	ND
BIS (2-CHLOROETHOXY)METHANE	ND	ND	ND	ND	ND
BIS (2-CHLOROISOPROPYL)ETHER	ND	ND	ND	ND	ND
BROMOBENZENE	ND	ND	ND	ND	ND
BROMODICHLOROMETHANE	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
BROMOETHANE	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND
CHLORACETALDEHYDE	ND	ND	ND	ND	ND
CHLORAL	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
CHLOROFORM	ND	1.5	ND	ND	0.54
1-CHLOROHEXANE	ND	ND	ND	ND	ND
2-CHLOROETHYL VINYL ETHER	ND	ND	ND	ND	ND
CHLOROMETHANE	ND	ND	ND	ND	ND
CHLOROMETHYL METHYL ETHER	ND	ND	ND	ND	ND
CHLOROTOLUENE	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND
DIBROMOMETHANE	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
DICHLORODIFLUOROMETHANE	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	62B	42B	53B	60B	27B
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND

ANALYSIS REPORT FOR WORK ORDER NUMBER 1036

EST COMPOUND	DANGB-BG-SL5-SD-1 88092672	DANGB-BG-SL4-SD-1 88092673	DANGB-BG-SL25-SD-1 88092674	DANGB-4-SL11-SD-1 88092675	DANGB-4-SL12-SD-1 88092676
,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: 1036
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
OAK 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/Kg, GROUP 8020

EST COMPOUND	DANGB-BG-SL5-SD-1 88092672	DANGB-BG-SL4-SD-1 88092673	DANGB-BG-SL25-SD-1 88092674	DANGB-4-SL11-SD-1 88092675	DANGB-4-SL12-SD-1 88092676
ENZENE	ND	ND	ND	240	ND
HLOROBENZENE	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND
,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
THYL BENZENE	ND	ND	ND	550	760
TOLUENE	ND	ND	ND	970	360
XYLENES	ND	ND	ND	3400	3000

ND - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1036
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: 4, UNITS: ug/Kg, GROUP 8080

EST COMPOUND	DANGB-BG-SL5-SD-1 88092672	DANGB-BG-SL25-SD-1 88092674
LDRIN	ND	ND
LPHA-BHC	ND	ND
ETA-BHC	ND	ND
ELTA-BHC	ND	ND
AMMA-BHC	ND	ND
HLORDANE	ND	ND
,4'-DDD	ND	ND
,4'-DDE	ND	ND
,4'-DDT	ND	ND
IELDRIN	ND	ND
NDOSULFAN I	ND	ND
NDOSULFAN II	ND	ND
NDOSULFAN SULFATE	ND	ND
NDRIN	ND	ND
NDRIN ALDEHYDE	NA	NA
EPTACHLOR	ND	ND
EPTACHLOR EPOXIDE	ND	ND
EPONE	NA	NA
ETHOXYCHLOR	ND	ND
OXAPHENF	ND	ND
CB-1016	ND	ND
CB-1221	ND	ND
CB-1232	ND	ND
CB-1242	ND	ND
CB-1248	ND	ND
CB-1254	ND	ND
CB-1260	ND	ND

) - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1036

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

TEST COMPOUND	DANGB-BG-SL4-SD-1 88092673
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	NA
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: Soil

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

Work Order: 1036
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:	88092672	88092673
Sample No.:	DANGB-BG-SL5-SD-1	DANGB-BG-SL4-SD-1
Date Sampled:	9-23-88	9-23-88
Time Sampled:	09:00	09:45
Date Extracted:	10-04-88	10-04-88
Date Analyzed:	11-10-88	11-10-88
Percent Moisture:	24	24

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-propylamine	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: September 24, 1988
Date Reported: December 9, 1988

Work Order: 1036
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:	88092672	88092673
Sample No.:	DANGB-BG-SL5-SD-1	DANGB-BG-SL4-SD-1
Date Sampled:	9-23-88	9-23-88
Time Sampled:	09:00	09:45
Date Extracted:	10-04-88	10-04-88
Date Analyzed:	11-10-88	11-10-88
Percent Moisture:	24	24

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Phenanthrene	330	ND	ND
Anthracene	330	ND	ND
Dibutyl phthalate	330	ND	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	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	2000	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: September 24, 1988
Date Reported: December 9, 1988

Work Order: 1036
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:	88092672	88092673
Sample No.:	DANGB-BG-SL5-SD-1	DANGB-BG-SL4-SD-1
Date Sampled:	9-23-88	9-23-88
Time Sampled:	09:00	09:45
Date Extracted:	10-04-88	10-04-88
Date Analyzed:	11-10-88	11-10-88
Percent Moisture:	24	24

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

Work Order: 1036
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:	88092672	88092673
Sample No.:	DANGB-BG-SL5-SD-1	DANGB-BG-SL4-SD-1
Date Sampled:	9-23-88	9-23-88
Time Sampled:	09:00	09:45
Date Extracted:	10-04-88	10-04-88
Date Analyzed:	11-10-88	11-10-88
Percent Moisture:	24	24

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

Work Order: 1036
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:	88092672	88092673
Sample No.:	DANGB-BG-SL5-SD-1	DANGB-BG-SL4-SD-1
Date Sampled:	9-23-88	9-23-88
Time Sampled:	09:00	09:45
Date Extracted:	10-04-88	10-04-88
Date Analyzed:	11-10-88	11-10-88
Percent Moisture:	24	24

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.

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: Soil

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

Work Order: 1036
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:	88092674
Sample No.:	DANGB-BG-SL25-SD-1
Date Sampled:	9-23-88
Time Sampled:	10:15
Date Extracted:	10-04-88
Date Analyzed:	11-11-88
Percent Moisture:	15

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
1,3-Dichlorobenzene	330	ND
1,4-Dichlorobenzene	330	ND
Hexachloroethane	330	ND
Bis(2-chloroethyl)ether	330	ND
1,2-Dichlorobenzene	330	ND
N-Nitrosodimethylamine	330	ND
Bis(2-chloroisopropyl)ether	330	ND
N-Nitrosodi-n-propylamine	330	ND
Hexachlorobutadiene	330	ND
1,2,4-Trichlorobenzene	330	ND
Nitrobenzene	330	ND
Isophorone	330	ND
Naphthalene	330	ND
Bis(2-chloroethoxy)methane	330	ND
2-Chloronaphthalene	330	ND
Hexachlorocyclopentadiene	330	ND
Acenaphthylene	330	ND
Acenaphthene	330	ND
Dimethyl phthalate	330	ND
2,6-Dinitrotoluene	330	ND
Fluorene	330	ND
2,4-Dinitrotoluene	330	ND
Diethyl phthalate	330	ND
N-Nitrosodiphenylamine	330	ND
Hexachlorobenzene	330	ND

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

Date Received: September 24, 1988 Work Order: 1036
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:	88092674
Sample No.:	DANGB-BG-SL25-SD-1
Date Sampled:	9-23-88
Time Sampled:	10:15
Date Extracted:	10-04-88
Date Analyzed:	11-11-88
Percent Moisture:	15

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
Phenanthrene	330	ND
Anthracene	330	ND
Dibutyl phthalate	330	ND
Fluoranthene	330	ND
4-Chlorophenyl phenyl ether	330	ND
Pyrene	330	ND
Butyl Benzyl phthalate	330	ND
Bis(2-ethylhexyl) phthalate	330	ND
Chrysene	330	ND
4-Bromophenyl phenyl ether	330	ND
Benzo(a)anthracene	330	ND
Di-n-octylphthalate	330	ND
Benzo(b)fluoranthene	330	ND
Benzo(k)fluoranthene	330	ND
Benzidine	2000	ND
3,3'-Dichlorobenzidine	660	ND
Benzo(a)pyrene	330	ND
Indeno(1,2,3-cd)pyrene	330	ND
Dibenzo(a,h)antnracene	330	ND
Benzo(ghi)perylene	330	ND
Benzyl Alcohol	660	ND

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

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

Work Order: 1036
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:	88092674
Sample No.:	DANGB-BG-SL25-SD-1
Date Sampled:	9-23-88
Time Sampled:	10:15
Date Extracted:	10-04-88
Date Analyzed:	11-11-88
Percent Moisture:	15

Compound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg
Acetophenone	--*	ND
Aniline	--*	ND
4-Aminobiphenyl	--*	ND
4-Chloroaniline	660	ND
1-Chloronaphthalene	--*	ND
Dibenzofuran	330	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	330	ND
1-Naphthylamine	--*	ND
2-Naphthylamine	--*	ND
2-Nitroaniline	1600	ND
3-Nitroaniline	1600	ND
4-Nitroaniline	1600	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: September 24, 1988
Date Reported: December 9, 1988

Work Order: 1036
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:	88092674
Sample No.:	DANGB-BG-SL25-SD-1
Date Sampled:	9-23-88
Time Sampled:	10:15
Date Extracted:	10-04-88
Date Analyzed:	11-11-88
Percent Moisture:	15

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
Alpha-BHC	--*	ND
Gamma-BHC	--*	ND
Beta-BHC	660	ND
Heptachlor	330	ND
Delta-BHC	500	ND
Aldrin	330	ND
Heptachlor epoxide	330	ND
Endosulfan I	--*	ND
Dieldrin	500	ND
4,4'-DDE	1000	ND
Endrin	--*	ND
Endosulfan II	--*	ND
4,4'-DDD	500	ND
4,4'-DDT	830	ND
Endosulfan Sulfate	1000	ND
Endrin aldehyde	--*	ND
Endrin Ketone	--*	ND
Chlordane	2000	ND
Methoxychlor	--*	ND
Toxaphene	2000	ND
Aroclor-1016	2000	ND
Aroclor-1221	2000	ND
Aroclor-1232	2000	ND
Aroclor-1242	2000	ND
Aroclor-1248	2000	ND
Aroclor-1254	2000	ND
Aroclor-1260	2000	ND

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

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

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

Work Order: 1036
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:	88092674
Sample No.:	DANGB-BG-SL25-SD-1
Date Sampled:	9-23-88
Time Sampled:	10:15
Date Extracted:	10-04-88
Date Analyzed:	11-11-88
Percent Moisture:	15

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
2-Chlorophenol	330	ND	
2-Nitrophenol	330	ND	
Phenol	330	ND	
2,4-Dimethylphenol	330	ND	
2,4-Dichlorophenol	330	ND	
2,4,6-Trichlorophenol	330	ND	
4-Chloro-3-methylphenol	660	ND	
2,4-Dinitrophenol	1600	ND	
2,6-Dichlorophenol	--*	ND	
2-Methyl-4,6-Dinitrophenol	1600	ND	
Pentachlorophenol	1600	ND	
4-Nitrophenol	1600	ND	
Benzoic Acid	1600	ND	
2-Methylphenol	330	ND	
3- & 4-Methylphenol	330	ND	
2,3,4,6-Tetrachlorophenol	--*	ND	
2,4,5-Trichlorophenol	330	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

1036

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.	ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA. 94710

SAMPLER(S): (Signature) [signature] Davis

SOILS ANALYSES REQUIRED

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	SW8080	SW8270	EPA 418.1	SW6010, 7060, 7191	SW7131, 7421, 7471			REMARKS
9-23-88	0900	DANGB-BG-SL5-SD-1	1	X								882672
9-23-88	0900	DANGB-BG-SL5-SD-1	1		X	X	X	X	X			882672
9-23-88	0945	DANGB-BG-SL4-SD-1	1	X								882673
9-23-88	0945	DANGB-BG-SL4-SD-1	1		X	X	X	X	X			882673
9-23-88	1015	DANGB-BG-SL25-SD-1	1	X								882674
9-23-88	1015	DANGB-BG-SL25-SD-1	1		X	X	X	X	X			882674
9-23-88	1045	DANGB-4-SL11-SD-1	1	X								[illegible]
9-23-88	1045	DANGB-4-SL11-SD-1	1				X	X	X			Do not analyze for 706-04 [illegible]
9-23-88	1100	DANGB-4-SL12-SD-1	1	X								[illegible]
9-23-88	1100	DANGB-4-SL12-SD-1	1				X	X	X			Do not analyze for 70 [illegible]

1702

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature]	9-23-88 1800	Fed Ex Airbill # 9490309931			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		[signature]	9-24-88 14:00	Samples [illegible] Intact

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: AAF-S-0051-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 9-24-88
Date Reported: 1-31-89
Dilution Factor: NA
%Moisture: 19.3

QC Report for Laboratory Sample No(s):
88092672-88092676, 88092731-88092741
88092781-88092783, 88092799-88092800

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	88092672	88092672	10-16-88	NA	7060	<1.0	<1.24	<1.24	NC	9.91	<1.24	7.96	80	
Cadmium	88092672	88092672	10-17-88	NA	7131	<0.50	<0.62	<0.62	NC	2.48	<0.62	2.73	110	
Chromium	88092672	88092672	10-18-88	NA	6010	<1.0	14.2	12.5	13	4.96	14.2	25.8	234N	
Lead	88092672	88092672	10-16-88	NA	7421	<0.50	3.97	3.44	1	4.96	3.97	7.68	75	

1703

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
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

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):
88092672-88092676, 88092731-88092741
88092781-88092783, 88092799-88092800

QC Report No: ICP-S-0047-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 9-24-88
Date Reported: 1-31-89
Dilution Factor: NA
%Moisture: 19.3

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	88092672	88092672	10-17-88	NA	6010	<20	41.1	42.3	3	496	41.1	514	95	

1704

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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

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):
88092672-88092676, 88092731-88092741
88092781-88092783, 88092799-88092800

QC Report No: CVM-S-0027-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 9-24-88
Date Reported: 1-31-89
Dilution Factor: NA
%Moisture: 19.3

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
Mercury	88092672	88092672	10-17-88	NA	7471	<0.10	<0.12	<0.12	NC	0.620	<0.12	0.680	110	

5021

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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

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
SAMPLE NO(S).: 88092672-88092676, 88092731-88092741
SAMPLE NO(S).: 88092781-88092783, 88092799-88092800

The detection limit for the analyte(s); arsenic, cadmium, chromium, lead, barium and mercury are provided by the sub-contract laboratory and based on a dry-weight of the sample.

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):
88092672-88092676
88092731-88092741

QC Report No: TPH-S-0063-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 9-24-88
Date Prepared: 10-13-88
Date Analyzed: 10-22-88
Date Reported: 11-01-88
Dilution Factor: 7
%Moisture: 24.3

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88092672	418.1	<100	<100	1320	1250	106	1290	98	3	
Blank	418.1	<100	<100	1000	1100	110	1000	100	10	

1707

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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).:
88092672-88092676, 88092731-88092741
88092781-88092783, 88082255

QC Report No: VGC-S-0060-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 9-27-88
Date Prepared: NA
Date Analyzed: 10-10-88
Date Reported: 11-03-88
Dilution Factor: NA
% Moisture: NT

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092739	1,1-dichloroethane	10	ND	8.32	83	5.50	55*	41*	20	58-124
	Trichloroethene	10	ND	7.90	79	6.34	63*	22*	16	75-110
	Chlorobenzene	10	ND	6.06	61*	5.21	52*	15	21	71-125
	Aromatics: 8020									
88092739 1708	Benzene	10	2.3	13.8	115	8.33	60*	49*	26	75-123
	Toluene	10	5.5	16.6	111	11.3	58*	38*	16	79-115
	Chlorobenzene	10	ND	9.40	94	8.21	82	14	24	82-112

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* 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
NT = Not Tested

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).:
88092672-88092676, 88092731-88092741
88092781-88092783, 88082255

QC Report No: VGC-S-0060-88B
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: NA
Date Prepared: NA
Date Analyzed: 10-10-88
Date Reported: 11-03-88
Dilution Factor: NA
% Moisture: 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	9.46	95	10.4	104	9	20	58-124
	Trichloroethene	10	ND	9.33	93	9.61	96	3	16	75-110
	Chlorobenzene	10	ND	8.78	88	9.11	91	4	21	71-125
	Aromatics: 8020									
Blank 1709	Benzene	10	ND	9.24	92	10.0	100	8	26	75-123
	Toluene	10	ND	9.38	94	9.53	95	2	16	79-115
	Chlorobenzene	10	ND	9.10	91	9.25	92	2	24	82-112

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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: Soil
Conc. Unit: ug/Kg
Date Reported: 11-03-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
23	10-04-88	VGC	Carbopack	75-09-2 127-18-4	Dichloromethane Tetrachloroethylene	30 0.49	0.25 0.03	88092672-88092676

1710

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO(S).: VGC-S-0060-88
QC REPORT NO(S).: VGC-S-0060-88B

Percent recovery and relative percent difference for some of the matrix spiking compounds are outside ES Laboratory acceptance limits. A blank spike analysis shows the laboratory to be in control.

Results for Sample No. 88092739 are reported on a wet weight basis, since percentage moisture was not performed.

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 No.: OCP-S-0037-88
QC Sample No.: 88092674
Level (Low/Med): Low
Date Reported: 11-03-88

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s).:
88092672-88092674, 88092731-88092737
88092782-88092783

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/Kg)	MS Conc. In Extract (ug/Kg)	MS % Rec. #	QC Limits Rec.
Lindane	2360	ND	49.2	62	46-127
Heptachlor	2360	ND	49.8	63	35-130
Aldrin	2360	ND	ND	NC*	34-132
Dieldrin	5910	ND	144	73	31-134
Endrin	5910	ND	122	62	42-139
4,4'-DDT	5910	ND	160	81	23-134

	MSD Conc. In Extract (ug/Kg)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	59.5	76	62	19	50	46-127
Heptachlor	66.7	85	63	29	31	35-130
Aldrin	49.5	63	NC*	NC*	43	34-132
Dieldrin	151	92	73	23	38	31-134
Endrin	152	77	62	22	45	42-139
4,4'-DDT	145	74	81	9	50	23-134

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
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).:
88092672-88092674, 88092731-88092737
88092782-88092783

QC Report No.: OCP-S-0037-88B
QC Sample No.: Blank
Level (Low/Med): Low
Date Reported: 11-03-88

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	37.0	56	46-127
Heptachlor	2000	ND	42.5	64	35-130
Aldrin	2000	ND	37.5	56	34-132
Dieldrin	5000	ND	115	69	31-134
Endrin	5000	ND	88.8	53	42-139
4,4'-DDT	5000	ND	99.0	60	23-134

	MSD Conc. In Extract (ug/Kg.	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	50.7	76	56	31	50	46-127
Heptachlor	49.0	74	64	14	31	35-130
Aldrin	39.3	60	56	6	43	34-132
Dieldrin	130	78	69	12	38	31-134
Endrin	108	63	53	20	45	42-139
4,4'-DDT	211	127	60	72*	50	23-134

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: 0 out of 12 outside limits

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

Matrix spike concentration is not detected for aldrin, therefore, spike recovery and relative percent difference are not calculated. A blank spike analysis shows the laboratory to be in control.

Endrin aldehyde and Kepone were not recoverable because they were removed by the alumina column clean-up required by 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:	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:	10-04-88		
Date Analyzed (1):	10-25-88	Date Analyzed (2):	10-26-88
Time Analyzed (1):	06:17	Time Analyzed (2):	03:43
Instrument ID (1):	5890 #2	Instrument ID (2):	5880
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
-	88092672	10-25-88	88092673	10-25-88
-	88092673	10-25-88	88092674	10-25-88
-	88092674	10-25-88		

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):
88092731-88092733, 88092782-88092783
88092799-88092805, 88092672-88092674

QC Report No: BNA-S-0052-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 9-29-88
Date Prepared: 10-07-88
Date Analyzed: 11-10-88
Date Reported: 12-13-88
Dilution Factor: NA
%Moisture: 15.4

Laboratory Supervisor Approval:

1716

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
B/N Laboratory Sample # 88092674	1,2,4-Trichlorobenzene	3920	ND	2070	53	2090	53	2	23	38-107
	Acenaphthene	3920	ND	2510	64	2490	64	1	19	31-137
	2,4-Dinitrotoluene	3920	ND	2870	73	2940	75	2	47	28-89
	Pyrene	3920	ND	2290	58	2300	59	4	36	35-142
	N-Nitroso-di-n-Propylamine	3920	ND	2640	67	2720	69	3	38	41-126
	1,4-Dichlorobenzene	3920	ND	1160	30	1110	28	4	27	28-104
ACID Laboratory Sample # 88092674	Pentachlorophenol	7840	ND	8000	102	7880	101	2	47	17-109
	Phenol	7840	ND	4590	59	4470	57	3	35	26-90
	2-Chlorophenol	7840	ND	4550	58	4310	55	5	50	25-102
	4-Chloro-3-Methylphenol	7840	ND	6200	79	6310	80	2	33	26-103
	4-Nitrophenol	7840	ND	6160	79	6120	78	7	50	11-114

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092673-88092674
WORK ORDER NO.: 1036

When samples 88092673 and 88092674 were analyzed, area counts for the last internal standard were below QC specifications. This analysis was repeated with the same result, indicating a matrix effect. Since this internal standard is used to calculate only dioctyl phthalate and a few - the highest boiling - of the polynuclear aromatic hydrocarbons (PNA's), and since these PNA's are nearly always accompanied by lower boiling PNA's, which were not present in these samples, this phenomenon should not affect the results of the analysis.

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: 12-12-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
S0471	11-01-88	BNA	1	-	None Detected	-	-	88092672-88092674

1718

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).:
88092672-88092676
88092731-88092741

Calibration Date: 10-22-88
Instrument I.D.: Bausch & lomb
Spectronic 270 IR

Unit: mg/L
Date Reported: 11-09-88
R= 0.9975

Laboratory Supervisor Approval:

Standard	Concentration	Absorbance	/Continuous RF /Calibration /Verification
No. 1	1.2	0.170	
No. 2	1.8	0.266	RF = 5.59
No. 3	2.4	0.395	
No. 4	3.0	0.483	
Cont. Cal. No. 2 (Initial)	1.86	0.283	CCV = 103%
Cont. Cal. No. 2 (88092672-88092676)+QC	1.9	0.295	CCV = 106%
Cont. Cal. No. 2 (88092731-88092736)	1.9	0.295	CCV = 106%
Cont. Cal. No. 2 (88092737-88092741)	1.7	0.288	CCV = 104%

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Project: Duluth

Work Order No.:
Lab Sample No.: 04-02
Lab File ID: S0471
Matrix: Soil
Level (low/med):
Date Analyzed: 11-10-88
Time Analyzed: 19:54
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-SL5-SD-1	88092672	S0473, E6343	11-10-88, 11-29-88
-BG-SL4-SD-1	88092673	S0474, E6344	11-10-88, 11-29-88
-BG-SL25-SD-1	88092674	E6186, E6349	11-11-88, 11-29-88
-BG-SL25-SD-1	88092674MS	E6187, E6350	11-11-88, 11-29-88
-BG-SL25-SD-1	88092674MSD	E6188, E6351	11-11-88, 11-29-88

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):
88092672-88092676
88092731-88092741

QC Report No: TPH-S-0063-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 9-24-88
Date Prepared: 10-13-88
Date Analyzed: 10-22-88
Date Reported: 11-01-88
Dilution Factor: 7
%Moisture: 24.3

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88092672	418.1	<100	<100	1320	1250	106	1290	98	3	
Blank	418.1	<100	<100	1000	1100	110	1000	100	10	

1791

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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

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: >T1110 DFTPP Injection Date: 11/10/88

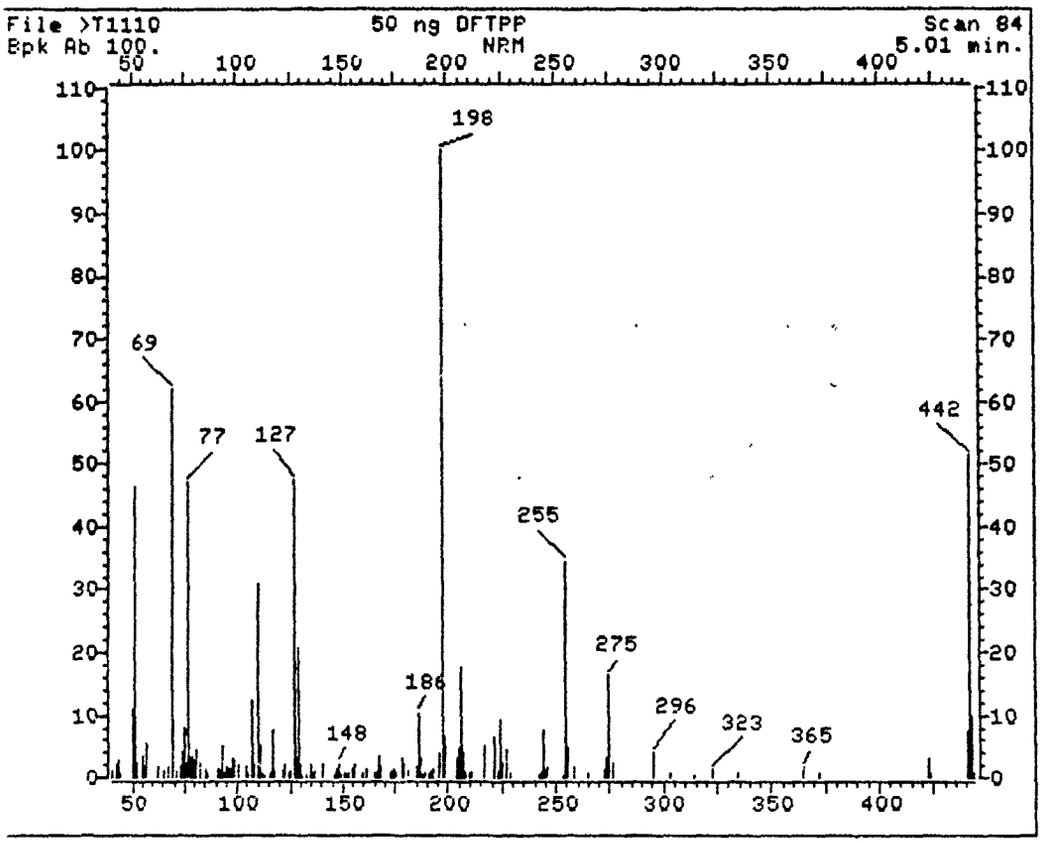
Instrument ID: 70 1 DFTPP Injection Time: 8:19

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	46.5
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	47.2
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	6.7
275	10.0 - 30.0% of mass 198	16.3
365	Greater than 1.00% of mass 198	1.69
441	Present, but less than mass 443	7.6
442	Greater than 40.0% of mass 198	51.3
443	17.0 - 23.0% of mass 442	9.8(19.0)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	60 ug/ml BNA STD	>S0460	11/10/88	8:36
02	88092607 1ml w/o1026	>S0461	11/10/88	9:39
03	88092608 1ml w/o1026	>S0462	11/10/88	10:38
04	88092609 1ml w/o1026	>S0463	11/10/88	11:38
05	88092610 1ml w/o1026	>S0464	11/10/88	12:38
06	88092742 BN 1ML + IS	>S0465	11/10/88	13:37
07	88092743 BN 1ML + IS	>S0466	11/10/88	14:37
08	88092746 BN 1ml + IS	>S0467	11/10/88	15:55
09	88092747 BN 1ml + IS	>S0468	11/10/88	16:55
10	88092765 BN 1ml + IS	>S0469	11/10/88	17:55
11	88092668 BN 1ml + IS	>S0470	11/10/88	18:54
12	88092672-74 BLANK	>S0471	11/10/88	19:54
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				



ile: >T1110 Scan #: 84 Retn. time: 5.01

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.10	1.230	91.10	1.367	129.05	20.619	179.95	1.959	243.00	.683
43.20	1.989	92.00	.972	130.05	2.050	181.05	1.230	244.00	7.546
44.10	2.718	93.00	5.056	131.05	.592	184.95	1.731	245.10	1.230
45.00	.668	94.10	.607	133.05	.820	186.05	10.295	245.90	1.701
50.10	10.780	95.10	1.640	135.05	2.171	187.05	3.006	253.90	.410
51.10	46.477	96.00	1.427	136.05	.805	188.05	.349	255.00	34.330
52.20	2.338	97.20	1.321	137.15	1.200	189.05	.698	256.00	4.889
55.10	3.416	98.00	3.295	141.05	2.035	190.95	.774	258.00	1.731
56.10	1.898	99.00	2.794	145.95	.440	191.95	1.245	265.00	.865
57.10	5.633	101.00	2.004	147.05	1.275	193.05	1.427	272.90	1.063
63.10	1.746	104.10	1.260	148.05	2.202	196.00	3.887	273.90	3.158
65.10	1.048	105.00	1.898	149.05	.790	198.00	100.000	274.95	16.262
67.10	1.646	105.90	.683	151.05	.607	199.00	6.650	276.05	2.308
69.00	61.889	107.00	12.101	152.15	.334	204.00	3.067	276.95	1.108
71.10	1.230	108.10	2.202	153.05	.865	205.00	4.904	295.95	4.069
73.10	1.731	110.00	30.960	155.05	1.367	206.00	17.811	302.95	.805
74.10	4.236	111.00	5.117	156.05	2.035	207.10	4.221	314.55	.319
75.10	7.729	112.00	.926	160.05	.774	208.00	1.078	314.75	.334
76.00	2.445	113.00	.456	161.15	1.291	210.10	.668	322.95	1.367
77.10	46.903	116.00	.714	165.15	.865	210.80	.744	334.05	.714
78.10	3.037	117.00	7.577	166.25	.759	217.00	5.208	364.90	1.685
79.00	3.553	118.05	1.002	167.05	3.371	221.00	6.423	372.10	.744
80.00	2.839	121.05	1.093	168.05	1.701	223.00	1.048	423.00	3.128
81.00	4.570	123.05	2.080	173.05	.683	224.10	9.201	423.90	.607
82.20	1.306	124.05	.683	174.15	1.002	225.00	2.353	441.05	.437
83.10	2.460	125.15	1.215	174.95	1.549	227.00	4.525	442.05	51.536
85.10	1.275	127.05	47.221	176.05	.744	229.00	.759	443.05	9.778

86.00 .987 128.05 3.189 178.95 3.082 242.00 .456 444.05 .926
86.90 .729

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/10/88

Contractor: ENGINEERING-SCIENCE Time: 08:36

Contract No: Laboratory ID:)S0460

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	.79488	11.85		
2-Fluorophenol	1.15802	1.21259	4.71		
bis(2-Chloroethyl)ether	1.11892	1.21871	8.92		
Phenol	1.41657	1.53237	8.17	*	
Phenol-d5	1.22488	1.37139	11.96		
Aniline	.54193	.69432	28.12		
2-Chlorophenol	1.23175	1.32271	7.38		
1,3-Dichlorobenzene	1.47535	1.45417	1.44		
1,4-Dichlorobenzene	1.40530	1.35944	3.26	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.94048	29.00		
1,2-Dichlorobenzene	1.32240	1.43354	8.40		
2 Methylphenol	1.17367	1.31773	12.27		
3-&-4-Methylphenol	1.07139	1.31626	22.85		
bis(2-chloroisopropyl)Ether	2.15627	2.55875	18.67		
N-Nitroso-Di-n-Propylamine	.84050	.88791	5.64		**
Hexachloroethane	.53840	.60326	12.05		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.43183	7.12		
Nitrobenzene-d5	.39137	.43794	11.90		
2-Nitrophenol	.24657	.28269	14.65	*	
Isophorone	.74170	.73314	1.15		
bis(2-Chloroethoxy)methane	.49386	.56880	15.18		
2,4-Dimethylphenol	.34849	.37437	7.43		
Benzoic Acid	.29725	.31264	5.18		
2,4-Dichlorophenol	.56733	.53236	6.16	*	
1,2,4-Trichlorobenzene	.36913	.34523	6.47		
Naphthalene	.94589	.93157	1.51		
4-Chloroaniline	.36309	.40428	11.34		
Hexachlorobutadiene	.20283	.16685	17.74	*	
4-Chloro-3-Methylphenol	.31360	.33458	6.69	*	
2-Methylnaphthalene	.56397	.56145	.45		

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 (**)

1725

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/10/88

Contractor: ENGINEERING-SCIENCE Time: 08:36

Contract No: Laboratory ID: >S0460

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	.34502	16.69		**
2,4,6-Trichlorophenol	.42280	.38741	8.37	*	
2,4,5-Trichlorophenol	.52897	.45530	13.93		
2-Fluorobiphenyl	1.27220	1.11319	12.50		
2-Chloronaphthalene	1.23784	1.18643	4.15		
2-Nitroaniline	.47288	.55085	16.49		
Dimethylphthalate	1.40629	1.33336	5.19		
2,6-Dinitrotoluene	.37415	.38093	1.81		
Acenaphthylene	1.68918	1.56995	7.06		
3-Nitroaniline	.44557	.51229	14.98		
2,4-Dinitrophenol	.11898	.17397	46.21		**
Acenaphthene	1.13011	.97867	13.40	*	
Dibenzofuran	1.64131	1.55065	5.52		
2,4-Dinitrotoluene	.28418	.32047	12.77		
4-Nitrophenol	.28450	.29271	2.89		**
Fluorene	1.12850	1.00425	11.01		
Diethylphthalate	1.20939	1.11405	7.88		
4-Chlorophenyl-phenylether	.59183	.49608	16.18		
4-Nitroaniline	.35956	.42717	18.80		
2,4,6-Tribromophenol	.21023	.18408	12.44		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.44659	10.86	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.20652	3.05		
Hexachlorobenzene	.26273	.24581	6.44		
Pentachlorophenol	.14536	.14944	2.80	*	

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 (**)

1726

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/10/88

Contractor: ENGINEERING-SCIENCE Time: 08:36

Contract No: Laboratory ID:)S0460

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	1.03521	.09		
Anthracene	1.05155	1.07258	2.00		
Di-n-Butylphthalate	1.51956	1.71681	12.98		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.13863	4.35	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.13617	238.48		
Pyrene	1.56086	1.52745	2.14		
Terphenyl-d14	1.05835	.99956	5.55		
Butylbenzylphthalate	1.03390	1.14287	10.54		
3,3'-Dichlorobenzidine	.13689	.23624	72.58		
Chrysene	.99655	1.03846	4.21		
Benzo(a)Anthracene	1.10407	1.17410	6.34		
bis(2-Ethylhexyl)Phthalate	1.21073	1.36663	12.88		
Di-n-octylphthalate	3.40275	3.06801	9.84	*	
Benzo(a)Pyrene	1.32098	1.31723	.28	*	
Benzo(b)fluoranthene	1.60850	1.39495	13.28		
Indeno(1,2,3-cd)Pyrene	.96800	1.41382	46.06		
Dibenzo(a,h)Anthracene	.87481	1.08282	23.78		
Benzo(k)fluoranthene	1.44370	1.40483	2.69		
Benzo(g,h,i)Perylene	.89761	1.14844	27.95		

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 (**)

1727

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: _____ Contract: _____

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

EPA Sample No.(Standard): SSTD060 Date Analyzed: 11/10/88

Lab File ID (Standard): S0460 Time Analyzed: 08:36

Instrument ID: 1

	IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
12 HOUR STD	92446	9.20	335872	12.82	189623	18.28
UPPER LIMIT	184892	9.70	671744	13.32	379246	18.78
LOWER LIMIT	46223	8.70	167936	1232	94812	17.78
EPA SAMPLE NO.						
01 88092607	73139	9.16	293868	12.75	146153	18.23
02 88092608	67859	9.14	266978	12.73	135605	18.22
03 88092609	76986	9.15	292907	12.74	151626	18.22
04 88092610	68372	9.16	256668	12.75	130397	18.22
05 88092743 BN	62190	9.16	233583	12.75	121729	18.23
06 88092743 BN	66964	9.17	242388	12.75	125975	18.24
07 88092746 BN	65730	9.15	245923	12.75	125363	18.23
08 88092747 BN	67857	9.17	251262	12.76	129049	18.25
09 88092765 BN	85308	9.17	309742	12.76	157878	18.24
10 88092668 BN	78935	9.16	279659	12.76	146840	18.24
11 88092673-74 BLK	86452	9.18	331146	12.75	175477	18.24
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

T.D

Lab Name: _____ Contract: _____

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

EPA Sample No.(Standard): SSTDØ6Ø Date Analyzed: 11/10/88

Lab File ID (Standard): SØ46Ø Time Analyzed: Ø8:36

Instrument ID: 1

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS4(PRY) AREA #	RT
12 HOUR STD	298825	22.92	221380	31.41	184771	37.49
UPPER LIMIT	597650	23.42	442760	31.91	369542	37.99
LOWER LIMIT	149413	22.42	110690	30.91	92386	36.99
EPA SAMPLE NO.						
01 88092607	224852	22.87	161282	31.33	120596	37.36
02 88092608	209997	22.86	152410	31.32	113686	37.33
03 88092609	226005	22.87	152381	31.32	121350	37.34
04 88092610	199554	22.87	142419	31.34	103388	37.35
05 88092742 BN	187474	22.86	134906	31.33	102631	37.34
06 88092743 BN	194650	22.88	142275	31.33	111911	37.35
07 88092746 BN	187921	22.87	137553	31.32	105457	37.33
08 88093747 BN	194664	22.91	149934	31.36	116333	37.37
09 88092765 BN	250358	22.88	192689	31.35	117525	37.36
10 88092668 BN	219790	22.90	174454	31.35	127459	37.36
11 88092672-74 BLK	267891	22.89	208316	31.37	117799	37.35
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

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: >T3110 DFTPP Injection Date: 11/10/88

Instrument ID: 70 1 DFTPP Injection Time: 20:59

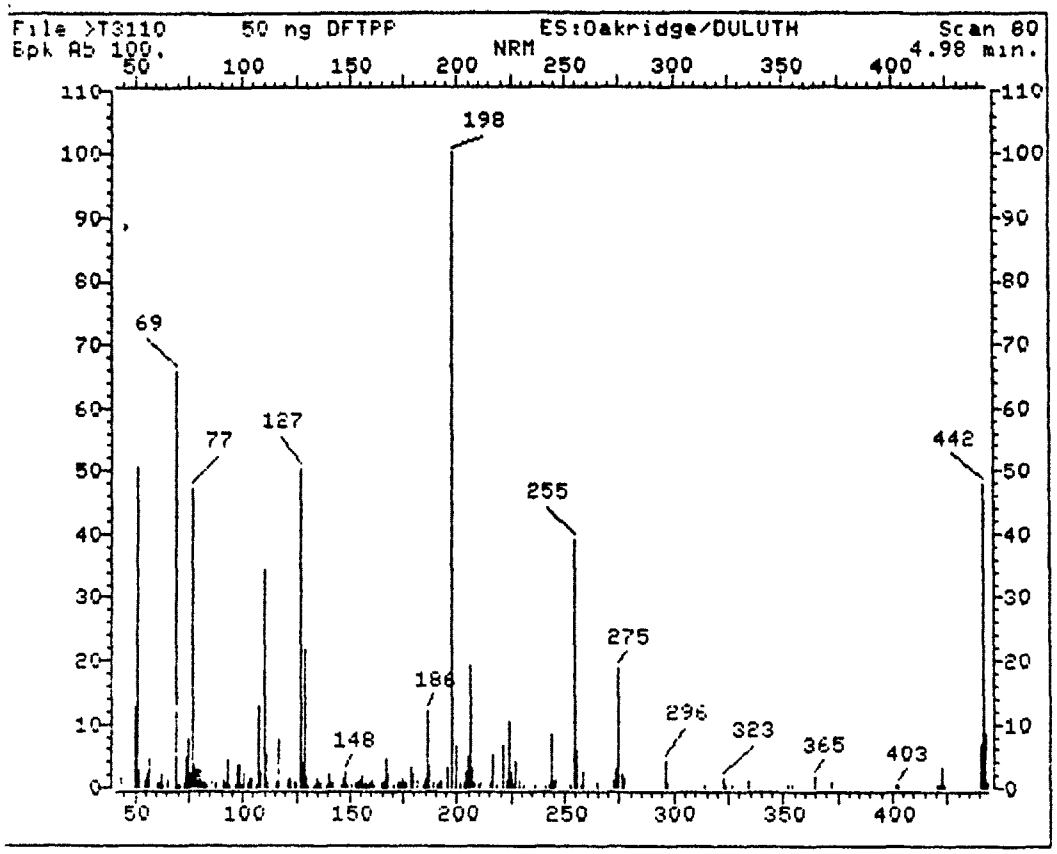
m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	50.4
68	Less than 2.0% of mass 69	0.0(0.0)1
69	Mass 69 relative abundance	66.
70	Less than 2.0% of mass 69	.5(.7)1
127	40.0 - 60.0% of mass 198	50.2
197	Less than 1.0% of mass 198	0.0
198	Base Peak, 100% relative abundance	100.
199	5.0 - 9.0% of mass 198	6.7
275	10.0 - 30.0% of mass 198	18.8
365	Greater than 1.00% of mass 198	1.94
441	Present, but less than mass 443	6.7
442	Greater than 40.0% of mass 198	47.7
443	17.0 - 23.0% of mass 442	8.7(18.2)2

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

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	60 ug/ml BNA STD	>S0472	11/10/88	21:15
02	88092672 1ml wo 1036	>S0473	11/10/88	22:15
03	88092673 1ml wo 1036	>S0474	11/10/88	23:15
04	88092806,24,35 BLANK AC	>S0475	11/11/88	0:14
05	88092806,24,35 BLANK BN	>S0476	11/11/88	1:14
06	88092806 AC w/o 1064	>S0477	11/11/88	2:13
07	88092806 BN w/o 1064	>S0478	11/11/88	3:12
08	88092824 AC w/o 1069	>S0479	11/11/88	4:12
09	88092824 BN w/o 1069	>S0480	11/11/88	5:11
10	88092835 AC w/o 1072	>S0481	11/11/88	6:10
11	88092835 BN w/o 1072	>S0482	11/11/88	7:13
12	88091942 1ml	>S0483	11/11/88	8:12
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				



File: >T3110 Scan #: 80 Retn. time: 4.98

m/z	Int	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.10	.565	94.00	.584	142.05	.782	187.05	3.354	246.00	1.385
44.10	1.272	97.10	.367	142.95	.707	189.05	.772	253.10	.367
50.10	12.454	98.10	3.570	146.05	.433	191.05	.490	255.00	38.973
51.10	50.419	99.00	3.495	147.05	1.366	191.95	.848	256.00	5.718
52.10	2.638	100.00	.339	148.05	2.478	193.05	1.074	257.10	.424
55.10	1.168	101.00	2.120	149.05	.537	196.10	3.043	258.00	2.355
56.10	1.969	103.00	.782	151.35	.330	198.00	100.000	265.00	.838
57.10	4.569	104.00	1.291	151.55	.311	199.10	6.651	273.00	1.253
61.10	.810	105.00	1.423	153.05	.914	200.00	.424	274.05	2.949
62.00	.669	106.00	.509	154.05	.631	201.50	.659	275.05	18.775
63.10	2.091	107.10	12.492	155.05	1.262	203.10	.659	276.05	2.270
64.10	.349	108.10	2.355	156.15	1.686	204.10	2.544	277.05	1.300
65.10	.961	110.00	34.348	157.15	.650	205.10	4.701	296.05	4.305
69.00	65.794	111.00	5.313	158.05	.622	206.10	19.143	297.05	.612
70.10	.452	112.00	.669	159.05	.490	207.10	3.128	314.85	.462
71.10	.593	116.10	.876	160.05	.641	208.00	.744	323.05	1.507
73.10	.895	117.00	7.414	161.05	1.102	210.00	.320	324.05	.264
74.10	4.795	122.05	.989	161.95	.339	211.10	.848	326.95	.339
75.10	7.593	123.05	1.328	165.05	.725	216.00	.659	334.05	1.055
76.20	2.195	124.05	.725	166.05	.707	217.00	5.002	352.10	.480
77.10	47.197	125.15	.782	167.05	4.371	218.10	.424	354.20	.528
78.10	3.457	127.05	50.221	168.05	2.063	221.00	6.434	365.00	1.941
79.10	2.770	128.05	3.759	170.95	.311	223.10	1.253	372.10	.801
80.10	2.694	129.05	21.809	173.05	.688	224.10	10.221	402.00	.283
81.10	3.731	130.05	1.771	174.05	.876	225.10	2.393	403.10	.528
82.10	.951	130.95	.367	175.05	1.564	226.20	.349	421.00	.358
83.00	1.168	131.15	.377	175.95	.650	227.00	4.173	422.10	.349

85.10	.838	134.05	.518	176.95	2.996	231.00	.415	424.00	.415
86.00	.838	135.05	1.479	180.05	1.988	237.00	.301	441.05	6.679
87.10	.735	136.05	.669	181.05	1.093	240.90	.207	442.05	47.744
91.00	.999	137.15	.876	183.95	.320	243.00	.518	443.05	8.686
92.10	.895	140.15	.292	185.05	1.554	244.10	8.271	444.05	.914
93.00	4.607	141.05	2.195	186.05	11.927	245.10	1.027		

HSL Compounds

Case No: ---------- Calibration Date: 11/10/88

Contractor: ENGINEERING-SCIENCE Time: 21:15

Contract No: ---------- Laboratory ID: >S0472

Instrument ID: 4 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	.84528	6.26		
2-Fluorophenol	1.15802	1.13505	1.98		
bis(2-Chloroethyl)ether	1.11892	1.18194	5.63		
Phenol	1.41657	1.32057	6.78	*	
Phenol-d5	1.22488	1.09362	10.72		
Aniline	.54193	.65068	20.07		
2-Chlorophenol	1.23175	1.36227	10.60		
1,3-Dichlorobenzene	1.47535	1.44367	2.15		
1,4-Dichlorobenzene	1.40530	1.36117	3.14	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.52301	28.26		
1,2-Dichlorobenzene	1.32240	1.43053	8.18		
2-Methylphenol	1.17367	1.79617	53.04		
3-&-4-Methylphenol	1.07139	1.56054	45.66		
bis(2-chloroisopropyl)Ether	2.15627	2.62993	21.97		
N-Nitroso-Di-n-Propylamine	.84050	.93931	11.76		**
Hexachloroethane	.53840	.59566	10.64		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.51104	26.77		
Nitrobenzene-d5	.39137	.43691	11.64		
2-Nitrophenol	.24657	.27535	11.67	*	
Isophorone	.74170	.79671	7.42		
bis(2-Chloroethoxy)methane	.49386	.58470	18.40		
2,4-Dimethylphenol	.34849	.34134	2.05		
Benzoic Acid	.29725	.36417	22.52		
2,4-Dichlorophenol	.56735	.57253	.92	*	
1,2,4-Trichlorobenzene	.36913	.34492	6.56		
Naphthalene	.94589	.92748	1.95		
4-Chloroaniline	.36309	.40177	10.65		
Hexachlorobutadiene	.20263	.16926	16.55	*	
4-Chloro-3-Methylphenol	.31360	.36371	15.98	*	
2-Methylnaphthalene	.56397	.58908	4.45		

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 (**)

HSL Compounds

Case No: _____ Calibration Date: 11/10/88

Contractor: ENGINEERING SCIENCE Time: 21:15

Contract No: _____ Laboratory ID: >50472

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

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.33102	11.95		**
2,4,6-Trichlorophenol	.42280	.37538	11.22	*	
2,4,5-Trichlorophenol	.52897	.55186	4.33		
2-Fluorobiphenyl	1.27220	1.12147	11.85		
2-Chloronaphthalene	1.23784	1.20653	2.53		
2-Nitroaniline	.47288	.56354	19.17		
Dimethylphthalate	1.40629	1.35064	3.96		
2,6-Dinitrotoluene	.37415	.39903	6.65		
Acenaphthylene	1.68918	1.60610	4.92		
3-Nitroaniline	.44557	.52506	17.84		
2,4-Dinitrophenol	.11898	.16995	42.84		**
Acenaphthene	1.13011	1.00859	10.75	*	
Dibenzofuran	1.64131	1.59722	2.69		
2,4-Dinitrotoluene	.28418	.34873	22.71		
4-Nitrophenol	.28450	.28342	.38		**
Fluorene	1.12850	1.02169	9.47		
Diethylphthalate	1.20939	1.15034	4.88		
4-Chlorophenyl-phenylether	.59183	.51273	13.37		
4-Nitroaniline	.35956	.45463	26.44		
2,4,6-Tribromophenol	.21023	.19636	6.60		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.45927	14.00	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.20736	2.65		
Hexachlorobenzene	.26273	.24332	7.39		
Pentachlorophenol	.14536	.14424	.77	*	

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 (**)

HSL Compounds

Case No: _____ Calibration Date: 11/10/88

Contractor: ENGINEERING-SCIENCE Time: 21:15

Contract No: _____ Laboratory ID: >50472

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

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	1.03868	.42		
Anthracene	1.05155	1.07827	2.54		
Di-n-Butylphthalate	1.51956	1.73597	14.24		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.16040	2.53	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.10769	167.68		
Pyrene	1.56086	1.50776	3.40		
Terphenyl-d14	1.05835	.99505	5.98		
Butylbenzylphthalate	1.03390	1.18978	15.08		
3,3'-Dichlorobenzidine	.13689	.24395	78.21		
Chrysene	.99655	1.04268	4.63		
Benzo(a)Anthracene	1.10407	1.20799	9.41		
bis(2-Ethylhexyl)Phthalate	1.21073	1.39309	15.06		
Di-n-octylphthalate	3.40275	3.16060	7.12	*	
Benzo(a)Pyrene	1.32098	1.31963	.10	*	
Benzo(b)Fluoranthene	1.60850	1.75277	8.97		
Indeno(1,2,3-cd)Pyrene	.96800	1.29037	33.30		
Dibenzo(a,h)Anthracene	.87481	1.04917	19.93		
Benzo(k)Fluoranthene	1.44370	1.04507	27.61		
Benzo(g,h,i)Perylene	.89761	.86488	3.65		

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 (**)

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: _____.

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

Lab File ID (Standard): >S0472 Date Analyzed:11/10/88

Instrument ID: 70 1 Time Analyzed: 21:15

	IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
12 HOUR STD	85900.	9.19	308277.	12.82	171302.	18.28
UPPER LIMIT	171800.		616554.		342604.	
LOWER LIMIT	42950.		154139.		85651.	
SAMPLE NO.						
01 88092672 1ml	74031.	9.19	281128.	12.76	151182.	18.24
02 88092673 1ml	75336.	9.18	285445.	12.74	151957.	18.23
03 88092806,24,	73328.	9.16	278250.	12.75	143374.	18.23
04 88092806,24,	72037.	9.16	265823.	12.75	137668.	18.24
05 88092806 AC	80343.	9.17	297228.	12.76	154896.	18.24
06 88092806 BN	74597.	9.17	274350.	12.77	140863.	18.25
07 88092824 AC	78930.	9.16	299372.	12.75	155847.	18.24
08 88092824 BN	86686.	9.17	312917.	12.75	162320.	18.24
09 88092835 AC	74719.	9.16	270616.	12.75	145245.	18.23
10 88092835 BN	79288.	9.15	289957.	12.75	148664.	18.24
11 88091942 1ml	69649.	9.16	252310.	12.75	81564.*	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.

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name:Engineering Science Contract:_____.

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

Lab File ID (Standard): >S0472 Date Analyzed:11/10/88

Instrument ID: 70 1 Time Analyzed: 21:15

		IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS3(PRY) AREA #	RT
	12 HOUR STD	274056.	22.92	203777.	31.40	173587.	37.46
	UPPER LIMIT	548112.		407554.		347174.	
	LOWER LIMIT	137028.		101888.		86793.	
	EPA SAMPLE NO.						
01	88092672 1ml	233379.	22.88	177759.	31.34	52451.*	37.33
02	88092673 1ml	234334.	22.88	173045.	31.33	79201.*	37.33
03	88092806,24,	230373.	22.88	166920.	31.32	118340.	37.36
04	88092806,24,	219158.	22.87	159106.	31.33	111417.	37.34
05	88092806 AC	242987.	22.89	177238.	31.33	118408.	37.34
06	88092806 BN	219115.	22.88	155109.	31.33	102412.	37.36
07	88092824 AC	241291.	22.88	177600.	31.33	119724.	37.36
08	88092824 BN	251133.	22.88	178855.	31.33	90439.	37.32
09	88092835 AC	226939.	22.87	161472.	31.33	110466.	37.33
10	88092835 BN	230830.	22.87	161823.	31.33	104227.	37.33
11	88091942 1ml	190824.	22.88	106536.	31.32	6492.*	37.33
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.

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 11/10/88 21:15

Lab ID >04110::02 Data Release Authorized By: Ramakrishna K

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	49.03 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	68.74	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	45.17 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	6.34 OK	
275	10.0 - 30.0% of mass 198	20.96 OK	
365	greater than 1.00% of mass 198	1.94 OK	
441	present, but less than mass 443	13.00 OK	
442	greater than 40.0% of mass 198	92.49 OK	
443	17.0 - 23.0% of mass 442	15.84 OK	(17.13) #2

5 point 10/12/88

all SS good

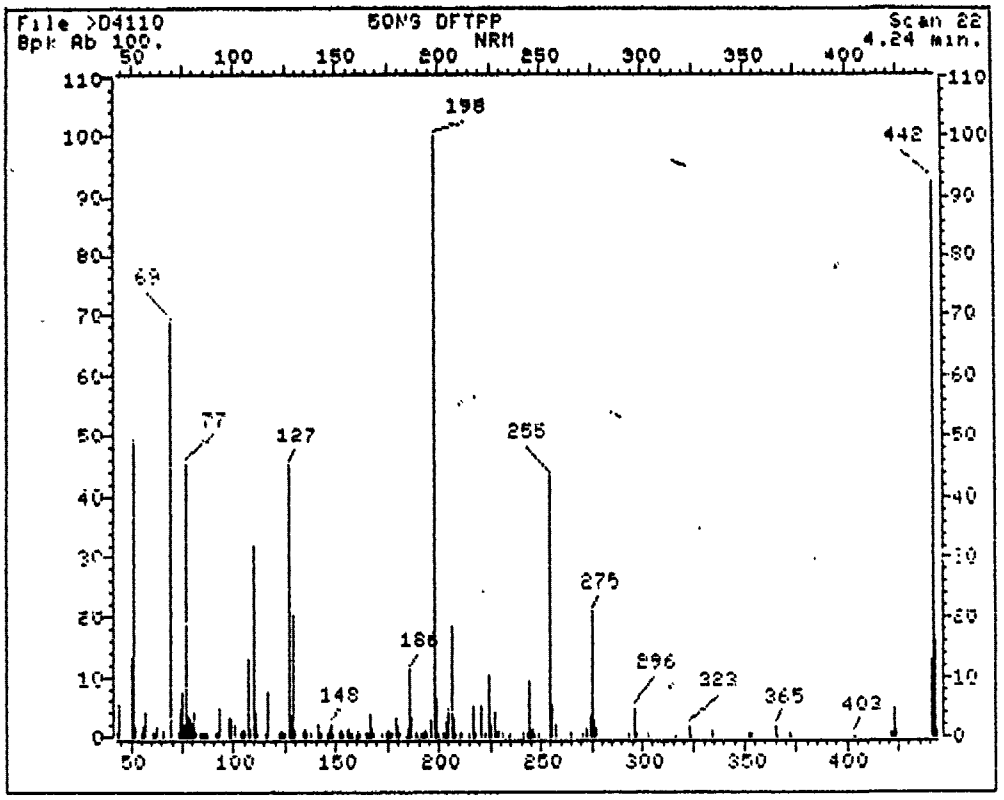
THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

#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	>04110	11/10/88	21:15	
60ng/Lstd	E6179		21:31	
BLK 2742-47AC	E6180		22:26	
"MS	E6181		23:21	
"MSD	E6182	11/11/88	00:16	another project
BLK 2742-47BL	E6183		01.11	
"MS	E6184		02.06	IS out
"MSD	E6185		03.01	IS out
8092674 Ind	E6186		03.56	IS out
"MS	E6187		07:00	IS out
"MSD	E6188		07:54	IS out
8092772 BN	~~E6189~~ E6189		08:50	IS out

use

Form V 7/85



File: >04110 Scan #: 22 Retn. time: 4.24

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.10	.622	100.95	2.023	153.95	.594	199.00	6.338	257.95	2.108
44.00	5.545	103.05	.736	154.95	1.004	200.00	.396	265.05	.707
50.10	13.142	104.05	1.132	155.95	1.542	201.10	.453	270.85	.297
51.00	49.031	104.95	.962	157.05	.424	203.00	.495	272.95	1.344
52.10	1.782	107.05	12.944	157.95	.368	204.00	2.320	274.05	3.324
55.10	.608	108.05	1.528	159.95	.736	205.00	4.357	275.05	20.965
56.00	1.768	110.00	31.857	161.05	1.019	206.00	18.263	276.05	2.787
57.00	4.201	111.00	4.173	161.85	.297	207.00	3.140	277.05	1.287
61.10	.693	111.90	.396	164.95	.721	208.00	.651	293.00	.368
62.10	.523	116.00	.863	165.85	.523	210.00	.325	296.00	4.937
63.10	1.853	117.00	7.399	166.95	3.706	210.90	.806	297.00	.665
65.10	.990	122.00	.750	167.95	1.301	215.00	.283	303.00	.538
67.05	.283	122.90	1.174	169.05	.340	216.90	5.050	316.00	.226
68.95	68.737	124.00	.594	171.95	.552	218.00	.750	323.10	1.825
72.95	.467	125.00	.538	172.85	.481	221.00	5.206	324.00	.226
74.05	4.513	127.00	45.169	174.05	.863	222.90	.792	334.05	.934
74.95	7.568	128.00	3.522	175.05	1.174	224.00	10.327	340.85	.240
76.05	2.009	129.00	20.314	176.05	.467	225.00	2.249	352.05	.439
77.05	45.367	130.00	1.500	176.95	.736	227.00	3.989	352.95	.368
78.05	3.296	131.90	.198	178.95	3.013	228.00	.410	354.05	.453
79.05	3.225	134.00	.764	180.05	1.655	229.00	1.004	365.05	1.938
79.95	2.575	135.00	1.599	181.05	.877	231.00	.368	365.75	.198
80.95	4.300	136.00	.552	183.95	.240	234.00	.240	372.00	.721
92.05	1.160	137.00	.665	185.05	1.358	234.90	.311	373.00	.184
93.05	.792	141.00	2.136	186.05	11.161	241.85	.509	402.90	.552
94.05	.283	142.00	.792	187.05	2.999	243.05	.467	404.10	.198
94.95	.622	142.90	.439	188.05	.354	244.05	9.223	421.05	.481
95.95	.877	146.00	.325	189.05	.552	244.95	1.231	422.05	.467

91.05	.863	148.00	2.349	191.95	.622	246.85	.311	925.95	.939
92.05	.651	149.00	.929	195.05	.998	248.95	.368	991.05	13.000
92.95	9.767	151.20	.255	194.05	.269	254.95	13.179	992.05	92.988
98.05	5.169	151.50	.269	196.05	2.886	255.95	5.588	993.05	15.899
98.95	5.091	153.00	1.202	197.90	100.000	257.05	.382	999.05	1.196

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/10/88

Contractor: Time: 21:31

Contract No: Laboratory ID: >E6179

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	.93312	24.77		
2-Fluorophenol	1.41912	1.23197	13.19		
bis(2-Chloroethyl)ether	1.41737	1.18284	16.55		
Phenol	1.78209	1.57668	11.53	*	
Phenol-d5	1.35470	1.43983	6.28		
Aniline	.74553	.42526	42.96		
2-Chlorophenol	1.32089	1.34603	1.90		
1,3-Dichlorobenzene	1.51101	1.47299	2.52		
1,4-Dichlorobenzene	1.51574	1.48391	2.10	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.56944	.67502	18.54		
1,2-Dichlorobenzene	1.45179	1.53437	5.69		
2-Methylphenol	1.42392	1.60074	12.42		
3-&-4-Methylphenol	1.58422	1.23208	22.23		
bis(2-chloroisopropyl)Ether	2.35722	2.09370	11.18		
N-Nitroso-Di-n-Propylamine	1.13410	1.24582	9.85		**
Hexachloroethane	.70056	.72571	3.59		
Dibromochloropropane	-	-	-		
Nitrobenzene	.56683	.56789	.19		
Nitrobenzene-d5	.49938	.51104	2.33		
2-Nitrophenol	.22040	.25513	15.76	*	
Isophorone	.87207	.88978	2.03		
bis(2-Chloroethoxy)methane	.58240	.61302	5.26		
2,4-Dimethylphenol	.40862	.35683	12.67		
Benzoic Acid	.29595	.31677	7.04		
2,4-Dichlorophenol	.53135	.51669	2.76	*	
1,2,4-Trichlorobenzene	.31739	.32547	2.55		
Naphthalene	.98196	1.02672	4.56		
4-Chloroaniline	.33116	.34566	4.38		
Hexachlorobutadiene	.18652	.19507	4.59	*	
4-Chloro-3-Methylphenol	.28631	.32720	14.28	*	
2-Methylnaphthalene	.54468	.60896	11.80		

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: 11/10/88

Contractor: Time: 21:31

Contract No: Laboratory ID:)E6179

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	.38811	16.59		**
2,4,6-Trichlorophenol	.32295	.27950	13.46	*	
2,4,5-Trichlorophenol	.49539	.54188	9.38		
2-Fluorobiphenyl	1.26699	1.23849	2.25		
2-Chloronaphthalene	1.24653	1.20563	3.28		
2-Nitroaniline	.63129	.57211	9.37		
Dimethylphthalate	1.33033	1.44149	8.36		
2,6-Dinitrotoluene	.31816	.36821	15.73		
Acenaphthylene	1.65820	1.66831	.61		
3-Nitroaniline	.63702	.58641	7.94		
2,4-Dinitrophenol	.05753	.07941	38.04		**
Acenaphthene	1.12644	1.10866	1.58	*	
Dibenzofuran	1.50204	1.52257	1.37		
2,4-Dinitrotoluene	.32099	.38649	20.41		
4-Nitrophenol	.18425	.12552	31.87		**
Fluorene	1.09332	1.11808	2.27		
Diethylphthalate	1.32354	1.38973	5.00		
4-Chlorophenyl-phenylether	.48214	.46904	2.72		
4-Nitroaniline	.27495	.29184	6.15		
2,4,6-Tribromophenol	.14218	.07285	48.76		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.44983	.43769	2.70	*	
4,6-Dinitro-2-Methylphenol	.08606	-	-		
4-Bromophenyl-phenylether	.22979	.24910	8.40		
Hexachlorobenzene	.28768	.32164	11.80		
Pentachlorophenol	.11390	.12519	9.90	*	

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: 11/10/88

Contractor: Time: 21:31

Contract No: Laboratory ID:)E6179

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	1.02556	5.01		
Anthracene	1.13334	1.07661	5.01		
Di-n-Butylphthalate	1.71746	1.90234	10.77		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.17568	1.12969	3.91	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.03775	.01689	55.26		
Pyrene	1.65647	1.60917	2.86		
Terphenyl-d14	1.09647	1.14155	4.11		
Butylbenzylphthalate	1.15097	1.27104	10.43		
3,3'-Dichlorobenzidine	.12990	.22399	72.44		
Chrysene	1.01423	.98668	2.72		
Benzo(a)Anthracene	1.09006	1.14817	5.33		
bis(2-Ethylhexyl)Phthalate	1.34247	1.52468	13.57		
Di-n-octylphthalate	3.72331	3.50446	5.88	*	
Benzo(a)Pyrene	1.27071	1.28254	.93	*	
Benzo(b)Fluoranthene	1.48902	1.55652	4.53		
Indeno(1,2,3-cd)Pyrene	.82543	.58023	29.71		
Dibenzo(a,h)Anthracene	.78966	.92392	17.00		
Benzo(k)Fluoranthene	1.51900	1.30665	13.98		
Benzo(g,h,i)Perylene	.74580	.93055	24.77		

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 (**)

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	80004	7.95	277927	11.84	147615	16.81
UPPER LIMIT	160008		555854		295230	
LOWER LIMIT	40002		138963		73807	
EPA SAMPLE NO.						
01 BLANK AC	58778	7.91	203970	11.39	100952	16.78
02 MS	66908	7.94	224156	11.40	112621	16.79
03 MSD	56363	7.93	184481	11.39	98244	16.78
04 BLANK BN	63077	7.92	217275	11.39	113193	16.78
05 MS	55068	7.94	193807	11.43	106118	16.81
06 MSD	48196	7.90	166317	11.41	232956	16.79
07 8809267A	59433	7.95	201217	11.39	105292	16.78
08 MS	64284	7.95	234271	11.40	116209	16.79
09 MSD	62577	8.01	225378	11.45	111225	16.84
10 8809272BN	47627	7.92	169898	11.40	87805	16.78
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	203553	21.39	133503	29.76	92779	34.56
	UPPER LIMIT	407106		267006		185558	
	LOWER LIMIT	101776		66751		46389	
	EPA SAMPLE NO.						
01	BLANK AC	133072	21.36	77362	29.70	49996	34.55
02	MS	151997	21.40	96793	29.73	63415	34.57
03	MSD	126575	21.39	82216	29.72	53440	34.57
04	BLANK BN	6156027	21.36	100753	29.70	67918	34.55
05	MS	131863	21.39	83749	29.73	— *	—
06	MSD	111205	21.37	70121	29.71	43872 *	34.56
07	8809267A	142850	21.35	91773	29.72	38045 *	34.56
08	MS	163029	21.38	112533	29.71	3462 *	34.60
09	MSD	166079	21.45	104568	29.77	13567 *	34.67
10	8809272BN	122797	21.36	73886	29.72	44082 *	34.56
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 asteri

page __ of __

file: BJ&AS
24 Oct 88

VOLATILE ORGANICS INITIAL CALIBRATION DATA

LabName:_____ Contract:_____

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

Instrument ID.: Carlmark Calibration Date(s): 10/4/88 9/23/89

LAB FILE ID: RRF10= 24 , 50 RRF20= 25 , 51
RRF 50= 26 , 52 RRF100= 27 , 53 RRF200= 28 , 54

COMPOUND	RRF10	RRF20	RRF 50	RRF100	RRF200	$\overline{RRF}$	% RSD	SD
Benzyl chloride	0.31	0.27	0.34	0.40	0.30	0.32		
bis (2-chloroethoxy methane	0.03	0.03	0.05	0.04	0.06	0042	33	
bis (2-chloroispropyl ether	0.24	0.27	0.26	0.24	0.30	0.26	9.6	
Bromobenzene	1.7	1.4	1.2	1.5	1.3	1.4	14	0.19
Bromodichloromethane	3.7	4.2	4.0	4.4	3.3	3.9	11	0.43
Bromofo m	1.1	1.9	2.1	2.5	2.0	1.9	27	0.51
Bromomethane	—	0.43	017	0.28	0.24			
Carbon tetrachloride	4.4	4.8	4.5	5.0	3.9	4.5	9	0.42
Chloroacetaldehyde	0.001	0.002	0.001	0.0005	0.0005	0.001	66	
Chlorobenzene	1.3	1.5	1.5	1.6	1.2	1.4	11	0.16
Chloroethane	0,42	0.43	0.46	0.49	0.41	0.44		
Chloroform	4.2	5.0	4.4	4.9	3.6	4.4	13	0.57
1-Chorohexane	1.7	1.2	1.0	1.2	0.97	1.2	24	0 29
2-Chloroethyl vinyl ether	0.03	0.03	0.05	0.04	0.06	0.042	32	
Chloromethane	0.61	0.46	0.54	0.62	0.54	0.55	11	0.06
Chloromethyl methyl ether	0 12	0.21	0.22	0.16	0.15	017	25	
o_,m_,& p_Chlorotoluenes	5.8	4.9	4.0	4.3	3.8	4.6	18	0.81
Dibromochloromethane	3.0	3.8	4.1	4.6	3.3	3.8	17	0.63
Dibromomethane	3.9	3.3	2.8	3.2	2.7	3.2	15	0.48
1,2_Dichlorobenzene	2.4	2.7	2.8	2.8	2.1	2.6	12	0.30
1,3_Dichlorobenzene	2.1	2.4	2.4	2.5	1.9	2.3	11	0 25
1,4_Dichlorobenzene	2.3	2.5	2.4	2.4	1.8	2.3	12	0.28
Dichlorodifluormethane	0.51	0 49	0.50	0.57	0.64	0.54	12	
1,1_Dichloroethane	2.3	2.6	2.4	2.8	2.1	2.3	12	0.27
1,2_Dichloroethane	3.2	3.1	2.8	4.9	2.3	3.3	36	0.98
1,1_Dichloroethylene	2.6	2.8	2.6	3.0	2.3	2.7	10	0.26
trans_1,2_dichloroethylene	2.4	2.7	2.6	29	2.2	2.6	10	0 27
Dichloromethane	35	7.0	6.1	3.1	2.4	11	127	14
1,2_Dichloropropane	2.2	2.6	2.5	2.8	2.0	2.4	13	0.32
1,3_Dichloropropylene	1.8	2.1	2.0	2.2	1.6	1.9	13	0 24
1,1,2,2_Tetrachloroethane	7.1	8.5	7.9	8.4	5.9	7.7	13	1.0
1,1,1,2_Tetrachloroethane	7.1	5.6	4.5	4.8	3.8	5.2	25	1.3
Tetrachloroethylene	7.7	8.5	7.9	8.4	5.9	7.7	13	
1,1,1_Trichloroethane	3.1	3.5	3.2	3.6	2.6	3.2	12	0.39
1,1,2_Trichloroethane	7.9	6.5	5.2	5.5	4.4	5.9	23	1.3
Trichloroethylene	3.4	4.0	4.0	4.4	3.1	3.8	14	0.52
Trichlorofluormethane	2.6	2.5	2.4	2.7	2.1	2.5	9	0 23
Trichloropropane	2.5	2.3	1.8	2.1	1.7	2.1	16	0 33
Vinyl chloride	0.82	0.76	0.77	0.85	0.70	0.78	8	0.06

file: 8020CAL
21 Oct 88

VOLATILE ORGANICS INITIAL CALIBRATION DATA

LabName:_____ Contract:_____

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

Instrument ID.: CARbapak Calibration Date(s): 10/4/88 _____

LAB FILE ID: RRF10= 24 RRF20= 25
RRF 50= 26 RRF100= 27 RRF200= 28

COMPOUND	RRF10	RRF20	RRF 50	RRF100	RRF200	$\overline{RRF}$	% RSD
Benzene	4.8	4.0	4.3	4.2	4.1	4.3	7
Chlorobenzene	5.0	4.9	4.7	5.0	5.4	5.0	5
1,2_Dichlorobenzene	3.3	3.7	4.0	4.0	4.0	3.8	8
1,3_Dichlorobenzene	4.2	4.4	4.4	4.6	4.6	4.4	4
1,4_Dichlorobenzene	3.4	3.6	3.6	3.8	3.8	3.6	5
Ethyl Benzene	3.2	3.5	3.1	3.5	3.5	3.4	6
Toluene	3.8	4.0	3.7	3.7	3.9	3.8	3
Xylenes	12	13	11	12	11	12	7

This page intentionally left blank.

DATA PACKAGE #27

This page intentionally left blank.

ES
ENGINEERING-SCIENCE, INC.

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

Job No.: OR001.00

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 samples received by this laboratory on 8-11-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081749	DANGB8-MW19-SS1	BA-I	8-11-88		9-07-88	
88081749	DANGB8-MW19-SS1	CD-~~I~~ F	8-11-88		9-07-88	
88081749	DANGB8-MW19-SS1	CR-~~I~~ F	8-11-88		9-07-88	
88081749	DANGB8-MW19-SS1	PB-F	8-11-88		9-16-88	
88081749	DANGB8-MW19-SS1	418.1	8-11-88	9-09-88	9-11-88	
88081749	DANGB8-MW19-SS1	MOIS	8-11-88		8-17-88	
88081749	DANGB8-MW19-SS1	8010	8-11-88		8-20-88	8-20-88
88081749	DANGB8-MW19-SS1	8020	8-11-88		8-20-88	8-20-88
88081749	DANGB8-MW19-SS1	8080	8-11-88	9-08-88	9-18-88	
88081750	DANGB8-MW19-SS2	BA-I	8-11-88		9-07-88	
88081750	DANGB8-MW19-SS2	CD-~~I~~ F	8-11-88		9-07-88	
88081750	DANGB8-MW19-SS2	CR-~~I~~ F	8-11-88		9-07-88	
88081750	DANGB8-MW19-SS2	PB-F	8-11-88		9-16-83	
88081750	DANGB8-MW19-SS2	418.1	8-11-88	9-09-88	9-11-88	
88081750	DANGB8-MW19-SS2	MOIS	8-11-88		8-17-88	
88081750	DANGB8-MW19-SS2	8010	8-11-88		8-20-88	8-20-88
88081750	DANGB8-MW19-SS2	8020	8-11-88		8-20-88	8-20-88
88081750	DANGB8-MW19-SS2	8080	8-11-88	9-08-88	9-18-88	
88081751	DANGB8-MW19-SS3	BA-I	8-11-88		9-07-88	
88081751	DANGB8-MW19-SS3	CD-~~I~~ F	8-11-88		9-07-88	
88081751	DANGB8-MW19-SS3	CR-~~I~~ F	8-11-88		9-07-88	
88081751	DANGB8-MW19-SS3	PB-F	8-11-88		9-16-88	
88081751	DANGB8-MW19-SS3	418.1	8-11-88	9-09-88	9-11-88	
88081751	DANGB8-MW19-SS3	MOIS	8-11-^8		8-17-88	
88081751	DANGB8-MW19-SS3	8010	8-11-88		8-20-88	8-20-88
88081751	DANGB8-MW19-SS3	8020	8-11-88		8-20-88	8-20-88
88081751	DANGB8-MW19-SS3	8080	8-11-88	9-08-88	9-18-88	

* If applicable

These "I's" were typos.
JS 12/20/88

ES
ENGINEERING-SCIENCE, INC.

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

Job No.: OR001.00

Project: Duluth ANGB

Attached are the analytical reports for the soil samples received by this laboratory on 8-11-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081752	DANGB8-MW16-SS1	BA-I	8-11-88		9-07-88	
88081752	DANGB8-MW16-SS1	CD-~~I~~F	8-11-88		9-07-88	
88081752	DANGB8-MW16-SS1	CR-~~I~~F	8-11-88		9-07-88	
88081752	DANGB8-MW16-SS1	PB-F	8-11-88		9-16-88	
88081752	DANGB8-MW16-SS1	418.1	8-11-88	9-09-88	9-11-88	
88081752	DANGB8-MW16-SS1	MOIS	8-11-88		8-17-88	
88081752	DANGB8-MW16-SS1	8010	8-11-88		8-20-88	8-22-88
88081752	DANGB8-MW16-SS1	8020	8-11-88		8-20-88	8-22-88
88081752	DANGB8-MW16-SS1	8080	8-11-88	9-08-88	9-18-88	
88081753	DANGB8-MW16-SS2	BA-I	8-11-88		9-07-88	
88081753	DANGB8-MW16-SS2	CD-~~I~~F	8-11-88		9-07-88	
88081753	DANGB8-MW16-SS2	CR-~~I~~F	8-11-88		9-07-88	
88081753	DANGB8-MW16-SS2	PB-F	8-11-88		9-16-88	
88081753	DANGB8-MW16-SS2	418.1	8-11-88	9-09-88	9-11-88	
88081753	DANGB8-MW16-SS2	MOIS	8-11-88		8-17-88	
88081753	DANGB8-MW16-SS2	8010	8-11-88		8-21-88	8-22-88
88081753	DANGB8-MW16-SS2	8020	8-11-88		8-21-88	8-22-88
88081753	DANGB8-MW16-SS2	8080	8-11-88	9-08-88	9-18-88	
88081754	DANGB8-MW16-SS6	BA-I	8-11-88		9-07-88	
88081754	DANGB8-MW16-SS6	CD-~~I~~F	8-11-88		9-07-88	
88081754	DANGB8-MW16-SS6	CR-~~I~~F	8-11-88		9-07-88	
88081754	DANGB8-MW16-SS6	PB-F	8-11-88		9-16-88	
88081754	DANGB8-MW16-SS6	418.1	8-11-88	9-09-88	9-11-88	
88081754	DANGB8-MW16-SS6	MOIS	8-11-88		8-17-88	
88081754	DANGB8-MW16-SS6	8010	8-11-88		8-21-88	8-21-88
88081754	DANGB8-MW16-SS6	8020	8-11-88		8-21-88	8-21-88
88081754	DANGB8-MW16-SS6	8080	8-11-88	9-08-88	9-18-88	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88081749-88081754
WORK ORDER NO.: 833

These soil samples were received at the ES Berkeley Laboratory on 8-11-88. They were received cold and intact.

ANALYSIS REPORT

ORDER NUMBER: 833
NUMBER : ZB0000000440
ORDER DATE : 08/11/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
OAK RIDGE/DULUTH ANGB
S. ILLINOIS AVE. STE. S103
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

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

SK: 2, UNITS: mg/kg

GT COMPOUND	DANGB8-MW19-SS1 8-10-88 88081749	DANGB8-MW19-SS2 8-10-88 88081750	DANGB8-MW19-SS3 8-10-88 88081751	DANGB8-MW16-SS1 8-10-88 88081752	DANGB8-MW16-SS2 8-10-88 88081753	DANGB8-MW16-SS6 8-10-88 88081754
D DIG SOIL	NA	NA	NA	NA	NA	NA
RIUM	37.8	43.4	25.0	20.0	24.4	24.7
MIUM	9.9*N	14.4*N	9.6*N	6.2*N	7.3*N	10.1*N
OMIUM	37.8	43.4	25.0	20.0	24.4	21.5
D	7.7S	4.4S	6.4S	10.6S	8.1S	4.7S

- Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 833
SB NUMBER : ZB0000000440
WORK ORDER DATE : 08/11/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
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/KG

TEST COMPOUND	DANGB8-MW19-SS1 8-10-88 88081749	DANGB8-MW19-SS2 8-10-88 88081750	DANGB8-MW19-SS3 8-10-88 88081751	DANGB8-MW16-SS1 8-10-88 88081752	DANGB8-MW16-SS2 8-10-88 88081753	DANGB8-MW16-SS6 8-10-88 88081754
418.1 PETROLEUM HYDROCARBONS	<100	<100	<100	<100	<100	<100
% MOISTURE	17.8	8.4	9.2	27.9	26.3	14.8

ND - Not Detected

ANALYSIS REPORT

RK ORDER NUMBER: 833
B NUMBER : ZB0000000440
RK ORDER DATE : 08/11/88

APPROVED BY _____
Lab Supervisor

ORT DATA:
OAK RIDGE/DULUTH ANGB
) S. ILLINOIS AVE. STE. S103
RIDGE, TN 37830
L HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB (134)
71 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/Kg, GROUP 8010

ST COMPOUND	DANGB8-MW19-SS1 8-10-88 88081749	DANGB8-MW19-SS2 8-10-88 88081750	DANGB8-MW19-SS3 8-10-88 88081751	DANGB8-MW16-SS1 8-10-88 88081752	DANGB8-MW16-SS2 8-10-88 88081753	DANGB8-MW16-SS6 8-10-88 88081754
NZYL CHLORIDE	ND	ND	ND	ND	ND	ND
S (2-CHLOROETHOXY)METHANE	ND	ND	ND	ND	ND	ND
S (2-CHLOROISOPROPYL)ETHER	ND	ND	ND	ND	ND	ND
OMOBENZENE	ND	ND	ND	ND	ND	ND
OMODICHLOROMETHANE	ND	ND	ND	ND	ND	ND
OMOFORM	ND	ND	ND	ND	ND	ND
OMOETHANE	ND	ND	ND	ND	ND	ND
RBON TETRACHLORIDE	ND	ND	ND	ND	ND	ND
LORACETALDEHYDE	ND	ND	ND	ND	ND	ND
LORAL	ND	ND	ND	ND	ND	ND
LOROBENZENE	ND	ND	ND	ND	ND	ND
LOROETHANE	ND	ND	ND	ND	ND	ND
LOROFORM	0.5B	0.05B	0.04B	ND	ND	ND
CHLOROHEXANE	ND	ND	ND	ND	ND	ND
CHLOROETHYL VINYL ETHER	ND	ND	ND	ND	ND	ND
LOROMETHANE	ND	ND	ND	ND	ND	ND
LOROMETHYL METHYL ETHER	ND	ND	ND	ND	ND	ND
LOROTOLUENE	ND	ND	ND	ND	ND	ND
BROMOCHLOROMETHANE	ND	ND	ND	ND	ND	ND
BROMOMETHANE	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
CHLORODIFLUOROMETHANE	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
ANS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
CHLOROMETHANE	10B	3.2B	3.2B	5.1B	10B	4.1B
2-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND

- Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 833

TEST COMPOUND	DANGB8-MW19-SS1 8-10-88 88081749	DANGB8-MW19-SS2 8-10-88 88081750	DANGB8-MW19-SS3 8-10-88 88081751	DANGB8-MW16-SS1 8-10-88 88081752	DANGB8-MW16-SS2 8-10-88 88081753	DANGB8-MW16-SS6 8-10-88 88081754
,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
1,1,1-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
INYL CHLORIDE	ND	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT

RK ORDER NUMBER: 833
E NUMBER : ZB0000000440
RK ORDER DATE : 08/11/88

APPROVED BY _____
Lab Supervisor

PORT DATA:
OAK RIDGE/DULUTH ANGB
) S. ILLINOIS AVE. STE. S103
< RIDGE, TN 37830
.L 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/Kg, GROUP 8020

ST COMPOUND	DANGB8-MW19-SS1 8-10-88 88081749	DANGB8-MW19-SS2 8-10-88 88081750	DANGB8-MW19-SS3 8-10-88 88081751	DANGB8-MW16-SS1 8-10-88 88081752	DANGB8-MW16-SS2 8-10-88 88081753	DANGB8-MW16-SS6 8-10-88 88081754
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	10	1.7	4.4	15	41	7.5
LENES	ND	ND	ND	ND	5.6	ND

- Not Detected

CHAIN OF CUSTODY RECORD

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

SAMPLER(S): (Signature) Robert L. Davis, Peter E. Hammerstrom

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

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SOILS ANALYSES REQUIRED: SW8010, 8020	SW8080	SW8270	EPA 418.1	SW8010, 7191	SW7131, 7421			REMARKS
8-10-88	0810	DANGBS-MW14-SS1	1	X								
8-10-88	0810	DANGBS-MW14-SS1	1			X	X	X	X			SW8010 is for Barium only
8-10-88	0825	DANGBS-MW14-SS2	1	X								
8-10-88	0825	DANGBS-MW14-SS2	1			X	X	X	X			" "
8-10-88	0837	DANGBS-MW14-SS3	1	X								
8-10-88	0837	DANGBS-MW14-SS3	1			X	X	X	X			" "
8-10-88	0934	DANGBS-MW16-SS1	1	X								
8-10-88	0934	DANGBS-MW16-SS1	1			X	X	X	X			" "
8-10-88	1005	DANGBS-MW16-SS2	1	X								
8-10-88	1005	DANGBS-MW16-SS2	1			X	X	X	X			" "
8-10-88	1124	DANGBS-MW16-SS6	1	X								
8-10-88	1124	DANGBS-MW16-SS6	1			X	X	X	X			" "

1713

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Robert L. Davis	8-10-88 1620				

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 8689891066

8689291066

SENDER'S COPY

Sender's Federal Express Account Number: 1196 4207 8
Date: 8-30-88

1 From (Your Name) Please Print: Kimberly Davis
Your Phone Number (Very Important): (615) 481-1920
Company: Engineering-Science, Inc.
Department/Floor No.: 1 550
Street Address: 710 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, Inc.
Department/Floor No.:
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes): 100 Bancroft Way
City: Berkeley State: CA ZIP Required: 94710

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.): SR-001

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
6 [ ] OVERNIGHT LETTER*
2 [ ] COURIER-PAK OVERNIGHT ENVELOPE*
7 [ ]
3 [ ] OVERNIGHT BOX
8 [ ]
4 [ ] OVERNIGHT TUBE
9 [ ]
5 [ ] STANDARD AIR Delivery not later than second business day
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)
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	OVER SIZE
1	3.1		
Total 1	Total 4.1	Total	

Received At: 1 [ ] Regular Stop 2 [ ] On-Call Stop 3 [ ] Drop Box 4 [ ] B.S.C. 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 1/88 PRINTED IN U.S.A. GBFE

009

© 1988 F.E.C.

SENDER'S COPY 8689891066

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):
88081749-88081754, 88081877-88081879
88081883-88081890

QC Report No: TPH-S-0045-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-11-88
Date Prepared: 9-09-88
Date Analyzed: 9-11-88
Date Reported: 9-21-88
Dilution Factor: 6.5
%Moisture: 17.8

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88081749	418.1	<100	<100	1220	1050	86	876	83	18	

1761

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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).:
88081749-88081754, 88081877-88081879,
88081883-88081890

QC Report No: VGC-S-0035-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 8-15-88
Date Prepared: NA
Date Analyzed: 8-25-88
Date Reported: 9-16-88
Dilution Factor: NA
% Moisture: 10.8

Laboratory Supervisor Approval:

1749

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88081878	1,1-dichloroethane	11.2	ND	14.4	129*	12.3	110	16	20	58-124
	Trichloroethene	11.2	ND	14.0	125*	12.1	108	15	16	75-110
	Chlorobenzene	11.2	ND	12.7	113	10.8	97	16	21	71-125
	Aromatics: 8020									
88081878	Benzene	11.2	ND	11.3	101	11.2	100	1	26	75-123
	Toluene	11.2	1.4	12.1	96	10.8	84	11	16	79-115
	Chlorobenzene	11.2	ND	10.6	95	9.8	88	8	24	82-112

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* Percent recoveries do not meet the ES QC limits. Blank spike analysis shows the laboratory to be in control.

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

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

MS = Spike Sample
MSD = Spike 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).:
88081749-88081754, 88081877-88081879
88081883-88081890

QC Report No: VGC-S-0035-88B
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: NA
Date Prepared: NA
Date Analyzed: 8-25-88
Date Reported: 9-16-88
Dilution Factor: NA
% Moisture: NA

Laboratory Supervisor Approval:

1763

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
Blank	1,1-dichloroethane	10.0	ND	9.73	97	9.82	98	1	20	58-124
	Trichloroethene	10.0	ND	9.82	98	10.1	101	3	16	75-110
	Chlorobenzene	10.0	ND	10.1	101	9.55	96	6	21	71-125
	Aromatics: 8020									
Blank	Benzene	10.0	ND	9.46	95	10.0	100	6	26	75-123
	Toluene	10.0	ND	8.75	88	9 28	93	6	16	79-115
	Chlorobenzene	10.0	ND	10.2	102	9.89	98	4	24	82-112

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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

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

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

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: mg/KG
Date Reported: 9-16-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
22	8-20-88	VGC	Carbopack	75-09-2	Dichloromethane	5.9	0.25	88081749-88081752
				67-66-3	Chloroform	0.2	0.05	
34	8-21-88	VGC	Carbopack	75-09-2	Dichloromethane	3.0	0.25	88081753-88081754

1764

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):
88081706, 88081708-88081709
88081749-88081754, 88081898-88081906

QC Report No: ICP-S-0023-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-08-88
Date Reported: 9-20-88
Dilution Factor: NA
%Moisture: 12.2

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	SR	SSR	PR	Note
Barium	88081706	88081706	9-07-88	8-23-88	SW6010	<20	49.9	49.0	2	228	49.9	228	78	A
Cadmium	88081706	88081706	9-07-88	8-23-88	SW6010	<0.5	6.7	5.1	27*	5.70	6.7	9.3	46N	A
Chromium	88081706	88081706	9-07-88	8-23-88	SW6010	<1.0	24.6	22.3	10	22.8	24.6	42.8	80	A

1765

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
N See Legend attached.
* See Legend attached.
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)

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
Samples No.: 88081706, 88081708-88081709
Samples No.: 88081749-88081754
Samples No.: 88081898-88081906
QC REPORT NO.: ICP-S-0023-88

The results obtained for the laboratory control sample (LCS) analyzed with these samples for the analytes Cadmium, Chromium and Barium exceeded the recommended EPA recoveries. All data associated with this batch was closely inspected and no analytical problems were found. The initial and continuing calibration verification standards and blanks and precision and accuracy recoveries were within acceptable limits with the exception of Cadmium.

The Cadmium spike recovery below acceptable limits was followed by an analytical spike as required by laboratory standard operating procedure. The results of the analytical spike indicate matrix interference for this analyte.

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):
88081706, 88081708-88081709
88081749-88081754

QC Report No: AAF-S-0022-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-19-88
Date Reported: 9-20-88
Dilution Factor: NA
%Moisture: 12.2

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
Lead	88081706	88081706	9-08-88	8-19-88	7421	<0.5	7.7	8.2	6	5.3	7.7	12.8	96	

1767

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)

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).:
88081749-88081754
88081877-88081879
88081883-88081890

Calibration Date: 9-11-88
Instrument I.D.: Perkin Elmer 257
Grating Infrared Spectrophotometer

Unit: mg/L
Date Reported: 11-09-88
R= 0.9998

Laboratory Supervisor Approval:

Standard	Concentration	Absorbance	/Continuous RF /Calibration /Verification
No. 1	0.59	0.115	
No. 2	1.2	0.212	RF = 6.57
No. 3	1.8	0.301	
No. 4	2.4	0.391	
Cont. Cal. No. 2 (88081749-88081752)	1.20	0.210	100%
Cont. Cal. No. 2 (88081753-88081754) (88081877-88081879) (88081883-88081887)	1.20	0.215	100%
Cont. Cal. No. 2 (88081889-88081890)	1.26	0.219	105%

LATILE CONTINUING CALIBRATION CHECK

Name:_____ Contract:_____

b Code:_____ Case No.:_____ SAS No.:_____

trument ID:CARBOPAK_____ Calibration Date(s):8/20/88

AB FILE ID:_15,16_____ Init. Calib. Date(s):8/19/88, 8/15/88

MPOUND	RRF	RRF50	%D
enzyl chloride	0.08	0.06	23.12
s (2-choroethoxy) thane	0.04		100.00
is (2-choroisopropyl her	0.26		100.00
omobenzene	1.21	1.16	3.95
romodichloromethane	3.68	3.35	8.99
omoform	1.45	1.19	18.10
omomethane	0.26	0.21	20.89
arbon tetrachloride	3.20	2.95	7.83
hloroacetaldehyde			ERR
lorobenzene	1.36	1.60	-17.57
loroethane	0.55	0.49	11.09
hloroform	4.50	4.19	6.86
Chorohexane	0.92	0.90	2.55
Chloroethyl vinyl ether	0.04		100.00
hloromethane	0.34	0.35	-1.59
hloromethyl methyl ether	0.17		100.00
,m_,& p_Chlorotoluenes	3.99	3.79	4.97
ibromochloromethane	3.90	3.40	12.93
ibromomethane	2.98	2.16	27.56
2_Dichlorobenzene	2.48	2.42	2.35
3_Dichlorobenzene	1.94	1.99	-2.83
,4_Dichlorobenzene	2.47	2.46	0.54
chlorodifluormethane	0.54		100.00
1_Dichloroethane	1.95	1.54	20.79
,2_Dichloroethane	2.33	2.23	4.22
,1_Dichloroethylene	2.44	2.10	13.79
ans_1,2_dichloroethylene	1.51	1.50	0.53
chloromethane	4.21	3.55	15.56
,2_Dichloropropane	2.70	2.73	-1.05
3_Dichloropropylene	4.60	3.65	20.68
1,2,2_Tetrachloroethane	6.65	7.25	-9.02
,1,1,2_Tetrachloroethane	3.61	2.72	24.76
trachloroethylene	6.65	7.25	-9.02
1,1_Trichloroethane	2.20	2.05	6.68
,1,2_Trichloroethane	4.60	3.65	20.65
richloroethylene	4.40	3.98	9.50
ichlorofluormethane	2.19	2.03	7.14
ichloropropane	3.59	3.46	3.57
inyl chloride	1.06	0.92	15.19

1769

ATILE CONTINUING CALIBRATION CHECK

Name:ENGINEERING SCIENCE_____ Contract:_____

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

trument ID.:CARBOPAK Calibration Date(s):8/20/88 _____

FILE ID: RRF 50 __15_____ Init calib = 8/19/88

MPOUND	$\overline{RRF}$	RRF50	%D
nzene_____	3.10	2.79	-10.14
lorobenzene_____	5.31	4.93	-7.18
2_Dichlorobenzene_____	2.44	2.83	15.93
3_Dichlorobenzene_____	2.71	3.17	17.03
4_Dichlorobenzene_____	2.53	3.00	18.58
yl Benzene:_____	3.51	2.79	-20.63
uene_____	4.40	3.47	-21.10
enes_____	7.63	8.61	12.90

LATILE CONTINUING CALIBRATION CHECK

Name:_____ Contract:_____

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

rument ID:CARBOPAK_____ Calibration Date(s):8/21/89

BB FILE ID:_31,32_____ Init. Calib. Date(s):8/19/88, 8/15/88

MPOUND	RRF	RRF50	%D
enzyl chloride	0.08	0.17	-111.57
s (2-choroethoxy) thane	0.04		100.00
is (2-choroisopropyl ther	0.26		100.00
omobenzene	1.21	1.11	8.38
romodichloromethane	3.68	3.41	7.36
romoform	1.45	1.12	22.94
omomethane	0.26	0.22	15.03
rbon tetrachloride	3.20	3.11	2.81
hloroacetaldehyde			ERR
lorobenzene	1.36	1.42	-4.47
loroethane	0.55	0.35	36.02
hloroform	4.50	4.31	4.20
Chorohexane	0.92	0.85	7.10
Chloroethyl vinyl ether	0.04		100.00
hloromethane	0.34	0.39	-13.85
hloromethyl methyl ether	0.17		100.00
,m_,& p_Chlorotoluenes	3.99	3.51	12.09
bromochloromethane	3.90	3.54	9.20
bromomethane	2.98	2.42	18.78
2_Dichlorobenzene	2.48	2.38	3.86
3_Dichlorobenzene	1.94	2.04	-4.98
,4_Dichlorobenzene	2.47	2.28	7.75
ichlorodifluormethane	0.54		100.00
1_Dichloroethane	1.95	1.88	3.45
,2_Dichloroethane	2.33	2.21	5.04
,1_Dichloroethylene	2.44	1.87	23.18
ans_1,2_dichloroethylene	1.51	1.63	-7.79
chloromethane	4.21	3.81	9.52
,2_Dichloropropane	2.70	2.73	-1.01
3_Dichloropropylene	4.60	3.63	21.17
1,2,2_Tetrachloroethane	6.65	6.75	-1.54
,1,1,2_Tetrachloroethane	3.61	2.89	20.06
etrachloroethylene	6.65	6.75	-1.50
1,1_Trichloroethane	2.20	2.12	3.43
,1,2_Trichloroethane	4.60	3.63	21.09
richloroethylene	4.40	3.54	19.52
ichlorofluormethane	2.19	1.86	14.94
ichloropropane	3.59	2.69	25.04
inyl chloride	1.08	0.80	26.28

ATILE CONTINUING CALIBRATION CHECK

Name:ENGINEERING SCIENCE_____ Contract:_____

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

Instrument ID.:CARBOPAK Calibration Date(s):8/29/88 _____

FILE ID: RRF 50 8830 Init Dat = 8/19/88

MPOUND	RRF	RRF50	%D
nzene	3.10	2.78	-10.24
orobenzene	5.31	5.09	-4.20
2_Dichlorobenzene	2.44	2.65	8.70
3_Dichlorobenzene	2.71	3.00	10.70
4_Dichorobenzene	2.53	2.78	9.98
yl Benzene	3.51	3.13	-10.81
luene	3.47	3.57	2.74
lenes	7.63	8.13	6.56

DATA PACKAGE #28

This page intentionally left blank.

ES
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 soil samples received by this laboratory on 9-27-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092731	DANGB-BG-SL3-SD1	AS-F	9-24-88		10-16-88	
88092731	DANGB-BG-SL3-SD1	BA-I	9-24-88		10-17-88	
88092731	DANGB-BG-SL3-SD1	CD-F	9-24-88		10-18-88	
88092731	DANGB-BG-SL3-SD1	CR-F	9-24-88		10-18-88	
88092731	DANGB-BG-SL3-SD1	HG-C	9-24-88		10-17-88	
88092731	DANGB-BG-SL3-SD1	PB-F	9-24-88		10-16-88	
88092731	DANGB-BG-SL3-SD1	418.1	9-24-88	10-13-88	10-22-88	
88092731	DANGB-BG-SL3-SD1	MOIS	9-24-88		10-10-88	
88092731	DANGB-BG-SL3-SD1	8010	9-24-88		10-05-88	10-04-88
88092731	DANGB-BG-SL3-SD1	8020	9-24-88		10-05-88	
88092731	DANGB-BG-SL3-SD1	8080	9-24-88	10-07-88	10-25-88	
88092731	DANGB-BG-SL3-SD1	8270	9-24-88	10-07-88	11-15-88	

* 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.
38092732	DANGB-BG-SL2-SD1	AS-F	9-24-88		10-17-88	
38092732	DANGB-BG-SL2-SD1	BA-I	9-24-88		10-17-88	
38092732	DANGB-BG-SL2-SD1	CD-F	9-24-88		10-18-88	
38092732	DANGB-BG-SL2-SD1	CR-F	9-24-88		10-18-88	
38092732	DANGB-BG-SL2-SD1	HG-C	9-24-88		10-17-88	
38092732	DANGB-BG-SL2-SD1	PB-F	9-24-88		10-16-88	
38092732	DANGB-BG-SL2-SD1	418.1	9-24-88	10-13-88	10-22-88	
38092732	DANGB-BG-SL2-SD1	MOIS	9-24-88		10-10-88	
38092732	DANGB-BG-SL2-SD1	8010	9-24-88		10-05-88	10-04-88
38092732	DANGB-BG-SL2-SD1	8020	9-24-88		10-05-88	
38092732	DANGB-BG-SL2-SD1	8080	9-24-88	10-07-88	10-25-88	
38092732	DANGB-BG-SL2-SD1	8270	9-24-88	10-07-88	11-30-88	
38092733	DANGB-BG-SL1-SD1	AS-F	9-24-88		10-17-88	
38092733	DANGB-BG-SL1-SD1	BA-I	9-24-88		10-17-88	
38092733	DANGB-BG-SL1-SD1	CD-F	9-24-88		10-18-88	
38092733	DANGB-BG-SL1-SD1	CR-F	9-24-88		10-18-88	
38092733	DANGB-BG-SL1-SD1	HG-C	9-24-88		10-17-88	
38092733	DANGB-BG-SL1-SD1	PB-F	9-24-88		10-25-88	
38092733	DANGB-BG-SL1-SD1	418.1	9-24-88	10-13-88	10-22-88	
38092733	DANGB-BG-SL1-SD1	MOIS	9-24-88		10-10-88	
38092733	DANGB-BG-SL1-SD1	8010	9-24-88		10-05-88	10-04-88
38092733	DANGB-BG-SL1-SD1	8020	9-24-88		10-05-88	
38092733	DANGB-BG-SL1-SD1	8080	9-24-88	10-07-88	10-25-88	
38092733	DANGB-BG-SL1-SD1	8270	9-24-88	10-07-88	11-15-88	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092731-88092733
WORK ORDER NO.: 1048

These soil samples were received at the ES Berkeley Laboratory on 9-27-88. They were received cold and intact.

ANALYSIS REPORT

)RK ORDER NUMBER: 1048
)B NUMBER : ZB0000000440
)RK ORDER DATE : 09/27/88

APPROVED BY
Lab Supervisor

.PORT DATA:
; 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

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

ASK: 2, UNITS: MG/KG

EST COMPOUND	DANGB-BG-SL3-SD1 88092731	DANGB-BG-SL2-SD1 88092732	DANGB-BG-SL1-SD1 88092733
CID DIG SOIL	NA	NA	NA
RSENIC	<1.2	<1.5	<1.2
ARIUM	36.3	46.4	31.4
ADMIUM	<0.6	<0.75	<0.61
HROMIUM	11.2 N	15.5 N	12.9 N
ERCURY	<0.12	6.3	<0.12
EAD	4.0	<0.15	4.8 S

.D - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1048
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/27/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 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/Kg

TEST COMPOUND		DANGB-BG-SL3-SD1 88092731	DANGB-BG-SL2-SD1 88092732	DANGB-BG-SL1-SD1 88092733
18.1 PETROLEUM HYDROCARBONS		<100	170	<100
% MOISTURE		18.3	33.5	16.9

ND - Not Detected

ANALYSIS REPORT

)RK ORDER NUMBER: 1048
)B NUMBER : ZB0000000440
)RK ORDER DATE : 09/27/88

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/Kg, GROUP 8010

ST COMPOUND	DANGB-BG-SL3-SD1 88092731	DANGB-BG-SL2-SD1 88092732	DANGB-BG-SL1-SD1 88092733
NZYL CHLORIDE	ND	ND	ND
S (2-CHLOROETHOXY)METHANE	ND	ND	ND
S (2-CHLOROISOPROPYL)ETHER	ND	ND	ND
:OMOBENZENE	ND	ND	ND
'OMODICHLOROMETHANE	ND	ND	ND
:OMOFORM	ND	ND	ND
'OMOETHANE	ND	ND	ND
,RBON TETRACHLORIDE	ND	ND	ND
;LORACETALDEHYDE	ND	ND	ND
,LORAL	ND	ND	ND
'LOROBENZENE	ND	ND	ND
LOROETHANE	ND	ND	ND
'LOROFORM	ND	ND	ND
CHLOROHEXANE	ND	ND	ND
CHLOROETHYL VINYL ETHER	ND	ND	ND
,LOROMETHANE	ND	ND	ND
LOROMETHYL METHYL ETHER	ND	ND	ND
LOROTOLUENE	ND	ND	ND
BROMOCHLOROMETHANE	ND	ND	ND
BROMOMETHANE	ND	ND	ND
2-DICHLOROBENZENE	ND	ND	ND
3-DICHLOROBENZENE	ND	ND	ND
4-DICHLOROBENZENE	ND	ND	ND
CHLORODIFLUOROMETHANE	ND	ND	ND
1-DICHLOROETHANE	ND	ND	ND
2-DICHLOROETHANE	ND	ND	ND
1-DICHLOROETHYLENE	ND	ND	ND
ANS-1,2-DICHLOROETHYLENE	ND	ND	ND
CHLOROMETHANE	0.77B	69B	34B
2-DICHLOROPROPANE	ND	ND	ND

- Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1048

TEST COMPOUND	DANGB-BG-SL3-SD1 88092731	DANGB-BG-SL2-SD1 88092732	DANGB-BG-SL1-SD1 88092733
,3-DICHLOROPROPYLENE	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND
,1,1,2-TETRACHLOROETHANE	ND	ND	ND
ETRACHLOROETHYLENE	ND	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND
RICHLOROETHYLENE	ND	ND	ND
RICHLOROFLUOROMETHANE	ND	ND	ND
TRICHLOROPROPANE	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT

)RK ORDER NUMBER: 1048
)B NUMBER : ZB0000000440
)RK ORDER DATE : 09/27/88

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/Kg, GROUP 8020

.ST COMPOUND	DANGB-BG-SL3-SD1 88092731	DANGB-BG-SL2-SD1 88092732	DANGB-BG-SL1-SD1 88092733
'NZENE	ND	ND	ND
ILOROBENZENE	ND	ND	ND
2-DICHLOROBENZENE	ND	ND	ND
3-DICHLOROBENZENE	ND	ND	ND
4-DICHLOROBENZENE	ND	ND	ND
'HYL BENZENE	ND	ND	ND
)LUENE	ND	ND	ND
'LENES	ND	ND	ND

- Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 1048
JOB NUMBER : Z80000000440
WORK ORDER DATE : 09/27/88

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/Kg, GROUP 8080

TEST COMPOUND	DANGB-BG-SL3-SD1 88092731	DANGB-BG-SL2-SD1 88092732	DANGB-BG-SL1-SD1 88092733
LDRIN	ND	ND	ND
LPHA-BHC	ND	ND	ND
BETA-BHC	ND	ND	ND
DELTA-BHC	ND	ND	ND
AMMA-BHC	ND	ND	ND
HLORDANE	ND	ND	ND
4,4'-DDD	ND	ND	ND
',4'-DDE	ND	ND	ND
,4'-DDT	ND	ND	ND
DIELDRIN	ND	ND	ND
ENDOSULFAN I	ND	ND	ND
NDOSULFAN II	ND	ND	ND
NDOSULFAN SULFATE	ND	ND	ND
ENDRIN	ND	ND	ND
ENDRIN ALDEHYDE	NA	NA	NA
EPTACHLOR	ND	ND	ND
EPTACHLOR EPOXIDE	ND	ND	ND
KEPONE	NA	NA	NA
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: Soil

ate Received: September 26, 1988 Work Order: 1048
ate Reported: December 9, 1988 Job Number: OR001

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

ab Number:	88092731	88092732
ample No.:	DANGB-BG-SL3-SD1	DANGB-BG-SL2-SD1
ate Sampled:	09-24-88	09-24-88
ime Sampled:	14:05	10:45
ate Extracted:	10-07-88	10-07-88
ate Analyzed:	11-15-88	11-30-88
ercent Moisture:	18	34

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
,3-Dichlorobenzene	330	ND	ND
,4-Dichlorobenzene	330	ND	ND
exachloroethane	330	ND	ND
is(2-chloroethyl)ether	330	ND	ND
,2-Dichlorobenzene	330	ND	ND
-Nitrosodimethylamine	330	ND	ND
is(2-chloroisopropyl)ether	330	ND	ND
-Nitrosodi-n-propylamine	330	ND	ND
exachlorobutadiene	330	ND	ND
,2,4-Trichlorobenzene	330	ND	ND
itrobenzene	330	ND	ND
sophorone	330	ND	ND
aphthalene	330	ND	ND
is(2-chloroethoxy)methane	330	ND	ND
-Chloronaphthalene	330	ND	ND
exachlorocyclopentadiene	330	ND	ND
cenaphthylene	330	ND	ND
cenaphthene	330	ND	ND
imethyl phthalate	330	ND	ND
,6-Dinitrotoluene	330	ND	ND
luorene	330	ND	ND
,4-Dinitrotoluene	330	ND	ND
iethyl phthalate	330	ND	ND
-Nitrosodiphenylamine	330	ND	ND
exachlorobenzene	330	ND	ND

= Compound was detected in the blank.

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

Date Received: September 26, 1988
Date Reported: December 9, 1988

Work Order: 1048
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:	88092731	88092732
Sample No.:	DANGB-BG-SL3-SD1	DANGB-BG-SL2-SD1
Date Sampled:	09-24-88	09-24-88
Time Sampled:	14:05	10:45
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-30-88
Percent Moisture:	18	34

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Phenanthrene	330	ND	790
Anthracene	330	ND	ND
Dibutyl phthalate	330	ND	ND
Fluoranthene	330	ND	890
4-Chlorophenyl phenyl ether	330	ND	ND
Pyrene	330	ND	590
Butyl Benzyl phthalate	330	ND	ND
Bis(2-ethylhexyl) phthalate	330	ND	ND
Chrysene	330	ND	420
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	2000	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

B = Compound was detected in the blank.

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

ate Received: September 26, 1988
ate Reported: December 9, 1988

Work Order: 1048
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:	88092731	88092732
ample No.:	DANGB-BG-SL3-SD1	DANGB-BG-SL2-SD1
ate Sampled:	09-24-88	09-24-88
ime Sampled:	14:05	10:45
ate Extracted:	10-07-88	10-07-88
ate Analyzed:	11-15-88	11-30-88
ercent Moisture:	18	34

ompound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg	ug/kg
cetophenone	--*	ND	ND
niline	--*	ND	ND
-Aminobiphenyl	--*	ND	ND
-Chloroaniline	660	ND	ND
-Chloronaphthalene	--*	ND	ND
ibenzofuran	330	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	330	ND	ND
-Naphthylamine	--*	ND	ND
-Naphthylamine	--*	ND	ND
-Nitroaniline	1600	ND	ND
-Nitroaniline	1600	ND	ND
-Nitroaniline	1600	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: Soil

Date Received: September 26, 1988
Date Reported: December 9, 1988

Work Order: 1048
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:	88092731	88092732
Sample No.:	DANGB-BG-SL3-SD1	DANGB-BG-SL2-SD1
Date Sampled:	09-24-88	09-24-88
Time Sampled:	14:05	10:45
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-30-88
Percent Moisture:	18	34

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.

* = Compound was detected in the blank.

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

ate Received: September 26, 1988
ate Reported: December 9, 1988

Work Order: 1048
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:	88092731	88092732
ample No.:	DANGB-BG-SL3-SD1	DANGB-BG-SL2-SD1
ate Sampled:	09-24-88	09-24-88
ime Sampled:	14:05	10:45
ate Extracted:	10-07-88	10-07-88
ate Analyzed:	11-15-88	11-30-88
ercent Moisture:	18	34

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
-Chlorophenol	330	ND	ND
-Nitrophenol	330	ND	ND
henol	330	ND	ND
,4-Dimethylphenol	330	ND	ND
,4-Dichlorophenol	330	ND	ND
,4,6-Trichlorophenol	330	ND	ND
-Chloro-3-methylphenol	660	ND	ND
,4-Dinitrophenol	1600	ND	ND
,6-Dichlorophenol	--*	ND	ND
-Methyl-4,6-Dinitrophenol	1600	ND	ND
entachloropnenol	1600	ND	ND
-Nitrophenol	1600	ND	ND
enzoic Acid	1600	ND	ND
-Methylphenol	330	ND	ND
- & 4-Methylphenol	330	ND	ND
,3,4,6-Tetrachlorophenol	--*	ND	ND
,4,5-Trichlorophenol	330	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: Soil

Date Received: September 26, 1988
Date Reported: December 9, 1988

Work Order: 1048
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:	88092733
Sample No.:	DANGB-BG-SL1-SD1
Date Sampled:	09-24-88
Time Sampled:	09:15
Date Extracted:	10-07-88
Date Analyzed:	11-15-88
Percent Moisture:	17

Compound	Detection Limit ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
1,3-Dichlorobenzene	330	ND
1,4-Dichlorobenzene	330	ND
Hexachloroethane	330	ND
Bis(2-chloroethyl)ether	330	ND
1,2-Dichlorobenzene	330	ND
N-Nitrosodimethylamine	330	ND
Bis(2-chloroisopropyl)ether	330	ND
N-Nitrosodi-n-propylamine	330	ND
Hexachlorobutadiene	330	ND
1,2,4-Trichlorobenzene	330	ND
Nitrobenzene	330	ND
Isophorone	330	ND
Naphthalene	330	ND
Bis(2-chloroethoxy)methane	330	ND
2-Chloronaphthalene	330	ND
Hexachlorocyclopentadiene	330	ND
Acenaphthylene	330	ND
Acenaphthene	330	ND
Dimethyl phthalate	330	ND
2,6-Dinitrotoluene	330	ND
Fluorene	330	ND
2,4-Dinitrotoluene	330	ND
Diethyl phthalate	330	ND
N-Nitrosodiphenylamine	330	ND
Hexachlorobenzene	330	ND

b = Compound was detected in the blank.

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

ate Received: September 26, 1988
ate Reported: December 9, 1988

Work Order: 1048
Job Number: OR001

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

ATTN: Mr. Bill Hayden

ab Number:	88092733
ample No.:	DANGB-BG-SL1-SD1
ate Sampled:	09-24-88
ime Sampled:	09:15
ate Extracted:	10-07-88
ate Analyzed:	11-15-88
ercent Moisture:	17

ompound	Detection Limit ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
nenanthrene	330	ND
nthracene	330	ND
ibutyl phthalate	330	ND
luoranthene	330	ND
-Chlorophenyl phenyl ether	330	D
yrene	330	ND
ityl Benzyl phthalate	330	ND
is(2-ethylhexyl)phthalate	330	770
nrysene	330	ND
-Bromophenyl phenyl ether	330	ND
enzo(a)anthracene	330	ND
i-n-octylphthalate	330	ND
enzo(b)fluoranthene	330	ND
enzo(k)fluoranthene	330	ND
enzidine	2000	ND
,3'-Dichlorobenzidine	660	ND
enzo(a)pyrene	330	ND
ndeno(1,2,3-cd)pyrene	330	ND
ibenzo(a,h)anthracene	330	ND
enzo(ghi)perylene	330	ND
enzyl Alcohol	660	ND

= Compound was detected in the blank.

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

Date Received: September 26, 1988
Date Reported: December 9, 1988

Work Order: 1048
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:	88092733
Sample No.:	DANGB-BG-SL1-SD1
Date Sampled:	09-24-88
Time Sampled:	09:15
Date Extracted:	10-07-88
Date Analyzed:	11-15-88
Percent Moisture:	17

Compound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg
Acetophenone	--*	ND
Aniline	--*	ND
4-Aminobiphenyl	--*	ND
4-Chloroaniline	660	ND
1-Chloronaphthalene	--*	ND
Dibenzofuran	330	ND
4-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	330	ND
1-Naphthylamine	--*	ND
2-Naphthylamine	--*	ND
4-Nitroaniline	1600	ND
3-Nitroaniline	1600	ND
2-Nitroaniline	1600	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.

* = Compound was detected in the blank.

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

ate Received: September 26, 1988
ate Reported: December 9, 1988

Work Order: 1048
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:	88092733
ample No.:	DANGB-BG-SL1-SD1
ate Sampled:	09-24-88
ime Sampled:	09:15
ate Extracted:	10-07-88
ate Analyzed:	11-15-88
ercent Moisture:	17

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
lpha-BHC	--*	ND
amma-BHC	--*	ND
eta-BHC	660	ND
eptachlor	330	ND
elta-BHC	500	ND
ldrin	330	ND
eptachlor epoxide	330	ND
ndosulfan I	--*	ND
ieldrin	500	ND
,4'-DDE	1000	ND
ndrin	--*	ND
ndosulfan II	--*	ND
,4'-DDD	500	ND
,4'-DDT	830	ND
ndosulfan Sulfate	1000	ND
ndrin aldehyde	--*	ND
ndrin Ketone	--*	ND
lordane	2000	ND
ethoxychlor	--*	ND
oxaphene	2000	ND
roclor-1016	2000	ND
roclor-1221	2000	ND
roclor-1232	2000	ND
roclor-1242	2000	ND
roclor-1248	2000	ND
roclor-1254	2000	ND
roclor-1260	2000	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: Soil

Date Received: September 26, 1988
Date Reported: December 9, 1988

Work Order: 1048
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:	88092733
Sample No.:	DANGB-BG-SL1-SD1
Date Sampled:	09-24-88
Time Sampled:	09:15
Date Extracted:	10-07-88
Date Analyzed:	11-15-88
Percent Moisture:	17

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
2-Chlorophenol	330	ND
2-Nitrophenol	330	ND
Phenol	330	ND
2,4-Dimethylphenol	330	ND
2,4-Dichlorophenol	330	ND
2,4,6-Trichlorophenol	330	ND
4-Chloro-3-methylphenol	660	ND
2,4-Dinitrophenol	1600	ND
4,6-Dichlorophenol	--*	ND
2-Methyl-4,6-Dinitrophenol	1600	ND
Pentachlorophenol	1600	ND
4-Nitrophenol	1600	ND
Benzoic Acid	1600	ND
2-Methylphenol	330	ND
3- & 4-Methylphenol	330	ND
2,3,4,6-Tetrachlorophenol	--*	ND
2,4,5-Trichlorophenol	330	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) J. Linn Sherwin Rita Reddy

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

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SOILS ANALYSES REQUIRED: SW8010, 8020	SW8080	SW8270	EPA 418.1	SW6010, 7060, 7191	SW7131, 7421, 7471			REMARKS
9/24	14:05	DANGB-BG-SL3-SD1	1		X	X	X	X	X			882731
9/24	14:05	DANGB-BG-SL3-SD1	1	X								882731 DN 882732
9/24	10:45	DANGB-BG-SL2-SD1	1		X	X	X	X	X			882732
9/24	9:15	DANGB-BG-SL1-SD1	1		X	X	X	X	X			882733
9/24	9:15	DANGB-BG-SL1-SD1	1	X								↓
9/24	10:45	DANGB-BG-SL2-SD1										882732 ~~882733~~ DN

1794

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
J. Linn Sherwin	9/24 1630				
(Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	

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):
88092672-88092676, 88092731-88092741
88092781-88092783, 88092799-88092800

QC Report No: AAF-S-0051-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 9-24-88
Date Reported: 1-31-89
Dilution Factor: NA
%Moisture: 19.3

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	88092672	88092672	10-16-88	NA	7060	<1.0	<1.24	<1.24	NC	9.91	<1.24	7.96	80	
Cadmium	88092672	88092672	10-17-88	NA	7131	<0.50	<0.62	<0.62	NC	2.48	<0.62	2.73	110	
Chromium	88092672	88092672	10-18-88	NA	6010	<1.0	14.2	12.5	13	4.96	14.2	25.8	234N	
Lead	88092672	88092672	10-16-88	NA	7421	<0.50	3.97	3.44	1	4.96	3.97	7.68	75	

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
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.: OR001.02

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

QC Report No: TCP-S-0047-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 9-24-88
Date Reported: 1-31-89
Dilution Factor: NA
%Moisture: 19.3

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092672-88092676, 88092731-88092741
88092781-88092783, 88092799-88092800

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	88092672	88092672	10-17-88	NA	6010	<20	41.1	42.3	3	496	41.1	514	95	

1796

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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):
88092672-88092676, 88092731-88092741
88092781-88092783, 88092799-88092800

QC Report No: CVM-S-0027-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 9-24-88
Date Reported: 1-31-89
Dilution Factor: NA
%Moisture: 19.3

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	88092672	88092672	10-17-88	NA	7471	<0.10	<C.12	<0.12	NC	0.620	<0.12	0.680	110	

1797

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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

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

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092672-88092676, 88092731-88092741
SAMPLE NO(S).: 88092781-88092783, 88092799-88092800

The detection limit for the analyte(s); arsenic, cadmium, chromium, lead, barium and mercury are provided by the sub-contract laboratory and based on a dry-weight of the sample.

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):
88092672-88092676
88092731-88092741

QC Report No: TPH-S-0063-88
Sample Matrix: Soil
Conc Unit: mg/KG
Date Received: 9-24-88
Date Prepared: 10-13-88
Date Analyzed: 10-22-88
Date Reported: 11-01-88
Dilution Factor: 7
%Moisture: 24.3

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88092672	418.1	<100	<100	1320	1250	106	1290	98	3	
Blank	418.1	<100	<100	1000	1100	110	1000	100	10	

1799

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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).:
88092672-88092676, 88092731-88092741
88092781-88092783, 88082255

QC Report No: VGC-S-0060-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 9-27-88
Date Prepared: NA
Date Analyzed: 10-10-88
Date Reported: 11-03-88
Dilution Factor: NA
% Moisture: NT

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092739	1,1-dichloroethane	10	ND	8.32	83	5.50	55*	41*	20	58-124
	Trichloroethene	10	ND	7.90	79	6.34	63*	22*	16	75-110
	Chlorobenzene	10	ND	6.06	61*	5.21	52*	15	21	71-125
	Aromatics: 8020									
88092739	Benzene	10	2.3	13.8	115	8.33	60*	49*	26	75-123
	Toluene	10	5.5	16.6	111	11.3	58*	38*	16	79-115
	Chlorobenzene	10	ND	9.40	94	8.21	82	14	24	82-112

1800

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* 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
NT = Not Tested

Q TY ...ROL ...SULTS 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).:
88092672-88092676, 88092731-88092741
88092781-88092783, 88082255

QC Report No: VGC-S-0060-88B
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: NA
Date Prepared: NA
Date Analyzed: 10-10-88
Date Reported: 11-03-88
Dilution Factor: NA
% Moisture: 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	9.46	95	10.4	104	9	20	58-124
	Trichloroethene	10	ND	9.33	93	9.61	96	3	16	75-110
	Chlorobenzene	10	ND	8.78	88	9.11	91	4	21	71-125
	Aromatics: 8020									
Blank 1801	Benzene	10	ND	9.24	92	10.0	100	8	26	75-123
	Toluene	10	ND	9.38	94	9.53	95	2	16	79-115
	Chlorobenzene	10	ND	9.10	91	9.25	92	2	24	82-112

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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

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

MS = Spike Sample
MSD = Spike Sample 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-S-0060-88
QC REPORT NO(S).: VGC-S-0060-88B

Percent recovery and relative percent difference for some of the matrix spiking compounds are outside ES Laboratory acceptance limits. A blank spike analysis shows the laboratory to be in control.

Results for Sample No. 88092739 are reported on a wet weight basis, since percentage moisture was not performed.

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: 11-04-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
60	10-05-88	VGC	Porasil	75-09-2	Dichloromethane	1.9	0.25	88092731-88092733
				67-66-3	Chloroform	0.35	0.05	

1803

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).:
88092672-88092674, 88092731-88092737
88092782-88092783

QC Report No.: OCP-S-0037-88B
QC Sample No.: Blank
Level (Low/Med): Low
Date Reported: 11-03-88

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	37.0	56	46-127
Heptachlor	2000	ND	42.5	64	35-130
Aldrin	2000	ND	37.5	56	34-132
Dieldrin	5000	ND	115	69	31-134
Endrin	5000	ND	88.8	53	42-139
4,4'-DDT	5000	ND	99.0	60	23-134

	MSD Conc. In Extract (ug/Kg)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	50.7	76	56	31	50	46-127
Heptachlor	49.0	74	64	14	31	35-130
Aldrin	39.8	60	56	6	43	34-132
Dieldrin	130	78	69	12	38	31-134
Endrin	108	65	53	20	45	42-139
4,4'-DDT	211	127	60	72*	50	23-134

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: 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).:
88092672-88092674, 88092731-88092737
88092782-88092783

QC Report No.: OCP-S-0037-88
QC Sample No.: 88092674
Level (Low/Med): Low
Date Reported: 11-03-88

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	2360	ND	49.2	62	46-127
Heptachlor	2360	ND	49.8	63	35-130
Aldrin	2360	ND	ND	NC*	34-132
Dieldrin	5910	ND	144	73	31-134
Endrin	5910	ND	122	62	42-139
4,4'-DDT	5910	ND	160	81	23-134

	MSD Conc. In Extract (ug/Kg)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	59.5	76	62	19	50	46-127
Heptachlor	66.7	85	63	29	31	35-130
Aldrin	49.5	63	NC*	NC*	43	34-132
Dieldrin	181	92	73	23	38	31-134
Endrin	152	77	62	22	45	42-139
4,4'-DDT	145	74	81	9	50	23-134

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

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

Matrix spike concentration is not detected for aldrin, therefore, spike recovery and relative percent difference are not calculated. A blank spike analysis shows the laboratory to be in control.

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

PESTICIDE 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

Lab Name: Engineering Science
Lab Sample No.: Blank
Matrix: Soil
Level (low/med): Low
Extraction:
(SepF/Cont/Sonc): Sonc
Date Reported: 11-03-88

Date Extracted: 10-07-88
Date Analyzed (1): 10-25-88
Time Analyzed (1): 11:47
Instrument ID (1): 5890 #2
GC Column ID (1): OV-1

Date Analyzed (2): 10-26-88
Time Analyzed (2): 09:23
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
-	88092731	10-25-88	88092731	10-26-88
-	88092732	10-25-88	88092732	10-26-88
-	88092733	10-25-88	88092734	10-26-88
-	88092734	10-25-88	88092735	10-26-88
-	88092735	10-25-88	88092736	10-26-88
-	88092736	10-25-88	88092737	10-26-88
-	88092737	10-25-88	88092782	10-26-88
-	88092782	10-25-88	88092783	10-26-88
-	88092783	10-25-88		

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):
88092731-88092733, 88092782-88092783
88092799-88092805, 88092672-88092674

QC Report No: BNA-S-0052-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 9-29-88
Date Prepared: 10-07-88
Date Analyzed: 11-10-88
Date Reported: 12-13-88
Dilution Factor: NA
%Moisture: 15.4

Laboratory Supervisor Approval:

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
B/N Laboratory Sample # 88092674	1,2,4-Trichlorobenzene	3920	ND	2070	53	2090	53	2	23	38-107
	Acenaphthene	3920	ND	2510	64	2490	64	1	19	31-137
	2,4-Dinitrotoluene	3920	ND	2870	73	2940	75	2	47	28-89
	Pyrene	3920	ND	2290	58	2300	59	4	36	35-142
	N-Nitroso-di-n-Propylamine	3920	ND	2640	67	2720	69	3	38	41-126
	1,4-Dichlorobenzene	3920	ND	1160	30	1110	28	4	27	28-104
ACID Laboratory Sample # 88092674	Pentachlorophenol	7840	ND	8000	102	7880	101	2	47	17-109
	Phenol	7840	ND	4590	59	4470	57	3	35	26-90
	2-Chlorophenol	7840	ND	4550	58	4310	55	5	50	25-102
	4-Chloro-3-Methylphenol	7840	ND	6200	79	6310	80	2	33	26-103
	4-Nitrophenol	7840	ND	6160	79	6120	78	7	50	11-114

1808

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO.: 88092732
WORK ORDER NO.: 1048

The first analysis of sample 88092732 resulted in area counts for one or more internal standards that were below EPA QC criteria. The extract was re-analyzed out of holding time. The analysis resulted in acceptable area counts for all internal standards.

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: 12-12-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E6240	11-15-88	BNA	2	-	None Detected	-	-	88092731-88092733 88092782-88092783 88092799-88092805

1810

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 04-07
Lab File ID: E6240
Matrix: Soil
Level (low/med):
Date Analyzed: 11-15-88
Time Analyzed: 18:51
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
DANGO-BG-SL3-SD1	88092731	E6241	11-15-88
-BG-SL2-SD1	88092732	E6245, S0616	11-15-88, 11-30-88
-BG-SL1-SD1	88092733	E6244	11-15-88
-SGC4-SS1-RESAMPLE	88092782	E6242	11-15-88
-SGC4-SS2-RESAMPLE	88092783	E6243, E6341	11-15-88, 11-29-88
-2-SL7-SD1	88092799	S0538	11-15-88
-2-SL6-SD1	88092800	S0539	11-15-88
-2-SL29-SD1	88092801	S0540	11-15-88
-3-SL28-SD1	88092802	S0541	11-15-88
-3-SL10-SD1	88092803	S0542	11-15-88
-3-SL9-SD1	88092804	S0543	11-15-88
-3-SL8-SD1	88092805	S0544, S0629	11-16-88, 12-1-88

File: CONTENE
24 Oct 88

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

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

Instrument ID. CARbopak Calibration Date(s): 10/5/88 _____

LAB FILE ID: #38, 39 Init. Calib. Date(s): 9/19/88 9/23/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzyl chloride	0.32	0.30	6
bis (2-chloroethoxy methane	—	—	
bis (2-chloroisopropyl ether	—	—	
Bromobenzene	1.4	1.2	14
Bromodichloromethane	3.7	4.2	14
Bromoform	1.7	2.0	18
Bromomethane	0.20	0.21	5
Carbon tetrachloride	4.2	4.5	7
Chloroacetaldehyde	—	—	—
Chlorobenzene	1.4	1.5	7
Chloroethane	0.72	0.44	39
Chloroform	3.9	4.6	18
1-Chorohexane	1.2	0.98	18
2-Chloroethyl vinyl ether	—	—	—
Chloromethane	0.46	0.49	7
Chloromethyl methyl ether	—	—	—
o_,m_,& p_Chlorotoluenes	4.6	3.9	15
Dibromochloromethane	3.7	4.1	11
Dibromomethane	3.2	2.4	25
1,2_Dichlorobenzene	2.5	2.6	4
1,3_Dichlorobenzene	2.1	2.3	10
1,4_Dichlorobenzene	2.3	2.3	0
Dichlorodifluormethane	—	—	—
1,1_Dichloroethane	2.4	2.5	4
1,2_Dichloroethane	2.6	3.0	13
1,1_Dichloroethylene	2.6	2.5	4
trans_1,2_dichloroethylene	2.4	2.6	8
Dichloromethane	4.1	16	*
1,2_Dichloropropane	2.5	2.5	0
1,3_Dichloropropylene	5.9	4.7	20
1,1,2,2_Tetrachloroethane	7.5	7.7	3
1,1,1,2_Tetrachloroethane	5.2	4.2	19
Tetrachloroethylene	7.5	7.7	3
1,1,1_Trichloroethane	3.0	3.3	10
1,1,2_Trichloroethane	5.9	4.7	20
Trichloroethylene	4.0	4.1	3
Trichlorofluormethane	2.3	2.3	0
Trichloropropane	2.1	1.4	33
Vinyl chloride	0.94	0.80	15

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): 10/5/88 _____

LAB FILE ID: #38 Init. Calib. Date(s): 9/19/88 _____

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	4.9	5.2	6
Chlorobenzene	5 3	5.7	8
1,2_Dichlorobenzene	4.4	4 3	2
1,3_Dichlorobenzene	5.0	5.3	2
1,4_Dichorobenzene	4.1	4.3	5
Ethyl Bezene	4.4	4.5	2
Toluene	3.9	4.5	15
Xylenes	13	13	0

This page intentionally left blank.

DATA PACKAGE #29

This page intentionally left blank.

ENGINEERING-SCIENCE, INC.

RESEARCH AND DEVELOPMENT
LABORATORY
600 BANCROFT WAY
BERKELEY, CALIFORNIA 94710
(415) 841-7353

REVISED REPORT

Job No.: OR001

Work Order No.: 941

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 9-01-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092250	DANGB8-MW14-SS3	BA-I	8-31-88		10-17-88	
88092250	DANGB8-MW14-SS3	CD-F	8-31-88		10-17-88	
88092250	DANGB8-MW14-SS3	CR-F	8-31-88		10-17-88	
88092250	DANGB8-MW14-SS3	PB-F	8-31-88		10-17-88	
88092250	DANGB8-MW14-SS3	418.1	8-31-88	9-22-88	9-23-88	
88092250	DANGB8-MW14-SS3	MOIS	8-31-88		9-09-88	
88092250	DANGB8-MW14-SS3	8010	8-31-88		9-13-88	9-11/12-88
88092250	DANGB8-MW14-SS3	8020	8-31-88		9-13-88	9-11-88
88092250	DANGB8-MW14-SS3	8080	8-31-88	9-07-88	10-05-88	
88092250	DANGB8-MW14-SS3	8270	8-31-88	9-10-88	10-21-88	
88092251	DANGB8-MW14-SS9	BA-I	8-31-88		10-17-88	
88092251	DANGB8-MW14-SS9	CD-F	8-31-88		10-17-88	
88092251	DANGB8-MW14-SS9	CR-F	8-31-88		10-17-88	
88092251	DANGB8-MW14-SS9	PB-F	8-31-88		10-17-88	
88092251	DANGB8-MW14-SS9	418.1	8-31-88	9-22-88	9-23-88	
88092251	DANGB8-MW14-SS9	MOIS	8-31-88		9-09-88	
88092251	DANGB8-MW14-SS9	8010	8-31-88		9-13-88	9-11/12-88
88092251	DANGB8-MW14-SS9	8020	8-31-88		9-13-88	9-11-88
88092251	DANGB8-MW14-SS9	8080	8-31-88	9-07-88	10-05-88	
88092251	DANGB8-MW14-SS9	8270	8-31-88	9-10-88	10-21-88	

* If applicable

Job No.: OR001

Work Order No.: 941

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092252	DANGB-MW20-SS5	BA-I	8-31-88		10-20-88	
88092252	DANGB-MW20-SS5	CD-F	8-31-88		10-20-88	
88092252	DANGB-MW20-SS5	CR-F	8-31-88		10-20-88	
88092252	DANGB-MW20-SS5	PB-F	8-31-88		10-20-88	
88092252	DANGB-MW20-SS5	418.1	8-31-88	9-22-88	9-23-88	
88092252	DANGB-MW20-SS5	MOIS	8-31-88		9-09-88	
88092252	DANGB-MW20-SS5	8010	8-31-88		9-13-88	9-11/12-88
88092252	DANGB-MW20-SS5	8020	8-31-88		9-13-88	9-11-88
88092252	DANGB-MW20-SS5	8080	8-31-88	9-07-88	10-05-88	
88092252	DANGB-MW20-SS5	8270	8-31-88	9-10-88 12-19-88Re	10-21-88 1-18-89Re	
88092253	DANGB8-MW20-SS1	BA-I	8-31-88		10-20-88	
88092253	DANGB8-MW20-SS1	CD-F	8-31-88		10-20-88	
88092253	DANGB8-MW20-SS1	CR-F	8-31-88		10-20-88	
88092253	DANGB8-MW20-SS1	PB-F	8-31-88		10-20-88	
88092253	DANGB8-MW20-SS1	418.1	8-31-88	9-22-88	9-23-88	
88092253	DANGB8-MW20-SS1	MOIS	8-31-88		9-09-88	
88092253	DANGB8-MW20-SS1	8010	8-31-88		9-13-88	9-11/12-88
88092253	DANGB8-MW20-SS1	8020	8-31-88		9-13-88	9-11-88
88092253	DANGB8-MW20-SS1	8080	8-31-88	9-07-88	10-05-88	
88092253	DANGB8-MW20-SS1	8270	8-31-88		NA	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092250 - 88092253
WORK ORDER NO.: 941

These soil samples were received at the ES Berkeley Laboratory on 09-01-88. They were received cold and intact.

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
WORK ORDER NO.: 941
EPA 8270 ANALYSIS

These samples were first extracted on September 10, 1988, within holding time, and first analyzed on October 21, 1988, one day out of holding time. Two or more surrogate spike recoveries for sample 88092252 were outside of EPA QC limits. This sample was reextracted and analyzed.

Surrogate spike recoveries met EPA criteria in the second analysis. Results of the second analysis are reported. The area count of the sixth internal standard was outside of EPA QC limits; however, the previous analysis showed there were no compounds of interest that were related to the sixth internal standard.

Sample 88092253 was not analyzed because it was a repeat of an earlier sample.

ENGINEERING-SCIENCE INC.
12/05/88

ANALYSIS REPORT

WORK ORDER NUMBER: 941
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/01/88

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: 2, UNITS: mg/L

	DANGB8,MW14,SS3	DANGB8,MW14,SS9	DANGB,MW20,SS5	DANGB8,MW20,SS1
TEST COMPOUND	88092250	88092251	88092252	88092253
ACID DIG SOIL	NA	NA	NA	NA
BARIUM	56.6	61.3	82.1	146
CADMIUM	10.3N	10.1N	8.6N	9.0N
CHROMIUM	41.0	43.2	37.8	38.6
LEAD	11.4N	11.4N	10.5	12.1

ND - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 941
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/01/88

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: 3, UNITS: mg/Kg

TEST COMPOUND	DANGB8,MW14,SS3 88092250	DANGB8,MW14,SS9 88092251	DANGB,MW20,SS5 88092252	DANGB8,MW20,SS1 88092253
418.1 PETROLEUM HYDROCARBONS	<10	<10	20	<10
% MOISTURE	8.7	9.1	10.8	11.6

ND - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 941
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/01/88

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: ug/Kg, GROUP 8010

	DANGB8,MW14,SS3	DANGB8,MW14,SS9	DANGB,MW20,SS5	DANGB8,MW20,SS1
TEST COMPOUND	88092250	88092251	88092252	88092253
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	120	ND	0.74	0.53
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
1,4-DICHLOROBENZENE	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	ND	ND
1,2-DICHLOROETHANE	ND	ND	ND	ND
1,1-DICHLOROETHYLENE	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND
DICHLOROMETHANE	1400B	4.6B	0.48B	0.35B
1,2-DICHLOROPROPANE	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 941

EST COMPOUND	DANGB8,MW14,SS3 88092250	DANGB8,MW14 SS9 88092251	DANGB,MW20,SS5 88092252	DANGB8,MW20,SS1 88092253
,3-DICHLOROPROPYLENE	ND	ND	ND	ND
,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND
,1,1,2-TETRACHLOROETHANE	ND	ND	ND	ND
ETRACHLOROETHYLENE	ND	ND	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
'INYL CHLORIDE	ND	ND	ND	ND

D - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 941
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/01/88

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: ug/Kg, GROUP 8020

	DANGB8,MW14,SS3	DANGB8,MW14,SS9	DANGB,MW20,SS5	DANGB8,MW20,SS1
TEST COMPOUND	88092250	88092251	83092252	88092253
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	220	ND	390	160
XYLENES	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 941
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/01/88

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/Kg, GROUP 8080

	DANGB8,MW14,SS3	DANGB8,MW14,SS9	DANGB,MW20,SS5	DANGB8,MW20,SS1
EST COMPOUND	88092250	88092251	88092252	88092253
LDRIN	ND	ND	ND	ND
LPHA-BHC	ND	ND	ND	ND
ETA-BHC	ND	ND	ND	ND
ELTA-BHC	ND	ND	ND	ND
AMMA-BHC	ND	ND	ND	ND
HLORDANE	ND	ND	ND	ND
,4'-DDD	ND	ND	ND	ND
,4'-DDE	ND	ND	ND	ND
,4'-DDT	ND	ND	ND	ND
IELDRIN	ND	ND	ND	ND
NDOSULFAN I	ND	ND	ND	ND
NDOSULFAN II	ND	ND	ND	ND
NDOSULFAN SULFATE	ND	ND	ND	ND
NDRIN	ND	ND	ND	ND
NDRIN ALDEHYDE	NA	NA	NA	NA
EPTACHLOR	ND	ND	ND	ND
EPTACHLOR EPOXIDE	ND	ND	ND	ND
EPONE	NA	NA	NA	NA
ETHOXYCHLOR	ND	ND	ND	ND
OXAPHENE	ND	ND	ND	ND
CB-1016	ND	ND	ND	ND
CB-1221	ND	ND	ND	ND
CB-1232	ND	ND	ND	ND
CB-1242	ND	ND	ND	ND
CB-1248	ND	ND	ND	ND
CB-1254	ND	ND	ND	ND
CB-1260	ND	ND	ND	ND

NA - Not Analyzed
D - Not Detected

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

Date Received: September 1, 1988
Date Reported: December 8, 1988

Work Order: 941
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:	88092250	88092251
Sample No.:	DANGB-8-MW14-SS3	DANGB-8-MW14-SS9
Date Sampled:	8-31-88	8-31-88
Time Sampled:	08:20	08:20
Date Extracted:	9-10-88	9-10-88
Date Analyzed:	10-21-88	10-21-88
Percent Moisture:	9	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-propylamine	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: September 1, 1988 Work Order: 941
Date Reported: December 8, 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:	88092250	88092251
Sample No.:	DANGB-8-MW14-SS3	DANGB-8-MW14-SS9
Date Sampled:	8-31-88	8-31-88
Time Sampled:	08:20	08:20
Date Extracted:	9-10-88	9-10-88
Date Analyzed:	10-21-88	10-21-88
Percent Moisture:	9	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	ND	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	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	2000	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: September 1, 1988
Date Reported: December 8, 1988

Work Order: 941
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:	88092250	88092251
Sample No.:	DANGB-8-MW14-SS3	DANGB-8-MW14-SS9
Date Sampled:	8-31-88	8-31-88
Time Sampled:	08:20	08:20
Date Extracted:	9-10-88	9-10-88
Date Analyzed:	10-21-88	10-21-88
Percent Moisture:	9	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: September 1, 1988
Date Reported: December 8, 1988

Work Order: 941
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:	88092250	88092251
Sample No.:	DANGB-8-MW14-SS3	DANGB-8-MW14-SS9
Date Sampled:	8-31-88	8-31-88
Time Sampled:	08:20	08:20
Date Extracted:	9-10-88	9-10-88
Date Analyzed:	10-21-88	10-21-88
Percent Moisture:	9	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: September 1, 1988
Date Reported: December 8, 1988

Work Order: 941
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:	88092250	88092251
Sample No.:	DANGB-8-MW14-SS3	DANGB-8-MW14-SS9
Date Sampled:	8-31-88	8-31-88
Time Sampled:	08:20	08:20
Date Extracted:	9-10-88	9-10-88
Date Analyzed:	10-21-88	10-21-88
Percent Moisture:	9	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.

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: Soil

ate Received: September 1, 1988
ate Reported: February 20, 1989

Work Order: 941
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:	88092252
ample No.:	DANGB-8-MW20-SS5
ate Sampled:	8-31-88
ime Sampled:	08:45
ate Extracted:	12-19-88
ate Analyzed:	01-18-89
ercent Moisture:	11

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
,3-Dichlorobenzene	330	ND
,4-Dichlorobenzene	330	ND
exachloroethane	330	ND
is(2-chloroethyl)ether	330	ND
,2-Dichlorobenzene	330	ND
-Nitrosodimethylamine	330	ND
is(2-chloroisopropyl)ether	330	ND
-Nitrosodi-n-propylamine	330	ND
exachlorobutadiene	330	ND
,2,4-Trichlorobenzene	330	ND
itrobenzene	330	ND
sophorone	330	ND
aphthalene	330	ND
is(2-chloroethoxy)methane	330	ND
-Chloronaphthalene	330	ND
exachlorocyclopentadiene	330	ND
cenaphthylene	330	ND
cenaphthene	330	ND
imethyl phthalate	330	ND
,6-Dinitrotoluene	330	ND
luorene	330	ND
,4-Dinitrotoluene	330	ND
iethyl phthalate	330	ND
-Nitrosodiphenylamine	330	ND
exachlorobenzene	330	ND

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

Date Received: September 1, 1988 Work Order: 941
Date Reported: February 20, 1989 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:	88092252
Sample No.:	DANGB-8-MW20-SS5
Date Sampled:	8-31-88
Time Sampled:	08:45
Date Extracted:	12-19-88
Date Analyzed:	01-18-89
Percent Moisture:	11

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
Phenanthrene	330	ND
Anthracene	330	ND
Dibutyl phthalate	330	ND
Fluoranthene	330	ND
4-Chlorophenyl phenyl ether	330	ND
Pyrene	330	ND
Butyl Benzyl phthalate	330	ND
Bis(2-ethylhexyl) phthalate	330	ND
Chrysene	330	ND
4-Bromophenyl phenyl ether	330	ND
Benzo(a)anthracene	330	ND
Di-n-octylphthalate	330	ND
Benzo(b)fluoranthene	330	ND
Benzo(k)fluoranthene	330	ND
Benzidine	2000	ND
3,3'-Dichlorobenzidine	660	ND
Benzo(a)pyrene	330	ND
Indeno(1,2,3-cd)pyrene	330	ND
Dibenzo(a,h)anthracene	330	ND
Benzo(ghi)perylene	330	ND
Benzyl Alcohol	660	ND

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

ate Received: September 1, 1988
ate Reported: February 20, 1989

Work Order: 941
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:	88092252
amp'e No.:	DANGB-8-MW20-SS5
ate Sampled:	8-31-88
ime Sampled:	08:45
ate Extracted:	12-19-88
ate Analyzed:	01-18-89
ercent Moisture:	11

ompound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg
cetophenone	--*	ND
niline	--*	ND
-Aminobiphenyl	--*	ND
-Chloroaniline	660	ND
-Chloronaphthalene	--*	ND
ibenzofuran	330	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	330	ND
-Naphthylamine	--*	ND
-Naphthylamine	--*	ND
-Nitroaniline	1600	ND
-Nitroaniline	1600	ND
-Nitroaniline	1600	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.

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

Date Received: September 1, 1988
Date Reported: February 20, 1989

Work Order: 941
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:	88092252
Sample No.:	DANGB-8-MW20-SS5
Date Sampled:	8-31-88
Time Sampled:	08:45
Date Extracted:	12-19-88
Date Analyzed:	01-18-89
Percent Moisture:	11

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
Alpha-BHC	--*	ND
Gamma-BHC	--*	ND
Beta-BHC	660	ND
Heptachlor	330	ND
Delta-BHC	500	ND
Aldrin	330	ND
Heptachlor epoxide	330	ND
Endosulfan I	--*	ND
Dieldrin	500	ND
4,4'-DDE	1000	ND
Endrin	--*	ND
Endosulfan II	--*	ND
4,4'-DDD	500	ND
4,4'-DDT	830	ND
Endosulfan Sulfate	1000	ND
Endrin aldehyde	--*	ND
Endrin Ketone	--*	ND
Chlordane	2000	ND
Methoxychlor	--*	ND
Toxaphene	2000	ND
Aroclor-1016	2000	ND
Aroclor-1221	2000	ND
Aroclor-1232	2000	ND
Aroclor-1242	2000	ND
Aroclor-1248	2000	ND
Aroclor-1254	2000	ND
Aroclor-1260	2000	ND

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

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

ate Received: September 1, 1988
ate Reported: February 20, 1989

Work Order: 941
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:	88092252
ample No.:	DANGB-8-MW20-SS5
ate Sampled:	8-31-88
ime Sampled:	08:45
ate Extracted:	12-19-88
ate Analyzed:	01-18-89
ercent Moisture:	11

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
-Chlorophenol	330	ND	
-Nitrophenol	330	ND	
henol	330	ND	
,4-Dimethylphenol	330	ND	
,4-Dichlorophenol	330	ND	
,4,6-Trichlorophenol	330	ND	
-Chloro-3-methylphenol	660	ND	
,4-Dinitrophenol	1600	ND	
,6-Dichlorophenol	--*	ND	
-Methyl-4,6-Dinitrophenol	1600	ND	
entachlorophenol	1600	ND	
-Nitrophenol	1600	ND	
enzoic Acid	1600	ND	
-Methylphenol	330	ND	
- & 4-Methylphenol	330	ND	
,3,4,6-Tetrachlorophenol	--*	ND	
,4,5-Trichlorophenol	330	ND	

Ellen Mills
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

CHAIN OF CUSTODY RECORD 941 B,F 942

3

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

SAMPLER(S): (Signature) Mike Roddy J. L. Hardee

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

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SOILS ANALYSES REQUIRED: SW8010, 8020	SW8080	SW8270	EPA 418.1	SW8010, [redacted], 7191	SW7131, 7421, [redacted]	REMARKS
8/31/88	8:20	DANGB8 MW14 SS3	1	X						882250 Resample (Original Sample broken 8-8-88)
8/31/88	8:20	DANGB8 MW14 SS9	1	X						882251 Resample (Discard original sample 8-8-88)
8/31/88	9:45	DANGB8 MW20 SS5	1	X						882252
8/31/88	8:45	DANGB8 MW20 SS1	1	X				882253		Resample (original sample Broken 8-5-88)
8/31/88	8:20	DANGB8 MW14 SS3	1		X	X	X	X	X	882250 Resample (Original Sample Broken 8-8-88)
8/31/88	8:20	DANGB8 MW14 SS9	1		X	X	X	X	X	882251 Resample (Discard orig. Sample 8-8-88)
8/31/88	8:45	DANGB8 MW20 SS1	1		X	X	X	X	X	882253 Resample (Original Sample broken 8-5-88)
8/31/88	8:45	DANGB8 MW20 SS5	1		X	X	X	X	X	882252
8/31/88	10:05	DANGB4 MW24 SS1	1	X				882254		Discard Resample (Original Sample broken 8-24-88)
8/31/88	10:05	DANGB4 MW24 SS1A	1	X						882255
8/31/88	10:05	DANGB4 MW24 SS1	1			X	X	X	X	Discard 882254 Resample (Original Sample broken 8-24-88)
8/31/88	10:05	DANGB4 MW24 SS1A	1			X	X	X	X	882255
										NOTE All 6010 Analysis for Barium Only

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
J. L. Hardee	8/31/88 1800				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Bill Hardeman	9.1.88 1515	received cold & intact

882250 882251 882252 882253 882254 882255

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: 927

Lab Code: _____ Case No.: 927 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88082192-2203

Sample wt/vol: 30 (g/mL) g Lab File ID: E5923

Level: (low/med) low Date Received: —

% Moisture: not dec. 0 dec. _____ Date Extracted: 9-10-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/20/88

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1

Number TICs found: 8 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	4.55	530	
2.			5.06	13000	
3.			6.24	230	
4.			23.96	600	
5.			28.70	1300	
6.			28.78	770	
7.			33.14	710	
8.			35.46	900	
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

EPA SAMPLE NO.

BLANK

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 909 941 SAS No.: _____ SDG No.: _____
DO 7/7/89

Matrix: (soil/water) Soil Lab Sample ID: 88092104/2252 BLANK REX

Sample wt/vol: 30 (g/mL) gm Lab File ID: S0931

Level: (low/med) low Date Received: —

% Moisture: not dec. — dec. _____ Date Extracted: 12-19-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 1/12/89

GPC Cleanup: (Y/N) N pH: ___ Dilution Factor: 1

Number TICs found: 14 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.35	200	
2.			3.75	300	
3.			4.11	270	
4.			4.61	130	
5.			4.81	170	
6.			5.00	500	
7.			5.38	2500	
8.			5.75	16000	
9.			6.99	570	
10.			26.06	7600	
11.			26.46	230	
12.			28.79	830	
13.			29.57	2000	
14.		↓	34.37	3000	
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1r

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: DANGB-8-MW14-553

Name: Engineering Science Contract: OR001

Code: _____ Case No.: 941 SAS No.: _____ Job No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88082250

Sample wt/vol: 30 (g/mL) g Lab File ID: E5943

Level: (low/med) low Date Received: 9-1-88

Moisture: not dec. 8.7 9 dec. _____ Date Extracted: 9-10-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/21/88

Cleanup: (Y/N) N pH: _____ Dilution Factor: none

Number TICs found: 9 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	4.52	200	
2.		unknown	4.75	1000	
3.		unknown	5.14	23,000	
4.		unknown	6.28	700	
5.	57-10-3	hexadecanoic acid	23.94	930	
6.		unknown	28.64	1500	
7.		unknown	28.88	170	
8.		unknown	33.06	900	
9.		unknown	35.50	9000	
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.: DAN6B-8-MW14-559

Lab Name: Engineering Science Contract: OR001

Lab Code: _____ Case No.: 941 SAS No.: _____ Job No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 8808Z251

Sample wt/vol: 30 (g/mL) g Lab File ID: E5944

Level: (low/med) low Date Received: 9-1-88

Moisture: not dec. 9% DD dec. _____ Date Extracted: 9-10-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/21/88

GPC Cleanup: (Y/N) N pH: ___ Dilution Factor: none

Number TICs Found: 11 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	127-18-4	tetrachloroethene	4.38	130	
2.		unknown	4.49	200	
3.		unknown	4.75	1000	
4.		unknown	5.12	21,000	
5.		unknown	6.27	730	
6.	57-10-3	hexadecanoic acid	23.92	1000	
7.		unknown	28.44	1300	
8.		unknown	28.88	130	
9.		unknown	30.33	200	
10.		unknown	33.06	200	
11.		unknown	35.51	930	
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

EPA SAMPLE NO.

DAN6B-8-MW20-555

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 941 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88092252 Rex

Sample wt/vol: 30 (g/mL) gm Lab File ID: S0933

Level: (low/med) low Date Received: 9-1-88

% Moisture: not dec. ~~10.8~~ 11 dec. _____ Date Extracted: 12-19-88

200 2/08/89

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 1/18/89

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: 1

Number TICs found: 20 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.27	410	
2.			3.39	220	
3.			3.79	2200	
4.			3.97	640	
5.			4.14	1600	
6.		unknown alkene - mol.wt. 98	4.89	8200	
7.		unknown	5.04	820	
8.			5.23	1100	
9.			5.70	12,000	
10.			24.89	340	
11.			26.07	3700	
12.			27.47	280	
13.			27.50	220	
14.			28.94	220	
15.			29.54	3000	
16.			29.82	670	
17.			30.87	190	
18.			31.62	150	
19.			31.91	150	
20.			34.39	2400	
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

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):
88092224-88092226
88092250-88092251

QC Report No: ICP-S-0032-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 9-01-88
Date Reported: 10-28-88
Dilution Factor: NA
%Moisture: 8.9

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	88092224	88092224	10-18-88	10-14-88	SW6010	<20	44.5	39.4	12	220	44.5	210	75	
Cadmium	88092224	88092224	10-18-88	10-14-88	SW6010	<0.5	7.8	7.1	9	5.49	7.8	11.4	66N	
Chromium	88092224	88092224	10-18-88	10-14-88	SW6010	<1.0	34.6	29.2	17	22.0	34.6	54.2	89	
Lead	88092224	88092224	10-18-88	10-14-88	SW6010	<10	7.6B	8.9B	NC	54.5	7.6B	49.3	77	A

1843

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
A Values for the following samples are reported from Furnace analysis: 88092226, 88092224.
See QC Report AAF-S-0036-88
N See Legend attached.

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

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):
88082200-88082203, 88092223-88092227
88092244-88092246, 88092248-88092249
88092252-88092255

QC Report No: ICP-S-0033-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-31-88
Date Reported: 10-28-88
Dilution Factor: NA
%Moisture: 8.1

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	Note
Barium	88082200	88082200	10-20-88	10-18-88	SW6010	<20	55.8	52.6	7	218	55.8	254	91	
Cadmium	88082200	88082200	10-20-88	10-18-88	SW6010	<0.5	7.4	8.7	16	5.4	7.4	11.0	67N	
Chromium	88082200	88082200	10-20-88	10-18-88	SW6010	<1.0	31.8	37.3	16	21.8	31.8	56.7	114	
Lead	88082200	88082200	10-20-88	10-18-88	SW6010	<10	<10	<10	NC	54.4	<10	49.2	90	A

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
A Sample results for lead are reported from Furnace analyses for the following Sample No(s).: 88082200-88082203, 88082244, 88092248-88092249, 88092252, 88092255.
N See Legend attached.

1844

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

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

QC Report No: AAF-S-0036-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 9-01-88
Date Reported: 11-01-88
Dilution Factor: NA
%Moisture: 8.9

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092224-88092226
88092250-88092251

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
Lead	88092224	88092224	10-25-88	10-14-88	7421	<0.5	4.5	4.5	0	5.49	4.5	14.8	188N	

1845

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
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

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092244-88092246, 88092248-88092249
88092252-88092255, 88092223-88092227

QC Report No: AAF-S-0035-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 9-01-88
Date Reported: 10-28-88
Dilution Factor: See Notes
%Moisture: 8.9

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	88092244	88092244	10-11-88	10-4-88	7060	<0.5	<5.0E	<5.0E	NC	4.84	2.42E	6.05	75*	DF=10
Lead	88092244	88092244	10-20-88	10-4-88	7421	<0.5	9.9	11.6	16	6.05	9.9	16.3	106*	DF=NA

1846

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* See Case Narrative attached.

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
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):
88092223-88092227
88092244-88092255

QC Report No: TPH-S-0075-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: NA
Date Prepared: 9-22-88
Date Analyzed: 9-23-88
Date Reported: 11-02-88
Dilution Factor: NA
%Moisture: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<10	8.6J	39.5	38.5	76	37.5	73	3	*

1847

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
J See Legend attached.
* The reporting limit for the sample 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

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).:
88082244-88082254

QC Report No: VGC-S-0049-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 9-01-88
Date Prepared: NA
Date Analyzed: 9-13-88
Date Reported: 10-26-88
Dilution Factor: NA
% Moisture: 17.4

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88082244	1,1-dichloroethane	12.1	ND	10.6	88	10.1	83	5	20	58-124
	Trichloroethene	12.1	ND	11.5	95	12.2	101	6	16	75-110
	Chlorobenzene	12.1	ND	11.3	93	11.9	98	5	21	71-125
	Aromatics: 8020									
88082244	Benzene	12.1	ND	10.9	90	12.1	100	10	26	75-123
	Toluene	12.1	ND	10.9	90	12.1	100	10	16	79-115
	Chlorobenzene	12.1	ND	10.6	88	11.7	97	10	24	82-112

1848

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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: Soil
Conc. Unit: ug/Kg
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.
52	9-13-88	VGC	Vocol	75-09-2	Dichloromethane	1.31	0.25	88082244-88082250
				71-43-2	Benzene	1.46	0.20	

1849

METHOD BLANK SUMMARY

Job No: OR001

Client: ES Oak Ridge
Attn: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37630

Project: Duluth ANGB

Sample Matrix: Soil
Conc. Unit: ug/Kg
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.
V52	9-12-88	VGC	Vocol	75-09-2	Dichloromethane	1.3	0.25	88092250
				71-43-2	Benzene	1.5	0.2	
C92	9-13-88	VGC	Carbopack	75-09-2	Dichloromethane	2.5	0.25	88092251-88092255
				541-73-1	1,3-Dichlorobenzene	4.4	0.32	88092256

1850

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).:
88082156-88082163
88082186-88082188
88082250-88082254

QC Report No.: OCP-S-0035-88
QC Sample No.: 88082158
Level (Low/Med): Low
Date Reported: 11-10-88

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	3060	ND	113	111	46-127
Heptachlor	3060	ND	97.1	95	35-130
Aldrin	3060	ND	138	135*	34-132
Dieldrin	7640	ND	367	144*	31-134
Endrin	7640	ND	346	135	42-139
4,4'-DDT	7640	ND	398	136*	23-134

	MSD Conc. In Extract (ug/Kg)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	94.9	93	111	17	50	46-127
Heptachlor	113	110	95	15	31	35-130
Aldrin	121	118	135*	13	43	34-132
Dieldrin	344	135*	144*	6	38	31-134
Endrin	329	129	135*	5	45	42-139
4,4'-DDT	321	126	156*	21	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: 5 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 No.: OCP-S-0035-88B
QC Sample No.: Blank
Level (Low/Med): Low
Date Reported: 11-10-88

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s).:
88082136-88082163
88082186-88082188
88082250-88082254

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/Kg)	MS Conc. In Extract (ug/Kg)	MS % Rec. #	QC Limits Rec.
Lindane	2000	ND	55.5	83	46-127
Heptachlor	2000	ND	45.1	68	35-130
Aldrin	2000	ND	72.6	109	34-132
Dieldrin	5000	ND	259	156*	31-134
Endrin	5000	ND	236	142*	42-139
4,4'-DDT	5000	ND	232	139*	23-134

	MSD Conc. In Extract (ug/Kg)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	68.4	103	83	21	50	46-127
Heptachlor	46.2	69	68	2	31	35-130
Aldrin	75.9	114	109	4	43	34-132
Dieldrin	302	181*	156*	15	38	31-134
Endrin	272	163*	142*	14	45	42-139
4,4'-DDT	258	155*	139*	11	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: 6 out of 12 outside limits

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: OCP-S-0035-88
QC REPORT NO.: OCP-S-0035-88B

Analysis of matrix spikes samples resulted in high recoveries for aldrin, dieldrin, endrin and DDT. Analysis of spiked blanks showed high recoveries for the same compounds. The RPDs were good in both cases. The data related to these analyses were closely examined. No errors or problems were found.

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:	Soil
Address:	710 S. Illinois Avenue	Level (low/med):	Low
	Suite F-103	Extraction:	
	Oak Ridge, Tn. 37830	(SepF/Cont/Sonc):	Sonc
		Date Reported:	11-11-88
Project:	Duluth ANGB		
Date Extracted:	9-07-88		
Date Analyzed (1):	10-4-88	Date Analyzed (2):	
Time Analyzed (1):	20:38	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
-	88082156	10-04-88		
-	88082157	10-04-88		
-	88082158	10-05-88		
-	88082159	10-05-88		
-	88082160	10-05-88		
-	88082161	10-05-88		
-	88082162	10-05-88		
-	88082163	10-05-88		
-	88082186	10-05-88		
-	88082187	10-05-88		
-	88082188	10-05-88		
-	88082250	10-05-88		
-	88082251	10-05-88		
-	88082252	10-05-88		
-	88082253	10-05-88		

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):
88092257, 88092258, 88092244-88092252,
88092336, 88092338

QC Report No: BNA-S-0083-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 09-01-88
Date Prepared: 09-10-88
Date Analyzed: 10-21-88
Date Reported: 03-09-89
Dilution Factor: 1
%Moisture: 17

Laboratory Supervisor Approval:

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
B/N Laboratory Sample # 88092244	1,2,4-Trichlorobenzene	4020	ND	2250	56	2410	60	7	23	38-107
	Acenaphthene	4020	ND	2770	69	2690	67	3	19	31-137
	2,4-Dinitrotoluene	4020	ND	3330	83	2970	74	11	47	28-89
	Pyrene	4020	ND	3490	87	3250	81	7	36	35-142
	N-Nitroso-di-n-Propylamine	4020	ND	3900	97	3780	94	3	38	41-126
	1,4-Dichlorobenzene	4020	ND	1360	34	1410	35	3	27	28-104
ACID Laboratory Sample # 88092244	Pentachlorophenol	8030	ND	4860	60	4100	51	16	47	17-109
	Phenol	8030	ND	5660	70	5300	66	6	35	26-90
	2-Chlorophenol	8030	ND	4860	60	4740	59	2	50	25-102
	4-Chloro-3-Methylphenol	8030	ND	7670	95	6950	86	10	33	26-103
	4-Nitrophenol	8030	ND	8270	103	7030	87	17	50	11-114

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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 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):
88082104Re
88092252Re

QC Report No: BNA-S-0003-89
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 12-07-88
Date Prepared: 12-16-88
Date Analyzed: 01-05-89
Date Reported: 02-23-89
Dilution Factor: NA
%Moisture: 16

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	3480	88	3660	92	5	23	38-107
B/N	Acenaphthene	3970	ND	3230	81	3290	83	2	19	31-137
Laboratory	2,4-Dinitrotoluene	3970	ND	2140	54	2160	54	1	47	28-89
Sample #	Pyrene	3970	ND	4010	101	4290	108	7	36	35-142
88123297	N-Nitroso-di-n-Propylamine	3970	ND	2690	68	2760	70	3	38	41-126
	1,4-Dichlorobenzene	3970	ND	2960	75	2850	72	4	27	28-104
	Pentachlorophenol	7940	ND	7300	92	8650	109	17	47	17-109
ACID	Phenol	7940	ND	6110	77	6350	80	4	35	26-90
Laboratory	2-Chlorophenol	7940	ND	5000	63	5160	65	3	50	25-102
Sample #	4-Chloro-3-Methylphenol	7940	ND	4840	61	5160	65	6	33	26-103
88123297	4-Nitrophenol	7940	ND	7380	93	7340	92	1	50	11-114

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
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

Work Order No(s).: 932/941

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

Sample Matrix: SOIL
Conc. Unit: ug/KG
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.
E5923	10-20-88	BNA	2	-	NONE DETECTED	-	-	88082192-88082203 88092250-88092252
S0931	01-18-89	BNA	1	-	NONE DETECTED	-	-	88092252 (REX)

1857

S0931 = REX BLANK

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 04-48
Lab File ID: 50931
Matrix: soil
Level (low/med):
Date Analyzed: 1-18-89
Time Analyzed: 12:44
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
ANGB-3-mw27-SS3	8808210 4 Rex	50932	1-18-89
ANGB-8-mw20-SS5	8809225 2 Rex	50933	1-18-89

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

Lab Name: Engineering Science

Client:
Attn:
Address:

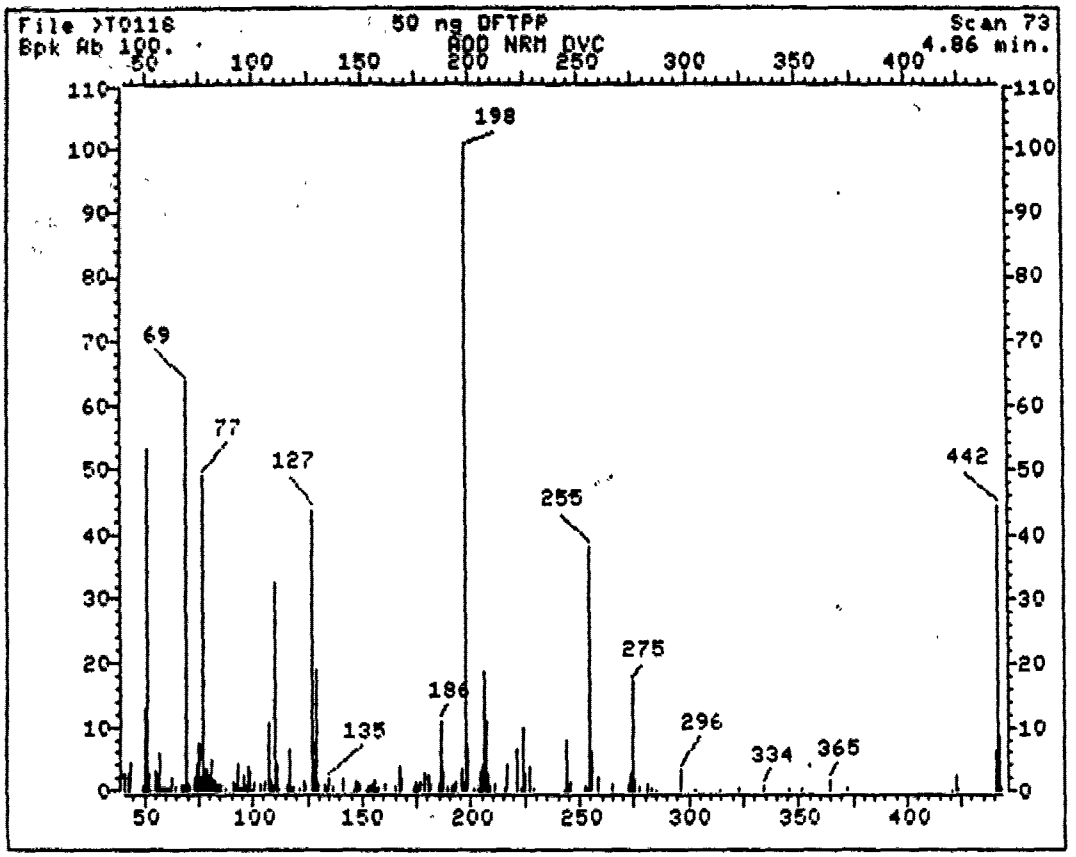
Job No.:
Project:
File ID: >T0118
DFTPP Injection Date: 1/18/89
DFTPP Injection Time: 9:21
Date Reported:
Instrument ID: 1

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	53.3
68	Less than 2.0% of mass 69	.8(1.3)1
69	Mass 69 relative abundance	63.6
70	Less than 2.0% of mass 69	1.1(1.7)1
127	40.0 - 60.0% of mass 198	43.7
197	Less than 1.0% of mass 198	.8
198	Base Peak, 100% relative abundance	100.0
199	5.0 - 9.0% of mass 198	7.1
275	10.0 - 30.0% of mass 198	17.2
365	Greater than 1.00% of mass 198	1.82
441	Present, but less than mass 443	6.1
442	Greater than 40.0% of mass 198	44.5
443	17.0 - 23.0% of mass 442	8.6(19.4)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	>S0928	1/18/89	9:41
02	88123522 AC 1ml	>S0929	1/18/89	10:45
03	88123522 BN 1ml	>S0930	1/18/89	11:44
04	88092104,2252 REX BL	>S0931	1/18/89	12:44
05	88092104 REX 1ml	>S0932	1/18/89	13:44
06	88092252 REX 1ml	>S0933	1/18/89	14:45
07	88092535 REX AC 1ml	>S0934	1/18/89	15:44
08	88092535 REX BN 1ml	>S0935	1/18/89	16:43
09	88113123 10ml	>S0936	1/18/89	17:42
10	88113122 10ml	>S0937	1/18/89	18:41
11	88113122 MS 10ml	>S0938	1/18/89	19:41
12	88113122 MSD 10ml	>S0939	1/18/89	20:41
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				



File: >T0118 Scan #: 73 Retn. time: 4.86

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.10	2.784	82.00	1.745	127.15	43.739	185.15	1.081	246.05	1.447
43.00	2.690	83.10	1.609	128.05	3.686	186.15	11.033	253.15	.868
44.00	4.469	84.10	1.005	129.05	19.111	187.05	3.158	254.05	.289
46.50	.238	85.00	1.124	129.95	1.319	188.95	.681	255.05	38.061
49.20	.928	86.00	.996	133.05	1.200	190.95	.638	256.05	6.155
50.00	12.837	87.00	.494	133.95	.400	192.15	1.107	258.15	2.111
51.10	53.265	91.00	1.490	135.05	2.103	193.05	1.328	258.95	.238
52.20	2.699	92.00	.272	137.15	.741	196.05	3.337	265.05	.936
52.90	.196	93.00	3.984	141.15	1.924	196.85	.809	273.05	1.064
55.00	3.150	94.00	.272	142.05	1.098	198.05	100.000	274.05	2.877
56.00	2.443	95.20	.409	146.15	.204	199.05	7.117	275.05	17.221
57.00	5.797	96.10	2.435	147.15	1.413	201.45	.298	276.05	1.898
58.10	.341	97.20	.911	148.05	1.413	203.05	.332	277.05	.749
59.20	.375	98.10	3.822	149.15	1.047	204.05	3.099	281.15	1.124
60.20	.400	99.00	2.979	152.15	.221	205.05	4.282	283.05	.272
61.10	.536	99.90	.230	153.05	.749	206.15	18.822	285.15	.230
62.10	.332	101.10	1.558	154.05	.851	207.05	10.837	296.05	3.405
63.10	1.949	104.00	1.090	155.05	1.234	208.15	2.665	296.95	.238
65.00	.613	105.10	1.549	156.15	1.694	209.15	.698	302.95	.230
67.00	1.030	107.00	10.496	157.05	.323	210.85	1.022	314.85	.247
68.00	.826	108.10	1.617	158.05	.681	216.05	.323	323.05	.545
69.00	63.599	109.00	.749	160.15	.673	217.05	4.154	334.05	.792
70.00	1.056	110.00	32.613	161.05	1.107	221.15	6.649	345.85	.468
71.10	.868	111.10	4.171	164.95	.792	221.85	.724	351.95	.392
73.00	1.966	112.10	.349	167.05	3.967	223.05	.553	364.95	1.822

76.10	2.247	118.10	.465	175.05	1.461	227.05	3.735	429.10	2.477
76.20	.630	118.90	.732	175.95	.349	229.05	.494	424.00	.332
77.10	48.974	122.10	.332	177.05	1.490	242.95	.187	441.10	6.087
78.10	3.516	123.10	1.379	179.05	2.724	243.35	.230	442.10	44.513
79.00	3.337	124.10	.741	180.15	2.443	244.05	7.789	443.10	8.649
80.00	2.554	124.90	.596	181.05	1.107	245.15	.732	444.10	.383
81.10	4.699								

Continuing Calibration Check
HSL Compounds

Case No: ---------- Calibration Date: 01/18/89

Contractor: ENGINEERING SCIENCE Time: 09:41

Contract No: ---------- Laboratory ID: >S0928

Instrument ID: 1 Initial Calibration Date: 10/19/88 Pre2

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	1.11679	23.85		
2-Fluorophenol	1.15802	1.35674	17.16		
bis(2-Chloroethyl)ether	1.11892	1.15280	3.03		
Phenol	1.41657	1.51102	6.67	*	
Phenol-d5	1.22488	1.26303	3.11		
Aniline	.54193	.41789	22.89		
2-Chlorophenol	1.23175	1.39610	13.34		
1,3-Dichlorobenzene	1.47535	1.46115	.96		
1,4-Dichlorobenzene	1.40530	1.46709	4.40	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.77814	6.73		
1,2-Dichlorobenzene	1.32240	1.45231	9.82		
2-Methylphenol	1.17367	1.46743	25.03		
3-&-4-Methylphenol	1.07139	1.36567	27.47		
bis(2-chloroisopropyl)Ether	2.15627	3.18410	47.67		
N-Nitroso-Di-n-Propylamine	.84050	1.00595	19.68		**
Hexachloroethane	.53840	.61224	13.72		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.46125	14.42		
Nitrobenzene-d5	.39137	.43795	11.90		
2-Nitrophenol	.24657	.28074	13.86	*	
Isophorone	.74170	.84116	13.41		
bis(2-Chloroethoxy)methane	.49386	.59520	20.52		
2,4-Dimethylphenol	.34849	.39852	14.36		
Benzoic Acid	.29725	.29254	1.58		
2,4-Dichlorophenol	.56733	.56513	.39	*	
1,2,4-Trichlorobenzene	.36913	.35741	3.18		
Naphthalene	.94589	.96581	2.11		
4-Chloroaniline	.36309	.37816	4.15		
Hexachlorobutadiene	.20283	.20495	1.05	*	
4-Chloro-3-Methylphenol	.31360	.35867	14.37	*	
2-Methylnaphthalene	.56397	.60546	7.36		

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: 01/18/89

Contractor: ENGINEERING SCIENCE Time: 09:41

Contract No: _____ Laboratory ID: >S0928

Instrument ID: 1 Initial Calibration Date: 10/13/88 10/12

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.31941	8.02		**
2,4,6-Trichlorophenol	.42280	.40322	4.63	*	
2,4,5-Trichlorophenol	.52897	.43301	18.14		
2-Fluorobiphenyl	1.27220	1.07840	15.23		
2-Chloronaphthalene	1.23784	1.08298	12.51		
2-Nitroaniline	.47288	.52331	10.66		
Dimethylphthalate	1.40629	1.19698	14.88		
2,6-Dinitrotoluene	.37415	.31419	16.02		
Acenaphthylene	1.68918	1.44134	14.67		
3-Nitroaniline	.44557	.52351	17.49		
2,4-Dinitrophenol	.11898	.14039	17.99		**
Acenaphthene	1.13011	1.01756	9.96	*	
Dibenzofuran	1.64131	1.53162	6.68		
2,4-Dinitrotoluene	.28418	.24651	13.26		
4-Nitrophenol	.28450	.21784	23.43		**
Fluorene	1.12850	1.00311	11.11		
Diethylphthalate	1.20939	1.03974	14.03		
4-Chlorophenyl-phenylether	.59183	.53215	10.08		
4-Nitroaniline	.35956	.36260	.85		
2,4,6-Tribromophenol	.21023	.19466	7.41		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.39967	.79	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.25429	19.38		
Hexachlorobenzene	.26273	.28073	6.85		
Pentachlorophenol	.14536	.15470	6.43	*	

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: 01/18/89

Contractor: ENVIRONMENTAL SCIENCE Time: 09:41

Contract No: _____ Laboratory ID: >S0928

Instrument ID: A Initial Calibration Date: 10/12/88 12 D87

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	1.11003	7.32		
Anthracene	1.05155	.98921	5.93		
Di-n-Butylphthalate	1.51956	1.32663	12.70		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.08330	9.00	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.01443	64.14		
Pyrene	1.56086	1.50017	3.89		
Terphenyl-d14	1.05835	1.13762	7.49		
Butylbenzylphthalate	1.03390	1.01574	1.76		
3,3'-Dichlorobenzidine	.13689	.22432	63.87		
Chrysene	.99655	.98581	1.08		
Benzo(a)Anthracene	1.10407	1.11191	.71		
bis(2-Ethylhexyl)Phthalate	1.21073	1.24614	2.92		
Di-n-octylphthalate	3.40275	3.09552	9.03	*	
Benzo(a)Pyrene	1.32098	1.33075	.74	*	
Benzo(b)Fluoranthene	1.60850	1.59981	.54		
Indeno(1,2,3-cd)Pyrene	.96800	1.06275	9.79		
Dibenzo(a,h)Anthracene	.87481	.96582	10.40		
Benzo(k)Fluoranthene	1.44370	1.42827	1.07		
Benzo(g,h,i)Perylene	.89761	.90720	1.07		

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 (**)

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science

Client:
Attn:
Address:

Job No.:
Project:
File ID: >S0928
Date Analyzed: 1/18/89 9:41
Date Reported:
Instrument ID: 1

	SAMPLE NUMBER	IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
	12 HOUR STD	168936.	8.94	613121.	12.56	389128.	18.00
	UPPER LIMIT	337872.		1226242.		778256.	
	LOWER LIMIT	84468.		306560.		194564.	
01	88123522 AC	172734.	8.92	580724.	12.51	317950.	17.97
02	88123522 BN	115195.	8.95	389830.	12.55	222570.	18.00
03	88092104,225	148229.	8.91	493561.	12.49	267650.	17.96
04	88092104 REX	136573.	8.91	494240.	12.50	277196.	17.95
05	88092252 REX	145543.	8.92	473359.	12.49	253782.	17.97
06	88092535 REX	171827.	8.95	579058.	12.55	325736.	18.01
07	88092535 REX	151473.	8.95	525990.	12.54	315673.	18.00
08	88113123 10m	143351.	8.95	509414.	12.54	290744.	18.00
09	88113122 10m	195428.	8.93	732237.	12.50	394902.	17.97
10	88113122 MS	170660.	8.92	646256.	12.51	338404.	17.98
11	88113122 MSD	183450.	8.92	661696.	12.50	346029.	17.97
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

Client:
Attn:
Address:

Job No.:
Project:
File ID: >S0928
Date Analyzed: 1/18/89
Date Reported:
Instrument ID: 1

		IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS6(PRY) AREA #	RT
	12 HOUR STD	573948.	22.65	386198.	31.09	239564.	36.92
	UPPER LIMIT	1147896.		772396.		479128.	
	LOWER LIMIT	286974.		193099.		119782.	
	SAMPLE NUMBER						
01	88123522 AC	452811.	22.63	285138.	31.08	163039.	36.94
02	88123522 BN	334942.	22.68	227728.	31.09	131511.	36.97
03	88092104,225	393432.	22.62	262049.	31.05	151245.	36.87
04	88092104 REX	407022.	22.61	253688.	31.05	131109.	36.89
05	88092252 REX	373394.	22.64	225728.	31.06	81406.*	36.92
06	88092535 REX	477426.	22.65	294239.	31.08	171711.	36.91
07	88092535 REX	459288.	22.66	250371.	31.10	136766.	36.93
08	88113123 10m	438683.	22.65	255515.	31.10	113149.*	36.93
09	88113122 10m	572426.	22.62	290279.	31.06	106730.*	36.90
10	88113122 MS	464718.	22.63	239596.	31.07	81120.*	36.93
11	88113122 MSD	490583.	22.63	237632.	31.08	90614.*	36.94
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

DATA PACKAGE #30

This page intentionally left blank.

ES
ENGINEERING-SCIENCE, INC.

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

Job No.: OR001.00

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 samples received by this laboratory on 8-09-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081706	DANGB8-MW14-SS1	BA-I	8-08-88		9-07-88	
88081706	DANGB8-MW14-SS1	CD-I	8-08-88		9-07-88	
88081706	DANGB8-MW14-SS1	CR-I	8-08-88		9-07-88	
88081706	DANGB8-MW14-SS1	PB-F	8-08-88		9-16-88	
88081706	DANGB8-MW14-SS1	418.1	8-08-88	8-29-88	8-31-88	
88081706	DANGB8-MW14-SS1	MOIS	8-08-88		8-12-88	
88081706	DANGB8-MW14-SS1	8010	8-08-88		8-18-88	8-18-88
88081706	DANGB8-MW14-SS1	8020	8-08-88		8-18-88	8-21-88
88081707	DANGB8-MW14-SS3	8010	8-08-88		8-17-88	8-18-88
88081707	DANGB8-MW14-SS3	8020	8-08-88		8-17-88	8-18-88
88081708	DANGB8-MW14-SS8	BA-I	8-08-88		9-07-88	
88081708	DANGB8-MW14-SS8	CD-I	8-08-88		9-07-88	
88081708	DANGB8-MW14-SS8	CR-I	8-08-88		9-07-88	
88081708	DANGB8-MW14-SS8	PB-F	8-08-88		9-16-88	
88081708	DANGB8-MW14-SS8	418.1	8-08-88	8-29-88	8-31-88	
88081708	DANGB8-MW14-SS8	MOIS	8-08-88		8-12-88	
88081708	DANGB8-MW14-SS8	8010	8-08-88		8-17-88	8-18-88
88081708	DANGB8-MW14-SS8	8020	8-08-88		8-17-88	8-18-88
88081709	DANGB8-MW14-SS9	BA-I	8-08-88		9-07-88	
88081709	DANGB8-MW14-SS9	CD-I	8-08-88		9-07-88	
88081709	DANGB8-MW14-SS9	CR-I	8-08-88		9-07-88	
88081709	DANGB8-MW14-SS9	PB-F	8-08-88		9-16-88	
88081709	DANGB8-MW14-SS9	418.1	8-08-88		8-31-88	
88081709	DANGB8-MW14-SS9	MOIS	8-08-88		8-12-88	
88081709	DANGB8-MW14-SS9	8010	8-08-88		8-17-88	8-18-88
88081709	DANGB8-MW14-SS9	8020	8-08-88		8-17-88	8-17-88

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88081706-88081709
WORK ORDER NO.: 819

These soil samples were received at the ES Berkeley Laboratory on 8-09-88. One 1L amber bottle for sample DANGB8-MW14-3S3 was received broken; all other samples were received cold and intact.

ANALYSIS REPORT

WORK ORDER NUMBER: 819
DB NUMBER : ZB0000000440
RK ORDER DATE : 08/09/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
S OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK 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: 2, UNITS: mg/kg

TEST COMPOUND	DANGB8-MW14-SS1 8-8-88 88081706	DANGB8-MW14-SS8 8-8-88 88081708	DANGB8-MW14-SS9 8-8-88 88081709
ID DIG SOIL	NA	NA	NA
ARIUM	49.9	18.9B	39.5
CADMIUM	6.7*N	13.9*N	9.2*N
HROMIUM	24.6	36.5	20.5
EAD	9.1S	5.5S	5.3S

ND - Not Detected

ANALYSIS REPORT

RA ORDER NUMBER: 819
E NUMBER : ZB0000000448
RK ORDER DATE : 08/09/88

APPROVED BY: _____
Lab Supervisor

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

S: S, UNITS: mg/kg

ST COMPOUND	OANGB8-MW14-SS1 8-8-88 880917mo	OANGB8-MW14-SS3 8-8-88 88081709	OANGB8-MW14-SS9 8-8-88 88081709
5.1 PETROLEUM HYDROCARBONS	<100	<100	<100
MOISTURE	12.2	15.1	12.2

- Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 819
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 08/09/88

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/Kg, GROUP 8010

TEST COMPOUND	DANGB8-MW14-SS1 8-8-88 88081706	DANGB8-MW14-SS3 8-8-88 88081707	DANGB8-MW14-SS8 8-8-88 88081708	DANGB8-MW14-SS9 8-8-88 88081709
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	ND	ND	ND	ND
2-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
1,4-DICHLOROBENZENE	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	ND	ND
1,2-DICHLOROETHANE	ND	ND	ND	ND
1,1-DICHLOROETHYLENE	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND
DICHLOROMETHANE	13B	3.0B	4.3B	3.0B
1,2-DICHLOROPROPANE	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 819

T COMPOUND	DANGB8-MW14-SS1 8-8-88 88081706	DANGB8-MW14-SS3 8-8-88 88081707	DANGB8-MW14-SS8 8-8-88 88081708	DANGB8-MW14-SS9 8-8-88 88081709
-DICHLOROPROPYLENE	ND	ND	ND	ND
,2,2-TETRACHLOROETHANE	ND	ND	ND	ND
1,1,2-TETRACHLOROETHANE	ND	ND	ND	ND
RACHLOROETHYLENE	ND	ND	ND	ND
1,1-TRICHLOROETHANE	ND	ND	ND	ND
,2-TRICHLOROETHANE	ND	ND	ND	ND
CHLOROETHYLENE	ND	ND	ND	ND
CHLORODFLUOROMETHANE	ND	ND	ND	ND
CHLOROPROPANE	ND	ND	ND	ND
YL CHLORIDE	ND	ND	ND	ND

- Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 819
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 08/09/88

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 # : 0P001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 4. UNITS: ug/kg. GROUP 8020

TEST COMPOUND	DANGB8-MW14-SS1 8-8-88 88081706	DANGB8-MW14-SS3 8-8-88 88081707	DANGB8-MW14-SS8 8-8-88 88081708	DANGB8-MW14-SS9 8-8-88 88081709
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	1400	9.4	23	9.9
XYLENES	ND	ND	ND	ND

ND - Not Detected

CHAIN OF CUSTODY RECORD

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

SAMPLER(S): (Signature) Kelly Z. Dani Peter E Riemenschneider

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

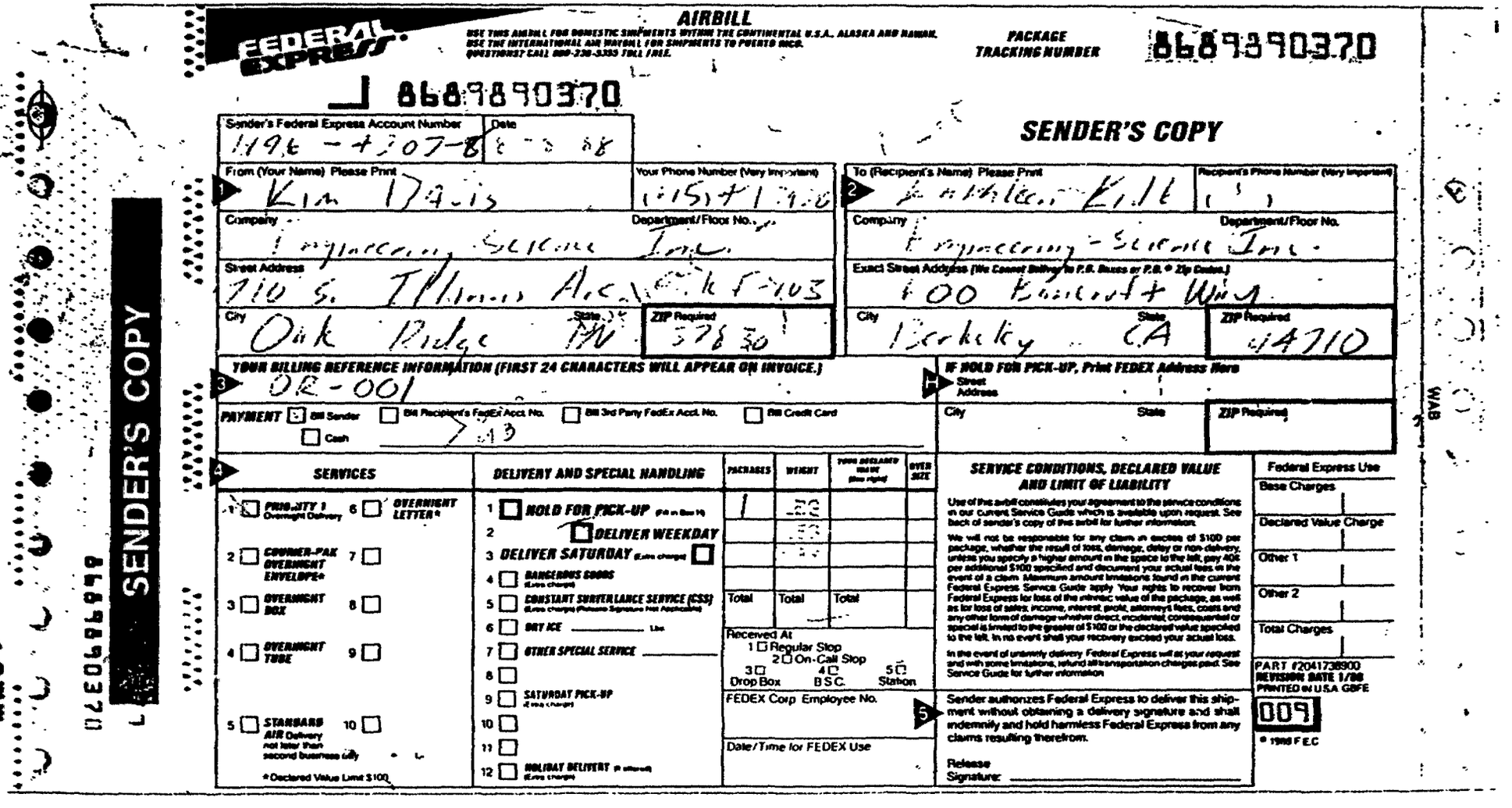
DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SOILS ANALYSES REQUIRED: SW8010, 8020	SW8080	SW8270	EPA 418.1	SW8010, 7181	SW7131, 7421			REMARKS
8-8-88	0825	DANGB8-MW14-551	1	X								
8-8-88	0825	DANGB8-MW14-551	1			X	X	X	X			SW6010 is for Barium only.
8-8-88	0858	DANGB8-MW14-553	1	X								
8-8-88	0858	DANGB8-MW14-553	1			X	X	X	X			" "
8-8-88	1207	DANGB8-MW14-558	1	X								
8-8-88	1207	DANGB8-MW14-558	1			X	X	X	X			" "
8-8-88	0858	DANGB8-MW14-559	1	X								
8-8-88	0858	DANGB8-MW14-559	1			X	X	X	X			" "

1876

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Kelly Z. Dani	8-8-88 / 1655				

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 868990370

868990370

SENDER'S COPY

Sender's Federal Express Account Number: 1196-4307-8 | Date: 6-3-88

1 From (Your Name) Please Print: Kim Davis | Your Phone Number (Very Important): (615)+1 [illegible]
Company: Engineering Science Inc.
Department/Floor No.:
Street Address: 710 S. Illinois Access F-103
City: Oak Ridge | State: TN | ZIP Required: 37830

2 To (Recipient's Name) Please Print: [illegible] Kile | Recipient's Phone Number (Very Important):
Company: Engineering-Science Inc.
Department/Floor No.:
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): 600 Emeryville Way
City: Berkeley | State: CA | ZIP Required: 94710

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.): OE-001

PAYMENT: [X] Bill Sender [ ] Bill Recipient's FedEx Acct. No. [ ] Bill 3rd Party FedEx Acct. No. [ ] Bill Credit Card [ ] Cash 3.13

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
[ ] 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	YOUR DECLARED VALUE (See right)	OVER SIZE
1	[illegible]		
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, 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 undeliverability, 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 #204738900
REVISION DATE 1/88
PRINTED IN U.S.A. GBFE
009
© 1988 F.E.C.

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

SENDER'S COPY

1877

WAB

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):
88081661-88081664, 88081706-88081709
88081692-88081700,

QC Report No: VGC-S-0034-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 8-10-88
Date Prepared: NA
Date Analyzed: 8-22-88
Date Reported: 9-12-88
Dilution Factor: NA
% Moisture: 12

Laboratory Supervisor Approval:

1878

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88081735	1,1-dichloroethane	11.3	ND	9.73	86	9.81	87	1	20	58-124
	Trichloroethene	11.3	0.10	9.30	81	9.73	85	4	16	75-110
	Chlorobenzene	11.3	ND	9.47	84	9.31	82	2	21	71-125
	Aromatics: 8020									
88081735	Benzene	11.3	ND	10.1	89	10.2	90	1	26	75-123
	Toluene	11.3	2.96	11.2	73*	11.2	70*	2	16	79-115
	Chlorobenzene	11.3	ND	8.37	74*	8.37	74*	0	24	82-112

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* See Case Narrative attached. The quality control sample is from a different Martin Marietta 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

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
Samples No.: 88081700, 88081706-88081707
QC REPORT NO.: VGC-S-0034-88

Samples 88081700 and 88081706 were analyzed initially as low soils. They were reanalyzed as medium soils due to the high acetone content. The results reflect the medium level analysis for acetone and the low level analysis for all other target compounds. Accordingly, both low and medium level blanks were required.

Sample 88081707 was lost after the 8240 analysis but before a moisture determination was done. Thus, the results are reported on a wet weight basis.

Percent recoveries for toluene and chlorobenzene in 8020 series do not meet the ES QC limits. Blank spike analysis showed the laboratory to be in control.

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: 10-06-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
C78	8-17-88	VGC	Carbopack	75-09-2	Dichloromethane	7.8	2.5	88081700, 88081706
C69	8-17-88	VGC	Carbopack	75-09-2	Dichloromethane	5.5	0.25	88081707-88081709

1860

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):
88081692-88081700,
88081706-88081708, 88081709

QC Report No: TPH-S-0042-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-08-88
Date Prepared: 8-29-88
Date Analyzed: 8-31-88
Date Reported: 9-06-88
Dilution Factor: 6.5
%Moisture: 10.1

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88081692	418.1	<100	<100	1110	830	75	760	68	9	*

1881

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

* Percent recovery is within ES control 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

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):
88081706, 88081708-88081709
88081749-88081754

QC Report No: AAF-S-0022-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-19-88
Date Reported: 9-20-88
Dilution Factor: NA
%Moisture: 12.2

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
Lead	88081706	88081706	9-08-88	8-19-88	7421	<0.5	7.7	8.2	6	5.3	7.7	12.8	96	

1892

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)

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):
88081706, 88081708-88081709
88081749-88081754, 88081898-88081906

QC Report No: ICP-S-0023-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-08-88
Date Reported: 9-20-88
Dilution Factor: NA
%Moisture: 12.2

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	88081706	88081706	9-07-88	8-23-88	SW6010	<20	49.9	49.0	2	228	49.9	228	78	A
Cadmium	88081706	88081706	9-07-88	8-23-88	SW6010	<0.5	6.7	5.1	27*	5.70	6.7	9.3	46N	A
Chromium	88081706	88081706	9-07-88	8-23-88	SW6010	<1.0	24.6	22.3	10	22.8	24.6	42.8	80	A

1883

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
N See Legend attached.
* See Legend attached.
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)

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
Samples No.: 88081706, 88081708-88081709
Samples No.: 88081749-88081754
Samples No.: 88081898-88081906
QC REPORT NO.: ICP-S-0023-88

The results obtained for the laboratory control sample (LCS) analyzed with these samples for the analytes Cadmium, Chromium and Barium exceeded the recommended EPA recoveries. All data associated with this batch was closely inspected and no analytical problems were found. The initial and continuing calibration verification standards and blanks and precision and accuracy recoveries were within acceptable limits with the exception of Cadmium.

The Cadmium spike recovery below acceptable limits was followed by an analytical spike as required by laboratory standard operating procedure. The results of the analytical spike indicate matrix interference for this analyte.

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 03-50
Lab File ID: 50069
Matrix: Soil
Level (low/med):
Date Analyzed: 9-16-88
Time Analyzed: 14:07
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
LANGB8 - MW14 - SS1	88081716	E5541	8-30-88
	88081716MS	E5542	"
	88081716MSD	E5543	"
LANGB2 - MW38 - SS1	88081877	E5546	"
- MW38 - SS2	88081878	E5547	"
- MW38 - SS4	88081879	E5548	"
———	BLANK MS	E5649	9-20-88
———	BLANK MSD	E5650	"

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):
88081692-88081700,
88081706-88081708, 88081709

QC Report No: TPH-S-0042-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-08-88
Date Prepared: 8-29-88
Date Analyzed: 8-31-88
Date Reported: 9-06-88
Dilution Factor: 6.5
%Moisture: 10.1

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88081692	418.1	<100	<100	1110	830	75	760	68	9	*

1886

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

* Percent recovery is within ES control 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

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):
88081692-88081700, 88081706-88081708,
88081709

QC Report No: TPH-S-0042-88B
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: NA
Date Prepared: 8-29-88
Date Analyzed: 8-31-88
Date Reported: 11-15-88
Dilution Factor: NA
%Moisture: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<100	<100	1000	790	79	790	79	0	

1887

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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. AD-76 Contractor ENG SCI(9/7/88) Contract No. 99-99-99

Instrument ID #1 Date / Time 9/16/88 11:15

Lab ID >T0916::03 Data Release Authorized By: [signature]

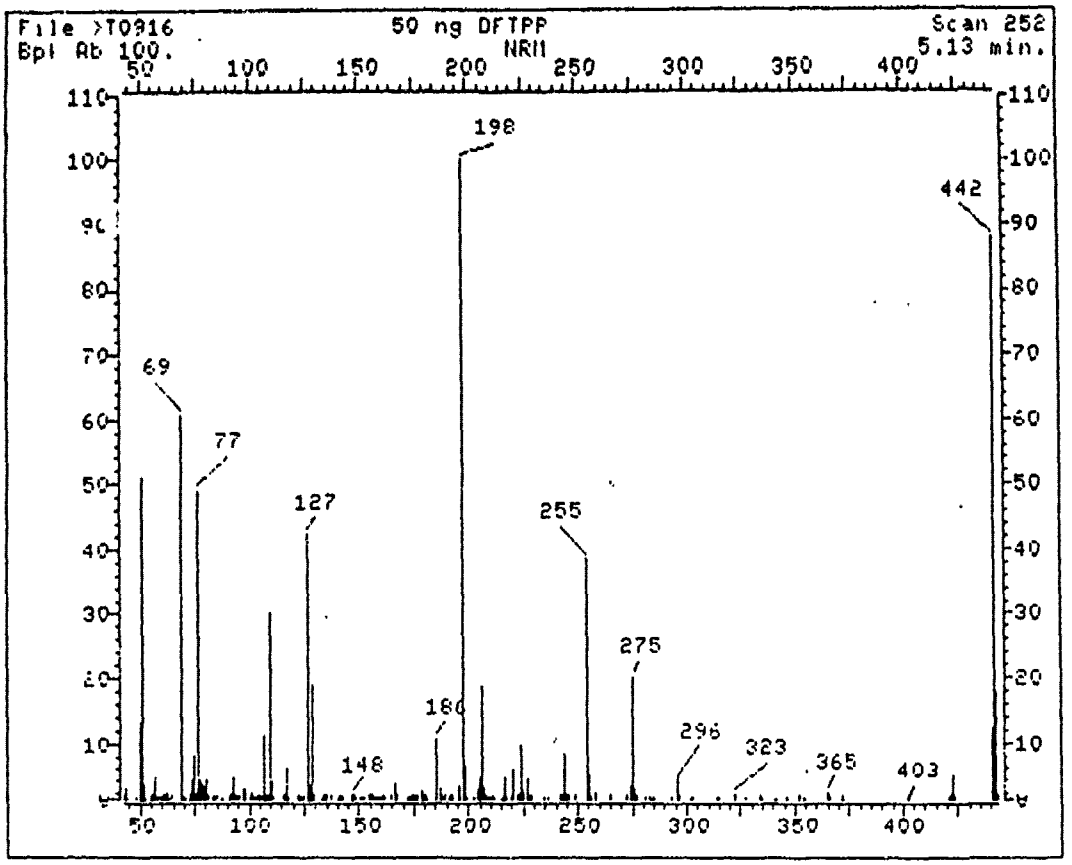
m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	51.18 OK
68	less than 2.0% of mass 69	0.00 OK (0.00) #1
69	mass 69 relative abundance	60.64
70	less than 2.0% of mass 69	.59 OK (.9747) #1
127	40.0 - 60.0% of mass 198	42.36 OK
197	less than 1.0% of mass 198	0.00 OK
198	base peak, 100% relative abundance	100.00 OK
199	5.0 - 9.0% of mass 198	6.37 OK
275	10.0 - 30.0% of mass 198	20.01 OK
365	greater than 1.00% of mass 198	2.14 OK
441	present, but less than mass 443	12.30 OK
442	greater than 40.0% of mass 198	87.91 OK
443	17.0 - 23.0% of mass 442	17.53 OK (19.94) #2

5 point
9/14/88

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
SSTDC25	900067	9-16-88	11:46
BLK 1661-64 1611 120	900068	"	13:07
Blk 1706-09, 77-74	900069	"	14:07
8808 1706	900070	"	16:12
~~8808 1706 MS~~	~~900071~~ DO	"	



File: >T0916 Scan #: 252 Retn. time: 5.13

m/z	In'.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.00	.748	96.05	.615	148.85	.531	205.00	4.415	281.00	.495
44.00	2.847	97.15	.519	150.45	.157	206.00	18.661	282.80	.265
45.00	.217	98.05	2.811	150.85	.277	207.10	2.642	283.50	.145
48.90	.579	98.95	2.955	151.75	.470	208.00	.748	284.40	.133
50.10	13.329	100.15	.555	152.85	.458	209.00	.302	285.00	.543
51.00	51.182	101.05	2.195	153.95	.881	210.00	.434	285.80	.145
52.10	3.329	102.15	.362	154.95	1.134	211.10	.893	292.90	.386
52.80	.217	102.95	.543	156.05	1.677	211.90	.398	295.85	4.439
55.10	1.134	104.05	.917	156.95	.446	214.80	.169	296.95	.724
56.00	1.435	105.05	1.604	157.75	.470	216.10	.495	301.95	.169
57.00	4.656	106.05	.507	158.95	.314	217.00	4.403	302.95	.543
57.90	.326	107.05	11.303	160.05	.350	218.00	.591	314.05	.362
58.80	.386	108.05	1.834	160.75	.760	219.70	.265	314.75	.579
60.05	.326	109.05	.929	162.05	.543	221.00	5.766	323.05	1.809
61.15	.856	110.05	30.157	165.05	.772	222.10	.724	326.95	.555
62.05	.724	111.05	3.788	166.95	3.450	223.00	.965	334.05	.820
63.05	2.027	111.95	.398	167.95	1.556	224.00	9.409	334.95	.326
63.75	.205	115.95	.712	171.95	.458	225.00	2.606	336.95	.193
64.95	.808	116.15	.736	173.25	.277	226.90	4.138	340.85	.169
69.05	60.639	117.05	6.068	173.95	.760	227.90	.531	341.75	.241
69.85	.591	117.95	.483	174.95	1.303	228.90	1.013	345.95	.483
71.05	.422	122.05	.808	175.95	.627	235.00	.314	351.95	.615
73.15	1.025	122.95	1.049	177.10	.893	236.80	.277	354.05	.446
74.95	4.005	123.85	.519	179.00	2.618	238.90	.229	354.85	.181
75.05	8.359	124.05	.531	179.90	1.411	242.00	.663	364.75	2.135
76.05	2.014	125.15	.772	181.00	.893	243.10	.519	365.85	.290
77.05	49.180	127.05	42.364	181.80	.193	244.00	8.323	371.95	1.134

78.05 4.053 128.05 3.172 185.10 1.460 245.00 1.025 372.65 .229

79.05	3.366	128.95	18.890	186.00	10.676	245.90	1.460	382.75	.241
80.05	3.004	129.85	1.689	187.10	2.702	249.00	.627	389.95	.193
81.05	4.041	132.35	.229	188.00	.374	255.00	38.444	401.75	.470
95	.784	133.95	.603	189.00	.760	256.00	4.934	401.95	.495
83.05	1.411	134.95	1.423	191.00	.446	256.90	.277	402.85	.893
84.05	.446	135.85	.639	192.00	1.230	257.90	1.954	421.00	.555
85.05	.881	137.05	.844	193.00	1.049	264.70	.567	422.00	.712
87.05	.555	139.85	.253	196.00	3.136	265.00	.688	423.00	4.656
88.25	.217	140.95	1.327	198.00	100.000	273.00	1.315	423.90	1.496
91.05	1.037	142.05	.881	199.00	6.369	274.00	3.293	441.00	12.304
92.05	.808	142.75	.410	200.20	.362	275.00	20.012	442.00	87.913
92.95	4.379	144.95	.217	202.90	.567	276.00	2.895	442.90	17.527
93.95	.663	147.05	.977	204.00	2.557	277.00	1.327	444.00	1.821
95.05	.290	147.85	1.918						

Continuing Calibration Check
HSL Compounds

Case No: ---------- Calibration Date: 09/16/88

Contractor: ENGINEERING-SCIENCE Time: 11:46

Contract No: ---------- Laboratory ID: >50067

Instrument ID: 1 Initial Calibration Date: ~~09/15/88~~ 9/14/88

meets 827 CL 62 for CA62 updated I1 CL

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	1.11526	1.17094	4.99		
2-Fluorophenol	1.04191	1.38286	32.72		
bis(2-Chloroethyl)ether	1.45395	1.53480	5.56		
Phenol	1.57814	1.78957	13.40	*	
Phenol-d5	1.44681	1.79559	24.11		
Aniline	1.29766	1.35176	4.17		
2-Chlorophenol	1.29000	1.45328	12.66		
1,3-Dichlorobenzene	1.33703	1.53610	14.89		
1,4-Dichlorobenzene	1.26808	1.44939	14.30	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.45243	.00930	97.94		
1,2-Dichlorobenzene	1.26918	1.49609	17.88		
2-Methylphenol	1.07746	1.33777	24.16		
3-&-4-Methylphenol	1.00178	1.21461	21.25		(Conc=50.00)
bis(2-chloroisopropyl)Ether	3.21777	3.24530	.86		
N-Nitroso-Di-n-Propylamine	1.20333	1.17066	2.72	**	
Hexachloroethane	.53519	.65973	23.27		
Dibromochloropropane	-	-	-		
Nitrobenzene	.47991	.49073	2.25		
Nitrobenzene-d5	.41608	.43361	4.21		
2-Nitrophenol	.21906	.24165	10.31	*	
Isophorone	.91400	.93894	2.73		
bis(2-Chloroethoxy)methane	.52989	.57088	7.73		
2,4-Dimethylphenol	.22693	.33757	48.75		
Benzoic Acid	.24110	.22836	5.28		
2,4-Dichlorophenol	.24667	.30362	23.09	*	
1,2,4-Trichlorobenzene	.32622	.36051	10.51		
Naphthalene	.85404	.95180	11.45		
4-Chloroaniline	.43129	.45071	4.50		
Hexachlorobutadiene	.19284	.21131	9.58	*	
4-Chloro-3-Methylphenol	.28823	.34565	19.92	*	
2-Methylnaphthalene	.49727	.54555	9.71		

RF - Response Factor from daily standard file at 25.00 mg/L

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

%f - % Difference from original average or curve

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

Continuing Calibration Check
HSL Compounds

Case No: ---------- Calibration Date: 09/16/88

Contractor: ENGINEERING-SCIENCE Time: 11:46

Contract No: ---------- Laboratory ID: >S0067

Instrument ID: 1 Initial Calibration Date: 09/14/88 -DSD

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.31998	.40283	25.89		**
2,4,6-Trichlorophenol	.34057	.41058	20.56	*	
2,4,5-Trichlorophenol	.37168	.42289	13.78		
2-Fluorobiphenyl	1.03228	1.13969	10.41		
2-Chloronaphthalene	1.10079	1.21103	10.01		
2-Nitroaniline	.62664	.65766	4.95		
Dimethylphthalate	1.30066	1.48378	14.08		
2,6-Dinitrotoluene	.37641	.41472	10.18		
Acenaphthylene	1.60416	1.89107	17.89		
3-Nitroaniline	.66097	.66197	.15		
2,4-Dinitrophenol	.20934	.23777	13.58		**
Acenaphthene	1.03503	1.16702	12.75	*	
Dibenzofuran	1.40372	1.62595	15.83		
2,4-Dinitrotoluene	.34782	.37435	7.63		
4-Nitrophenol	.17238	.17962	4.20		**
Fluorene	1.01979	1.15706	13.46		
Diethylphthalate	1.02412	1.25075	22.13		
4-Chlorophenyl-phenylether	.51416	.65343	27.09		
4-Nitroaniline	.51880	.54570	5.18		
2,4,6-Tribromophenol	.21315	.36382	70.69		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40222	.48204	19.85	*	
4,6-Dinitro-2-Methylphenol	.13708	.18395	34.20		
4-Bromophenyl-phenylether	.22189	.25111	13.17		
Hexachlorobenzene	.32402	.36177	11.65		
Pentachlorophenol	.17454	.20372	16.72	*	

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: 09/16/88

Contractor: ENGINEERING-SCIENCE Time: 11:46

Contract No: ---------- Laboratory ID: >S0067

Instrument ID: 1 Initial Calibration Date: ~~09/15/88~~ 9/14/88

meets 827C
CLP
625
for CA625
updated I1 CLP

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	1.11526	1.17094	4.99		
2-Fluorophenol	1.04191	1.38286	32.72		
bis(2-Chloroethyl)ether	1.45395	1.53480	5.56		
Phenol	1.57814	1.78957	13.40	*	
Phenol-d5	1.44681	1.79559	24.11		
Aniline	1.29766	1.35176	4.17		
2-Chlorophenol	1.29000	1.45328	12.66		
1,3-Dichlorobenzene	1.33703	1.53610	14.89		
1,4-Dichlorobenzene	1.26808	1.44939	14.30	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.45243	.00930	97.94		
1,2-Dichlorobenzene	1.26918	1.49609	17.88		
2-Methylphenol	1.07746	1.33777	24.16		
3-&-4-Methylphenol	1.00178	1.21461	21.25		(Conc=50.00)
bis(2-chloroisopropyl)Ether	3.21777	3.24530	.86		
N-Nitroso-Di-n-Propylamine	1.20333	1.17066	2.72	**	
Hexachloroethane	.53519	.65973	23.27		
Dibromochloropropane	-	-	-		
Nitrobenzene	.47991	.49073	2.25		
Nitrobenzene-d5	.41608	.43361	4.21		
2-Nitrophenol	.21906	.24165	10.31	*	
Isophorone	.91400	.93894	2.73		
bis(2-Chloroethoxy)methane	.52989	.57088	7.73		
2,4-Dimethylphenol	.22693	.33757	48.75		
Benzoic Acid	.24110	.22836	5.28		
2,4-Dichlorophenol	.24667	.30362	23.09	*	
1,2,4-Trichlorobenzene	.32622	.36051	10.51		
Naphthalene	.85404	.95180	11.45		
4-Chloroaniline	.43129	.45071	4.50		
Hexachlorobutadiene	.19284	.21131	9.58	*	
4-Chloro-3-Methylphenol	.28823	.34565	19.92	*	
2-Methylnaphthalene	.49727	.54555	9.71		

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): 25mg/L BNA STD Date Analyzed: 9/16/88

Lab File ID (Standard): 50067 Time Analyzed: 11:46

Instrument ID: _____

	IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
12 HOUR STD	73109	9.35	284937	12.98	156581	18.48
UPPER LIMIT	146,218	9.85	569,874	13.48	313,162	18.98
LOWER LIMIT	36,555	8.85	142,469	12.48	78,291	17.98
EPA SAMPLE NO.						
01 BLK 161-64, 169-170	73660	9.36	298074	12.96	176591	18.48
02 BLK 175-09, 177-79	114976	9.38	296238	12.96	235142	18.49
03 8808170C	67959	9.36	272626	12.96	162275	18.48
04 ~~8808170C MS~~	DO					
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

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: 9/16/88

Lab File ID (Standard): S0067 Time Analyzed: 11:46

Instrument ID: _____

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS4(PRY) AREA #	RT
12 HOUR STD	296819	23.14	319388	31.63	341093	37.89
UPPER LIMIT	593638	23.64	638,776	32.13	682,186	38.39
LOWER LIMIT	148410	22.64	159,694	31.13	170547	37.39
EPA SAMPLE NO.						
01 BLK 1661-61,164-1700	298616	23.14	357020	31.61	250402	3787
02 BLK 1726-09 1877-79	485091	2317	392210	31.62	593754	37.82
03 8805170	287851	23.13	286644	31.64	173413	37.90
04 ~~8805170 MS~~	DEL					
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

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. AD-76 Contractor ENG SCI(9/7/88) Contract No. 99-99-99

Instrument ID #1 Date / Time 9/20/88 12:19

Lab ID >D0920::D1 Data Release Authorized By: Laura Kuck

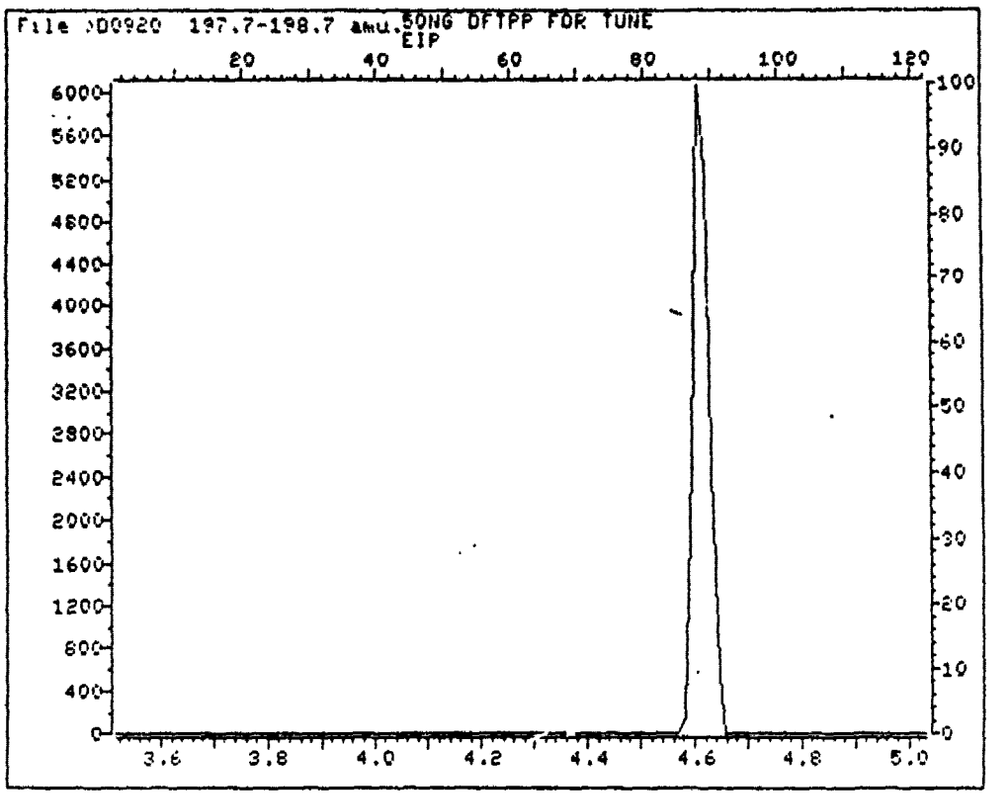
9/16 - 5 point

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	47.26 OK	
68	less than 2.0% of mass 69	1.12 OK	(1.626) #1
69	mass 69 relative abundance	68.77	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	43.92 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	6.54 OK	
275	10.0 - 30.0% of mass 198	20.95 OK	
365	greater than 1.00% of mass 198	1.13 OK	
441	present, but less than mass 443	8.50 OK	
442	greater than 40.0% of mass 198	61.39 OK	
443	17.0 - 23.0% of mass 442	11.69 OK	(19.05) #2

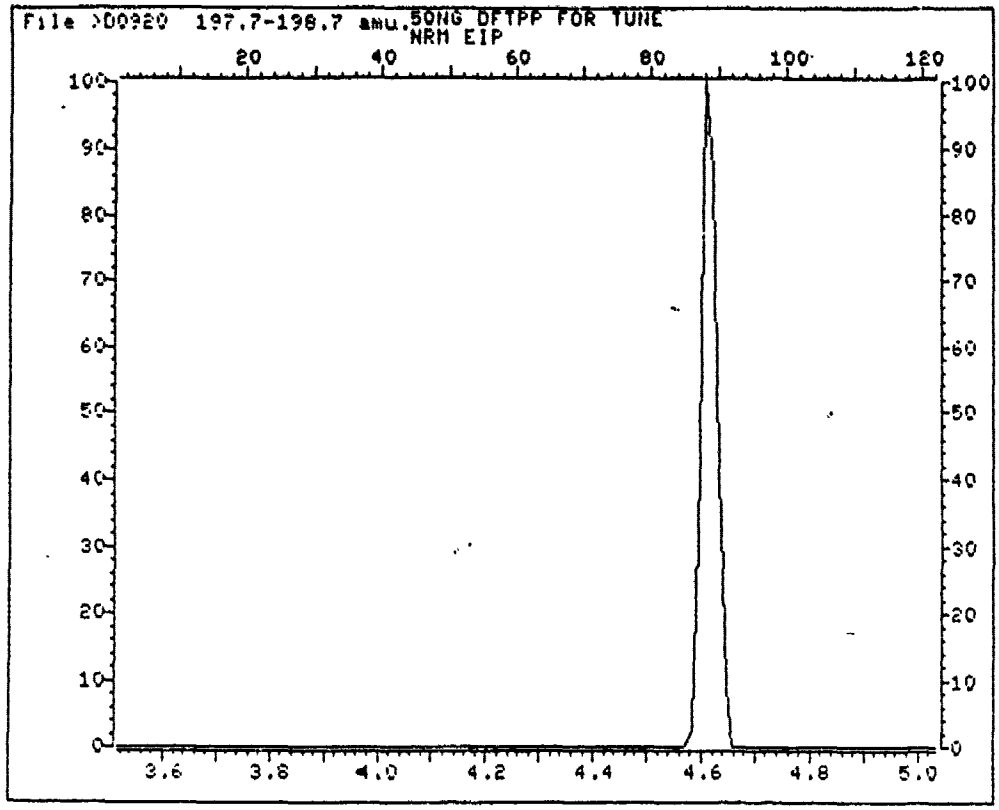
THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

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

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS	
8081/TX6 BLK	>E5651	9/20/88	15:54	* IS out (1) SS good IS good - use
" BLK MS	>E5649	↓	14:04	SS good IS good - use
" BLK MSD	>E5650	↓	14:59	SS good IS good - use
20ng/l ABN	>E5648	↓	12:46	good



time	Int.	time	Int.	time	Int.	time	Int.	time	Int.
3.52	0.000	3.83	0.000	4.14	0.000	4.44	0.000	4.75	0.000
3.53	0.000	3.84	0.000	4.15	0.000	4.46	0.000	4.76	0.000
3.54	0.000	3.85	0.000	4.17	0.000	4.47	0.000	4.77	0.000
3.55	0.000	3.87	0.000	4.18	0.000	4.48	0.000	4.78	0.000
3.57	0.000	3.88	0.000	4.19	0.000	4.49	0.000	4.80	0.000
3.58	0.000	3.89	0.000	4.20	0.000	4.51	0.000	4.81	0.000
3.59	0.000	3.90	0.000	4.22	0.000	4.52	0.000	4.82	0.000
3.60	0.000	3.92	0.000	4.23	0.000	4.53	0.000	4.83	0.000
3.62	0.000	3.93	0.000	4.24	0.000	4.54	0.000	4.85	0.000
3.63	0.000	3.94	0.000	4.26	0.000	4.56	0.000	4.86	0.000
3.64	0.000	3.95	0.000	4.27	0.000	4.57	0.000	4.87	0.000
3.65	0.000	3.97	0.000	4.28	0.000	4.58	2.187	4.88	0.000
3.67	0.000	3.98	0.000	4.29	0.000	4.59	41.737	4.90	0.000
3.68	0.000	3.99	0.000	4.31	0.000	4.61	100.000	4.91	0.000
3.69	0.000	4.00	0.000	4.32	0.000	4.62	86.548	4.92	0.000
3.70	0.000	4.02	0.000	4.33	0.000	4.63	41.062	4.93	0.000
3.72	0.000	4.03	0.000	4.34	0.000	4.65	8.995	4.95	0.000
3.73	0.000	4.04	0.000	4.36	0.000	4.66	0.000	4.96	0.000
3.74	0.000	4.05	0.000	4.37	0.000	4.67	0.000	4.97	0.000
3.75	0.000	4.07	0.000	4.38	0.000	4.68	0.000	4.98	0.000
3.77	0.000	4.08	0.000	4.39	0.000	4.70	0.000	5.00	0.000
3.78	0.000	4.09	0.000	4.41	0.000	4.71	0.000	5.01	0.000
3.79	0.000	4.10	0.000	4.42	0.000	4.72	0.000	5.02	0.000
3.80	0.000	4.12	0.000	4.43	0.000	4.73	0.000	5.03	0.000
3.82	0.000	4.13	0.000						


File >D0920 197.7-198.7 amu.SONG DFTPP FOR TUNE
NRM EIP
20
40
60
80
100
120
100
90
80
70
60
50
40
30
20
10
0
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 09/20/88

Contractor: Time: 12:46

Contract No: Laboratory ID:)E5648

Instrument ID: Initial Calibration Date: 09/19/68

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC	
N-Nitroso-Dimethylamine	.97318	.93696	3.72			
2-Fluorophenol	1.19718	1.22023	1.92			
bis(2-Chloroethyl)ether	1.72380	1.73545	.68			
Phenol	1.60763	1.63142	1.48	*		
Phenol-d5	1.46321	1.44923	.96			
Aniline	1.25111	1.04746	16.28			
2-Chlorophenol	1.33134	1.33499	.27			
1,3-Dichlorobenzene	1.39328	1.47278	5.71			
1,4-Dichlorobenzene	1.25213	1.39776	11.63	*		
Benzyl Chloride	-	-	-			
Benzyl Alcohol	.15892	-	-			
1,2-Dichlorobenzene	1.30329	1.38274	6.10			
2-Methylphenol	1.07027	1.05457	1.47			
3-&-4-Methylphenol	1.11935	1.29013	15.26			(Conc=50.00)
bis(2-chloroisopropyl)Ether	2.85694	2.15475	24.58			
N-Nitroso-Di-n-Propylamine	1.23303	.95972	22.17		**	
Hexachloroethane	.58509	.58815	.52			
Dibromochloropropane	-	-	-			
Nitrobenzene	.50051	.47067	5.96			
Nitrobenzene-d5	.40361	.39152	2.99			
2-Nitrophenol	.22074	.21501	2.60	*		
Isophorone	.89798	.84593	5.80			
bis(2-Chloroethoxy)methane	.49629	.50802	2.37			
2,4-Dimethylphenol	.34275	.29399	14.23			
Benzoic Acid	.28274	.24180	14.48			
2,4-Dichlorophenol	.29035	.30426	4.79	*		
1,2,4-Trichlorobenzene	.32164	.32996	2.59			
Naphthalene	.84665	.92740	9.54			
4-Chloroaniline	.39615	.36496	7.87			
Hexachlorobutadiene	.18867	.19822	5.06	*		
4-Chloro-3-Methylphenol	.33811	.32830	2.90	*		
2-Methylnaphthalene	.49672	.53371	7.45			

RF - Response factor from daily standard file at 25.00 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: 09/20/88

Contractor: Time: 12:46

Contract No: Laboratory ID: >E5648

Instrument ID: Initial Calibration Date: 09/19/88

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.34256	.33101	3.37		**
2,4,6-Trichlorophenol	.31771	.38174	20.15	*	
2,4,5-Trichlorophenol	.31050	.38174	22.95		
2-Fluorobiphenyl	1.02332	1.05582	3.18		
2-Chloronaphthalene	1.06734	1.13798	6.62		
2-Nitroaniline	.64844	.56556	12.78		
Dimethylphthalate	1.15185	1.29520	12.44		
2,6-Dinitrotoluene	.37240	.38297	2.84		
Acenaphthylene	1.43234	1.64883	15.11		
3-Nitroaniline	.61164	.54950	10.16		
2,4-Dinitrophenol	.21222	.15711	25.97		**
Acenaphthene	1.00882	1.12041	11.06	*	
Dibenzofuran	1.48405	1.49012	.41		
2,4-Dinitrotoluene	.35416	.34929	1.38		
4-Nitrophenol	.56574	.23117	59.14		**
Fluorene	1.16382	1.24422	6.91		
Diethylphthalate	1.29579	1.50905	16.46		
4-Chlorophenyl-phenylether	.47028	.54233	15.32		
4-Nitroaniline	.35809	.30634	14.45		
2,4,6-Tribromophenol	.18471	.17937	2.89		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.39351	.47291	20.18	*	
4,6-Dinitro-2-Methylphenol	.12828	.15328	19.49		
4-Bromophenyl-phenylether	.20837	.22530	8.13		
Hexachlorobenzene	.28398	.29568	4.12		
Pentachlorophenol	.19068	.15933	16.44	*	

RF - Response Factor from daily standard file at 25.00 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: 09/20/88

Contractor: Time: 12:46

Contract No: Laboratory ID: >E5648

Instrument ID: Initial Calibration Date: 09/19/88

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	.91670	1.03025	12.39		
Anthracene	.92993	1.03528	11.33		
Di-n-Butylphthalate	1.56546	1.75524	12.12		
4,4'-Dibromobiphenyl	1.36378	1.44482	5.94		
Fluoranthene	.99605	1.04022	4.43	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.21202	.02003	90.55		
Pyrene	1.43648	1.40665	2.08		
Terphenyl-d14	1.01113	.89868	11.12		
Butylbenzylphthalate	1.01773	1.06793	4.93		
3,3'-Dichlorobenzidine	.22856	.14941	34.63		
Chrysene	1.17468	1.13876	3.06		
Benzo(a)Anthracene	1.25941	1.05682	16.09		
bis(2-Ethylhexyl)Phthalate	1.25969	1.40900	11.85		
Di-n-octylphthalate	2.46859	3.09515	25.38	*	
Benzo(a)Pyrene	1.06996	1.08656	1.55	*	
Benzo(b)Fluoranthene	1.46574	1.25168	14.60		
Indeno(1,2,3-cd)Pyrene	.70560	.68930	2.31		
Dibenzo(a,h)Anthracene	.64885	.82341	26.90		
Benzo(k)Fluoranthene	1.00583	1.25110	24.39		
Benzo(g,h,i)Perylene	.49832	.65649	31.74		

RF - Response Factor from daily standard file at 25.00 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		73181	8.45	256140	12.00	137964	17.43
UPPER LIMIT		146362		512280		274128	
LOWER LIMIT		36591		128070		68532	
EPA SAMPLE NO.							
ES657	01 SB108706BL	118375	8.49	464213	12.01	234315	17.44
ES649	02 " MS DL	68730	8.48	240730	12.00	129665	17.43
ES650	03 " MSD DL	64594	8.48	232593	12.00	120343	17.42
	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 asteris

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name:_____ Contract:_____

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

EPA Sample No.(Standard):_____ Date Analyzed: 9/20/

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

Instrument ID:_____

		IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS4(PRY) AREA #	RT
12 HOUR STD		219253	22.02	167387	30.41	124851	35.2
UPPER LIMIT		438506		334774		249702	
LOWER LIMIT		109626		83694		62426	
EPA SAMPLE NO.							
ES651	01	8808706 BLK	404192	22.04	198527	30.41	30595 *	35.20
ES649	02	" MS BLK	197581	22.03	140027	30.40	85660	35.19
ES650	03	" MSD BLK	193149	22.04	135800	30.39	79899	35.21
	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 asteri

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. AD-76 Contractor ENG SCI(9/7/88) Contract No. 99-99-99

Instrument ID #1 Date / Time 9/20/88 12:19

Lab ID)D0920::01 Data Release Authorized By: Laura Kuck

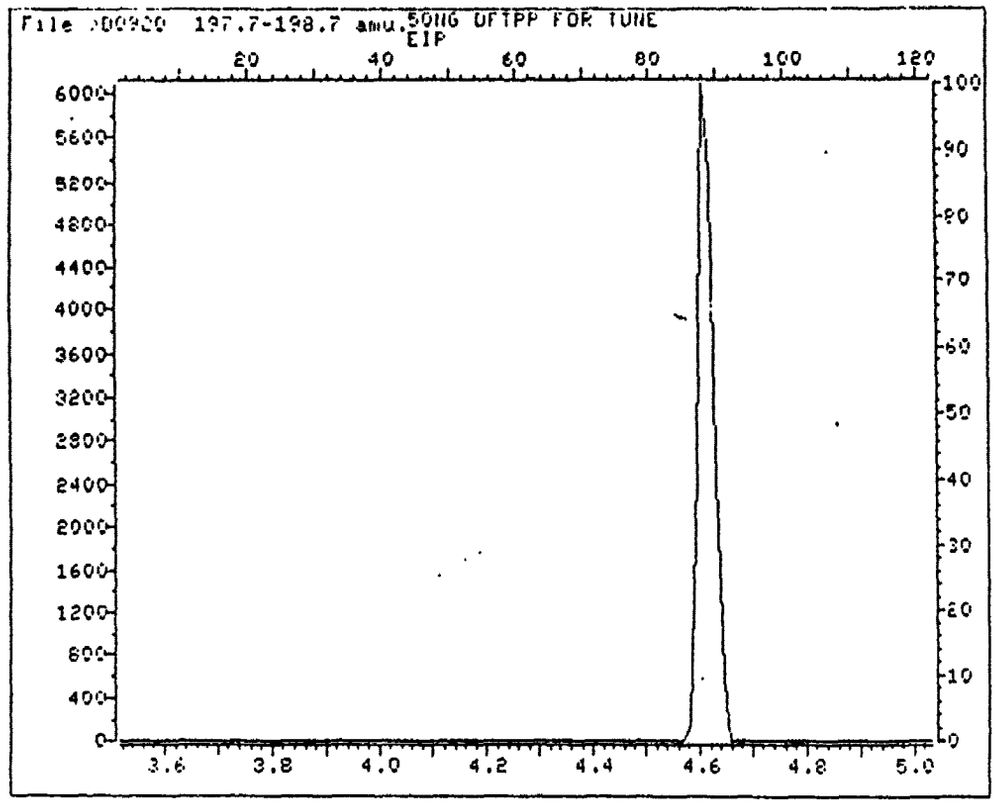
9/16 - Spoint

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	47.26 OK	
68	less than 2.0% of mass 69	1.12 OK	(1.626) #1
69	mass 69 relative abundance	68.77	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	43.92 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	6.54 OK	
275	10.0 - 30.0% of mass 198	20.95 OK	
365	greater than 1.00% of mass 198	1.13 OK	
441	present, but less than mass 443	8.50 OK	
442	greater than 40.0% of mass 198	61.39 OK	
443	17.0 - 23.0% of mass 442	11.69 OK	(19.05) #2

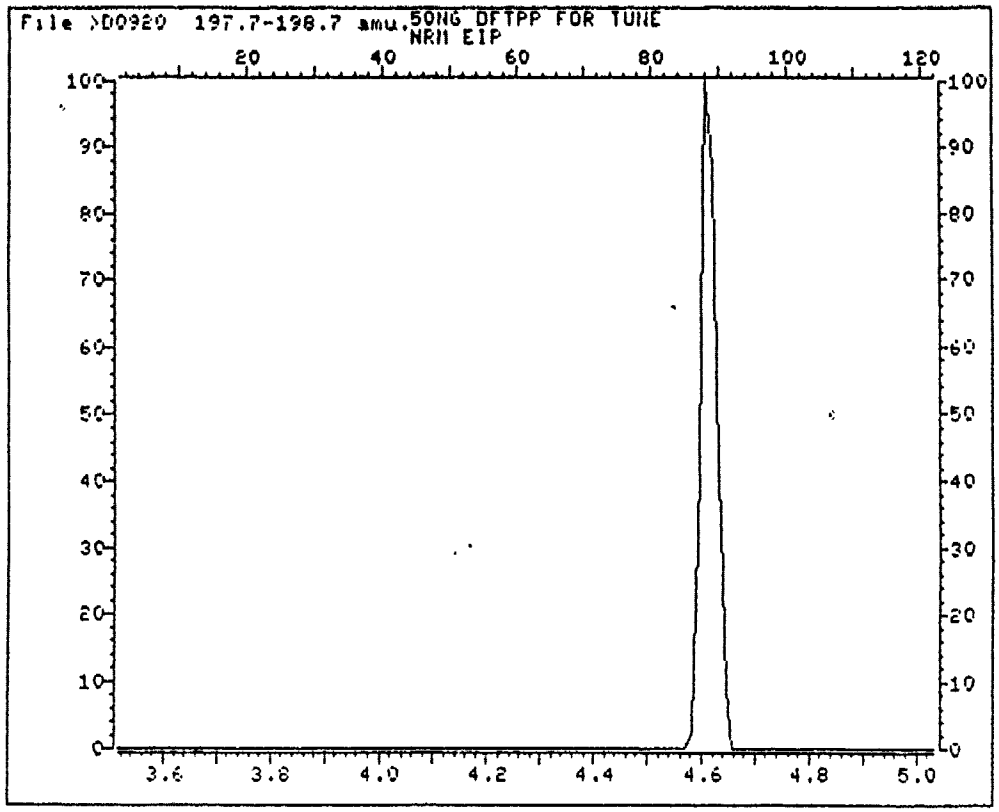
THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

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

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS	
880706 BLK	>ES651	9/20/88	15:54	* IS out (1)
" BLK MS	>ES649	↓	14.04	SS good IS good - use
" BLK MSD	>ES650	↓	14.59	SS good IS good - use
25ng/LABN	>ES648	↓	12:46	good



time	Int.	time	Int.	time	Int.	time	Int.	time	Int.
3.52	0.000	3.83	0.000	4.14	0.000	4.44	0.000	4.75	0.000
3.53	0.000	3.84	0.000	4.15	0.000	4.46	0.000	4.76	0.000
3.54	0.000	3.85	0.000	4.17	0.000	4.47	0.000	4.77	0.000
3.55	0.000	3.87	0.000	4.18	0.000	4.48	0.000	4.78	0.000
3.57	0.000	3.88	0.000	4.19	0.000	4.49	0.000	4.80	0.000
3.58	0.000	3.89	0.000	4.20	0.000	4.51	0.000	4.81	0.000
3.59	0.000	3.90	0.000	4.22	0.000	4.52	0.000	4.82	0.000
3.60	0.000	3.92	0.000	4.23	0.000	4.53	0.000	4.83	0.000
3.62	0.000	3.93	0.000	4.24	0.000	4.54	0.000	4.85	0.000
3.63	0.000	3.94	0.000	4.26	0.000	4.56	0.000	4.86	0.000
3.64	0.000	3.95	0.000	4.27	0.000	4.57	0.000	4.87	0.000
3.65	0.000	3.97	0.000	4.28	0.000	4.58	2.187	4.88	0.000
3.67	0.000	3.98	0.000	4.29	0.000	4.59	11.737	4.90	0.000
3.68	0.000	3.99	0.000	4.31	0.000	4.61	100.000	4.91	0.000
3.69	0.000	4.00	0.000	4.32	0.000	4.62	86.548	4.92	0.000
3.70	0.000	4.02	0.000	4.33	0.000	4.63	41.062	4.93	0.000
3.72	0.000	4.03	0.000	4.34	0.000	4.65	8.995	4.95	0.000
3.73	0.000	4.04	0.000	4.36	0.000	4.66	0.000	4.96	0.000
3.74	0.000	4.05	0.000	4.37	0.000	4.67	0.000	4.97	0.000
3.75	0.000	4.07	0.000	4.38	0.000	4.68	0.000	4.98	0.000
3.77	0.000	4.08	0.000	4.39	0.000	4.70	0.000	5.00	0.000
3.78	0.000	4.09	0.000	4.41	0.000	4.71	0.000	5.01	0.000
3.79	0.000	4.10	0.000	4.42	0.000	4.72	0.000	5.02	0.000
3.80	0.000	4.12	0.000	4.43	0.000	4.73	0.000	5.03	0.000
3.82	0.000	4.13	0.000						


File >D0920 197.7-198.7 amu.50NG DFTPP FOR TUNE
NRM EIP
20
40
60
80
100
120
100
90
80
70
60
50
40
30
20
10
0
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 09/20/88

Contractor: _____ Time: 12:46

Contract No: _____ Laboratory ID: >E5648

Instrument ID: _____ Initial Calibration Date: 09/19/88

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC	
N-Nitroso-Dimethylamine	.97318	.93696	3.72			
2-Fluorophenol	1.19718	1.22023	1.92			
bis(2-Chloroethyl)ether	1.72380	1.73545	.68			
Phenol	1.60763	1.63142	1.48	*		
Phenol-d5	1.46321	1.44923	.96			
Aniline	1.25111	1.04746	16.20			
2-Chlorophenol	1.33134	1.33499	.27			
1,3-Dichlorobenzene	1.39328	1.47278	5.71			
1,4-Dichlorobenzene	1.25213	1.39776	11.63	*		
Benzyl Chloride	-	-	-			
Benzyl Alcohol	.15892	-	-			
1,2-Dichlorobenzene	1.30329	1.38274	6.10			
2-Methylphenol	1.07027	1.05457	1.47			
3-&-4-Methylphenol	1.11935	1.29013	15.26			(Conc=50.00)
bis(2-chloroisopropyl)Ether	2.85694	2.15475	24.58			
N-Nitroso-Di-n-Propylamine	1.23303	.95972	22.17		**	
Hexachloroethane	.58509	.58815	.52			
Dibromochloropropane	-	-	-			
Nitrobenzene	.50051	.47067	5.96			
Nitrobenzene-d5	.40361	.39152	2.99			
2-Nitrophenol	.22074	.21501	2.60	*		
Isophorone	.89798	.84593	5.80			
bis(2-Chloroethoxy)methane	.49629	.50802	2.37			
2,4-Dimethylphenol	.34275	.29399	14.23			
Benzoic Acid	.28274	.24180	14.48			
2,4-Dichlorophenol	.29035	.30426	4.79	*		
1,2,4-Trichlorobenzene	.32164	.32996	2.59			
Naphthalene	.84665	.92740	9.54			
4-Chloroaniline	.39615	.36496	7.87			
Hexachlorobutadiene	.18867	.19822	5.06	*		
4-Chloro-3-Methylphenol	.33811	.32830	2.90	*		
2-Methylnaphthalene	.49672	.53371	7.45			

RF - Response Factor from daily standard file at 25.00 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: 09/20/88

Contractor: Time: 12:46

Contract No: Laboratory ID: >ES648

Instrument ID: Initial Calibration Date: 09/19/88

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.34256	.33101	3.37		**
2,4,6-Trichlorophenol	.31771	.38174	20.15	*	
2,4,5-Trichlorophenol	.31050	.38174	22.95		
2-Fluorobiphenyl	1.02332	1.05582	3.18		
2-Chloronaphthalene	1.06734	1.13798	6.62		
2-Nitroaniline	.64844	.56556	12.78		
Dimethylphthalate	1.15185	1.29520	12.44		
2,6-Dinitrotoluene	.37240	.38237	2.84		
Acenaphthylene	1.43234	1.64883	15.11		
3-Nitroaniline	.61164	.54950	10.16		
2,4-Dinitrophenol	.21222	.15711	25.97		**
Acenaphthene	1.00882	1.12041	11.06	*	
Dibenzofuran	1.48405	1.49012	.41		
2,4-Dinitrotoluene	.35416	.34929	1.38		
4-Nitrophenol	.56574	.23117	59.14		**
Fluorene	1.16382	1.24422	6.91		
Diethylphthalate	1.29579	1.50905	16.46		
4-Chlorophenyl-phenylether	.47028	.54233	15.32		
4-Nitroaniline	.35809	.30634	14.45		
2,4,6-Tribromophenol	.18471	.17937	2.89		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.39351	.47291	20.18	*	
4,6-Dinitro-2-Methylphenol	.12828	.15328	19.49		
4-Bromophenyl-phenylether	.20837	.22530	8.13		
Hexachlorobenzene	.26398	.29568	4.12		
Pentachlorophenol	.19068	.15933	16.44	*	

RF - Response Factor from daily standard file at 25.00 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: 09/20/88

Contractor: Time: 12:46

Contract No: Laboratory ID: >E5648

Instrument ID: Initial Calibration Date: 09/19/88

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	.91670	1.03025	12.39		
Anthracene	.92993	1.03528	11.33		
Di-n-Butylphthalate	1.56546	1.75524	12.12		
4,4'-Dibromobiphenyl	1.36378	1.44482	5.94		
Fluoranthene	.99605	1.04022	4.43	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.21202	.02003	90.55		
Pyrene	1.43648	1.40665	2.08		
Terphenyl-d14	1.01113	.89868	11.12		
Butylbenzylphthalate	1.01773	1.06793	4.93		
3,3'-Dichlorobenzidine	.22856	.14941	34.63		
Chrysene	1.17468	1.13876	3.06		
Benzo(a)Anthracene	1.25941	1.05692	16.09		
bis(2-Ethylhexyl)Phthalate	1.25969	1.40900	11.85		
Di-n-octylphthalate	2.46859	3.09515	25.38	*	
Benzo(a)Pyrene	1.06996	1.08656	1.55	*	
Benzo(b)Fluoranthene	1.46574	1.25168	14.60		
Indeno(1,2,3-cd)Pyrene	.70560	.68930	2.31		
Dibenzo(a,h)Anthracene	.64885	.82341	26.90		
Benzo(k)Fluoranthene	1.00583	1.25110	24.39		
Benzo(g,h,i)Perylene	.49832	.65649	31.74		

RF - Response Factor from daily standard file at 25.00 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		73181	8.45	256140	12.00	137464	17.43
UPPER LIMIT		146362		512280		274128	
LOWER LIMIT		36591		128070		68532	
EPA SAMPLE NO.							
ES651	01	8109DCBLL	118375	8.49	464213	12.01	234315	17.44
ES649	02	" MS DL	68730	8.48	240730	12.00	129665	17.43
ES650	03	" MSD DL	64594	8.48	232593	12.00	120343	17.42
	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

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: _____ Contract: _____

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

EPA Sample No.(Standard): _____ Date Analyzed: 9/20/88

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

Instrument ID: _____

	EPA SAMPLE NO.	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS4(PRY) AREA #	RT
	12 HOUR STD	219253	22.02	167387	30.41	124851	35.24
	UPPER LIMIT	438506		334774		249702	
	LOWER LIMIT	109626		83694		62426	
ES651 01	8808706BLK	404192	22.04	198527	30.41	30595*	35.20
ES649 02	" MSBLK	197581	22.03	140027	30.40	85660	35.19
ES650 03	" MSDBLK	193149	22.04	135800	30.39	79899	35.21
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 __

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

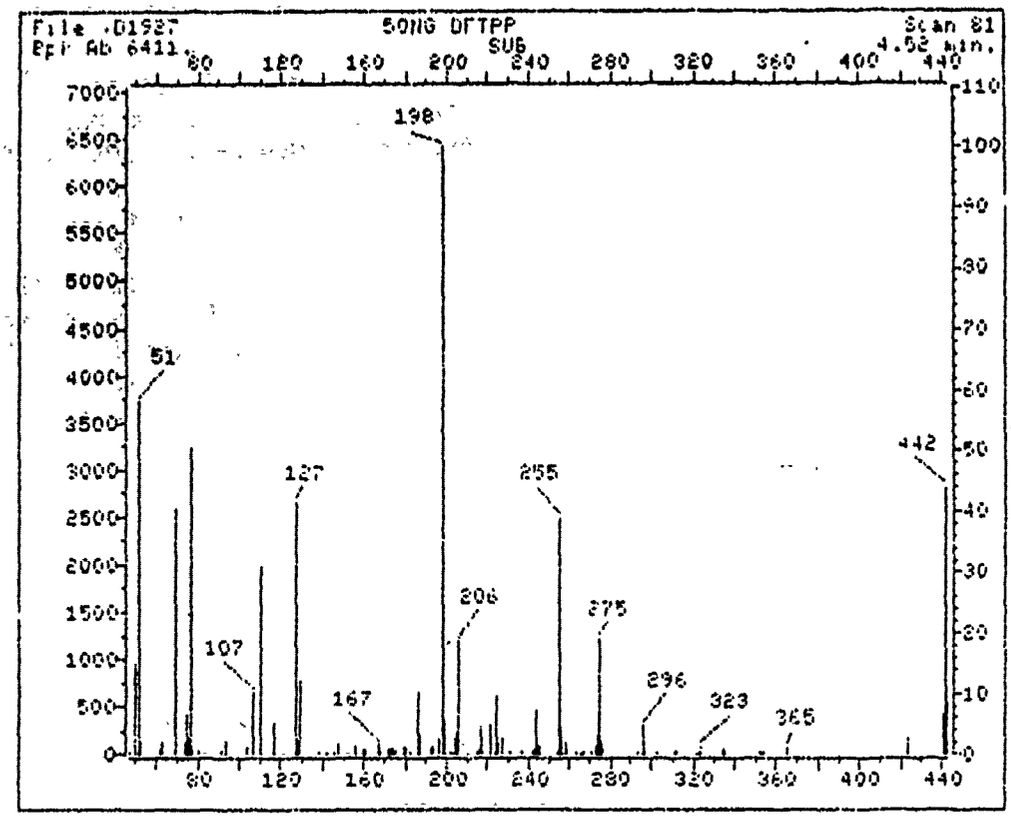
Lab Name: Engineering Science
Job No.:
Project:
Client:
File ID: >D1927
Attn:
DFTPP Injection Date: 9/27/88 12:
Address:
DFTPP Injection Time: 9/27/88 12:23
Date Reported:
Instrument ID: 2

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	58.1	
68	Less than 2.0% of mass 69	0.0	0.0(1)
69	Mass 69 relative abundance	40.5	
70	Less than 2.0% of mass 69	0.0	0.0(1)
127	40.0 - 60.0% of mass 198	41.4	
197	Less than 1.0% of mass 198	0.0	
198	Base Peak, 100% relative abundance	100.0	
199	5.0 - 9.0% of mass 198	5.6	
275	10.0 - 30.0% of mass 198	19.1	
365	Greater than 1.00% of mass 198	1.12	
441	Present, but less than mass 443	6.6	
442	Greater than 40.0% of mass 198	43.7	
443	17.0 - 23.0% of mass 442	8.5	19.4(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
01ZZ	40mg/L ABN std	E5721	9/27/88	12:49
02ZZ	25 mg/L ABN std	E5722		13:48
03ZZ	60 mg/L ABN std	E5719		09:56
04ZZ	80 mg/L ABN std	E5724		15:37
05ZZ	120 mg/L ABN std	E5725		16:32
06ZZ	10 mg/L ABN std	E5726		17:26
07ZZ				
08ZZ				
09ZZ				
10ZZ				
11ZZ				
12ZZ				
13ZZ				
14ZZ				
15ZZ				
16ZZ				
17ZZ				
18ZZ				
19ZZ				
20ZZ				
21ZZ				



File: >01927 Scan #: 81 Retn. time: 4.52

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
47.00	.390	138.15	.457	195.00	1.045	242.90	.343	283.05	.187
50.00	14.896	141.95	.577	196.05	2.558	243.00	.749	285.15	.250
51.10	58.119	145.35	.437	198.00	100.000	244.00	7.175	293.05	.374
52.00	1.950	148.05	1.638	199.00	5.608	245.00	1.310	295.15	.234
61.95	.842	156.05	1.497	200.00	.047	246.00	1.607	295.95	4.726
63.05	2.026	158.05	.296	201.50	.577	247.05	.070	297.05	.562
66.95	40.462	160.05	.873	203.05	.250	254.10	.296	302.95	.499
74.05	2.137	161.05	.827	203.95	2.685	255.00	38.730	311.15	.296
75.05	6.489	167.00	1.731	204.95	3.478	256.00	4.477	312.15	.468
76.05	2.948	168.05	.905	205.95	18.624	257.00	.187	314.10	.234
77.05	50.398	172.00	.827	207.95	.062	258.00	2.059	320.90	.234
78.05	1.529	173.00	.593	210.05	.031	259.10	.593	322.00	.218
80.05	.702	174.00	1.045	215.05	.577	263.20	.406	323.00	1.248
92.05	.796	175.05	.374	216.05	.437	265.10	.172	324.10	.203
93.00	1.950	176.00	.686	216.95	4.617	265.90	.031	334.10	.811
104.00	1.061	177.00	.250	218.05	.655	267.10	.265	335.00	.296
107.00	10.139	179.05	1.154	220.95	4.648	271.10	.343	351.95	.390
108.00	.094	180.00	1.061	223.05	.109	272.10	.312	352.95	.218
113.00	30.775	182.10	.671	224.05	9.624	273.00	1.357	353.95	.468
117.00	5.147	184.10	.250	224.95	2.106	274.00	3.213	364.85	1.123
127.00	41.413	186.00	10.061	226.95	2.667	275.00	19.123	423.00	2.808
128.00	1.997	187.00	3.354	229.05	.187	276.00	2.433	441.05	6.598
129.00	11.809	190.10	.047	231.05	.312	276.95	.983	441.95	42.691
136.05	.094	192.00	1.170	236.05	.343	278.05	.031	443.05	8.454

Compound											
N-Nitroso-Dimethylamine	1.08569	1.38852	1.11426	1.02763	1.37662	1.22750	-	.421	1.20337	12.742	
2-Fluorophenol	.66997	1.52534	1.28999	1.15261	1.30893	1.25050	-	.677	1.19956	23.916	
bis(2-Chloroethyl)ether	1.27618	1.58087	1.30986	1.23229	1.72206	1.58876	-	.944	1.45200	14.011	
Phenol	.85186	1.79310	1.63109	1.38016	1.64972	1.49519	-	.943	1.46685	22.680	
Phenol-d5	.78237	1.50354	1.46145	1.28144	1.38407	1.24329	-	.936	1.27603	20.514	
Aniline	1.36722	1.41046	1.10544	.79925	1.55410	1.59067	-	.923	1.30453	23.106	
2-Chlorophenol	1.22315	1.52390	1.33856	1.28053	1.39813	1.29974	-	.956	1.34100	7.868	
1,3-Dichlorobenzene	1.51830	1.60947	1.39505	1.35971	1.39062	1.27648	-	.988	1.42494	8.371	
1,4-Dichlorobenzene	1.44534	1.39100	1.32457	1.17507	1.24020	1.12528	-	1.006	1.28358	9.737	
Benzyl Chloride	-	-	-	-	-	-	-	-	-	-	
Benzyl Alcohol	.08813	.16395	.11103	.29092	.20105	.19096	-	1.120	.17434	41.464	
1,2-Dichlorobenzene	1.43612	1.51121	1.34259	1.25425	1.28235	1.21271	-	1.060	1.33987	8.538	
2-Methylphenol	.92919	1.87322	1.14661	1.39167	1.42565	1.23273	-	1.122	1.33318	23.996	
3-&-4-Methylphenol	1.01742	1.34632	1.07895	1.05391	1.10139	.99307	-	1.177	1.09850	11.621	(Conc=20.0,50.0,80
bis(2-chloroisopropyl)Ether	2.24728	2.79953	2.18141	2.16660	2.75649	2.55200	-	1.110	2.45055	11.828	
N-Nitroso-Di-n-Propylamine	1.12508	1.29120	1.14914	.94229	1.37319	1.25128	-	1.170	1.18870	12.747	
Hexachloroethane	.66696	.70723	.62609	.57201	.61689	.56167	-	1.156	.62514	8.880	
Dibromochloropropane	-	-	-	-	-	-	-	-	-	-	
Nitrobenzene	.51595	.55896	.48810	.57186	.48727	.79458	-	.840	.56945	20.333	
Nitrobenzene-d5	.37411	.46072	.41073	.42850	.41716	.36574	-	.835	.40949	8.607	
2-Nitrophenol	.18582	.24426	.22939	.24184	.24345	.22354	-	.914	.22805	9.797	
Isophorone	.79223	.97906	.85826	.91435	.93001	.84316	-	.902	.88701	7.458	
bis(2-Chloroethoxy)methane	.49171	.58553	.51441	.55222	.59588	.52884	-	.961	.54476	7.488	
2,4-Dimethylphenol	.28557	.33298	.29059	.29978	.28310	.28660	-	.952	.29644	6.354	
Benzoic Acid	-	.17773	.14586	.25101	.29732	.32367	-	1.019	.23912	31.811	
2,4-Dichlorophenol	.18128	.30682	.28275	.29435	.27638	.23766	-	.981	.26321	17.651	
1,2,4-Trichlorobenzene	.29109	.32791	.32296	.32592	.29758	.26950	-	.991	.30633	7.598	
Naphthalene	.92590	.90741	.88325	.89047	.85583	.79578	-	1.005	.87644	5.249	
4-Chloroaniline	.32147	.42802	.38538	.40544	.30030	.21347	-	1.030	.34235	23.363	
Hexachlorobutadiene	.18450	.18608	.19033	.19301	.15773	.14555	-	1.054	.17620	11.150	
4-Chloro-3-Methylphenol	.23901	.35935	.31989	.35231	.36985	.32336	-	1.180	.32730	14.543	
2-Methylnaphthalene	.50534	.55666	.52910	.52986	.49523	.44747	-	1.180	.51061	7.372	
Hexachlorocyclopentadiene	.21051	.35194	.35655	.33267	.34901	.36360	-	.852	.32738	17.770	
2,4,6-Trichlorophenol	.23795	.43239	.40297	.35240	.28983	.32010	-	.873	.33927	21.247	
2,4,5-Trichlorophenol	-	.43239	.40297	.33842	.28983	.32010	-	.875	.35674	16.593	
2-fluorobiphenyl	1.12342	1.17169	1.03208	.96867	.99201	.86823	-	.884	1.02602	10.684	
2-Chloronaphthalene	1.15079	1.21532	1.09991	1.06272	1.03601	.98402	-	.897	1.09146	7.597	
2-Nitroaniline	.52645	.69271	.55909	.56887	.67251	.63637	-	.929	.60933	11.059	
Dimethylphthalate	1.26180	1.33015	1.16212	1.11951	.87336	.84796	-	.972	1.09915	18.117	

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

- initial calibration all 8 on 9/27/88-10/2

Calibration Report

Title: ID 625 ACID AND BASE/NEUTRALS + ELPHENOL,DNSBP&2-NO2-4-MEPH
Calibrated: 880928 09:57

Compound	Files:)E5726 RF 10.00	)E5722 RF 25.00	)E5721 RF 40.00	)E5719 RF 60.00	)E5724 RF 80.00	)E5725 RF 120.00	- RF 160.00	$\overline{RRT}$	$\overline{RF}$	% RSD
2,6-Dinitrotoluene	.29199	.35265	.35675	.32539	.29598	.28087	-	.982	.31777	10.099
Acenaphthylene	1.73106	1.71268	1.53484	1.43551	1.43958	1.39242	-	.971	1.54101	9.567
3-Nitroaniline	.56554	.67944	.57668	.51562	.63383	.60430	-	1.005	.59590	9.560
2,4-Dinitrophenol	-	.04276	.05309	.15468	.15543	.17204	-	1.026	.11560	53.868
Acenaphthene	1.12789	1.08331	1.00565	.90161	.93906	.86255	-	1.006	.98668	10.586
Dibenzofuran	1.41013	1.53117	1.33485	1.30011	1.34789	1.29948	-	1.035	1.37061	6.458
2,4-Dinitrotoluene	.27726	.39180	.32554	.32134	.37324	.29367	-	1.052	.33047	13.453
4-Nitrophenol	-	.18012	.22252	.21520	.27420	.28494	-	1.057	.23540	18.504
Fluorene	1.15826	1.21906	1.07060	1.04536	1.01533	.95797	-	1.097	1.07776	8.860
Diethylphthalate	1.44578	1.38220	1.25424	1.07538	1.10661	1.07526	-	1.102	1.22324	13.339
4-Chlorophenyl-phenylether	.51993	.49562	.46170	.39977	.36829	.35814	-	1.103	.43391	15.696
4-Nitroaniline	-	.36054	.31116	.28563	.33747	.28214	-	1.122	.31539	10.677
2,4,6-Tribromophenol	-	.14340	.18268	.16643	.11698	.14129	-	1.148	.15076	16.588
1,2-Diphenylhydrazine	-	-	-	-	-	-	-	-	-	-
Alpha-BHC	-	-	-	-	-	-	-	-	-	-
Beta-BHC	-	-	-	-	-	-	-	-	-	-
Gamma-BHC	-	-	-	-	-	-	-	-	-	-
Delta-BHC	-	-	-	-	-	-	-	-	-	-
Heptachlor	-	-	-	-	-	-	-	-	-	-
Aldrin	-	-	-	-	-	-	-	-	-	-
N-Nitrosodiphenylamine	.51172	.49684	.49128	.35285	.30900	.40275	-	.893	.42741	19.907
4,6-Dinitro-2-Methylphenol	-	.10640	.08164	.11332	.12217	.11230	-	.892	.10717	14.315
4-Bromophenyl-phenylether	.22049	.22432	.21520	.20318	.19357	.19133	-	.940	.20902	6.614
Hexachlorobenzene	.26964	.27824	.28381	.28195	.24251	.24865	-	.958	.26247	6.635
Pentachlorophenol	-	.07262	.06770	.09375	.06809	.09579	-	.959	.07959	17.599
Phenanthrene	1.03639	1.00804	.98111	.94722	.99633	.97687	-	1.004	.99099	3.058
Anthracene	1.01560	.96964	.95072	.92002	.81856	.97687	-	1.009	.94190	7.231
Di-n-Butylphthalate	1.64556	1.70985	1.51810	1.55083	1.58595	1.51052	-	1.105	1.58680	4.916
4,4'-Dibromobiphenyl	1.35480	1.20790	1.23853	1.16983	1.02085	.93552	-	1.141	1.15457	13.197
Fluoranthene	.77412	.84940	.80439	.82733	.84966	.79639	-	1.176	.81688	3.732
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 (PT Std/PT Istd)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

Calibration Report

Title: ID 625 ACID AND BASE/NEUTRALS + DIPHENOL,DNSBPB2-NO2-4-MEPH
Calibrated: 880928 09:57

Compound	Files:)E5726 RF 10.00	)E5722 RF 25.00	)E5721 RF 40.00	)E5719 RF 60.00	)E5724 RF 80.00	)E5725 RF 120.00	- RF 160.00	$\overline{RRT}$	$\overline{RF}$	%RSD
Endosulfan Sulfate	-	-	-	-	-	-	-	-	-	-
Dibutylchlorendate	-	-	-	-	-	-	-	-	-	-
Benzidine	-	.04609	.02280	.12215	.18403	.33976	-	.869	.14297	88.939
Pyrene	1.57519	1.86759	1.65577	1.58611	1.67623	1.76581	-	.872	1.68778	6.629
Terphenyl-d14	.95373	1.18674	1.12395	1.08741	1.05957	1.14049	-	.894	1.05198	7.388
Butylbenzylphthalate	1.15372	1.31230	1.25941	1.17083	1.30714	1.37430	-	.953	1.26295	6.831
3,3'-Dichlorobenzidine	.01837	.16210	.16488	.17788	.24508	.24737	-	1.001	.16928	19.257
Chrysene	1.10796	1.12550	1.11456	1.09010	1.13408	1.12459	-	1.003	1.11613	1.404
Benzo(a)Anthracene	.97810	1.16979	1.10416	1.07133	1.30827	1.30441	-	.998	1.15601	11.404
bis(2-Ethylhexyl)Phthalate	1.57439	1.62858	1.51249	1.46744	1.51408	1.56359	-	1.018	1.54343	3.689
Di-n-octylphthalate	3.20019	3.43083	3.53434	3.06346	3.04689	3.10461	-	.934	3.23005	6.357
Benzo(a)Pyrene	.85431	1.09481	1.06907	1.11781	1.13635	1.12146	-	.994	1.06563	9.963
Benzo(b)fluoranthene	1.32056	1.55167	1.46206	1.32273	1.79129	1.74230	-	.961	1.53177	13.227
Indeno(1,2,3-cd)Pyrene	.79661	.93893	1.00946	1.17862	1.24651	1.26528	-	1.150	1.07257	17.524
Dibenzo(a,h)Anthracene	.91469	1.03758	1.16094	1.10202	1.03475	1.14262	-	1.156	1.06543	8.485
Benzo(k)fluoranthene	.98095	1.02262	1.46206	1.10326	.69815	.87871	-	.963	1.02429	24.979
Benzo(g,h,i)Perylene	.75223	.96936	.99427	.92269	1.05895	1.07197	-	1.194	.96158	12.140

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

LATILE ORGANICS INITIAL CALIBRATION DATA

Name: ENGINEERING SCIENCE Contract: _____

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

Instrument ID.: CARBOPAK_ Calibration Date(s): 8/18/88 8/15/88

LAB FILE ID: RRF10= 84, 40 RRF20= 85, 41
RRF 50= 82, 42 RRF100= 86, 43 RRF200= 87, 44

COMPOUND	RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$	%RSD
Benzyl chloride	0.08	0.04	0.09	0.10	0.08	0.08	29.24
Bis (2-chloroethoxy) methane	0.03	0.03	0.05	0.04	0.06	0.04	31.04
Bis (2-chloroisopropyl) ether	0.24	0.27	0.26	0.24	0.30	0.26	9.50
Bromobenzene	1.00	1.26	1.31	1.23	1.26	1.21	10.06
Bromodichloromethane	3.17	2.97	3.04	3.40	3.40	3.20	6.17
Bromoform	0.98	0.92	0.87	1.49	1.30	1.11	24.18
Bromomethane	0.13	0.24	0.20	0.27	0.26	0.22	25.25
Carbon tetrachloride	2.90	2.87	2.78	3.13	2.92	2.92	4.3[illegible]
Chloroacetaldehyde	0.001	0.002	0.001	0.0015	0.0013	0.001	69
Chlorobenzene	1.33	1.34	1.24	1.37	1.35	1.32	3.90
Chloroethane	0.47	0.47	0.50	0.46	0.48	0.48	3.51
Chloroform	3.29	4.36	3.80	4.17	3.78	3.88	10.65
2-Chloroethyl vinyl ether	0.83	0.82	0.95	0.91	1.02	0.92	7.86
Chloromethane	0.03	0.03	0.05	0.04	0.06	0.04	31.04
Chloromethyl methyl ether	0.21	0.26	0.32	0.34	0.22	0.27	21.72
m_/ p_Chlorotoluenes	0.12	0.21	0.22	0.16	0.15	0.17	24.46
Dibromochloromethane	4.21	4.22	3.93	3.70	3.90	3.99	5.56
Dibromomethane	3.30	3.10	3.12	3.79	3.53	3.37	8.71
1,2_Dichlorobenzene	2.98	3.04	3.29	3.04	2.56	2.98	8.87
1,3_Dichlorobenzene	2.61	2.38	2.22	2.34	2.19	2.35	7.18
1,4_Dichlorobenzene	2.02	1.95	1.83	1.99	1.91	1.94	3.64
Dichlorodifluoromethane	2.47	2.62	2.13	2.37	2.18	2.35	8.65
1,1_Dichloroethane	0.51	0.49	0.50	0.57	0.64	0.54	11.63
1,2_Dichloroethane	0.76	0.83	1.27	1.65	1.54	1.21	33.23
1,1_Dichloroethylene	1.82	1.87	2.02	2.27	2.17	2.03	9.44
trans_1,2_dichloroethylene	2.41	2.26	2.17	2.28	1.51	2.12	16.76
Dichloromethane	0.91	1.06	1.35	1.57	1.38	1.25	21.15
1,2_Dichloropropane	12.91	4.97	3.63	3.57	2.24	5.46	78.18
1,3_Dichloropropylene	2.45	2.50	1.69	1.84	1.83	2.06	18.50
1,1,2,2_Tetrachloroethane	4.60	4.56	4.69	4.50	4.66	4.60	1.66
1,1,2_Trichloroethane	7.49	6.99	6.33	6.87	5.87	6.71	9.31
Tetrachloroethylene	3.89	3.60	3.41	3.20	3.94	3.61	8.71
1,1,1_Trichloroethane	7.49	6.99	6.33	6.87	5.87	6.71	9.31
1,2_Trichloroethane	1.94	2.01	1.89	2.11	2.15	2.02	5.43
Trichloroethylene	4.60	4.56	4.69	4.50	4.66	4.60	1.66
Trichlorofluoromethane	4.73	4.27	3.77	3.83	3.65	4.05	11.0[illegible]
Vinyl chloride	2.20	2.09	1.91	2.04	1.60	1.97	11.59
Xylenes	4.47	3.74	3.60	3.29	2.83	3.59	16.[illegible]
[illegible]	0.89	0.90	0.96	0.97	1.06	0.95	7.[illegible]

ATILE ORGANICS INITIAL CALIBRATION DATA

oName:ENGINEERING SCIENCE_____ Contract:_____

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

trument ID.:CARBOPAK Calibration Date(s):8/18/88_____

LAB FILE ID: RRF 10 _84_____ RRF 20 _85_____
RF 50=82_____ RRF100=_86_____ RRF200=_87_____

OMPOUND	RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$	%RSD
nzene	4.46	2.84	2.55	2.94	2.92	3.14	23.95
lorobenzene	9.53	6.39	4.58	4.56	4.02	5.82	38.84
2_Dichlorobenzene	2.84	2.74	2.80	2.94	2.96	2.85	3.31
3_Dichlorobenzene	2.84	2.94	3.04	3.24	3.32	3.08	6.63
,4_Dichlorobenzene	3.04	3.55	3.04	3.32	3.23	3.24	6.57
hyl Benzene	4.26	3.14	2.47	2.74	2.66	3.05	23.46
luene	7.09	4.56	3.16	3.08	2.37	4.05	46.31
lenes						ERR	ERR

ATILE ORGANICS INITIAL CALIBRATION DATA

Name:_____ Contract:_____

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

trument ID.:CARBOFAI_ Calibration Date(s):8/19/88____ 8/15/88____

AB FILE ID: RRF10=_7,40_____ RRF20=_8,41_____
RF 50=1,42_____ RRF100=_9,43_____ RRF200=_10,44_____

MPOUND	RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$	%RSD
nzyl chloride	0.08	0.04	0.09	0.10	0.08	0.08	29.24
s (2-chloroethoxy) methane	0.03	0.03	0.05	0.04	0.06	0.04	31.04
s (2-chloroisopropyl ether	0.24	0.27	0.26	0.24	0.30	0.26	9.50
omobenzene	1.00	1.26	1.31	1.23	1.26	1.21	10.06
omodichloromethane	3.57	3.80	3.78	3.53	3.70	3.68	3.36
omoform	1.89	1.41	1.01	1.43	1.51	1.45	21.66
omomethane	0.17	0.23	0.23	0.31	0.35	0.26	28.18
rbon tetrachloride	2.97	3.34	3.26	3.22	3.24	3.20	4.36
loroacetaldehyde	0.001	0.002	0.001	0.0005	0.0003	0.001	69.
lorobenzene	1.41	1.54	1.20	1.34	1.29	1.36	9.5.
loroethane	0.46	0.55	0.56	0.58	0.63	0.55	11.49
loroform	5.06	5.08	4.11	4.19	4.06	4.50	11.62
Chloroethyl vinyl ether	0.83	0.88	0.95	0.91	1.02	0.92	7.83
Chloroethyl vinyl ether	0.03	0.03	0.05	0.04	0.06	0.04	31.04
loromethane	0.28	0.33	0.32	0.36	0.43	0.34	16.01
loromethyl methyl ether	0.12	0.21	0.22	0.16	0.15	0.17	24.46
,m_,& p_Chlorotoluenes	4.21	4.22	3.93	3.70	3.90	3.99	5.56
bromochloromethane	3.73	4.21	3.31	3.89	4.37	3.90	10.67
bromomethane	2.98	3.04	3.29	3.04	2.56	2.98	8.97
2_Dichlorobenzene	2.51	2.71	2.83	2.24	2.11	2.48	12.20
3_Dichlorobenzene	2.01	2.13	1.76	1.91	1.88	1.94	7.22
4_Dichlorobenzene	2.86	2.84	2.09	2.33	2.21	2.47	14.67
chlorodifluoromethane	0.51	0.49	0.50	0.57	0.64	0.54	11.63
1_Dichloroethane	1.73	1.96	2.10	1.93	2.02	1.95	7.03
2_Dichloroethane	2.11	2.39	2.49	2.29	2.35	2.33	6.03
1_Dichloroethylene	2.57	2.66	2.42	2.30	2.25	2.44	7.10
ans_1,2_dichloroethylene	1.10	1.53	1.64	1.64	1.65	1.51	15.70
chloromethane	6.27	5.09	3.65	3.11	2.95	4.21	33.87
2_Dichloropropane	2.59	2.97	1.85	2.93	3.18	2.70	19.31
3_Dichloropropylene	4.60	4.56	4.69	4.50	4.66	4.60	1.66
1,2,_Tetrachloromethane	7.57	7.70	5.96	5.90	6.13	6.65	13.97
1,1,_Trichloroethane	3.89	3.60	3.41	3.20	3.94	3.61	8.71
trac[illegible]	7.57	7.70	5.96	5.90	6.13	6.65	13.9[illegible]
1,_Trichloromethane	2.15	2.30	2.26	2.14	2.14	2.20	3.57
1,2_Trichloroethane	4.60	4.56	4.69	4.50	4.66	4.60	1.66
ichloroethylene	5.05	5.12	4.15	3.96	3.71	4.40	14.73
ichlorofluoromethane	2.33	2.37	2.14	2.07	2.04	2.19	6.74
[illegible]	4.47	3.74	3.60	3.29	3.83	3.59	[illegible]

1920

LATILE ORGANICS INITIAL CALIBRATION DATA

bName:ENGINEERING SCIENCE_____ Contract:_____

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

strument ID.:CARBOPAK Calibration Date(s):8/19/88 _____

LAB FILE ID: RRF 10 ___7_____ RRF 20 ____8_____
RRF 50=_____1_____ RRF100=__9_____ RRF200=__10_____

OMPOUND	RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$	%RSD
enzene	4.83	3.02	2.71	2.50	2.45	3.10	31.96
hlorobenzene	8.28	5.69	4.79	4.07	3.71	5.31	34.39
,2_Dichlorobenzene	1.90	2.33	2.79	2.41	2.75	2.44	14.91
,3_Dichlorobenzene	2.24	2.67	3.08	2.67	2.90	2.71	11.57
,4_Dichlorobenzene	2.07	2.41	2.83	2.60	2.74	2.53	11.95
thyl Benzene	6.03	4.22	2.64	2.43	2.24	3.51	45.01
oluene	8.28	5.26	3.25	2.74	2.48	4.40	55.06
ylenes	9.14	8.10	7.14	6.76	7.02	7.63	12.90

TILE CONTINUING CALIBRATION CHECK

lame: _____ Contract: _____

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

rument ID: CARBOPAK_____ Calibration Date(s): 8/19/88

B FILE ID: ___01_____ Init. Calib. Date(s): 8/15/88 8/15/88

PPOUND	RRF	RRF50	%D
yl chloride_____	0.08	0.06	23.12
(2-choroethoxy) hane_____	0.04		100.00
(2-chloroisopropyl) er_____	0.26		100.00
mobenzene_____	1.21	1.05	13.03
modichloromethane_____	3.20	3.78	-18.28
moform_____	1.11	1.01	8.60
momethane_____	0.22	0.23	-3.22
bon tetrachloride_____	2.93	3.26	-11.61
oroethylene_____			ERR
orobenzene_____	1.32	1.20	8.85
oroethane_____	0.48	0.56	-16.20
oroform_____	3.88	4.11	-5.87
horohexane_____	0.92	0.70	23.86
hloroethyl vinyl ether_	0.04		100.00
oromethane_____	0.27	0.32	-18.05
oromethyl vinyl ether_	0.17		100.00
m,o,p-Dichlorotoluenes _	3.99	3.01	24.64
romomethane_____	3.37	3.31	1.88
romomethane_____	2.98	2.97	0.48
-Dichlorobenzene_____	2.35	2.83	-20.31
-Dichlorobenzene_____	1.94	1.76	9.23
-Dichlorobenzene_____	2.35	2.09	10.99
nlorodifluoromethane____	0.54		100.00
-Dichloroethane_____	1.21	2.10	-73.85
-Dichloroethane_____	2.03	2.49	-22.86
-Dichloroethylene_____	2.12	2.42	-14.26
s-1,2-dichloroethylene	1.25	1.67	-33.23
hloromethane _____	5.46	3.65	33.09
-Dichloropropane_____	2.06	1.85	10.07
-Dichloropropylene_____	4.60	3.99	13.24
,2,2-Tetrachloroethane_	6.71	5.96	11.23
,1,2-Tetrachloroethane_	3.61	2.74	24.09
rachloroethylene_____	6.71	5.96	11.18
,1-Trichloroethane_____	2.02	2.26	-12.03
,2-Trichloroethane_____	4.60	3.99	13.26
richloroethylene_____	4.05	4.15	-2.41
chloromonofluoromethane_____	1.97	2.14	-8.60
chloropropene _____	3.59	2.70	24.71
chloride _____	0.95	1.06	-11.97

ATILE CONTINUING CALIBRATION CHECK

Name: ENGINEERING SCIENCE_____ Contract:_____

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

trument ID.: CARROPAK Calibration Date(s): 8/19/88_____

FILE ID: RRF 50 __01_____

Inital calib = 8/15/88

COMPOUND	$\overline{RRF}$	RRF50	%D
_____	4.25	2.71	-36.27
_____	4.97	4.79	-3.59
_____	3.48	2.79	-19.78
_____	3.91	3.08	-21.14
_____	3.65	2.83	-22.37
_____	3.06	2.64	-13.88
_____	3.40	3.25	-4.97
_____	11.65	8.18	-29.78

This page intentionally left blank.

DATA PACKAGE #31

1925

This page intentionally left blank.

ES
ENGINEERING-SCIENCE, INC.

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

Job No.: OR001.02

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 samples received by this laboratory on 8-06-88.

Samplee Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081692	DANGB2-MW13-SS1	BA-I	8-05-88		9-07-88	
88081692	DANGB2-MW13-SS1	CD-I	8-05-88		9-07-88	
88081692	DANGB2-MW13-SS1	CR-I	8-05-88		9-07-88	
88081692	DANGB2-MW13-SS1	PB-F	8-05-88		9-13-88	
88081692	DANGB2-MW13-SS1	418.1	8-05-88	8-29-88	8-31-88	
88081692	DANGB2-MW13-SS1	MOIS	8-05-88		8-15-88	
88081692	DANGB2-MW13-SS1	8010	8-05-88		8-16-88	8-16-88
88081692	DANGB2-MW13-SS1	8020	8-05-88		8-16-88	8-16-88
88081692	DANGB2-MW13-SS1	8270	8-05-88	8-16-88	9-15-88	
88081693	DANGB2-MW13-SS3	BA-I	8-05-88		9-07-88	
88081693	DANGB2-MW13-SS3	CD-I	8-05-88		9-07-88	
88081693	DANGB2-MW13-SS3	CR-I	8-05-88		9-07-88	
88081693	DANGB2-MW13-SS3	PB-F	8-05-88		9-13-88	
88081693	DANGB2-MW13-SS3	418.1	8-05-88	8-29-88	8-31-88	
88081693	DANGB2-MW13-SS3	MOIS	8-05-88		8-15-88	
88081693	DANGB2-MW13-SS3	8010	8-05-88		8-16-88	8-16-88
88081693	DANGB2-MW13-SS3	8020	8-05-88		8-16-88	8-16-88
88081693	DANGB2-MW13-SS3	8270	8-05-88		9-18-88	
88081694	DANGB2-MW13-SS4	BA-I	8-05-88		9-07-88	
88081694	DANGB2-MW13-SS4	CD-I	8-05-88		9-07-88	
88081694	DANGB2-MW13-SS4	CR-I	8-05-88		9-07-88	
88081694	DANGB2-MW13-SS4	PB-F	8-05-88		9-13-88	
88081694	DANGB2-MW13-SS4	418.1	8-05-88	8-29-88	8-31-88	
88081694	DANGB2-MW13-SS4	MOIS	8-05-88		8-15-88	
88081694	DANGB2-MW13-SS4	8010	8-05-88		8-16-88	8-16-88
88081694	DANGB2-MW13-SS4	8020	8-05-88		8-16-88	8-16-88
88081694	DANGB2-MW13-SS4	8270	8-05-88		9-18-88	

ES
ENGINEERING-SCIENCE, INC.

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

Job No.: OR001.00

Project: Duluth ANGB

Attached are the analytical reports for the soil samples received by this laboratory on 8-11-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081695	DANGB8-MW18-SS1	BA-I	8-05-88		9-07-88	
88081695	DANGB8-MW18-SS1	CD-I	8-05-88		9-07-88	
88081695	DANGB8-MW18-SS1	CR-I	8-05-88		9-07-88	
88081695	DANGB8-MW18-SS1	PB-F	8-05-88		9-13-88	
88081695	DANGB8-MW18-SS1	418.1	8-05-88	8-29-88	8-31-88	
88081695	DANGB8-MW18-SS1	MOIS	8-05-88		8-15-88	
88081695	DANGB8-MW18-SS1	8010	8-05-88		8-16-88	8-16-88
88081695	DANGB8-MW18-SS1	8020	8-05-88		8-16-88	8-16-88
88081695	DANGB8-MW18-SS1	8080	8-05-88		9-18-88	
88081696	DANGB8-MW18-SS2	BA-I	8-05-88		9-07-88	
88081696	DANGB8-MW18-SS2	CD-I	8-05-88		9-07-88	
88081696	DANGB8-MW18-SS2	CR-I	8-05-88		9-07-88	
88081696	DANGB8-MW18-SS2	PB-F	8-05-88		9-13-88	
88081696	DANGB8-MW18-SS2	418.1	8-05-88	8-29-88	8-31-88	
88081696	DANGB8-MW18-SS2	MOIS	8-05-88		8-15-88	
88081696	DANGB8-MW18-SS2	8010	8-05-88		8-16-88	8-17-88
88081696	DANGB8-MW18-SS2	8020	8-05-88		8-16-88	8-17-88
88081696	DANGB8-MW18-SS2	8080	8-05-88		9-18-88	
88081697	DANGB8-MW18-SS3	BA-I	8-05-88		9-07-88	
88081697	DANGB8-MW18-SS3	CD-I	8-05-88		9-07-88	
88081697	DANGB8-MW18-SS3	CR-I	8-05-88		9-07-88	
88081697	DANGB8-MW18-SS3	PB-F	8-05-88		9-13-88	
88081697	DANGB8-MW18-SS3	418.1	8-05-88	8-29-88	8-31-88	
88081697	DANGB8-MW18-SS3	MOIS	8-05-88		8-15-88	
88081697	DANGB8-MW18-SS3	8010	8-05-88		8-17-88	8-17-88
88081697	DANGB8-MW18-SS3	8020	8-05-88		8-17-88	8-17-88
88081697	DANGB8-MW18-SS3	8080	8-05-88		9-18-88	

* If applicable

ES
ENGINEERING-SCIENCE, INC.

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

Job No.: OR001.00

Project: Duluth ANGB

Attached are the analytical reports for the soil samples received by this laboratory on 8-11-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081698	DANGB8-MW20-SS1	8010	8-05-88		8-16-88	8-17-88
88081698	DANGB8-MW20-SS1	8020	8-05-88		8-16-88	8-17-88
88081698	DANGB8-MW20-SS1	8080	8-05-88		9-18-88	
88081699	DANGB8-MW20-SS2	BA-I	8-05-88		9-07-88	
88081699	DANGB8-MW20-SS2	CD-I	8-05-88		9-07-88	
88081699	DANGB8-MW20-SS2	CR-I	8-05-88		9-07-88	
88081699	DANGB8-MW20-SS2	PB-F	8-05-88		9-13-88	
88081699	DANGB8-MW20-SS2	418.1	8-05-88	8-29-88	8-31-88	
88081699	DANGB8-MW20-SS2	MOIS	8-05-88		8-15-88	
88081699	DANGB8-MW20-SS2	8010	8-05-88		8-18-88	8-17-88
88081699	DANGB8-MW20-SS2	8020	8-05-88		8-17-88	8-17-88
88081699	DANGB8-MW20-SS2	8080	8-05-88		9-18-88	
88081700	DANGB8-MW20-SS4	BA-I	8-05-88		9-07-88	
88081700	DANGB8-MW20-SS4	CD-I	8-05-88		9-07-88	
88081700	DANGB8-MW20-SS4	CR-I	8-05-88		9-07-88	
88081700	DANGB8-MW20-SS4	PB-F	8-05-88		9-13-88	
88081700	DANGB8-MW20-SS4	418.1	8-05-88	8-29-88	8-31-88	
88081700	DANGB8-MW20-SS4	MOIS	8-05-88		8-15-88	
88081700	DANGB8-MW20-SS4	8010	8-05-88		8-17-88	8-17-88
88081700	DANGB8-MW20-SS4	8020	8-05-88		8-17-88	8-17-88
88081700	DANGB8-MW20-SS4	8080	8-05-88		9-18-88	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88081692-88081700
WORK ORDER NO.: 816

These soil samples were received at the ES Berkeley Laboratory on 8-06-88. They were received cold and intact, except for 1-L amber jar of DANGB8-MW20-SS1 which was received broken. Sample DANGB8-MW20-SS4 (88081700) was received with this batch of samples but was not listed on the Chain-of-Custody. It was analyzed for the same tests as the other samples as per phone conversation with K. Davis on 8-08-88.

The chain of custody for samples 88081695-88081700 requested analysis by EPA Method 8270. The samples were extracted by this protocol. After the extraction holding time for these samples had expired, the requested analysis was changed to EPA Method 8080. The only difference in extraction procedure between these two methods is the surrogate(s) used. In order to avoid extraction out of holding time, the 8270 extracts were used for analysis by Method 8080. Since the pesticide surrogate was not added during the extraction process, no pesticide surrogate recovery is available for these samples.

ANALYSIS REPORT

WORK ORDER NUMBER: 816
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 08/08/88

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

TASK: 2, UNITS: mg/Kg

	DANGB2-MW13-SS1	DANGB2-MW13-SS3	DANGB2-MW13-SS4	DANGB8-MW18-SS1	DANGB8-MW18-SS2	DANGB8-MW18-SS3
TEST COMPOUND	88081692	88081693	88081694	88081695	88081696	88081697
ACID DIG SOIL	NA	NA	NA	NA	NA	NA
BARIUM	54.9	38.2	58.7	31.8	51.1	70.7
CADMIUM	11.1N	10.1N	11.0N	10.1N	11.5N	10.3N
CHROMIUM	31.3N	28.3N	26.0N	25.6N	40.5N	30.3N
LEAD	10.9SN	3.3SN	3.8SN	3.6SN	5.3N	5.3SN

NA- NOT ANALYZED
ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 816

.SK: 2, UNITS: mg/Kg

.ST COMPOUND	DANGB8-MW20-SS2 88081699	DANGB8-MW20-SS4 88081700
:ID DIG SOIL	NA	NA
\RIUM	56.5	27.2
.DMIUM	9.0N	11.0N
:ROMIUM	30.2N	24.9N
:AD	4.9N	3.2N

A- NOT ANALYZED
) - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 81[illegible]
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 08/08/88

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

TASK: 3, UNITS: mg/KG

	DANGB2-MW13-SS1	DANGB2-MW13-SS3	DANGB2-MW13-SS4	DANGB8-MW18-SS1	DANGB8-MW18-SS2	DANGB8-MW18-SS3
TEST COMPOUND	88081692	88081693	88081694	88081695	88081696	88081697
418.1 PETROLEUM HYDROCARBONS	<100	<100	<100	<100	160	<100
% MOISTURE	10.1	8.1	8.1	6.0	12.5	12.9

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 816

\SK: 3, UNITS: mg/KG

	DANGB8-MW20-SS2	DANGB8-MW20-SS4
EST COMPOUND	88081699	88081700
18.1 PETROLEUM HYDROCARBONS	<100	<100
MOISTURE	16.5	8.3

) - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 816
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 08/08/88

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

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

TEST COMPOUND	DANGB2-MW13-SS1 88081692	DANGB2-MW13-SS3 88081693	DANGB2-MW13-SS4 88081694	DANGB8-MW18-SS1 88081695	DANGB8-MW18-SS2 88081696	DANGB8-MW18-SS3 88081697
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	ND	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	ND	ND	ND
1,1-DICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
DICHLOROMETHANE	9.9B	4.3B	4.4B	3.3B	5.1B	4.4B
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 816

.ST COMPOUND	DANGB2-MW13-SS1 88081692	DANGB2-MW13-SS3 88081693	DANGB2-MW13-SS4 88081694	DANGB8-MW18-SS1 88081695	DANGB8-MW18-SS2 88081696	DANGB8-MW18-SS3 88081697
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	ND
1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
:ICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
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 816

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

TEST COMPOUND	DANGB8-MW20-SS1 88081698	DANGB8-MW20-SS2 88081699	DANGB8-MW20-SS4 88081700
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	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	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	3.4B	7.6B	3.6B
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: 816
)B NUMBER : ZB0000000440
)RK ORDER DATE : 08/08/88

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/Kg, GROUP 8020

:ST COMPOUND	D\NGB2-MW13-SS1 88081692	DANGB2-MW13-SS3 88081693	DANGB2-MW13-SS4 88081694	DANGB8-MW18-SS1 88081695	DANGB8-MW18-SS2 88081696	DANGB8-MW18-SS3 88081697
:NZENE	ND	ND	ND	ND	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
THYL BENZENE	ND	ND	ND	ND	ND	ND
)LUENE	19	13	4.9	2.0	84	81
'LENES	ND	ND	ND	ND	ND	ND

) - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 816

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

	DANGB8-MW20-SS1	DANGB8-MW20-SS2	DANGB8-MW20-SS4
EST COMPOUND	88081698	88081699	88081700
ENZENE	ND	ND	ND
HLOROBENZENE	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND
,4-DICHLOROBENZENE	ND	ND	ND
THYL BENZENE	ND	ND	ND
TOLUENE	15	120	720
XYLENES	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT

)RK ORDER NUMBER: 816
)B NUMBER : ZB0000000440
)RK ORDER DATE : 08/08/88

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/Kg, GROUP 8080

:ST COMPOUND	DANGB8-MW18-SS1 88081695	DANGB8-MW18-SS2 88081696	DANGB8-MW18-SS3 88081697	DANGB8-MW20-SS1 88081698	DANGB8-MW20-SS2 88081699	DANGB8-MW20-SS4 88081700
.DRIN	ND	ND	ND	ND	ND	ND
.PHA-BHC	ND	ND	ND	ND	ND	ND
:TA-BHC	ND	ND	ND	ND	ND	ND
:LTA-BHC	ND	ND	ND	ND	ND	ND
\MMA-BHC	ND	ND	ND	ND	ND	ND
:LORDANE	ND	ND	ND	ND	ND	ND
4'-DDD	ND	ND	ND	ND	ND	ND
,4'-DDE	ND	ND	ND	ND	ND	ND
4'-DDT	ND	ND	ND	ND	ND	ND
.ELDRIN	ND	ND	ND	ND	ND	ND
\DOSULFAN I	ND	ND	ND	ND	ND	ND
\DOSULFAN II	ND	ND	ND	ND	ND	ND
\DOSULFAN SULFATE	ND	ND	ND	ND	ND	ND
:DRIN	ND	ND	ND	ND	ND	ND
\DRIN ALDEHYDE	NA	NA	NA	NA	NA	NA
:PTACHLOR	ND	ND	ND	ND	ND	ND
.PTACHLOR EPOXIDE	ND	ND	ND	ND	ND	ND
:PONE	NA	NA	NA	NA	NA	NA
:THOXYCHLOR	ND	ND	ND	ND	ND	ND
)XAPHENE	ND	ND	ND	ND	ND	ND
:B-1016	ND	ND	ND	ND	ND	ND
:B-1221	ND	ND	ND	ND	ND	ND
:B-1232	ND	ND	ND	ND	ND	ND
:B-1242	ND	ND	ND	ND	ND	ND
:B-1248	ND	ND	ND	ND	ND	ND
'B-1254	ND	ND	ND	ND	ND	ND
:B-1260	ND	ND	ND	ND	ND	ND

\- NOT ANALYZED
- Not Detected

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

Date Received: August 6, 1988
Date Reported: December 8, 1988

Work Order: 816
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:	88081692
Sample No.:	DANGB2-MW13-SS1
Date Sampled:	8-05-88
Time Sampled:	07:49
Date Extracted:	8-16-88
Date Analyzed:	9-15-88
Percent Moisture:	10

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
1,3-Dichlorobenzene	330	ND
1,4-Dichlorobenzene	330	ND
Hexachloroethane	330	ND
Bis(2-chloroethyl)ether	330	ND
1,2-Dichlorobenzene	330	ND
N-Nitrosodimethylamine	330	ND
Bis(2-chloroisopropyl)ether	330	ND
N-Nitrosodi-n-propylamine	330	ND
Hexachlorobutadiene	330	ND
1,2,4-Trichlorobenzene	330	ND
Nitrobenzene	330	ND
Isophorone	330	ND
Naphthalene	330	ND
Bis(2-chloroethoxy)methane	330	ND
2-Chloronaphthalene	330	ND
Hexachlorocyclopentadiene	330	ND
Acenaphthylene	330	ND
Acenaphthene	330	ND
Dimethyl phthalate	330	ND
2,6-Dinitrotoluene	330	ND
Fluorene	330	ND
2,4-Dinitrotoluene	330	ND
Diethyl phthalate	330	ND
N-Nitrosodiphenylamine	330	ND
Hexachlorobenzene	330	ND

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

Date Received: August 6, 1988 Work Order: 816
Date Reported: December 8, 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:	88081692
Sample No.:	DANGB2-MW13-SS1
Date Sampled:	8-05-88
Time Sampled:	07:49
Date Extracted:	8-16-88
Date Analyzed:	9-15-88
Percent Moisture:	10

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
Phenanthrene	330	ND
Anthracene	330	ND
Dibutyl phthalate	330	ND
Fluoranthene	330	ND
4-Chlorophenyl phenyl ether	330	ND
Pyrene	330	ND
Butyl Benzyl phthalate	330	ND
Bis(2-ethylhexyl) phthalate	330	ND
Chrysene	330	ND
4-Bromophenyl phenyl ether	330	ND
Benzo(a)anthracene	330	ND
Di-n-octylphthalate	330	ND
Benzo(b)fluoranthene	330	ND
Benzo(k)fluoranthene	330	ND
Benzidine	2000	ND
3,3'-Dichlorobenzidine	660	ND
Benzo(a)pyrene	330	ND
Indeno(1,2,3-cd)pyrene	330	ND
Dibenzo(a,h)anthracene	330	ND
Benzo(ghi)perylene	330	ND
Benzyl Alcohol	660	ND

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

Date Received: August 6, 1988
Date Reported: December 8, 1988

Work Order: 816
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:	88081692
Sample No.:	DANGB2-MW13-SS1
Date Sampled:	8-05-88
Time Sampled:	07:49
Date Extracted:	8-16-88
Date Analyzed:	9-15-88
Percent Moisture:	10

Compound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg
Acetophenone	--*	ND
Aniline	--*	ND
4-Aminobiphenyl	--*	ND
4-Chloroaniline	660	ND
1-Chloronaphthalene	--*	ND
Dibenzofuran	330	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	330	ND
1-Naphthylamine	--*	ND
2-Naphthylamine	--*	ND
2-Nitroaniline	1600	ND
3-Nitroaniline	1600	ND
4-Nitroaniline	1600	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 6, 1988
Date Reported: December 8, 1988

Work Order: 816
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:	88081692
Sample No.:	DANGB2-MW13-SS1
Date Sampled:	8-05-88
Time Sampled:	07:49
Date Extracted:	8-16-88
Date Analyzed:	9-15-88
Percent Moisture:	10

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
Alpha-BHC	--*	ND
Gamma-BHC	--*	ND
Beta-BHC	660	ND
Heptachlor	330	ND
Delta-BHC	500	ND
Aldrin	330	ND
Heptachlor epoxide	330	ND
Endosulfan I	--*	ND
Dieldrin	500	ND
4,4'-DDE	1000	ND
Endrin	--*	ND
Endosulfan II	--*	ND
4,4'-DDD	500	ND
4,4'-DDT	830	ND
Endosulfan Sulfate	1000	ND
Endrin aldehyde	--*	ND
Endrin Ketone	--*	ND
Chlordane	2000	ND
Methoxychlor	--*	ND
Toxaphene	2000	ND
Aroclor-1016	2000	ND
Aroclor-1221	2000	ND
Aroclor-1232	2000	ND
Aroclor-1242	2000	ND
Aroclor-1248	2000	ND
Aroclor-1254	2000	ND
Aroclor-1260	2000	ND

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

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

Date Received: August 6, 1988
Date Reported: December 8, 1988

Work Order: 816
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:	88081692
Sample No.:	DANGB2-MW13-SS1
Date Sampled:	8-05-88
Time Sampled:	07:49
Date Extracted:	8-16-88
Date Analyzed:	9-15-88
Percent Moisture:	10

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
2-Chlorophenol	330	ND	
2-Nitrophenol	330	ND	
Phenol	330	ND	
2,4-Dimethylphenol	330	ND	
2,4-Dichlorophenol	330	ND	
2,4,6-Trichlorophenol	330	ND	
4-Chloro-3-methylphenol	660	ND	
2,4-Dinitrophenol	1600	ND	
2,6-Dichlorophenol	--*	ND	
2-Methyl-4,6-Dinitrophenol	1600	ND	
Pentachlorophenol	1600	ND	
4-Nitrophenol	1600	ND	
Benzoic Acid	1600	ND	
2-Methylphenol	330	ND	
3- & 4-Methylphenol	330	ND	
2,3,4,6-Tetrachlorophenol	--*	ND	
2,4,5-Trichlorophenol	330	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: Soil

te Received: August 6, 1988
te Reported: December 8, 1988

Work Order: 816
Job Number: OR001

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

ATTN: Mr. Bill Hayden

b Number:	88081693	88081694
mple No.:	DANGB2-MW13-SS3	DANGB2-MW13-SS4
te Sampled:	8-05-88	8-05-88
me Sampled:	08:31	08:47
te Extracted:	10-18-88	10-18-88
te Analyzed:	10-27-88	10-27-88
rcent Moisture:	8	8

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
3-Dichlorobenzene	330	ND	ND
4-Dichlorobenzene	330	ND	ND
xachloroethane	330	ND	ND
s(2-chloroethyl)ether	330	ND	ND
2-Dichlorobenzene	330	ND	ND
Nitrosodimethylamine	330	ND	ND
s(2-chloroisopropyl)ether	330	ND	ND
Nitrosodi-n-propylamine	330	ND	ND
xachlorobutadiene	330	ND	ND
2,4-Trichlorobenzene	330	ND	ND
trobenzene	330	ND	ND
ophorone	330	ND	ND
phthalene	330	ND	ND
s(2-chloroethoxy)methane	330	ND	ND
Chloronaphthalene	330	ND	ND
xachlorocyclopentadiene	330	ND	ND
enaphthylene	330	ND	ND
enaphthene	330	ND	ND
methyl phthalate	330	ND	ND
6-Dinitrotoluene	330	ND	ND
uorene	330	ND	ND
4-Dinitrotoluene	330	ND	ND
ethyl phthalate	330	ND	ND
Nitrosodiphenylamine	330	ND	ND
xachlorobenzene	330	ND	ND

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

Date Received: August 6, 1988 Work Order: 816
Date Reported: December 8, 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:	88081693	88081694
Sample No.:	DANGB2-MW13-SS3	DANGB2-MW13-SS4
Date Sampled:	8-05-88	8-05-88
Time Sampled:	08:31	08:47
Date Extracted:	10-18-88	10-18-88
Date Analyzed:	10-27-88	10-27-88
Percent Moisture:	8	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	ND	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	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	2000	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)

te Received: August 6, 1988
te Reported: December 8, 1988

Work Order: 816
Job Number: OR001

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

ATTN: Mr. Bill Hayden

b Number:	88081693	88081694
mple No.:	DANGB2-MW13-SS3	DANGB2-MW13-SS4
te Sampled:	8-05-88	8-05-88
me Sampled:	08:31	08:47
te Extracted:	10-18-88	10-18-88
te Analyzed:	10-27-88	10-27-88
rcent Moisture:	8	8

mpound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg	ug/kg
etophenone	--*	ND	ND
iline	--*	ND	ND
Aminobiphenyl	--*	ND	ND
Chloroaniline	660	ND	ND
Chloronaphthalene	--*	ND	ND
benzofuran	330	ND	ND
Dimethylaminoazobenzene	--*	ND	ND
12-Dimethylbenz(a)anthracene	--*	ND	ND
,a-Dimethylphenethylamine	--*	ND	ND
phenylamine	--*	ND	ND
2-Diphenylhydrazine	--*	ND	ND
hyl methanesulfonate	--*	ND	ND
Methylcholanthrene	--*	ND	ND
thyl methanesulfonate	--*	ND	ND
Methylnaphthalene	330	ND	ND
Naphthylamine	--*	ND	ND
Naphthylamine	--*	ND	ND
Nitroaniline	1600	ND	ND
Nitroaniline	1600	ND	ND
Nitroaniline	1600	ND	ND
Nitroso-di-n-butylamine	--*	ND	ND
Nitrosopiperidine	--*	ND	ND
ntachlorobenzene	--*	ND	ND
ntachloronitrobenzene	--*	ND	ND
enacetin	--*	ND	ND
Picoline	--*	ND	ND
onamide	--*	ND	ND
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

ate Received: August 6, 1988
ate Reported: December 8, 1988

Work Order: 816
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:	88081693	88081694
mple No.:	DANGB2-MW13-SS3	DANGB2-MW13-SS4
ate Sampled:	8-05-88	8-05-88
ime Sampled:	08:31	08:47
te Extracted:	10-18-88	10-18-88
ate Analyzed:	10-27-88	10-27-88
ercent Moisture:	8	8

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
lpha-BHC	--*	ND	ND
amma-BHC	--*	ND	ND
ta-BHC	660	ND	ND
eptachlor	330	ND	ND
elta-BHC	500	ND	ND
drin	330	ND	ND
ptachlor epoxide	330	ND	ND
ndosulfan I	--*	ND	ND
eldrin	500	ND	ND
4'-DDE	1000	ND	ND
ndrin	--*	ND	ND
ndosulfan II	--*	ND	ND
4'-DDD	500	ND	ND
,4'-DDT	830	ND	ND
ndosulfan Sulfate	1000	ND	ND
drin aldehyde	--*	ND	ND
drin Ketone	--*	ND	ND
hlordane	2000	ND	ND
thoxyc lor	--*	ND	ND
xaphene	2000	ND	ND
roclor-1016	2000	ND	ND
roclor-1221	2000	ND	ND
oclor-1232	2000	ND	ND
oclor-1242	2000	ND	ND
roclor-1248	2000	ND	ND
oclor-1254	2000	ND	ND
oclor-1260	2000	ND	ND

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

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

te Received: August 6, 1988
te Reported: December 8, 1988

Work Order: 816
Job Number: OR001

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

ATTN: Mr. Bill Hayden

x Number:	88081693	88081694
mple No.:	DANGB2-MW13-SS3	DANGB2-MW13-SS4
te Sampled:	8-05-88	8-05-88
me Sampled:	08:31	08:47
te Extracted:	10-18-88	10-18-88
te Analyzed:	10-27-88	10-27-88
rcent Moisture:	8	8

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
-Chlorophenol	330	ND	ND
-Nitrophenol	330	ND	ND
enol	330	ND	ND
4-Dimethylphenol	330	ND	ND
4-Dichlorophenol	330	ND	ND
4,6-Trichlorophenol	330	ND	ND
-Chloro-3-methylphenol	660	ND	ND
4-Dinitrophenol	1600	ND	ND
t-Dichlorophenol	--*	ND	ND
-Methyl-4,6-Dinitrophenol	1600	ND	ND
ntachlorophenol	1600	ND	ND
-Nitrophenol	1600	ND	ND
nzoic Acid	1600	ND	ND
-Methylphenol	330	ND	ND
& 4-Methylphenol	330	ND	ND
3,4,6-Tetrachlorophenol	--*	ND	ND
4,5-Trichlorophenol	330	ND	ND

Analyst

Laboratory Supervisor

PA 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.

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):
88081661-88081664
88081692-88081700

QC Report No: AAF-S-0023-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-05-88
Date Reported: 9-20-88
Dilution Factor: NA
Moisture: 5.8

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	N
Lead	88081661	88081661	9-08-88	8-19-88	7421	<0.5	6.7	6.5	3	5.3	6.7	10.5	72N	

1951

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
N See Legend attached.

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

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):
88081661-88081664
88081692-88081697
88081699-88081700

QC Report No: ICP-S-0024-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-05-88
Date Reported: 9-20-88
Dilution Factor: NA
%Moisture: 5.8

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	SR	SSR	PR	Not.
Barium	88081661	88081661	9-07-88	8-23-88	6010	<20	64.9	68.5	5	212	64.9	269	96	A
Cadmium	88081661	88081661	9-07-88	8-23-88	6010	<0.5	10.9	10.4	5	5.31	10.9	13.7	53N	A
Chromium	88081661	88081661	9-07-88	8-23-88	6010	<1.0	37.4	30.7	20	21.2	37.4	48.0	50N	A

1952

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
N See Legend attached.
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
SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

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

DRAFT

CHAIN OF CUSTODY RECORD

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

SAMPLER(S): (Signature) Kimberly Z. Davis, Peter E Remeverma

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkley, CA. 97410

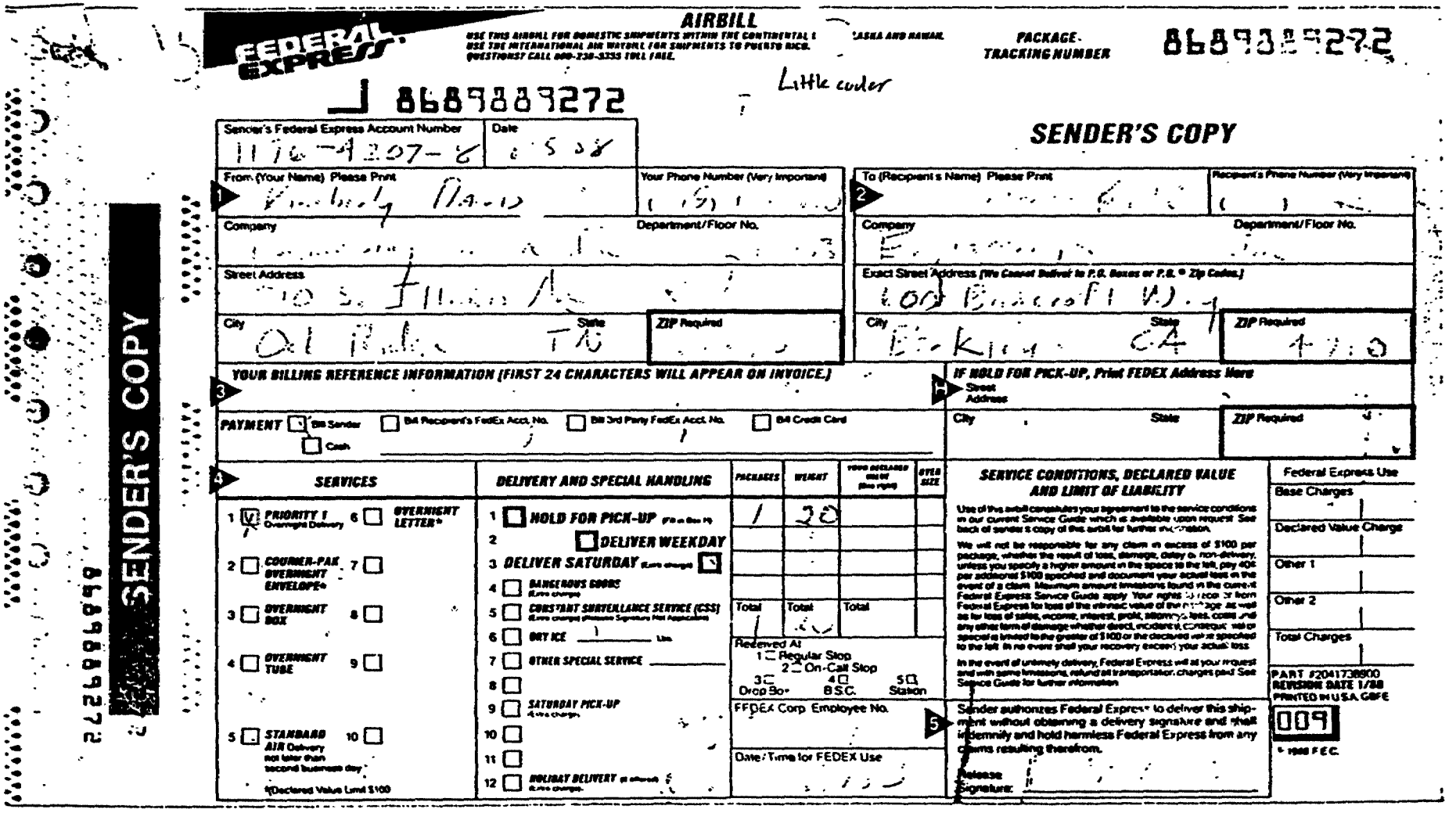
DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SOILS ANALYSES REQUIRED: SW8010, 8020	SW8080	SW8270	EPA 418.1	SW8010, 7060 7/91	SW7131, 7421, 7421	REMARKS
8-5-91	1545	DANGB8-MW20—SS1	1	X						
8-5-91	1545	DANGB8-MW20-SS1	1			X	X	X	X	SW6010 is for Barium only
8-5-91	1605	DANGB8-MW20-SS2	1	X						
8-5-91	1605	DANGB8-MW20-SS2				X	X	X	X	" "

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Kimberly Z. Davis	8-5-91 1735				

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

Distribution: Original Accompanies Shipment. Copy to [illegible]rdinator Field Files

1953



FEDERAL EXPRESS

AIRBILL

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

PACKAGE TRACKING NUMBER 8689889272

8689889272

Little cooler

SENDER'S COPY

Sender's Federal Express Account Number: 1176-9207-6 | Date: 6 5 98

1 From (Your Name) Please Print: Kimberly Allen | Your Phone Number (Very Important): (5) 1 [illegible]
Company: [illegible] | Department/Floor No.:
Street Address: 10 S. Ellis Ave
City: Oak Park | State: IL | ZIP Required:

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.): 400 Bracelli Ave
City: Bakersfield | State: CA | ZIP Required: 9 3 3 0

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

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

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

4 SERVICES

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

DELIVERY AND SPECIAL HANDLING

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

	PACKAGES	WEIGHT	YOUR DECLARED VALUE (See right)	OVER SIZE
	1	20		
Total	1	20	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, 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 1/98
PRINTED IN U.S.A. GBFE
009
© 1998 FEC

SENDER'S COPY 8689889272

1954

DRAFT

CHAIN OF CUSTODY RECORD

3

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

SAMPLER(S): (Signature)

SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkley, CA. 97410

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SOILS ANALYSES REQUIRED: SW8010, 8020	SW8080	SW8270	EPA 418.1	SW6010, [illegible]	SW7131, 7421, [illegible]	[illegible]	[illegible]	REMARKS
8-5-88	0749	DANGB2 - MW13 - SS1	1	X								
8-5-88	0747	DANGB2 - MW13 - SS1	1			X	X	X	X			SW6010 is for Barium only
8-5-88	0831	DANGB2 - MW13 - SS3	1	X								
8-5-88	0831	DANGB2 - MW13 - SS3	1			X	X	X	X			" "
8-5-88	0847	DANGB2 - MW13 - SS4	1	X								
8-5-88	0847	DANGB2 - MW13 - SS4	1			X	X	X	X			" "
8-5-88	1345	DANGB8 - MW18 - SS1	1	X								
8-5-88	1348	DANGB8 - MW18 - SS1	1			X	X	X	X			" "
8-5-88	1432	DANGB8 - MW18 - SS2	1	X								
8-5-88	1432	DANGB8 - MW18 - SS2	1			X	X	X	X			" "
8-5-88	1452	DANGB8 - MW18 - SS3	1	X								
8-5-88	1452	DANGB8 - MW18 - SS5	1			X	X	X	X			" "

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	8-5-88 1735				

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 8689889261

8689889261

SENDER'S COPY

Sender's Federal Express Account Number: 1191-4207-1	Date: 5

1 From (Your Name) Please Print: [illegible]	Your Phone Number (Very Important): [illegible]	2 To (Recipient's Name) Please Print: [illegible]	Recipient's Phone Number (Very Important): ( )
Company: [illegible] Inc	Department/Floor No.	Company: [illegible] Inc	Department/Floor No.
Street Address: 716 S. Illinois Ave		Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): 200 [illegible]	
City: Oak Ridge	State: TN	ZIP Required: [illegible]	City: Berkeley	State: CA	ZIP Required: [illegible]

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 [ ] PRIORITY 1 Overnight Delivery
6 [ ] OVERNIGHT LETTER*
2 [ ] COURIER-PAK OVERNIGHT ENVELOPE*
7 [ ]
3 [ ] OVERNIGHT BOX
8 [ ]
4 [ ] OVERNIGHT TUBE
9 [ ]
5 [ ] STANDARD AIR Delivery not later than second business day
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) [X]
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	37		
Total 1	Total 37	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: 17

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 1/88 PRINTED IN U.S.A. GBFE

009

© 1988 F.E.C.

SENDER'S COPY 1

8689889261

1956

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
Samples No.: 88081661-88081664
Samples No.: 88081692-88081697
Samples No.: 88081699-88081700
QC REPORT NO.: ICP-S-0024-88

The results obtained for the laboratory control sample (LCS) analyzed with these samples for the analytes Cadmium, Chromium and Barium exceeded the recommended EPA recoveries. All data associated with this batch was closely inspected and no analytical problems were found. The initial and continuing calibration verification standards and blanks and precision and accuracy recoveries were within acceptable limits with the following exceptions:

Chromium and Cadmium spike recoveries were below acceptable limits and were followed by analytical spike as required by laboratory standard operating procedure. The results of the analytical spike recovery for Chromium were within acceptable ranges. The results of the analytical spike recovery for Cadmium indicate matrix interference for this analyte.

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):
88081692-88081700,
88081706-88081708, 88081709

QC Report No: TPH-S-0042-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-08-88
Date Prepared: 8-29-88
Date Analyzed: 8-31-88
Date Reported: 9-06-88
Dilution Factor: 6.5
%Moisture: 10.1

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88081692	418.1	<100	<100	1110	830	75	760	68	9	*

1958

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

* Percent recovery is within ES control 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

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):
88081661-88081664, 88081706-88081709
88081692-88081700,

QC Report No: VGC-S-0034-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 8-10-88
Date Prepared: NA
Date Analyzed: 8-22-88
Date Reported: 9-12-88
Dilution Factor: NA
% Moisture: 12

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88081735	1,1-dichloroethane	11.3	ND	9.73	86	9.81	87	1	20	58-124
	Trichloroethene	11.3	0.10	9.30	81	9.73	85	4	16	75-110
	Chlorobenzene	11.3	ND	9.47	84	9.31	82	2	21	71-125
	Aromatics: 8020									
88081735	Benzene	11.3	ND	10.1	89	10.2	90	1	26	75-123
	Toluene	11.3	2.96	11.2	73*	11.2	70*	2	16	79-115
	Chlorobenzene	11.3	ND	8.37	74*	8.37	74*	0	24	82-112

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* See Case Narrative attached. The quality control sample is from a different Martin Marietta 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

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
Samples No.: 88081700, 88081706-88081707
QC REPORT NO.: VGC-S-0034-88

Samples 88081700 and 88081706 were analyzed initially as low soils. They were reanalyzed as medium soils due to the high acetone content. The results reflect the medium level analysis for acetone and the low level analysis for all other target compounds. Accordingly, both low and medium level blanks were required.

Sample 88081707 was lost after the 8240 analysis but before a moisture determination was done. Thus, the results are reported on a wet weight basis.

Percent recoveries for toluene and chlorobenzene in 8020 series do not meet the ES QC limits. Blank spike analysis showed the laboratory to be in control.

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: 9-12-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
C50	8-16-88	VGC	Carbopack	75-09-2	Dichloromethane	0.89	0.25	88081661-88081664
				67-66-3	Chloroform	1.1	0.05	88081692-88081699
C69	8-17-88	VGC	Carbopack	75-09-2	Dichloromethane	5.5	0.25	88081707-88081709

1961

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: Medium soil
Conc. Unit: ug/KG
Date Reported: 9-12-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
C78	8-17-88	VGC	Carbopack	75-09-2	Dichloromethane	7.8	2.5	88081700, 88081706

1962

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).:
88081706-88081710, 88081695-88081700,
88081749-88081754

QC Report No.: OCP-S-0042-88
QC Sample No.: 88081707
Level (Low/Med): Low
Date Reported: 11-04-88

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	63.4	95	46-127
Heptachlor	2000	ND	63.7	96	35-130
Aldrin	2000	ND	62.3	94	34-132
Dieldrin	5000	ND	173	104	31-134
Endrin	5000	ND	166	100	42-139
4,4'-DDT	5000	ND	155	93	23-134

	MSD Conc. In Extract (ug/Kg)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	53.1	80	95	18	50	46-127
Heptachlor	54.3	82	96	16	31	35-130
Aldrin	54.1	81	94	14	43	34-132
Dieldrin	145	87	104	18	38	31-134
Endrin	141	85	100	16	45	42-139
4,4'-DDT	128	77	93	19	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 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
Project:	Duluth ANGB		
Date Extracted:	9-16-88		
Date Analyzed (1):	9-18-88	Date Analyzed (2):	
Time Analyzed (1):	09:24	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
-	88081695	9-18-88		
-	88081696	9-18-88		
-	88081697	9-18-88		
-	88081699	9-18-88		
-	88081700	9-18-88		
-				

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: OCP-S-0042-88

These samples (WO# 816, 819, 833) were analyzed using protocols from EPA Method 8080 instead of CLP pesticides. The only difference is that a five point calibration is performed at the start of a series of analyses, thus there is no evaluation check standard for linearity. Note that there were no compounds found and confirmed.

The samples in work orders 816 and 819 were extracted for analysis by EPA Method 8270, as requested on the chain of custody. This request was changed to pesticides by the client. Thus, no pesticide surrogate standard was added.

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

The analytical results for Sample No. 88081707 is provided on a wet weight basis, since percent moisture was not performed.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Sample Matrix:	Soil
		Conc. Unit:	ug/KG
Client:	ES Oak Ridge	Work Order No:	816
Attn:	Bill Hayden	Lab Sample ID:	Blank
Address:	710 S. Illinois Avenue	Lab File ID:	S0082
	Suite F-103	Date Received:	NA
	Oak Ridge, Tn. 37830	Date Extracted:	8-16-88
		Date Analyzed:	9-20-88
		Date Reported:	12-12-88
Project:	Duluth ANGB	Dilution Factor:	None
		% Moisture:	NA
# TICs Found:	15		

Laboratory Supervisor Approval:

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.95	19	
-	Unknown	4.35	20	
-	Unknown	4.47	24	
-	Unknown	5.52	13	
-	Unknown	5.96	240	
-	Unknown	7.35	27	
-	Unknown	20.26	23	
-	Unknown	25.22	5.0	
-	Unknown	30.09	36	
-	Unknown	30.31	31	
-	Unknown	34.76	7.9	
-	Unknown	35.16	37	
-	Unknown	37.89	11	
-	Unknown	38.08	32	
-	Unknown	43.06	7.4	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Sample Matrix:	Soil
		Conc. Unit:	ug/KG
Client:	ES Oak Ridge	Work Order No:	816
Attn:	Bill Hayden	Lab Sample ID:	88081692
Address:	710 S. Illinois Avenue	Lab File ID:	S0062
	Suite F-103	Date Received:	8-08-88
	Oak Ridge, Tn. 37830	Date Extracted:	8-16-88
		Date Analyzed:	9-15-88
		Date Reported:	12-12-88
Project:	Duluth ANGB	Dilution Factor:	None
		% Moisture:	NA
# TICs Found:	13		

Laboratory Supervisor Approval:

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.52	5.6	
-	Unknown	3.93	130	
-	C6 alkene	4.10	18	
-	Unknown	4.27	6.0	
-	Unknown	5.09	150	
-	Unknown	5.94	260	
-	Unknown	6.93	4.6	
-	Unknown	25.23	10	
-	Unknown	26.92	5.0	
-	Unknown	27.36	6.5	
-	Unknown	29.69	6.7	
-	Unknown	30.05	18	
-	Unknown	35.13	14	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Sample Matrix:	Soil
		Conc. Unit:	ug/KG
Client:	ES Oak Ridge	Work Order No:	816
Attn:	Bill Hayden	Lab Sample ID:	88081693
Address:	710 S. Illinois Avenue	Lab File ID:	S0061
	Suite F-103	Date Received:	8-08-88
	Oak Ridge, Tn. 37830	Date Extracted:	10-18-88
		Date Analyzed:	10-27-88
		Date Reported:	12-12-88
Project:	Duluth ANGB	Dilution Factor:	None
		% Moisture:	NA
# TICs Found:	9		

Laboratory Supervisor Approval:

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.95	160	
-	C7 alkene	5.04	23	
-	Unknown	5.46	18	
-	Unknown	5.98	390	
-	Unknown	7.28	7.1	
-	Unknown	25.21	5.4	
-	Unknown	30.04	20	
-	Unknown	35.13	16	
-	Unknown	38.20	40	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Sample Matrix:	Soil
		Conc. Unit:	ug/KG
Client:	ES Oak Ridge	Work Order No:	816
Attn:	Bill Hayden	Lab Sample ID:	88081694
Address:	710 S. Illinois Avenue	Lab File ID:	S0060
	Suite F-103	Date Received:	8-08-88
	Oak Ridge, Tn. 37830	Date Extracted:	10-18-88
		Date Analyzed:	10-27-88
		Date Reported:	12-12-88
Project:	Duluth ANGB	Dilution Factor:	None
		% Moisture:	NA
# TICs Found:	10		

Laboratory Supervisor Approval:

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.91	140	
-	Unknown	5.44	16	
-	Unknown	5.90	200	
-	Unknown	7.28	10	
-	Unknown	25.21	9.0	
-	Unknown	26.98	8.5	
-	Unknown	30.05	21	
-	Unknown	30.29	17	
-	Unknown	35.14	18	
-	Unknown	38.23	100	

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):
88081887Re, 88081889, 88081939Re,
88081941Re-88081942Re, 88081955Re-88081956
88092146-88092147Re, 88092148, 88081879, 88081693Re-88081694Re

QC Report No: BNA-S-0045-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 8-18-88
Date Prepared: 10-28-88
Date Analyzed: 11-02-88
Date Reported: 12-08-88
Dilution Factor: NA
%Moisture: 8

Laboratory Supervisor Approval:

1970

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
B/N Laboratory Sample # 88081942Re	1,2,4-Trichlorobenzene	4060	ND	2370	58	2840	70	18	23	38-107
	Acenaphthene	4060	ND	3660	90	3980	98	8	19	31-137
	2,4-Dinitrotoluene	4060	ND	5040	124*	5980	147*	17	47	28-89
	Pyrene	4060	ND	4880	120	5370	132	10	36	35-142
	N-Nitroso-di-n-Propylamine	4060	ND	5410	133*	5930	146*	9	38	41-126
	1,4-Dichlorobenzene	4060	ND	1460	36	1580	39	8	27	28-104
ACID Laboratory Sample # 88081942Re	Pentachlorophenol	8130	ND	10600	130*	11300	139*	6	47	17-109
	Phenol	8130	ND	6140	76	6910	85	12	35	26-90
	2-Chlorophenol	8130	ND	5840	72	6580	81	12	50	25-102
	4-Chloro-3-Methylphenol	8130	ND	10400	128*	11800	145*	13	33	26-103
	4-Nitrophenol	8130	ND	7320	90	5120	63	35	50	11-114

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* 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

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 No: BNA-S-0045-88B
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: NA
Date Prepared: 10-28-88
Date Analyzed: 11-02-88
Date Reported: 12-08-88
Dilution Factor: NA
%Moisture: NA

Laboratory Supervisor Approval:

1971

QC Report for Laboratory Sample No(s):
88081887Re, 88081889, 88081939Re, 88081941Re
88081942Re, 88091955Re-88091956, 88092146
88092147Re, 88092148, 88081879, 88081693Re-88081694Re

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
B/N Laboratory Sample # Blank	1,2,4-Trichlorobenzene	3330	ND	2600	78	2300	69	12	23	38-107
	Acenaphthene	3330	ND	2630	79	2200	66	18	19	31-137
	2,4-Dinitrotoluene	3330	ND	2870	86	2900	87	1	47	28-89
	Pyrene	3330	ND	3130	94	2930	88	7	36	35-142
	N-Nitroso-di-n-Propylamine	3330	ND	3430	103	2830	85	19	38	41-126
	1,4-Dichlorobenzene	3330	ND	2130	64	1800	54	17	27	28-104
ACID Laboratory Sample # Blank	Pentachlorophenol	6670	ND	6520	98	6070	91	7	47	17-109
	Phenol	6670	ND	3870	58	3240	48	18	35	26-90
	2-Chlorophenol	6670	ND	4200	63	3800	57	10	50	25-102
	4-Chloro-3-Methylphenol	6670	ND	6100	91	6170	92	1	33	26-103
	4-Nitrophenol	6670	ND	1590	24	990	15	46	50	11-114

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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 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):
88081661-88081664
88081692-88081694

QC Report No: BNA-S-0031-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 8-05-88
Date Prepared: 8-16-88
Date Analyzed: 9-19-88
Date Reported: 10-17-88
Dilution Factor: NA
%Moisture: 5.8

Laboratory Supervisor Approval:

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
B/N Laboratory Sample # 88081661	1,2,4-Trichlorobenzene	3540	ND	1900	54	3380	95	56*	23	38-107
	Acenaphthene	3540	ND	2230	63	2880	81	26*	19	31-137
	2,4-Dinitrotoluene	3540	ND	2150	61	3150	89	38	47	28-89
	Pyrene	3540	ND	2260	64	2940	83	26	36	35-142
	N-Nitroso-di-n-Propylamine	3540	ND	3030	86	4750	134*	44*	38	41-126
	1,4-Dichlorobenzene	3540	ND	1040	29	2920	82	95*	27	28-104
ACID Laboratory Sample # 88081661	Pentachlorophenol	7090	ND	3620	51	6060	85	50*	47	17-109
	Phenol	7090	ND	4330	61	5890	83	31	35	26-90
	2-Chlorophenol	7090	ND	4220	60	5600	79	28	50	25-102
	4-Chloro-3-Methylphenol	7090	ND	4750	67	6450	92	32	33	26-103
	4-Nitrophenol	7090	ND	4960	70	3720	52	29	50	11-114

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* 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

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):
88081661-88081664
88081692-88081694

1643

QC Report No: BNA-S-0031-88B
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: NA
Date Prepared: 8-16-88
Date Analyzed: 9-20-88
Date Reported: 10-17-88
Dilution Factor: NA
%Moisture: NA

Laboratory Supervisor Approval:

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
B/N Laboratory Sample # Blank	1,2,4-Trichlorobenzene	3330	ND	1490	45	1370	41	8	23	38-107
	Acenaphthene	3330	ND	1270	38	1220	37	4	19	31-137
	2,4-Dinitrotoluene	3330	ND	1370	41	1320	40	4	47	28-89
	Pyrene	3330	ND	1340	40	1300	39	3	36	35-142
	N-Nitroso-di-n-Propylamine	3330	ND	1920	58	1880	56	2	38	41-126
	1,4-Dichlorobenzene	3330	ND	1250	38	1050	32	17	27	28-104
ACID Laboratory Sample # Blank	Pentachlorophenol	6670	ND	3140	47	2760	41	13	47	17-109
	Phenol	6670	ND	2540	38	2300	34	10	35	26-90
	2-Chlorophenol	6670	ND	2490	37	2320	35	7	50	25-102
	4-Chloro-3-Methylphenol	6670	ND	2910	44	2810	42	3	33	26-103
	4-Nitrophenol	6670	ND	3250	49	3080	46	5	50	11-114

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* 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

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: 12-12-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
S0082	9-20-88	BNA	1	84-66-2	Diethylphthalate	5500	330	88081692-88081694
S0263	10-27-88	BNA	1	-	None Found	-	-	88081692Re-88081693Re

1974

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: 12-12-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
S0082	9-20-88	BNA	1	84-66-2	Diethylphthalate	5500	330	88081692-88081694
S0263	10-27-88	BNA	1	-	None Found	-	-	88081692Re-88081693Re

1975

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: BNA-S-0031-88
QC REPORT NO.: BNA-S-0031-88B
QC REPORT NO.: BNA-S-0045-88
QC REPORT NO.: BNA-S-0045-88B

Analysis of duplicate matrix spike samples for this batch showed, one recovery and five RPD's higher than EPA QC limits. A pair of spiked blanks were analyzed and the results showed the laboratory to be in control.

Analysis of samples 88081692 and 88081694 gave recoveries of two of the three base neutral surrogates that were much lower than EPA QC limits. These samples were re-extracted on 10-18-88, past the expiration of the extraction holding time. Analysis of these re-extractions showed good surrogate recoveries. The only difference in results was that dibutylphthalate was found in the original analysis and not in the re-analysis. The results of the second analysis are enclosed.

Matrix spikes that were analyzed with the re-extraction were found to have low recoveries of dichlorobenzene and high RPD's for di and trichlorobenzenes and acenaphthene. Spiked blanks were analyzed. The results showed the laboratory to be in control.

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).:
88081692-88081700
88081706-88081709

Calibration Date: 8-31-88
Instrument I.D.: Perkin Elmer 257
Grating Infrared Spectrophotometer

Unit: mg/L
Date Reported: 11-09-88
R= 0.9999

Laboratory Supervisor Approval:

Standard	Concentration	Absorbance	/Continuous RF /Calibration /Verification
No. 1	0.59	0.105	
No. 2	1.2	0.218	RF = 5.28
No. 3	1.8	0.336	
No. 4	2.4	0.446	
Cont. Cal. No. 2 (88081692-88081696)+QC	1.20	0.221	100%
Cont. Cal. No. 2 (88081697-88081700) (88081706-88081709)	1.20	0.221	100%

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time ~~10/27/88~~ 14:45

Lab ID >T1027::D2 Data Release Authorized By:

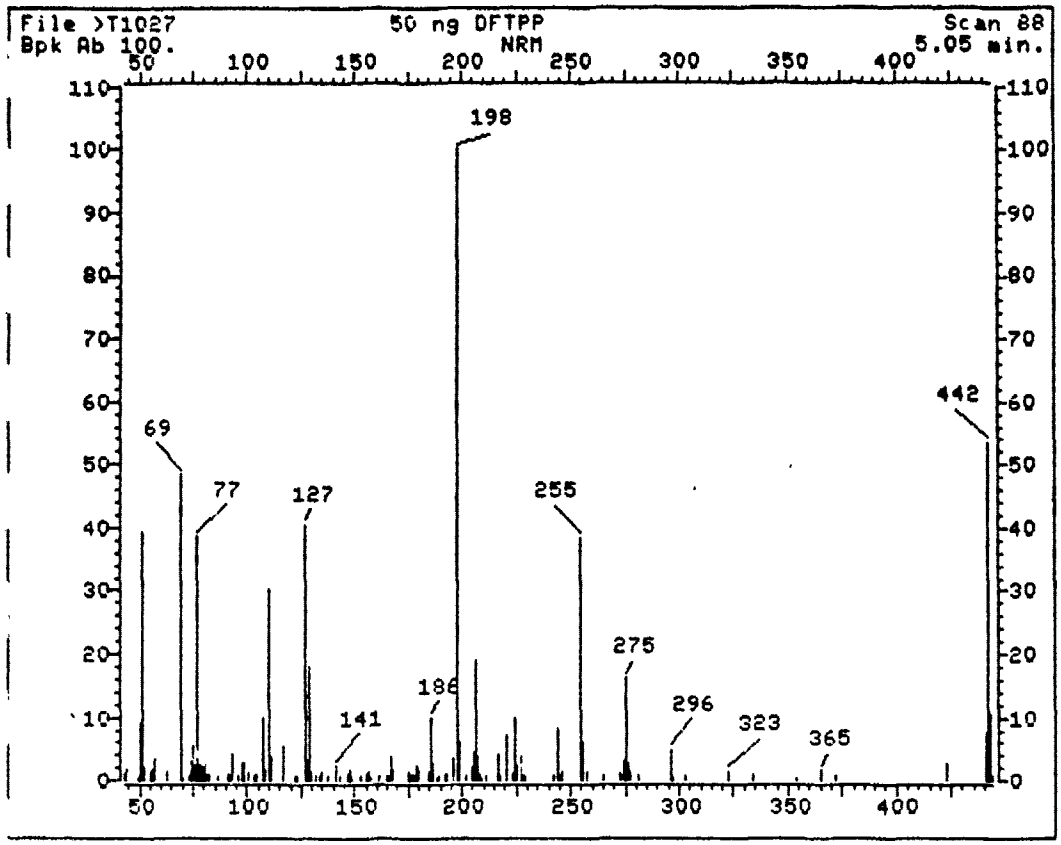
m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	39.19 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	48.39	
70	less than 2.0% of mass 69	.54 OK	(1.114) #1
127	40.0 - 60.0% of mass 198	40.37 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	6.27 OK	
275	10.0 - 30.0% of mass 198	16.17 OK	
365	greater than 1.00% of mass 198	1.65 OK	
441	present, but less than mass 443	7.66 OK	
442	greater than 40.0% of mass 198	53.53 OK	
443	17.0 - 23.0% of mass 442	10.49 OK	(19.60) #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	
50 ng DFTPP	>T1027	10/27/88	14:45	
SSTD060	50257		15:05	
~~88082102-04~~ BLK	50258		16:17	
88082132 RA	50259		17:16	
88082058 RA	50260		18:16	← another project
88081947 RA	50261		19:16	
88081879 REX	50262		20:15	
88081693-94 REX BLK	50263		21:15	
88081693 REX	50264		22:14	
88081694 REX	50265		23:13	
88081974	50266	10/28/88	00:13	
88081975	50267		01:13	
88081976	50268		02:12	



File: >T1027 Scan #: 88 Retn. time: 5.05

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.10	1.246	92.00	.758	146.95	1.095	192.95	1.213	246.00	1.297
44.00	1.785	93.00	4.026	147.95	1.617	196.10	3.369	255.00	38.336
49.20	.371	96.10	.691	149.15	.674	198.00	100.000	256.00	6.232
50.10	9.230	98.00	2.813	152.95	.842	199.00	6.266	257.90	1.533
51.10	39.195	99.00	2.628	155.05	.943	201.50	.893	264.90	.926
52.10	2.004	101.00	1.516	156.15	1.533	204.10	2.156	272.90	1.230
55.00	1.331	103.00	.741	156.95	.455	205.10	4.514	274.05	3.251
56.00	1.668	104.00	1.044	160.95	.910	206.10	18.999	275.05	16.170
57.10	3.571	107.00	10.005	165.05	.808	207.10	3.823	276.05	2.762
63.10	1.550	108.00	1.684	165.95	.539	208.10	1.112	276.95	1.533
69.00	48.391	110.00	30.200	167.05	3.925	209.10	.472	281.05	.724
69.90	.539	111.00	3.958	167.95	1.886	211.10	.893	295.95	4.834
73.00	.724	117.00	5.339	175.05	1.331	217.00	4.009	296.95	.556
74.10	3.200	122.05	.623	176.05	.792	217.90	.724	302.95	.623
75.00	5.659	122.95	.825	177.05	1.162	221.00	7.125	323.05	1.583
76.10	2.425	127.05	40.374	177.95	.623	223.10	.960	334.05	1.011
77.10	38.487	128.05	3.268	179.05	2.527	224.00	9.752	354.00	.371
78.10	2.611	129.05	17.972	180.05	1.886	225.00	2.543	364.90	1.651
79.10	2.358	130.05	1.314	185.05	1.516	227.00	3.840	372.00	.842
80.00	2.274	132.15	.707	185.95	9.988	228.00	.623	423.00	2.678
81.00	2.628	133.95	.606	187.05	2.830	229.00	.775	441.05	7.664
82.00	.977	135.05	1.381	188.05	.472	242.00	.674	442.05	53.529
83.00	1.044	137.15	.674	188.95	.792	244.00	8.034	443.05	10.494
85.90	.640	141.05	2.392	191.95	1.044	245.10	.792	444.05	.859
91.00	1.162	143.05	.623						

Continuing Calibration Check
HSL Compounds

Case No: ---------- Calibration Date: 10/27/88

Contractor: ENGINEERING-SCIENCE Time: 15:05

Contract No: ---------- Laboratory ID: >50257

Instrument ID: 1 Initial Calibration Date: 10/15/88 (12)

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	.87491	2.97		
2-Fluorophenol	1.15802	1.21392	4.83		
bis(2-Chloroethyl)ether	1.11892	.92868	17.00		
Phenol	1.41657	1.35680	4.22	*	
Phenol-d5	1.22488	1.28661	5.04		
Aniline	.54193	.61906	14.23		
2-Chlorophenol	1.23175	1.26184	2.44		
1,3-Dichlorobenzene	1.47535	1.38989	5.79		
1,4-Dichlorobenzene	1.40530	1.31521	6.41	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.74567	2.28		
1,2-Dichlorobenzene	1.32240	1.43902	8.82		
2-Methylphenol	1.17367	1.34936	14.97		
3-&-4-Methylphenol	1.07139	1.31020	22.29		
bis(2-chloroisopropyl)Ether	2.15627	2.50651	16.24		
N-Nitroso-Di-n-Propylamine	.84050	.72370	13.90		**
Hexachloroethane	.53840	.55448	2.99		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.40645	.83		
Nitrobenzene-d5	.39137	.41557	6.18		
2-Nitrophenol	.24657	.27773	12.64	*	
Isophorone	.74170	.84469	13.88		
bis(2-Chloroethoxy)methane	.49386	.51948	5.19		
2,4-Dimethylphenol	.34849	.40744	16.92		
Benzoic Acid	.29725	.29356	1.24		
2,4-Dichlorophenol	.56733	.63539	12.00	*	
1,2,4-Trichlorobenzene	.36913	.38144	3.33		
Naphthalene	.94589	.89500	5.38		
4-Chloroaniline	.36309	.42244	16.34		
Hexachlorobutadiene	.20283	.22170	9.30	*	
4-Chloro-3-Methylphenol	.31360	.35759	14.03	*	
2-Methylnaphthalene	.56397	.62695	11.17		

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 (**)

1980

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 10/27/88

Contractor: ENGINEERING SCIENCE Time: 15:05

Contract No: _____ Laboratory ID: >S0257

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	.34377	16.26		**
2,4,6-Trichlorophenol	.42280	.41758	1.23	*	
2,4,5-Trichlorophenol	.52897	.53213	.60		
2-Fluorobiphenyl	1.27220	1.08216	14.94		
2-Chloronaphthalene	1.23784	1.13463	8.34		
2-Nitroaniline	.47288	.47140	.31		
Dimethylphthalate	1.40629	1.27616	9.25		
2,6-Dinitrotoluene	.37415	.38642	3.28		
Acenaphthylene	1.68918	1.47081	12.93		
3-Nitroaniline	.44557	.45602	2.35		
2,4-Dinitrophenol	.11898	.11678	1.85		**
Acenaphthene	1.13011	.90785	19.67	*	
Dibenzofuran	1.64131	1.51278	7.83		
2,4-Dinitrotoluene	.28418	.27376	3.67		
4-Nitrophenol	.28450	.22553	20.73		**
Fluorene	1.12850	.88242	21.81		
Diethylphthalate	1.20939	1.01039	16.45		
4-Chlorophenyl-phenylether	.59183	.55402	6.39		
4-Nitroaniline	.35956	.35521	1.21		
2,4,6-Tribromophenol	.21023	.22924	9.04		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.46395	15.16	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.24635	15.65		
Hexachlorobenzene	.26273	.31606	20.30		
Pentachlorophenol	.14536	.13951	4.02	*	

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: 10/27/88

Contractor: ENGINEERING-SCIENCE Time: 15:05

Contract No: _____ Laboratory ID: >S0257

Instrument ID: (Initial Calibration Date: 10/25/88 DED

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	.96381	6.82		
Anthracene	1.05155	1.08903	3.56		
Di-n-Butylphthalate	1.51956	1.59943	5.26		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.16418	2.21	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.13688	240.25		
Pyrene	1.56086	1.57352	81		
Terphenyl-d14	1.05835	1.13815	7.54		
Butylbenzylphthalate	1.03390	1.04490	1.06		
3,3'-Dichlorobenzidine	.13689	.24532	79.21		
Chrysene	.99655	1.03981	4.34		
Benzo(a)Anthracene	1.10407	1.12293	1.71		
bis(2-Ethylhexyl)Phthalate	1.21073	1.25998	4.07		
Di-n-octylphthalate	3.40275	2.71179	20.31	*	
Benzo(e)Pyrene	1.32098	1.26310	4.38	*	
Benzo(b)Fluoranthene	1.60850	1.46084	9.18		
Indeno(1,2,3-cd)Pyrene	.96800	.62326	35.61		
Dibenzo(a,h)Anthracene	.87481	1.02042	16.64		
Benzo(k)Fluoranthene	1.44370	1.20620	16.45		
Benzo(g,h,i)Perylene	.89761	1.03979	15.84		

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 (**)

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR0001

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

Sample No. (Standard): SSTD0760 Date Analyzed: 10/27/88

Lab File ID (Standard): S0257 Time Analyzed: 15:05

Instrument ID: 1

		IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
	12 HOUR STD	64681	9.24	218039	12.87	144112	18.35
	UPPER LIMIT	129362	9.74	436078	13.37	288224	18.85
	LOWER LIMIT	32341	8.74	109020	12.37	72056	17.85
	EPA SAMPLE NO.						
SSTD	01	63200	9.23	241935	12.83	141381	18.34
59	02	62083	9.24	240870	12.83	138130	18.33
61	03	62313	9.24	131723	12.85	100685	18.34
62	04	61373	9.23	242822	12.85	142083	18.34
63	05	63243	9.23	250829	12.86	143029	18.34
64	06	62321	9.21	226132	12.84	150883	18.34
65	07	75574	9.23	300544	12.84	165972	18.34
66	08	69907	9.29	152873	12.97	42566*	18.60
67	09	109499	9.23	267839	12.84	151340	18.33
68	10	67964	9.23	240651	12.83	148161	18.34
69	11	68254	9.24	257292	12.84	151584	18.35
	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 __

8C

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: 10/27/88

Lab File ID (Standard): SØ257   Time Analyzed: 15:05

Instrument ID: 1

		IS4 (PHN) AREA #	RT	IS5 (CRY) AREA #	RT	IS4 (PRY) AREA #	RT
	12 HOUR STD	223270	23.02	157469	31.50	128590	37.68
	UPPER LIMIT	446540	23.52	314938	32.00	257180	38.18
	LOWER LIMIT	111635	22.52	78735	31.00	64295	37.18
	EPA SAMPLE NO.						
S0258 01	88082102-04 etc BLK P.A.	215795	23.01	146753	31.49	63244*	37.66
59 02	88082132 RA	223903	23.01	131492	31.49	31807 *	37.71
6Ø 03	88081947 RA	187049	23.02	139511	31.48	61901 *	37.70
61 04	88081879 REX	224933	23.01	137315	31.48	91404	37.67
63 05	88081697.94,1697 REX BLK	231399	23.02	150562	31.49	95996	37.67
64 06	88081693 REX	236381	23.01	152426	31.48	96764	37.67
65 07	88081690 REX	250643	23.02	156864	31.49	77695	37.69
66 08	88081974	73419*	23.24	124029	31.61	73547	37.80
67 09	88081975	218921	23.02	132980	31.50	64816 *	37.70
68 10	88081976	233346	23.02	156960	31.49	76466	37.73
69 11	88081977	226800	23.02	148092	31.51	67869* ← OK'D	37.74
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

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. AD-76 Contractor EMB SCI(9/7/88) Contract No. 99-99-99

Instrument ID #1 Date / Time 9/19/88 11:53

Lab ID >D0919::SC Data Release Authorized By: Laura Kuck

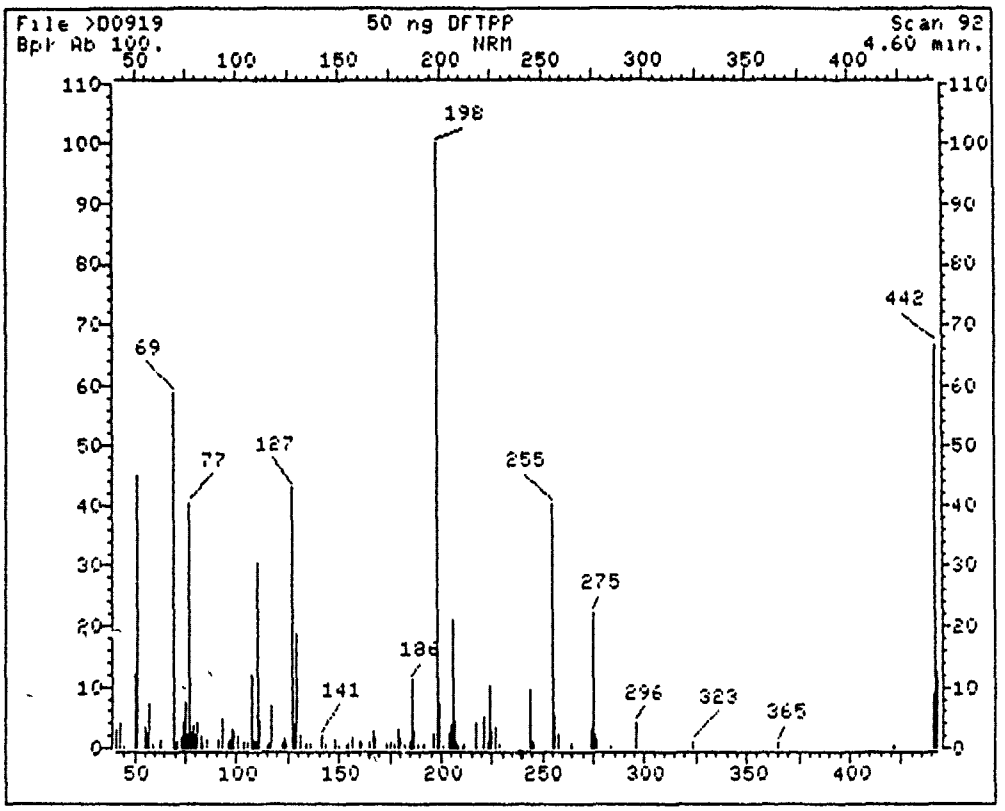
m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	45.04 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	58.85	
70	less than 2.0% of mass 69	.70 OK	(1.197) #1
127	40.0 - 60.0% of mass 198	42.88 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	7.05 OK	
275	10.0 - 30.0% of mass 198	22.23 OK	
365	greater than 1.00% of mass 198	1.04 OK	
441	present, but less than mass 443	8.82 OK	
442	greater than 40.0% of mass 198	66.68 OK	
443	17.0 - 23.0% of mass 442	12.50 OK	(18.75) #2

9/16/88 - 5 point

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

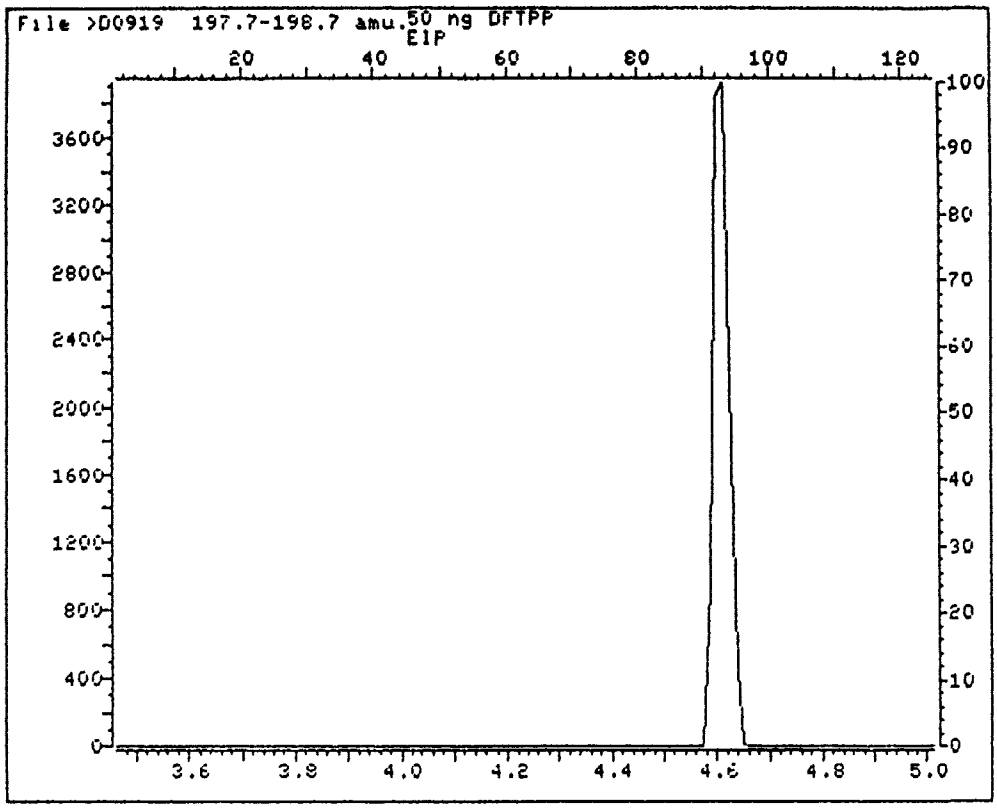
#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS	
25ng/L ASN	>E5623	9/19/88	12:19	
88081693	>E5634	↓	22:56	SS out, see next 5026
88081694	>E5635	↓	23:50	SS out, see next 5026



File: >D0919 Scan #: 92 Retn. time: 4.60

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.10	3.079	83.05	2.009	127.00	42.876	181.00	.887	226.95	3.471
43.10	3.993	83.95	.731	128.00	3.680	185.00	1.253	228.95	.887
45.00	.783	85.05	1.514	129.00	18.659	186.00	11.143	244.00	9.395
50.00	11.900	91.05	1.461	130.95	2.114	187.00	2.766	245.00	1.122
51.10	15.042	93.00	4.828	133.95	.678	188.90	.705	245.90	1.018
55.10	3.471	96.00	1.174	135.95	.861	192.00	.835	255.00	10.136
55.95	2.401	97.10	1.566	140.95	2.009	196.00	2.349	255.90	5.506
57.05	7.098	98.00	2.975	143.05	.626	198.00	100.000	258.00	2.323
59.05	.783	99.00	2.897	147.95	1.592	199.00	7.046	264.90	.757
63.05	1.487	101.00	2.035	149.85	.339	201.10	.418	274.00	3.105
68.95	58.847	103.90	1.122	154.05	.548	203.95	2.349	275.00	22.234
69.95	.705	105.00	1.070	155.05	.887	204.95	3.810	276.00	2.349
71.05	1.435	107.00	11.952	156.05	1.644	205.95	21.112	276.95	1.435
73.05	1.801	108.00	1.461	160.05	.992	207.05	4.332	283.05	.522
73.95	4.019	109.10	1.096	161.05	.783	207.95	1.070	295.95	4.228
74.95	2.359	110.00	30.350	165.05	1.018	208.95	.522	323.00	1.070
76.05	1.983	111.00	4.436	167.00	2.949	210.05	.444	364.95	1.044
77.05	40.162	115.00	.365	168.00	1.775	211.05	.678	421.00	.444
78.05	2.427	116.00	.731	173.90	.757	216.95	4.123	422.00	.261
79.05	3.706	117.00	6.811	175.00	1.044	220.95	5.193	441.05	8.820
80.05	1.957	122.00	.913	176.90	.731	222.95	1.174	442.05	66.675
81.05	4.097	123.00	1.618	178.90	3.158	224.05	10.177	443.05	12.500
82.15	1.722	124.00	.809	180.00	1.801	225.05	2.740		


File >D0919 197.7-198.7 amu.50 ng DFTPP
EIP
20
40
60
80
100
120
3600
3200
2800
2400
2000
1600
1200
800
400
0
100
90
80
70
60
50
40
30
20
10
0
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 09/19/88

Contractor: Time: 12:19

Contract No: Laboratory ID:)E5623

Instrument ID: Initial Calibration Date: 09/19/88

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC	
N-Nitroso-Dimethylamine	.97318	1.07635	10.60			
2-Fluorophenol	1.19718	1.31751	10.05			
bis(2-Chloroethyl)ether	1.72380	1.40218	18.66			
Phenol	1.60763	1.81562	12.94	*		
Phenol-d5	1.46321	1.55312	6.14			
Aniline	1.25111	1.18157	5.56			
2-Chlorophenol	1.33134	1.42093	6.73			
1,3-Dichlorobenzene	1.39328	1.50763	8.21			
1,4-Dichlorobenzene	1.25213	1.39931	11.75	*		
Benzyl Chloride	-	-	-			
Benzyl Alcohol	.15892	.00678	95.74			
1,2-Dichlorobenzene	1.30329	1.39243	6.84			
2-Methylphenol	1.07027	1.19410	11.57			
3-&-4-Methylphenol	1.11935	1.34529	20.19			(Conc=50.00)
bis(2-chloroisopropyl)Ether	2.85694	2.48818	12.91			
N-Nitroso-Di-n-Propylamine	1.23303	1.13341	8.08		**	
Hexachloroethane	.58509	.57984	.90			
Dibromochloropropane	-	-	-			
Nitrobenzene	.50051	.52136	4.17			
Nitrobenzene-d5	.40361	.44199	9.51			
2-Nitrophenol	.22074	.23327	5.68	*		
Isophorone	.89798	.92254	2.74			
bis(2-Chloroethoxy)methane	.49629	.53830	8.47			
2,4-Dimethylphenol	.34275	.27932	18.51			
Benzoic Acid	.28274	.24926	11.84			
2,4-Dichlorophenol	.29035	.32147	10.72	*		
1,2,4-Trichlorobenzene	.32164	.33966	5.60			
Naphthalene	.84665	.92501	9.26			
4-Chloroaniline	.39615	.40815	3.03			
Hexachlorobutadiene	.18867	.19727	4.56	*		
4-Chloro-3-Methylphenol	.33811	.37759	11.68	*		
2-Methylnaphthalene	.49672	.55090	10.91			

RF - Response Factor from daily standard file at 25.00 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 (**)

1988

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 09/19/88

Contractor: Time: 12:19

Contract No: Laboratory ID:)E5623

Instrument ID: Initial Calibration Date: 09/19/88

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.34256	.34381	.36		**
2,4,6-Trichlorophenol	.31771	.37594	18.33	*	
2,4,5-Trichlorophenol	.31050	.37594	21.08		
2-Fluorobiphenyl	1.02332	1.09018	6.53		
2-Chloronaphthalene	1.06734	1.21139	13.50		
2-Nitroaniline	.64844	.65928	1.67		
Dimethylphthalate	1.15185	1.33718	16.09		
2,6-Dinitrotoluene	.37240	.41438	11.27		
Acenaphthylene	1.43234	1.67392	16.87		
3-Nitroaniline	.61164	.63407	3.67		
2,4-Dinitrophenol	.21222	.12281	42.13		**
Acenaphthene	1.00882	1.17692	16.66	*	
Dibenzofuran	1.48405	1.55024	4.46		
2,4-Dinitrotoluene	.35416	.39415	11.29		
4-Nitrophenol	.56574	.31555	44.22		**
Fluorene	1.16382	1.31997	13.42		
Diethylphthalate	1.29579	1.49884	15.67		
4-Chlorophenyl-phenylether	.47028	.53867	14.54		
4-Nitroaniline	.35809	.39547	10.44		
2,4,6-Tribromophenol	.18471	.15082	18.35		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.39351	.47145	19.81	*	
4,6-Dinitro-2-Methylphenol	.12828	.10952	14.62		
4-Bromophenyl-phenylether	.20837	.21622	3.77		
Hexachlorobenzene	.28398	.29194	2.80		
Pentachlorophenol	.19069	.14489	24.01	*	

RF - Response Factor from daily standard file at 25.00 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 (**)

1989

Continuing Calibration Check
HSL Compounds

Case No: ----------

Calibration Date: 09/19/88 ----------

Contractor: ----------

Time: 12:19 ----------

Contract No: ----------

Laboratory ID: >E5623 ----------

Instrument ID: ----------

Initial Calibration Date: 09/19/88 ----------

Minimum $\overline{RF}$ for SPCC is

Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	.91670	.97780	6.67		
Anthracene	.92993	1.06850	14.90		
Di-n-Butylphthalate	1.56546	1.73467	10.81		
4,4'-Dibromobiphenyl	1.36378	1.48760	9.08		
Fluoranthene	.99605	1.09483	9.92	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.21202	.05534	73.90		
Pyrene	1.43648	1.31088	8.74		
Terphenyl-d14	1.01113	.87947	13.02		
ButylBenzylphthalate	1.01773	1.03877	2.07		
3,3'-Dichlorobenzidine	.22856	.15299	33.06		
Chrysene	1.17468	1.12241	4.45		
Benzo(a)Anthracene	1.25941	1.10503	12.26		
bis(2-Ethylhexyl)Phthalate	1.25969	1.31705	4.55		
Di-n-octylphthalate	2.46859	2.87050	16.28	*	
Benzo(a)Pyrene	1.06996	1.11869	4.55	*	
Benzo(b)fluoranthene	1.46574	1.39482	4.84		
Indeno(1,2,3-cd)Pyrene	.70560	.46815	33.65		
Dibenzo(a,h)Anthracene	.64885	.59217	8.74		
Benzo(k)fluoranthene	1.00583	1.18467	17.78		
Benzo(g,h,i)Perylene	.49832	.38243	23.26		

RF - Response Factor from daily standard file at 25.00 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: 9/19/

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

Instrument ID:_____

		IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
12 HOUR STD		77914	8.44	279649	12.00	150572	17.4
UPPER LIMIT		155828		559298		301024	
LOWER LIMIT		38957		139824		75256	
EPA SAMPLE NO.							
ES634	01 88081693	97123	8.46	366041	11.97	207255	17.4
ES635	02 88081694	84433	8.47	324783	11.97	184340	17.4
	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 asteri

1991

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name:_____ Contract:_____

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

EPA Sample No.(Standard):_____ Date Analyzed: 9/14/88

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

Instrument ID: B

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS4(PRY) AREA #	RT
12 HOUR STD	~~256999~~ 230944	22.02	214589	30.41	169942	35.24
UPPER LIMIT	513898		429138		339884	
LOWER LIMIT	128474		107284		84971	
EPA SAMPLE NO.						
ES634 01	88081693	22.01	298279	30.40	165481	35.20
ES635 02	88081694	22.02	273392	30.42	174479	35.22
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 asteris

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

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

Instrument ID:CARBOPAK_____ Calibration Date(s):8/16/88

LAB FILE ID:47,48_____ Init. Calib. Date(s):8/15/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzyl chloride	0.08	0.17	-115.75
bis (2-chloroethoxy) methane	0.04		NA
bis (2-chloroisopropyl ether	0.26		NA
Bromobenzene	1.21	1.15	5.14
Bromodichloromethane	3.56	3.43	3.54
Bromoform	1.20	1.12	6.66
Bromomethane	0.18	0.20	-12.74
Carbon tetrachloride	3.18	2.97	6.49
Chloroacetaldehyde	ERR		ERR
Chlorobenzene	1.31	1.33	-1.30
Chloroethane	0.39	0.39	-0.37
Chloroform	4.53	4.26	5.97
1-Chlorohexane	0.92	0.86	6.98
2-Chloroethyl vinyl ether	0.04		NA
Chloromethane	0.22	0.32	-41.88
Chloromethyl methyl ether	0.17		NA
o-,m-,& p-Chlorotoluenes	3.99	3.54	11.41
Dibromochloromethane	3.57	3.46	3.20
Dibromomethane	2.98	2.61	12.37
1,2-Dichlorobenzene	2.35	2.30	2.09
1,3-Dichlorobenzene	1.97	1.95	1.15
1,4-Dichlorobenzene	2.38	2.23	6.35
Dichlorodifluormethane	0.54		NA
1,1-Dichloroethane	2.15	2.02	6.14
1,2-Dichloroethane	2.25	2.35	-4.50
1,1-Dichloroethylene	2.28	2.09	8.58
trans-1,2-dichloroethylene	1.64	1.60	2.32
Dichloromethane	6.37	3.32	47.81
1,2-Dichloropropane	2.06	1.81	12.27
1,3-Dichloropropylene	4.60	4.07	11.65
1,1,2,2-Tetrachloroethane	6.94	6.75	2.72
1,1,1,2-Tetrachloroethane	3.61	2.98	17.54
Tetrachloroethylene	6.94	6.75	2.77
1,1,1-Trichloroethane	2.21	2.13	3.84
1,1,2-Trichloroethane	4.60	4.07	11.55
Trichloroethylene	3.97	3.87	2.56
Trichlorofluormethane	1.90	1.70	10.43
Trichloropropane	3.59	3.11	13.28
Vinyl chloride	0.91	0.87	4.24

VOLATILE CONTINUING CALIBRATION CHECK

LabName:ENGINEERING SCIENCE Contract:

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

Instrument ID.:CAR Calibration Date(s): 8/16/88

LAB FILE ID: RRF 50 _47 Initcal: 8/15/88

COMPOUND	$\overline{RRF}$	RRF50.	%D
Benzene	4.25	3.05	-28.34
Chlorobenzene	4.97	4.74	-4.70
1,2_Dichlorobenzene	3.48	3.17	-8.95
1,3_Dichlorobenzene	3.91	3.53	-9.57
1,4_Dichorobenzene	3.65	3.24	-11.30
Ethyl Bezene	3.06	2.95	-3.71
Toluene	3.61	3.46	-4.31
Xylenes	11.65	9.50	-18.44

LATILE CONTINUING CALIBRATION CHECK

abName:_____ Contract:_____

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

strument ID:_CARBOPAK_____ Calibration Date(s):_8/17/88

LAB FILE ID:_66, 67_____ Init. Calib. Date(s):_8/15/88

COMPOUND	RRF	RRF50	%D
enzyl chloride	0.08	0.17	-112.50
is (2-chloroethoxy) ethane	0.04		100.00
s (2-chloroisopropyl ether	0.26		100.00
romobenzene	1.21	0.92	23.72
romodichloromethane	3.56	3.27	8.06
romoform	1.20	1.10	8.65
romomethane	0.18	0.23	-26.78
arbon tetrachloride	3.18	2.84	10.57
loroacetaldehyde	ERR		ERR
hlorobenzene	1.31	1.31	-0.30
hloroethane	0.39	0.48	-24.69
hloroform	4.53	3.93	13.32
-Chlorohexane	0.92	0.73	20.25
-Chloroethyl vinyl ether	0.04		NA
loromethane	0.22	0.30	-35.62
hloromethyl methyl ether	0.17		NA
,m-,& p-Chlorotoluene	3.99	3.17	20.56
ibromochloromethane	3.57	3.47	2.91
ibromomethane	2.98	2.03	31.88
,2-Dichlorobenzene	2.35	2.19	6.52
,3-Dichlorobenzene	1.97	1.85	6.25
,4-Dichlorobenzene	2.38	2.05	13.63
ichlorodifluoromethane	0.54		NA
,1-Dichloroethane	2.15	1.88	12.59
,2-Dichloroethane	2.25	2.18	3.39
,1-Dichloroethylene	2.28	2.00	12.52
rans-1,2-dichloroethylene	1.64	1.35	17.72
ichloromethane	6.37	3.37	47.17
,2-Dichloropropane	2.06	1.76	14.42
,3-Dichloropropylene	4.60	3.47	24.66
,1,2,2-Tetrachloroethane	6.94	6.32	8.91
,1,1,2-Tetrachloroethane	3.61	2.59	28.20
etrachloroethylene	6.94	6.32	8.89
1,1,1-Trichloroethane	2.21	2.01	9.27
1,2-Trichloroethane	4.60	3.63	21.02
richloroethylene	3.97	3.80	4.41
richlorofluoromethane	1.90	1.62	14.86
richloropropane	3.59	2.76	23.24
nyl chloride	0.91	0.86	5.78

ATILE CONTINUING CALIBRATION CHECK

Name: ENGINEERING SCIENCE Contract: _____

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

trument ID.: _____ Calibration Date(s): I 8/15/88 C 8/17/88

FILE ID: RRF 50 66 Init calib - 8/15/88

MPOUND	RRF	RRF50	%D
nzene	4.25	2.63	-38.14
lorobenzene	4.97	5.16	3.80
2_Dichlorobenzene	3.48	2.68	-23.12
3_Dichlorobenzene	3.91	2.99	-23.62
4_Dichlorobenzene	3.65	2.83	-22.39
hyl Benzene	3.06	3.04	-0.52
luene	3.61	3.47	-3.79
lenes	11.65	8.18	-29.78

DATA PACKAGE #32

This page intentionally left blank.

ES
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 soil sample received by this laboratory on 8-31-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092223	DANGB-2BH1-SS6-15-17'	BA-I	8-30-88		10-20-88	
88092223	DANGB-2BH1-SS6-15-17'	CD-F	8-30-88		10-20-88	
88092223	DANGB-2BH1-SS6-15-17'	CR-F	8-30-88		10-20-88	
88092223	DANGB-2BH1-SS6-15-17'	PB-F	8-30-88		10-26-88	
88092223	DANGB-2BH1-SS6-15-17'	418.1	8-30-88	9-22-88	9-23-88	
88092223	DANGB-2BH1-SS6-15-17'	MOIS	8-30-88		9-09-88	
88092223	DANGB-2BH1-SS6-15-17'	8010	8-30-88		9-09-88	9-11-88
88092223	DANGB-2BH1-SS6-15-17'	8020	8-30-88		9-09-88	9-11-88
88092223	DANGB-2BH1-SS6-15-17'	8270	8-30-88	9-10-88	10-20-88	
88092224	DANGB-2BH1-SS7-22-24'	BA-I	8-30-88		10-20-88	
88092224	DANGB-2BH1-SS7-22-24'	CD-F	8-30-88		10-20-88	
88092224	DANGB-2BH1-SS7-22-24'	CR-F	8-30-88		10-20-88	
88092224	DANGB-2BH1-SS7-22-24'	PB-F	8-30-88		10-25-88	
88092224	DANGB-2BH1-SS7-22-24'	418.1	8-30-88	9-22-88	9-23-88	
88092224	DANGB-2BH1-SS7-22-24'	MOIS	8-30-88		9-09-88	
88092224	DANGB-2BH1-SS7-22-24'	8010	8-30-88		9-11-88	9-09-88
88092224	DANGB-2BH1-SS7-22-24'	8020	8-30-88		9-11-88	9-09-88
88092224	DANGB-2BH1-SS7-22-24'	8270	8-30-88	9-10-88	10-22-88	

* If applicable

ES
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.
88092225	DANGB-2BH2-SS4-14-15'	BA-I	8-30-88		10-20-88	
88092225	DANGB-2BH2-SS4-14-15'	CD-F	8-30-88		10-20-88	
88092225	DANGB-2BH2-SS4-14-15'	CR-F	8-30-88		10-20-88	
88092225	DANGB-2BH2-SS4-14-15'	PB-F	8-30-88		10-17-88	
88092225	DANGB-2BH2-SS4-14-15'	418.1	8-30-88	9-22-88	9-23-88	
88092225	DANGB-2BH2-SS4-14-15'	MOIS	8-30-88		9-09-88	
88092225	DANGB-2BH2-SS4-14-15'	8010	8-30-88		9-11-88	9-09-88
88092225	DANGB-2BH2-SS4-14-15'	8020	8-30-88		9-11-88	9-09-88
88092225	DANGB-2BH2-SS4-14-15'	8270	8-30-88	9-10-88	10-20-88	
88092226	DANGB-2BH2-SS5-20-22'	BA-I	8-30-88		10-20-88	
88092226	DANGB-2BH2-SS5-20-22'	CD-F	8-30-88		10-20-88	
88092226	DANGB-2BH2-SS5-20-22'	CR-F	8-30-88		10-20-88	
88092226	DANGB-2BH2-SS5-20-22'	PB-F	8-30-88		10-25-88	
88092226	DANGB-2BH2-SS5-20-22'	418.1	8-30-88	9-22-88	9-23-88	
88092226	DANGB-2BH2-SS5-20-22'	MOIS	8-30-88		9-09-88	
88092226	DANGB-2BH2-SS5-20-22'	8010	8-30-88		9-10-88	9-11-88
88092226	DANGB-2BH2-SS5-20-22'	8020	8-30-88		9-10-88	9-11-88
88092226	DANGB-2BH2-SS5-20-22'	8270	8-30-88	10-29-88	11-02-88	
88092227	DANGB-2BH2-SS6-24-25'	BA-I	8-30-88		10-20-88	
88092227	DANGB-2BH2-SS6-24-25'	CD-F	8-30-88		10-20-88	
88092227	DANGB-2BH2-SS6-24-25'	CR-F	8-30-88		10-20-88	
88092227	DANGB-2BH2-SS6-24-25'	PB-F	8-30-88		10-20-88	
88092227	DANGB-2BH2-SS6-24-25'	418.1	8-30-88	9-22-88	9-23-88	
88092227	DANGB-2BH2-SS6-24-25'	MOIS	8-30-88		9-09-88	
88092227	DANGB-2BH2-SS6-24-25'	8010	8-30-88		9-10-88	9-11-88
88092227	DANGB-2BH2-SS6-24-25'	8020	8-30-88		9-10-88	9-11-88
88092227	DANGB-2BH2-SS6-24-25'	8270	8-30-88	9-10-88	10-22-88	

* If applicable

ANALYSIS REPORT

WORK ORDER NUMBER: 937
JOB NUMBER : ZB0000000440 APPROVED BY _____
WORK ORDER DATE : 09/01/88 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

ASK: 2, UNITS: mg/Kg

EST COMPOUND	DANGB,2BH1,SS6, 15-17' 88092223	DANGB,2BH1,SS7, 22-24' 88092224	DANGB,2BH2,SS4, 14-15' 88092225	DANGB,2BH2,SS5, 20-22' 88092226	DANGB,2BH2,SS6, 24-25' 88092227
ACID DIG SOIL	NA	NA	NA	NA	NA
BARIUM	67.5	44.5	62.1	94.1	25.4
CADMIUM	8.6N	7.8N	8.4N	6.3N	7.9N
CHROMIUM	30.3	34.6	28.4	24.8	24.9
LEAD	4.7	4.5N	11.3	4.1N	2.9

ND - Not Detected
NA - Not Analyzed

2001

ANALYSIS REPORT

)RK ORDER NUMBER: 937
)B NUMBER : ZB0000000440
)RK ORDER DATE : 09/01/88

APPROVED BY _____
Lab Supervisor

:PORT 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

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

ASK: 3, UNITS: mg/Kg

:ST COMPOUND	DANGB,2BH1,SS6, 15-17' 88092223	DANGB,2BH1,SS7, 22-24' 88092224	DANGB,2BH2,SS4, 14-15' 88092225	DANGB,2BH2,SS5, 20-22' 88092226	DANGB,2BH2,SS6, 24-25' 88092227
18.1 PETROLEUM HYDROCARBONS	<10	16	<10	NT	<10
MOISTURE	7.9	8.9	9.4	7.8	7.9

- Not Detected
T - Not Tested

ANALYSIS REPORT

ORK ORDER NUMBER: 937
OB NUMBER : ZB0000000440 APPROVED BY _____
WORK ORDER DATE : 09/01/88 Lab Supervisor

EPORT DATA:
S OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK 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/Kg, GROUP 8010

EST COMPOUND	DANGB,2BH1,SS6, 15-17' 88092223	DANGB,2BH1,SS7, 22-24' 88092224	DANGB,2BH2,SS4, 14-15' 88092225	DANGB,2BH2,SS5, 20-22' 88092226	DANGB,2BH2,SS6, 24-25' 88092227
ENZYL CHLORIDE	ND	ND	ND	ND	ND
IS (2-CHLOROETHOXY)METHANE	ND	ND	ND	ND	ND
IS (2-CHLOROISOPROPYL)ETHER	ND	ND	ND	ND	ND
BROMOBENZENE	ND	ND	ND	ND	ND
ROMODICHLOROMETHANE	ND	ND	ND	ND	ND
ROMOFORM	ND	ND	ND	ND	ND
BROMOETHANE	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND
HLORACETALDEHYDE	ND	ND	ND	ND	ND
HLORAL	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
HLOROFORM	0.44B	1.4B	1.7B	0.43B	0.33B
-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
HLOROTOLUENE	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND
IBROMOMETHANE	ND	ND	ND	ND	ND
,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-DICHLOROETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROETHANE	ND	ND	ND	ND	ND
,1-DICHLOROETHYLENE	ND	ND	ND	ND	ND
RANS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND	ND
ICHLOROMETHANE	21B	2.1B	1.5B	3.2B	1.9B
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 937

ST COMPOUND	DANGB,2BH1,SS6, 15-17' 88092223	DANGB,2BH1,SS7, 22-24' 88092224	DANGB,2BH2,SS4, 14-15' 88092225	DANGB,2BH2,SS5, 20-22' 88092226	DANGB,2BH2,SS6, 24-25' 88092227
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
TRACHLOROETHYLENE	ND	ND	ND	ND	ND
1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND
1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
ICHLOROETHYLENE	ND	ND	ND	ND	ND
ICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND
ICHLOROPROPANE	ND	ND	ND	ND	ND
NYL CHLORIDE	ND	ND	ND	ND	ND

- Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 937
OB NUMBER : ZB0000000440
WORK ORDER DATE : 09/01/88

APPROVED BY _____
Lab Supervisor

EPORT DATA:
S OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
OAK 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/Kg, GROUP 8020

EST COMPOUND	DANGB,2BH1,SS6, 15-17' 88092223	DANGB,2BH1,SS7, 22-24' 88092224	DANGB,2BH2,SS4, 14-15' 88092225	DANGB,2BH2,SS5, 20-22' 88092226	DANGB,2BH2,SS6, 24-25' 88092227
ENZENE	2.8	ND	ND	0.43	ND
HLOROBENZENE	ND	ND	ND	ND	ND
,2-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND
,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
THYL BENZENE	ND	0.44	ND	ND	ND
OLUENE	200	1.7	ND	4.0	11
XYLENES	ND	ND	ND	ND	ND

ND - Not Detected

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD 936-2 937-2

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	SOILS ANALYSES REQUIRED: SW8010, 8020	SW8080	SW8270	EPA 418.1	SW8010, 8020, 7191	SW7131, 7421,		REMARKS
8/30/88	1520	DANGB2BH2 SS1 0-2'	1	X							882220 936 6010 BA only ~~882211~~ D.F
	1520	2BH2 SS1 0-2'	1			X	X	X	X	D.F	
	1530	2BH2 SS2 5-6'	1	X							" 882221 ~~882212~~ B.F
	1530	2BH2 SS2 5-6'	1			X	X	X	X	D.F	
	1540	2BH2 SS3 10-12'	1	X							882222 ~~882213~~ B.F.
	1540	2BH2 SS3 10-12'	1			X	X	X	X	B.F	
	1545	2BH2 SS4 14-15'	1	X							937 882225 ~~882214~~ B.F.
	1545	2BH2 SS4 14-15'	1			X	X	X	X		
	1550	2BH2 SS5 20-22	1	X							882226 ~~882215~~ B.F
	1550	2BH2 SS5 20-22	1			X	X	X	X		
	1555	2BH2 SS6 24-25'	1	X							882227 ~~882216~~ B.F
	1555	2BH2 SS6 24-25	1			X	X	X	X		

9002

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
		Bill Hamilton	8-31-88 12:00	rec'd cold & intact first 3 samples logged in for 8010/8020 only as per P. Buxton

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD 936-1, 937-1

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

SAMPLER(S): (Signature) Jim Hardin, Rick Roddy

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

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	SW8080	SW8270	EPA 418.1	SW6010, 7190, 7191	SW7131, 7421,	REMARKS
8/30/88	1610	DANGB 2BH1 SS1 0-2	1	X						936 ~~882201 b.f.~~ 882215
	1610	" " SS1 0-2	1		X	X	X	X	b.f	
	1620	" " SS2 2-4	1	X						~~882205 b.f.~~ 882216
	1620	" " SS2 2-4	1		X	X	X	X	b.f	
	1630	" " SS4 8-10	1	X						~~882206 b.f.~~ 882217
	1630	" " SS4 8-10	1		X	X	X	X	b.f	
	1620	" " SS3 6-8	1	X						~~882207 b.f.~~ 882218
	1620	" " SS3 6-8	1		X	X	X	X	b.f	
	1640	" " SS5 10-12	1	X						882219 ~~882208 b.f.~~
	1640	" " SS5 10-12	1		X	X	X	X	b.f	
	1640	" " SS6 15-17	1	X						937 882220 ~~882209 b.f.~~
	1640	" " SS6 15-17	1		X	X	X	X		
	1650	" " SS7 22-24	1	X						882221 ~~882210 b.f.~~
	1650	" " SS7 22-24	1		X	X	X	X		

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Rick Roddy	8/30/88 18:00				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Bill Mountcastle	8.31.88 12:00	rec'd cold & intact — first 4 samples logged in for 8010 & 8020 only as per R. Buxton

2007

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD 936-1, 937-1

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

SAMPLER(S): (Signature) Jim Hardin, Bibb Rodds

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

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SOILS ANALYSES REQUIRED: SW8010, 8020	SW8080	SW8270	EPA 418.1	SW6010, 7190, 7191	SW7131, 7421,	REMARKS
4/30/88	1610	DANGB 2BH1 SS1 0-2	1	X						936 ~~882201~~ 882215
	1610	" " SS1 0-2	1		X	X	X	X	X	
	1620	" " SS2 2-4	1	X						~~882205~~ 882216
	1620	" " SS2 2-4	1		X	X	X	X	X	
	1630	" " SS4 8-10	1	X						~~882206~~ 882217
	1630	" " SS4 8-10	1		X	X	X	X	X	
	1620	" " SS3 6-8	1	X						~~882207~~ 882218
	1620	" " SS3 6-8	1		X	X	X	X	X	
	1640	" " SS5 10-12	1	X						882219 ~~882208~~
	1640	" " SS5 10-12	1		X	X	X	X	X	
	1640	" " SS6 15-17	1	X						937 882223 ~~882209~~
	1640	" " SS6 15-17	1		X	X	X	X		
	1650	" " SS7 22-24	1	X						882224 ~~882210~~
	1650	" " SS7 22-24	1		X	X	X	X		

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Bibb Rodds	4/30/88 18:00				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
			5/3/88 12:00	rec'd cold & intact — first 4 samples logged in for 8010 & 8020 only as per R. Buxton

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 8689885256

SENDER'S COPY

8689885256

Sender's Federal Express Account Number	Date
1196-42078	8-20-00

1 From (Your Name) Please Print: Mike Kidd — Your Phone Number (Very Important): [illegible]

Company: Engineering Science Inc — Department/Floor No.: [illegible]

Street Address: [illegible]

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

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

Company: Engineering Science Inc. — Department/Floor No.: [illegible]

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

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

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

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 (Fill 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	56		
1	39		
1	39		
Total 3	Total [illegible]	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

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 1/88
PRINTED IN U.S.A. GBFE

009

© 1988 F.E.C.

SENDER'S COPY

8689885256

2009

CASE NARRATIVE
EPA METHOD 8270 ANALYSIS
SAMPLE NO(S).: 88092223-88092227
WORK ORDER NO.: 937

These soil samples were received at the ES Berkeley Laboratory on 8-31-88. They were received cold and intact.

8270 analysis of matrix spikes showed recoveries for some of the spiked compounds that were higher than EPA QC limits in the MS. Several RPD's were also higher than EPA QC limits. Spiked blanks were analyzed. Results showed several recoveries and RPD's that were outside EPA QC limits. Since no target compounds were found in the samples associated with these matrix spikes, these high recoveries and poor precision should not adversely affect the sample results.

When samples 88092223 and 88092226 were first analyzed, two or more surrogate spike recoveries were outside of EPA QC limits. These samples were re-extracted out of holding time. Results for sample 88092223 did not change; this indicates a matrix effect. Surrogate spike recoveries for sample 88092226 were good in the second extract.

The first analysis of sample 88092224 resulted in low area counts for one or more internal standards. The sample was re-analyzed. Area counts for all internal standards were within EPA QC limits in the second analysis.

ANALYSIS REPORT

Borehole data

WORK ORDER NUMBER: 937
JOB NUMBER : ZB0000000440 APPROVED BY _____
WORK ORDER DATE : 09/01/88 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/Kg

TEST COMPOUND	DANGB,2BH1,SS6, 15-17' 88092223	DANGB,2BH1,SS7, 22-24' 88092224	DANGB,2BH2,SS4, 14-15' 88092225	DANGB,2BH2,SS5, 20-22' 88092226	DANGB,2BH2,SS6, 24-25' 88092227
ACID DIG SOIL	NA	NA	NA	NA	NA
BARIUM	67.5	44.5	62.1	94.1	25.4
CADMIUM	8.6N	7.8N	8.4N	6.3N	7.9N
CHROMIUM	30.3	34.6	28.4	24.8	24.9
LEAD	4.7	4.5N	11.3	4.1N	2.9

ND - Not Detected

2011

ANALYSIS REPORT

ORK ORDER NUMBER: 937
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/01/88

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/Kg

EST COMPOUND	DANGB,2BH1,SS6, 15-17' 88092223	DANGB,2BH1,SS7, 22-24' 88092224	DANGB,2BH2,SS4, 14-15' 88092225	DANGB,2BH2,SS5, 20-22' 88092226	DANGB,2BH2,SS6, 24-25' 88092227
18.1 PETROLEUM HYDROCARBONS	<10	16	<10	NT	<10
MOISTURE	7.9	8.9	9.4	7.8	7.9

- Not Detected

2012

ANALYSIS REPORT

WORK ORDER NUMBER: 937
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/01/88

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: ug/Kg, GROUP 8010

TEST COMPOUND	DANGB,2BH1,SS6, 15-17' 88092223	DANGB,2BH1,SS7, 22-24' 88092224	DANGB,2BH2,SS4, 14-15' 88092225	DANGB,2BH2,SS5, 20-22' 88092226	DANGB,2BH2,SS6, 24-25' 88092227
BENZYL CHLORIDE	ND	ND	ND	ND	ND
BIS (2-CHLOROETHOXY)METHANE	ND	ND	ND	ND	ND
BIS (2-CHLOROISOPROPYL)ETHER	ND	ND	ND	ND	ND
BROMOBENZENE	ND	ND	ND	ND	ND
BROMODICHLOROMETHANE	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
BROMOETHANE	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND
CHLORACETALDEHYDE	ND	ND	ND	ND	ND
CHLORAL	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
CHLOROFORM	0.44B	1.4B	1.7B	0.43B	0.33B
1-CHLOROHEXANE	ND	ND	ND	ND	ND
2-CHLOROETHYL VINYL ETHER	ND	ND	ND	ND	ND
CHLOROMETHANE	ND	ND	ND	ND	ND
CHLOROMETHYL METHYL ETHER	ND	ND	ND	ND	ND
CHLOROTOLUENE	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND
DIBROMOMETHANE	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
DICHLORODIFLUOROMETHANE	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	21B	2.1B	1.5B	3.2B	1.9B
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 937

EST COMPOUND	DANGB,2BH1,SS6, 15-17' 88092223	DANGB,2BH1,SS7, 22-24' 88092224	DANGB,2BH2,SS4, 14-15' 88092225	DANGB,2BH2,SS5, 20-22' 88092226	DANGB,2BH2,SS6, 24-25' 88092227
,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

WORK ORDER NUMBER: 937
JOB NUMBER : ZB0000000440 APPROVED BY _____
WORK ORDER DATE : 09/01/88 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/Kg, GROUP 8020

TEST COMPOUND	DANGB,2BH1,SS6, 15-17' 88092223	DANGB,2BH1,SS7, 22-24' 88092224	DANGB,2BH2,SS4, 14-15' 88092225	DANGB,2BH2,SS5, 20-22' 88092226	DANGB,2BH2,SS6, 24-25' 88092227
BENZENE	2.8	ND	ND	0.43	ND
CHLOROBENZENE	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
ETHYL BENZENE	ND	0.44	ND	ND	ND
TOLUENE	200	1.7	ND	4.0	11
XYLENES	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 937
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/01/88

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/Kg

EST COMPOUND	DANGB,2BH1,SS6, 15-17' 88092223	DANGB,2BH1,SS7, 22-24' 88092224	DANGB,2BH2,SS4, 14-15' 88092225	DANGB,2BH2,SS5, 20-22' 88092226	DANGB,2BH2,SS6, 24-25' 88092227
CID DIG SOIL	NA	NA	NA	NA	NA
ARIUM	67.5	44.5	62.1	94.1	25.4
ADMIUM	8.6N	7.8N	8.4N	6.3N	7.9N
HROMIUM	30.3	34.6	28.4	24.8	24.9
EAD	4.7	4.5N	11.3	4.1N	2.9

- Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 937
OB NUMBER : ZB0000000440
WORK ORDER DATE : 09/01/88

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: NA

EST COMPOUND	DANGB,2BH1,SS6, 15-17' 88092223	DANGB,2BH1,SS7, 22-24' 88092224	DANGB,2BH2,SS4, 14-15' 88092225	DANGB,2BH2,SS5, 20-22' 88092226	DANGB,2BH2,SS6, 24-25' 88092227
18.1 PETROLEUM HYDROCARBONS	ND	ND	ND	ND	ND
MOISTURE	7.9	8.9	9.4	7.8	7.9

ND - Not Detected

ANALYSIS REPORT

)RK ORDER NUMBER: 937
)B NUMBER : ZB0000000440
)RK ORDER DATE : 09/01/88

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/Kg, GROUP 8010

ST COMPOUND	DANGB,2BH1,SS6, 15-17' 88092223	DANGB,2BH1,SS7, 22-24' 88092224	DANGB,2BH2,SS4, 14-15' 88092225	DANGB,2BH2,SS5, 20-22' 88092226	DANGB,2BH2,SS6, 24-25' 88092227
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
ARBON 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	0.44B	1.4B	1.7B	0.43B	0.33B
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	21B	2.1B	1.5B	3.2B	1.9B
2-DICHLOROPROPANE	ND	ND	ND	ND	ND

- Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 937

TEST COMPOUND	DANGB,2BH1,SS6, 15-17' 88092223	DANGB,2BH1,SS7, 22-24' 88092224	DANGB,2BH2,SS4, 14-15' 88092225	DANGB,2BH2,SS5, 20-22' 88092226	DANGB,2BH2,SS6, 24-25' 88092227
1,3-DICHLOROPROPYLENE	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
1,1,1,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
TETRACHLOROETHYLENE	ND	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
TRICHLOROETHYLENE	ND	ND	ND	ND	ND
TRICHLOROFLUOROMETHANE	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: 937
)B NUMBER : ZB0000000440
)RK ORDER DATE : 09/01/88

APPROVED BY _____
Lab Supervisor

:PORT 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

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

\SK: 4, UNITS: ug/Kg, GROUP 8020

:ST COMPOUND	DANGB,2BH1,SS6, 15-17' 88092223	DANGB,2BH1,SS7, 22-24' 88092224	DANGB,2BH2,SS4, 14-15' 88092225	DANGB,2BH2,SS5, 20-22' 88092226	DANGB,2BH2,SS6, 24-25' 88092227
:NZENE	2.8	ND	ND	0.43	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
:HYL BENZENE	ND	0.44	ND	ND	ND
)LUENE	200	1.7	ND	4.0	11
'LENES	ND	ND	ND	ND	ND

) - Not Detected

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

Date Received: August 31, 1988
Date Reported: December 8, 1988

Work Order: 937
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:	88092227
Sample No.:	DANGB-2BH2-SS6- 24-25'
Date Sampled:	8-30-88
Time Sampled:	15:55
Date Extracted:	9-10-88
Date Analyzed:	10-22-88
Percent Moisture:	8

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
1,3-Dichlorobenzene	330	ND
1,4-Dichlorobenzene	330	ND
Hexachloroethane	330	ND
Bis(2-chloroethyl)ether	330	ND
1,2-Dichlorobenzene	330	ND
N-Nitrosodimethylamine	330	ND
Bis(2-chloroisopropyl)ether	330	ND
N-Nitrosodi-n-propylamine	330	ND
Hexachlorobutadiene	330	ND
1,2,4-Trichlorobenzene	330	ND
Nitrobenzene	330	ND
Isophorone	330	ND
Naphthalene	330	ND
Bis(2-chloroethoxy)methane	330	ND
2-Chloronaphthalene	330	ND
Hexachlorocyclopentadiene	330	ND
Acenaphthylene	330	ND
Acenaphthene	330	ND
Dimethyl phthalate	330	ND
2,6-Dinitrotoluene	330	ND
Fluorene	330	ND
2,4-Dinitrotoluene	330	ND
Diethyl phthalate	330	ND
N-Nitrosodiphenylamine	330	ND
Hexachlorobenzene	330	ND

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

ate Received: August 31, 1988
ate Reported: December 8, 1988

Work Order: 937
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:	88092227
ample No.:	DANGB-2BH2-SS6- 24-25'
ate Sampled:	8-30-88
ime Sampled:	15:55
ate Extracted:	9-10-88
ate Analyzed:	10-22-88
ercent Moisture:	8

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
nenanthrene	330	ND
nthracene	330	ND
ibutyl phthalate	330	ND
luoranthene	330	ND
-Chlorophenyl phenyl ether	330	ND
yrene	330	ND
ıtyl Benzyl phthalate	330	ND
is(2-ethylhexyl) phthalate	330	ND
ırysene	330	ND
-Bromophenyl phenyl ether	330	ND
enzo(a)anthracene	330	ND
i-n-octylphthalate	330	ND
enzo(b)fluoranthene	330	ND
enzo(k)fluoranthene	330	ND
enzidine	2000	ND
,3'-Dichlorobenzidine	660	ND
enzo(a)pyrene	330	ND
ndeno(1,2,3-cd)pyrene	330	ND
ibenzo(a,h)anthracene	330	ND
enzo(ghi)perylene	330	ND
enzyl Alcohol	660	ND

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

Date Received: August 31, 1988
Date Reported: December 8, 1988

Work Order: 937
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:	88092227
Sample No.:	DANGB-2BH2-SS6- 24-25'
Date Sampled:	8-30-88
Time Sampled:	15:55
Date Extracted:	9-10-88
Date Analyzed:	10-22-88
Percent Moisture:	8

Compound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg
Acetophenone	--*	ND
Aniline	--*	ND
4-Aminobiphenyl	--*	ND
4-Chloroaniline	660	ND
1-Chloronaphthalene	--*	ND
Dibenzofuran	330	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	330	ND
1-Naphthylamine	--*	ND
2-Naphthylamine	--*	ND
2-Nitroaniline	1600	ND
3-Nitroaniline	1600	ND
4-Nitroaniline	1600	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

2023

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

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

ate Received: August 31, 1988
ate Reported: December 8, 1988

Work Order: 937
Job Number: OR001

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

ATTN:Mr. Bill Hayden

ab Number:	88092227
ample No.:	DANGB-2BH2-SS6- 24-25'
ate Sampled:	8-30-88
ime Sampled:	15:55
ate Extracted:	9-10-88
ate Analyzed:	10-22-88
ercent Moisture:	8

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
lpha-BHC	--*	ND
amma-BHC	--*	ND
eta-BHC	660	ND
eptachlor	330	ND
elta-BHC	500	ND
ldrin	330	ND
eptachlor epoxide	330	ND
ndosulfan I	--*	ND
eldrin	500	ND
,4'-DDE	1000	ND
ndrin	--*	ND
ndosulfan II	--*	ND
,4'-DDD	500	ND
,4'-DDT	830	ND
ndosulfan Sulfate	1000	ND
ndrin aldehyde	--*	ND
ndrin Ketone	--*	ND
lordane	2000	ND
ethoxychlor	--*	ND
oxaphene	2000	ND
roclor-1016	2000	ND
roclor-1221	2000	ND
roclor-1232	2000	ND
roclor-1242	2000	ND
roclor-1248	2000	ND
roclor-1254	2000	ND
roclor-1260	2000	ND

2024

EPA has not yet determined detection limits for these compounds.

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

Date Received: August 31, 1988
Date Reported: December 8, 1988

Work Order: 937
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:	88092227
Sample No.:	DANGB-2BH2-SS6- 24-25'
Date Sampled:	8-30-88
Time Sampled:	15:55
Date Extracted:	9-10-88
Date Analyzed:	10-22-88
Percent Moisture:	8

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
2-Chlorophenol	330	ND	
2-Nitrophenol	330	ND	
Phenol	330	ND	
2,4-Dimethylphenol	330	ND	
2,4-Dichlorophenol	330	ND	
2,4,6-Trichlorophenol	330	ND	
4-Chloro-3-methylphenol	660	ND	
2,4-Dinitrophenol	1600	ND	
2,6-Dichlorophenol	--*	ND	
4-Methyl-4,6-Dinitrophenol	1600	ND	
Pentachlorophenol	1600	ND	
4-Nitrophenol	1600	ND	
Benzoic Acid	1600	ND	
2-Methylphenol	330	ND	
3- & 4-Methylphenol	330	ND	
2,3,4,6-Tetrachlorophenol	--*	ND	
2,4,5-Trichlorophenol	330	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: Soil

Date Received: August 31, 1988
Date Reported: December 8, 1988

Work Order: 937
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:	88092225	88092226
Sample No.:	DANGB-2BH2-SS4- 14-15'	DANGB-2BH2-SS5- 20-22'
Date Sampled:	8-30-88	8-30-88
Time Sampled:	15:45	15:50
Date Extracted:	9-10-88	10-29-88
Date Analyzed:	10-20-88	11-02-88
Percent Moisture:	9	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-propylamine	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 31, 1988
Date Reported: December 8, 1988

Work Order: 937
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:	88092225	88092226
Sample No.:	DANGB-2BH2-SS4- 14-15'	DANGB-2BH2-SS5- 20-22'
Date Sampled:	8-30-88	8-30-88
Time Sampled:	15:45	15:50
Date Extracted:	9-10-88	10-29-88
Date Analyzed:	10-20-88	11-02-88
Percent Moisture:	9	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	ND	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	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	2000	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 31, 1988
Date Reported: December 8, 1988

Work Order: 937
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:	88092225	88092226
Sample No.:	DANGB-2BH2-SS4- 14-15'	DANGB-2BH2-SS5- 20-22'
Date Sampled:	8-30-88	8-30-88
Time Sampled:	15:45	15:50
Date Extracted:	9-10-88	10-29-88
Date Analyzed:	10-20-88	11-02-88
Percent Moisture:	9	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 31, 1988
Date Reported: December 8, 1988

Work Order: 937
Job Number: OR001

FOR: ES:Oak Ridge/Duluth 4NGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN:Mr. Bill Hayden

Lab Number:	88092225	88092226
Sample No.:	DANGB-2BH2-SS4- 14-15'	DANGB-2BH2-SS5- 20-22'
Date Sampled:	8-30-88	8-30-88
Time Sampled:	15:45	15:50
Date Extracted:	9-10-88	10-29-88
Date Analyzed:	10-20-88	11-02-88
Percent Moisture:	9	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 31, 1988
Date Reported: December 8, 1988

Work Order: 937
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:	88092225	88092226
Sample No.:	DANGB-2BH2-SS4- 14-15'	DANGB-2BH2-SS5- 20-22'
Date Sampled:	8-30-88	8-30-88
Time Sampled:	15:45	15:50
Date Extracted:	9-10-88	10-29-88
Date Analyzed:	10-20-88	11-02-88
Percent Moisture:	9	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

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: Soil

Date Received: August 31, 1988
Date Reported: December 8, 1988

Work Order: 937
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:	88092223	88092224
Sample No.:	DANGB-2BH1-SS6- 15-17'	DANGB-2BH1-SS7- 22-24'
Date Sampled:	8-30-88	8-30-88
Time Sampled:	16:40	16:50
Date Extracted:	9-10-88	9-10-88
Date Analyzed:	10-20-88	10-22-88
Percent Moisture:	8	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-propylamine	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)

ate Received: August 31, 1988 Work Order: 937
ate Reported: December 8, 1988 Job Number: OR001

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

ab Number:	88092223	88092224
ample No.:	DANGB-2BH1-SS6- 15-17'	DANGB-2BH1-SS7- 22-24'
ate Sampled:	8-30-88	8-30-88
ime Sampled:	16:40	16:50
ate Extracted:	9-10-88	9-10-88
ate Analyzed:	10-20-88	10-22-88
ercent Moisture:	8	9

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
ienanthrene	330	ND	ND
nthracene	330	ND	ND
ibutyl phthalate	330	ND	ND
luoranthene	330	ND	ND
-Chlorophenyl phenyl ether	330	ND	ND
yrene	330	ND	ND
ityl Benzyl phthalate	330	ND	ND
is(2-ethylhexyl) phthalate	330	ND	ND
rysene	330	ND	ND
-Bromophenyl phenyl ether	330	ND	ND
enzo(a)anthracene	330	ND	ND
i-n-octylphthalate	330	ND	ND
enzo(b)fluoranthene	330	ND	ND
enzo(k)fluoranthene	330	ND	ND
enzidine	2000	ND	ND
,3'-Dichlorobenzidine	660	ND	ND
enzo(a)pyrene	330	ND	ND
ndeno(1,2,3-cd)pyrene	330	ND	ND
ibenzo(a,h)anthracene	330	ND	ND
enzo(ghi)perylene	330	ND	ND
enzyl Alcohol	660	ND	ND

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

Date Received: August 31, 1988
Date Reported: December 8, 1988

Work Order: 937
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:	88092223	88092224
Sample No.:	DANGB-2BH1-SS6- 15-17'	DANGB-2BH1-SS7- 22-24'
Date Sampled:	8-30-88	8-30-88
Time Sampled:	16:40	16:50
Date Extracted:	9-10-88	9-10-88
Date Analyzed:	10-20-88	10-22-88
Percent Moisture:	8	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

ate Received: August 31, 1988
ate Reported: December 8, 1988

Work Order: 937
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:	88092223	88092224
ample No.:	DANGB-2BH1-SS6- 15-17'	DANGB-2BH1-SS7- 22-24'
ate Sampled:	8-30-88	8-30-88
ime Sampled:	16:40	16:50
ate Extracted:	9-10-88	9-10-88
ate Analyzed:	10-20-88	10-22-88
ercent Moisture:	8	9

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
lpha-BHC	--*	ND	ND
amma-BHC	--*	ND	ND
eta-BHC	660	ND	ND
eptachlor	330	ND	ND
elta-BHC	500	ND	ND
ldrin	330	ND	ND
eptachlor epoxide	330	ND	ND
ndosulfan I	--*	ND	ND
ieldrin	500	ND	ND
,4'-DDE	1000	ND	ND
ndrin	--*	ND	ND
ndosulfan II	--*	ND	ND
,4'-DDD	500	ND	ND
,4'-DDT	830	ND	ND
ndosulfan Sulfate	1000	ND	ND
ndrin aldehyde	--*	ND	ND
ndrin Ketone	--*	ND	ND
nlordane	2000	ND	ND
ethoxychlor	--*	ND	ND
oxaphene	2000	ND	ND
roclor-1016	2000	ND	ND
roclor-1221	2000	ND	ND
roclor-1232	2000	ND	ND
roclor-1242	2000	ND	ND
roclor-1248	2000	ND	ND
roclor-1254	2000	ND	ND
roclor-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 31, 1988
Date Reported: December 8, 1988

Work Order: 937
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:	88092223	88092224
Sample No.:	DANGB-2BH1-SS6- 15-17'	DANGB-2BH1-SS7- 22-24'
Date Sampled:	8-30-88	8-30-88
Time Sampled:	16:40	16:50
Date Extracted:	9-10-88	9-10-88
Date Analyzed:	10-20-88	10-22-88
Percent Moisture:	8	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.

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.

ATILE CONTINUING CALIBRATION CHECK

Name:_____ Contract:_____

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

rument ID:_carbopak_____ Calibration Date(s):_9/9/88

AB FILE ID:__32,33_____ Init. Calib. Date(s):9/2/88, 9/2/88

MPOUND	$\overline{RRF}$	RRF50	%D
nyl chloride_____	0.08		100.00
s (2-chloroethoxy) thane_____	0.04		100.00
s (2-chloroisopropyl) ier_____	0.26		100.00
omobenzene_____	1.17	1.05	9.96
modichloromethane_____	4.54	3.64	19.79
omoform_____	3.48	2.92	15.85
momethane_____	0.38	0.16	59.02
bon tetrachloride_____	4.58	4.07	11.05
oroacetaldehyde_____	ERR		ERR
orobenzene_____	1.48	1.43	3.42
oroethane_____	0.58	0.51	12.49
oroform_____	4.89	3.83	21.82
hloroheyene_____	1.02	0.94	8.50
hloroethyl vinyl ether_	0.04		100.00
oromethane_____	0.49	0.18	3.31
oromethyl methyl ether_	0.17		100.00
m_,& p_Chlorotoluenes_	4.06	3.84	5.58
romochloromethane_____	5.29	3.82	27.84
romomethane_____	3.56	2.27	36.17
2_Dichloropentane_____	2.72	2.65	2.76
3_Dichlorobenzene_____	2.42	2.23	7.90
4_Dichlorobenzene_____	2.36	2.20	7.02
hlorodifluoromethane_____	0.54		100.00
1_Dichloroethane_____	2.58	2.01	22.05
2_Dichloroethane_____	3.23	2.67	17.10
1_Dichloroethylene_____	2.79	2.23	20.06
ns_1,2_dichloroethylene	2.99	2.28	23.89
hloromethane_____	3.07	2.92	4.83
2_Dichloropropane_____	2.67	2.22	16.72
2_Dichloropropylene_____	5.98	4.81	19.49
1,2,2_Tetrachloroethane_	9.09	8.89	2.25
1,1,2_Tetrachloroethane_	4.51	4.27	5.25
achloroethylene_____	9.10	8.89	2.26
1,1_Trichloroethane_____	3.43	2.79	18.68
1,2_Trichloroethane_____	5.98	4.81	19.57
richlorofluoromethane_____	4.32	3.90	9.92
richloropropane_____	2.76	1.98	28.25
richloropropene_____	3.33	2.90	12.98
yl ether_____	1.43	0.58	59.78

LATILE CONTINUING CALIBRATION CHECK

bName: ENGINEERING SCIENCE_____ Contract: _____

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

strument ID.: carbopak Calibration Date(s): 9/9/88 _____

B FILE ID: RRF 50 __32_____ Int cal = 9/2/88

OMPOUND	$\overline{RRF}$	RRF50	%D
enzene	5.93	4.74	-20.08
hlorobenzene	4.90	4.91	0.27
2_Dichlorobenzene	3.97	3.78	-4.72
3_Dichlorobenzene	4.57	4.52	-1.06
,4_Dichorobenzene	3.83	3.43	-10.32
thyl Benzene	3.32	3.74	12.62
oluene	3.79	3.70	-2.49
ylenes	12.16	11.87	-2.39

ATILE ORGANICS INITIAL CALIBRATION DATA

Name:_____ Contract:_____

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

trument ID.:Carbopak_ Calibration Date(s):_9/1/88____ _9/0/88____

AB FILE ID: RRF10=_65,53_____ RRF20=____66,54_____
RF 50=67,50_____ RRF100=68,55_____ RRF200=69,56_____

MPOUND	RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$	%RSD
nzyl chloride	0.08	0.04	0.09	0.10	0.08	0.08	29.24
s (2-chloroethoxy) methane	0.03	0.03	0.05	0.04	0.06	0.04	31.04
s (2-chloroisopropyl ether	0.24	0.27	0.26	0.24	0.30	0.26	9.50
omobenzene	0.44	0.68	1.03	1.22	1.32	0.94	39.54
omodichloromethane	3.79	3.48	3.61	4.00	3.63	3.70	5.42
omoform	2.25	1.96	2.54	3.19	2.99	2.59	19.57
omomethane	0.28	0.31	0.40	0.44	0.48	0.38	22.24
rbon tetrachloride	4.25	4.11	4.03	4.41	3.97	4.15	4.27
loroacetaldehyde	0.001	0.002	0.001	0.0005	0.0003	0.001	69
lorobenzene	1.39	1.18	1.31	1.49	1.36	1.35	8.60
loroethane	0.57	0.54	0.54	0.63	0.64	0.58	8.24
loroform	4.93	4.13	4.29	4.41	3.84	4.32	9.34
Chorohexane	0.61	0.78	0.96	1.01	1.07	0.89	21.17
Chloroethyl vinyl ether	0.03	0.03	0.05	0.04	0.06	0.04	31.04
loromethane	0.59	0.43	0.49	0.45	0.51	0.49	13.01
loromethyl methyl ether	0.13	0.21	0.22	0.16	0.15	0.17	24.46
,m_,& p_Chlorotoluenes	3.37	3.66	3.96	4.07	4.08	3.83	8.12
oromochloromethane	3.96	3.88	3.85	4.37	4.09	4.03	5.24
bromomethane	1.33	2.21	2.44	2.59	2.68	2.25	24.09
2_Dichlorobenzene	2.96	2.45	2.49	2.71	2.47	2.61	8.49
3_Dichlorobenzene	2.39	2.02	2.12	2.37	2.16	2.21	7.34
4_Dichlorobenzene	2.32	2.02	1.94	2.12	1.94	2.07	7.82
chlorodifluoromethane	0.51	0.49	0.50	0.57	0.64	0.54	11.63
1_Dichloroethane	2.68	1.55	2.27	2.51	2.24	2.25	19.09
2_Dichloroethane	3.25	2.55	2.74	3.01	2.70	2.85	9.73
1_Dichloroethylene	3.11	2.14	2.73	3.08	2.78	2.77	14.04
ans_1,2_dichloroethylene	2.89	1.89	2.52	2.75	2.44	2.50	15.38
chloromethane	2.25	1.57	1.58	1.75	1.65	1.76	16.07
2_Dichloropropane	2.75	2.32	2.38	2.64	2.33	2.48	7.93
3_Dichloropropylene	4.03	4.73	4.91	4.99	4.88	4.71	8.29
1,2,2_Tetrachloroethane	8.36	7.95	7.17	7.99	7.25	7.74	6.61
1,1,2_Tetrachloroethane	4.18	4.44	4.50	4.20	4.13	4.29	3.94
trachloroethylene	8.36	7.95	7.17	7.99	7.25	7.74	6.63
1,1_Trichloroethane	3.32	2.93	2.96	3.20	2.90	3.06	6.11
1,2_Trichloroethane	4.03	4.73	4.91	4.99	4.88	4.71	8.30
ichloroethylene	5.82	4.32	4.39	4.66	3.90	4.62	15.77
ichlorofluoromethane	2.50	2.90	2.83	2.77	2.53	2.71	6.66
richloropropane	2.58	2.66	2.88	3.00	2.96	2.86	5.72
nyl chloride	1.37	1.59	1.41	1.39	1.40	1.43	6.11

ATILE ORGANICS INITIAL CALIBRATION DATA

Name: ENGINEERING SCIENCE_____ Contract:_____

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

strument ID.: carbopak Calibration Date(s): 9/11/88 _____

AB FILE ID: RRF 10 ___65_____ RRF 20 _____66_____
RF 50=___67_____ RRF100=____68_____ RRF200=_____69_____

OMPOUND	RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$	%RSD
nzene	9.89	7.66	5.81	4.63	4.12	6.42	36.93
lorobenzene	4.47	4.47	4.40	5.14	4.77	4.65	6.63
,2_Dichlorobenzene	7.66	5.59	4.98	4.66	4.55	5.49	23.33
,3_Dichlorobenzene	3.83	8.30	10.85	7.09	5.82	7.18	36.73
,4_Dichlorobenzene	3.51	4.31	4.91	4.02	4.90	4.33	13.82
hyl Benzene	6.70	5.27	3.77	3.48	3.64	4.57	30.43
oluene	4.79	3.67	3.57	3.83	3.56	3.88	13.29
lenes	39.57	25.69	17.17	14.33	13.18	21.99	49.94

This page intentionally left blank.

DATA PACKAGE #33

This page intentionally left blank.

ES
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 9-12-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092321	DANGB-4-MW21-GW1	BA-I	9-10-88		10-18-88	
88092321	DANGB-4-MW21-GW1	CD-F	9-10-88		10-24-88	
88092321	DANGB-4-MW21-GW1	CR-F	9-10-88		11-01-88	
88092321	DANGB-4-MW21-GW1	PB-F	9-10-88		10-20-88	
88092321	DANGB-4-MW21-GW1	418.1	9-10-88	9-29-88	10-05-88	
88092321	DANGB-4-MW21-GW1	8010	9-10-88		9-16-88	9-15-88
88092321	DANGB-4-MW21-GW1	8020	9-10-88		9-16-88	9-15-88
88092322	DANGB-4-MW24-GW1	BA-I	9-10-88		10-18-88	
88092322	DANGB-4-MW24-GW1	CD-F	9-10-88		10-24-88	
88092322	DANGB-4-MW24-GW1	CR-F	9-10-88		11-01-88	
88092322	DANGB-4-MW24-GW1	PB-F	9-10-88		10-20-88	
88092322	DANGB-4-MW24-GW1	418.1	9-10-88	9-29-88	10-05-88	
88092322	DANGB-4-MW24-GW1	8010	9-10-88		9-16-88	9-15-88
88092322	DANGB-4-MW24-GW1	8020	9-10-88		9-16-88	9-15-88
88092323	DANGB-8-GW8B-GW1	BA-I	9-10-88		10-18-88	
88092323	DANGB-8-GW8B-GW1	CD-F	9-10-88		10-24-88	
88092323	DANGB-8-GW8B-GW1	CR-F	9-10-88		11-01-88	
88092323	DANGB-8-GW8B-GW1	PB-F	9-10-88		10-20-88	
88092323	DANGB-8-GW8B-GW1	418.1	9-10-88	9-29-88	10-05-88	
88092323	DANGB-8-GW8B-GW1	8010	9-10-88		9-20-88	9-15-88
88092323	DANGB-8-GW8B-GW1	8020	9-10-88		9-20-88	9-15-88
88092323	DANGB-8-GW8B-GW1	8080	9-10-88	9-15-88	10-16-88	

* 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.
88092324	DANGB-BR3	BA-I	9-10-88		10-18-88	
88092324	DANGB-BR3	CD-F	9-10-88		10-24-88	
88092324	DANGB-BR3	CR-F	9-10-88		11-01-88	
88092324	DANGB-BR3	PB-F	9-10-88		10-20-88	
88092324	DANGB-BR3	418.1	9-10-88	9-29-88	10-05-88	
88092324	DANGB-BR3	8010	9-10-88		9-20-88	9-15-88
88092324	DANGB-BR3	8020	9-10-88		9-20-88	
88092324	DANGB-BR3	8080	9-10-88	9-15-88	10-16-88	10-19-88
88092325	DANGB-4-MW22-GW1	BA-I	9-10-88		10-18-88	
88092325	DANGB-4-MW22-GW1	CD-F	9-10-88		10-24-88	
88092325	DANGB-4-MW22-GW1	CR-F	9-10-88		11-01-88	
88092325	DANGB-4-MW22-GW1	PB-F	9-10-88		10-20-88	
88092325	DANGB-4-MW22-GW1	418.1	9-10-88	9-29-88	10-05-88	
88092325	DANGB-4-MW22-GW1	8010	9-10-88		9-20-88	9-15-88
88092325	DANGB-4-MW22-GW1	8020	9-10-88		9-20-88	
88092327	DANGB-8-GW8A-GW1	BA-I	9-10-88		10-18-88	
88092327	DANGB-8-GW8A-GW1	CD-F	9-10-88		10-24-88	
88092327	DANGB-8-GW8A-GW1	CR-F	9-10-88		11-01-88	
88092327	DANGB-8-GW8A-GW1	PB-F	9-10-88		10-20-88	
88092327	DANGB-8-GW8A-GW1	418.1	9-10-88	9-29-88	10-05-88	
88092327	DANGB-8-GW8A-GW1	8010	9-10-88		9-20-88	9-15-88
88092327	DANGB-8-GW8A-GW1	8020	9-10-88		9-20-88	
88092327	DANGB-8-GW8A-GW1	8080	9-10-88	9-15-88	10-16-88	10-19-88

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092321-88092325, 88092327
WORK ORDER NO.: 962

These water samples were received at the ES Berkeley Laboratory on 9-12-88. They were received cold and intact.

462

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 601	EPA 625	EPA 418.1	SW 8010, 7040, 7131	SW7421, 7470	SW8310, 9315	SM429	REMARKS
9-10-88	0730	DANGB-BR3	5	X								882324
9-10-88	0900	DANGB-FB2	2	X								882328
9-10-88	0915	DANGB-4-MW22-GW-1	5	X								882325
9-10-88	1015	DANGB-4-MW21-GW-1	5	X								DW9112/88 ~~882322~~ 882321
9-10-88	1120	DANGB-4-MW24-GW-1	5	X								882322
9-10-88	1310	DANGB-8-GW8B-GW-1	5	X								882323
9-10-88	1510	DANGB-8-GW8A-GW-1	5	X								882327
9-7-88	0430	DANGB-TB2	3	X								882329

9402

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	9-10-88 1900	Fed Ex Airbill # 9403142546			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Judie Arnold Smith	09/12/88 9:30	Samples received cold and intact.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

DRAFT

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

962

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 Dan				

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8240, 8020	EPA 601	EPA 625	EPA 418.1	SW 8015, Tables 7131	SW7421, 7470, 7471	SW9030, 9315	SM423	REMARKS
9-10-88	1015	DANGB-4-MW21-GW-1	4				X	X	X			382321
9-10-88	1120	DANGB-4-MW24-GW-1	4				X	X	X			~~382323~~ LW 9/19/88 382322
9-10-88	1310	DANGB-4-GW4B-GW-1	4				X	X	X			382323

2047

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Robert L Dan	9-10-88 1700	Fed Ex Airbill # 9490 314256			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
			09/12 9:30	Samples received cold and intact.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

962

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

SAMPLER(S): (Signature) Robert L. Dean

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, 7060, 7131	SW7421, 7470, 7191	SW9310, 9315	SM426	REMARKS
9-7-88	0730	DANGB-BR3	4				X	X	X			received 4 amb 382333 382333
9-10-88	0915	DANGB-4-MW22-GW-1	4				X	X	X			382335

2048

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Robert L Dean	9-10-88 1700	Fed Ex Airbill # 4490314256			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Jackie Harold Sinton Jr.	09/12/1988 9:30	Samples received cold and intact.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

DRAFT

ENGINEERING SCIENCE

962

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: SW8240, 8020	EPA 608	EPA 625	EPA 418.1	SW 8010, 7000, 7131	SW7421, 7470-7191	SW9250, 9315	SM426	REMARKS
9-10-88	1310	DANGB-8-GW8B-GW-1	2		X							~~482326~~ 882323 DW 9/8/88
9-10-88	1510	DANGB-8-GW8A-GW-1	6		X		X	X	X			882327

2049

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	9-10-88 1700	Fed Express 4490314 2			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
			9/12/88 7:30	Samples received cold and intact

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

ANALYSIS REPORT

ORK ORDER NUMBER: 962
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/12/88

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 # : 30R001
ONTACT : BILL HAYDEN
(615)-481-3920

ASK: 2, UNITS: mg/L

EST COMPOUND	DANGB-4-MW21-GW-1 88092321	DANGB-4-MW24-GW-1 88092322	DANGB-E-GW8B-GW-1 88092323	DANGB-BR3 88092324	DANGB-4-MW22-GW-1 88092325	DANGB-8-GW8A-GW-1 88092327
CID DIG FLAME	NA	NA	NA	NA	NA	NA
CID DIG FURNACE	NA	NA	NA	NA	NA	NA
ARIUM	0.06BN	<0.05N	0.05BN	0.05BN	0.11BN	0.01BN
ADMIUM	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
HROMIUM	<0.002	0.0024 B	<0.002	<0.002	0.0029B	<0.002
EAD	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

: - Not Detected
- Not Applicable

ANALYSIS REPORT

WORK ORDER NUMBER: 962
JOB NUMBER : Z80000000440 APPROVED BY _____
WORK ORDER DATE : 09/12/88 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 # : 30R001
CONTACT : BILL HAYDEN
(615)-481-3920

TASK: 3, UNITS: mg/L

TEST COMPOUND	DANGB-4-MW21-GW-1 88092321	DANGB-4-MW24-GW-1 88092322	DANGB-8-GW8B-GW-1 88092323	DANGB-BR3 88092324	DANGB-4-MW22-GW-1 88092325	DANGB-8-GW8A-GW-1 88092327
418.1 PETROLEUM HYDROCARBONS	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5

ND - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 962
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/12/88

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 # : 3OR001
ONTACT : BILL HAYDEN
(615)-481-3920

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

EST COMPOUND	DANGB-4-MW21-GW-1 88092321	DANGB-4-MW24-GW-1 88092322	DANGB-8-GW8B-GW-1 88092323	DANGB-BR3 88092324	DANGB-4-MW22-GW-1 88092325	DANGB-8-GW8A-GW-1 88092327
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	0.18	ND	0.59B	0.23B	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
.BROMOCHLOROMETHANE	ND	ND	ND	ND	ND	ND
BROMOMETHANE	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
CHLORODIFLUOROMETHANE	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
.ANS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
CHLOROMETHANE	2.6B	4.1B	0.46B	1.7B	0.69B	1.6B
2-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND

) - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 962

TEST COMPOUND	DANGB-4-MW21-GW-1 88092321	DANGB-4-MW24-GW-1 88092322	DANGB-8-GW8B-GW-1 88092323	DANGB-BR3 88092324	DANGB-4-MW22-GW-1 88092325	DANGB-8-GW8A-GW-1 88092327
1,3-DICHLOROPROPYLENE	ND	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
1,1,1,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
TETRACHLOROETHYLENE	ND	ND	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
TRICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
TRICHLOROFLUOROMETHANE	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 962

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

EST COMPOUND	DANGB-FB6 88092328	DANGB-TB3 88092329
ENZYL CHLORIDE	ND	ND
IS (2-CHLOROETHOXY)METHANE	ND	ND
IS (2-CHLOROISOPROPYL)ETHER	ND	ND
ROMOBENZENE	ND	ND
ROMODICHLOROMETHANE	ND	ND
ROMOFORM	ND	ND
ROMOETHANE	ND	ND
ARBON TETRACHLORIDE	ND	ND
HLORACETALDEHYDE	ND	ND
HLORAL	ND	ND
HLOROBENZENE	ND	ND
HLOROETHANE	ND	ND
HLOROFORM	16	ND
-CHLOROHEXANE	ND	ND
-CHLOROETHYL VINYL ETHER	ND	ND
HLOROMETHANE	ND	ND
HLOROMETHYL METHYL ETHER	ND	ND
HLOROTOLUENE	ND	ND
IBROMOCHLOROMETHANE	ND	ND
IBROMOMETHANE	ND	ND
,2-DICHLOROBENZENE	ND	ND
,3-DICHLOROBENZENE	ND	ND
,4-DICHLOROBENZENE	ND	ND
ICHLORODIFLUOROMETHANE	ND	ND
,1-DICHLOROETHANE	ND	ND
,2-DICHLOROETHANE	ND	ND
,1-DICHLOROETHYLENE	ND	ND
RANS-1,2-DICHLOROETHYLENE	ND	ND
ICHLOROMETHANE	1.4B	1.4B
,2-DICHLOROPROPANE	ND	ND
,3-DICHLOROPROPYLENE	ND	ND
,1,2,2-TETRACHLOROETHANE	ND	ND
,1,1,2-TETRACHLOROETHANE	ND	ND
ETRACHLOROETHYLENE	ND	ND
,1,1-TRICHLOROETHANE	ND	ND
,1,2-TRICHLOROETHANE	ND	ND
RICHLOROETHYLENE	ND	ND
RICHLOROFLUOROMETHANE	ND	ND
RICHLOROPROPANE	ND	ND
INYL CHLORIDE	ND	ND

) - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 962
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/12/88

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 # : 3OR001
CONTACT : BILL HAYDEN
(615)-481-3920

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

TEST COMPOUND	DANGB-4-MW21-GW-1 88092321	DANGB-4-MW24-GW-1 88092322	DANGB-8-GW8B-GW-1 88092323	DANGB-BR3 88092324	DANGB-4-MW22-GW-1 88092325	DANGB-8-GW8A-GW-1 88092327
BENZENE	22	ND	ND	ND	ND	ND
CHLOROBENZENE	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
ETHYL 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 962

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

	DANGB-FB6	DANGB-TB3
EST COMPOUND	88092328	88092329
ENZENE	ND	ND
HLOROBENZENE	ND	ND
,2-DICHLOROBENZENE	ND	ND
,3-DICHLOROBENZENE	ND	ND
,4-DICHLOROBENZENE	ND	ND
THYL BENZENE	ND	ND
OLUENE	ND	ND
YLENES	ND	ND

) - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 962
JOB NUMBER : ZB0000000440 APPROVED BY _____
WORK ORDER DATE : 09/12/88 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 # : 30R001
CONTACT : BILL HAYDEN
(615)-481-3920

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

TEST COMPOUND	DANGB-8-GW8B-GW-1 88092323	DANGB-BR3 88092324	DANGB-8-GW8A-GW-1 88092327
ALDRIN	ND	ND	ND
ALPHA-BHC	ND	ND	ND
BETA-BHC	ND	ND	ND
DELTA-BHC	ND	ND	ND
GAMMA-BHC	ND	ND	ND
CHLORDANE	ND	ND	ND
4,4'-DDD	ND	ND	ND
4,4'-DDE	ND	ND	ND
4,4'-DDT	ND	ND	ND
DIELDRIN	ND	ND	ND
ENDOSULFAN I	ND	ND	ND
ENDOSULFAN II	ND	ND	ND
ENDOSULFAN SULFATE	ND	ND	ND
ENDRIN	ND	ND	ND
ENDRIN ALDEHYDE	NA	NA	NA
HEPTACHLOR	ND	ND	ND
HEPTACHLOR EPOXIDE	ND	ND	ND
KEPONE	ND	ND	ND
METHOXYCHLOR	ND	ND	ND
TOXAPHENE	ND	ND	ND
PCB-1016	ND	ND	ND
PCB-1221	ND	ND	ND
PCB-1232	ND	ND	ND
PCB-1242	ND	ND	ND
PCB-1248	ND	ND	ND
PCB-1254	ND	ND	ND
PCB-1260	ND	ND	ND

ND - Not Detected

NA - Not Analyzed

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, 88092256, 88092303-88092306
88092312-88092317, 88092321-88092327

QC Report No: ICP-C-0051-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-08-88
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	Duplicate RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery 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	

8502

N - See Legend attached.

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

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

QC Report No: AAF-W-0032-88
Sample Matrix: Water
Date Received: 10-01-88
Date Reported: 11-07-88
Dilution Factor: NA

Project: Duluth ANGB

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88092256, 88092303-88092306, 88092291-88092293
88092312-88092316, 88092321-88092327

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	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	

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
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									
8897092321	Benzene	10	20	30.8	108	30.8	108	0	20	56-146
	Toluene	10	ND	10.7	107	9.72	97	10	41	82-150
	Chlorobenzene	10	ND	10.1	101	9.37	94	7	36	76-133

2060

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.: OR004

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

Project: Duluth ANGB

Report for Laboratory Sample No(s):
88092322-88092325
88092327-88092332
88092348-88092356, 88092388

QC Report No: VGC-W-0051-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: NA
Date Prepared: NA
Date Analyzed: 9-26-88
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									
4,388	1,1-Dichloroethane	10	ND	9.50	95	9.36	94	2	26	70-130
	Trichloroethene	10	ND	11.3	113	10.8	108	5	19	65-131
	Chlorobenzene	10	ND	11.4	114	11.2	112	2	40	59-137
	Aromatics: 8020									
4,388	Benzene	10	ND	11.1	111	11.3	113	2	20	56-146
	Toluene	10	ND	11.4	114	11.6	116	2	41	42-150
	Chlorobenzene	10	ND	10.5	105	11.2	112	6	36	76-133

1902 2091

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.
82	9-20-88	VGC	Carbopack	75-09-2	Dichloromethane	1.4	0.25	88092323-88092325
				67-66-3	Chloroform	0.42	0.05	88092327
35	9-15-88	VGC	Carbopack	75-09-2	Dichloromethane	1.4	0.25	88092322 88092328-88092332
50	9-16-88	VGC	Carbopack	75-09-2	Dichloromethane	4.6	0.25	88092321
				67-66-3	Chloroform	0.44	0.05	

2902

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.: QC-W-0034-88
QC Sample No.: 8809230b
Level (Low/Med): Low
Date Reported: 11-11-88

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s).:
88092303-88092306, 88092291-88092293
88092423-88092427, 88092313-88092317
88092323-88092327

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	200	ND	ND	NC*	56-123
Heptachlor epoxide	200	ND	0.200	100	40-131
Aldrin	200	ND	0.226	113	40-120
Dieldrin	500	ND	0.577	115	52-126
Endrin	500	ND	0.516	103	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	ND	NC*	NC*	NC*	15	56-123
Heptachlor epoxide	0.191	96	100	5	20	40-131
Aldrin	0.187	94	113	19	22	40-120
Dieldrin	0.478	96	115	19*	18	52-126
Endrin	0.465	93	103	10	21	56-121
4,4'-DDT	0.317	63	78	20	27	38-127

- Column to be used to flag recovery and RPD values with an asterisk
* - Values outside of QC limits
NC - Not Calculated

RPD: 2 out of 6 outside limits

Spike Recovery: 2 out of 12 outside limits

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-0034-88B
QC Sample No.: Blank
Level (Low/Med): Low
Date Reported: 11-11-88

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s).:
88092303-88092306, 88092291-88092303
88092313-88092317, 88092323-88092324
88092327, 88092423-88092427

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	200	ND	0.177	89	56-123
Heptachlor epoxide	200	ND	0.194	97	40-131
Aldrin	200	ND	0.181	91	40-120
Dieldrin	500	ND	0.487	97	52-126
Endrin	500	ND	0.458	92	56-121
4,4'-DDT	500	ND	0.388	78	38-127

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.0110	6*	89	179*	15	56-123
Heptachlor epoxide	0.0141	7*	97	180*	20	40-131
Aldrin	ND	NC*	91	NC*	22	40-120
Dieldrin	0.0333	7*	97	177*	18	52-126
Endrin	0.0322	6*	92	176*	21	56-121
4,4'-DDT	0.0279	6*	78	171*	27	38-127

- Column to be used to flag recovery and RPD values with an asterisk
* - Values outside of QC limits
NC - Not Calculated
RPD: 6 out of 6 outside limits

Spike Recovery: 6 out of 12 outside limits

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: OCP-W-0034-88
QC REPORT NO.: OCP-W-0034-88B

Analysis of matrix spikes showed lindane to be not quantifiable because it was swamped by an interference. The RPD for dieldrin was slightly higher than EPA QC guidelines. When spiked blanks were analyzed, an interference made the aldrin response not quantifiable. In addition, the blank spike recoveries were essentially twice what they should have been, while recoveries from the duplicate were close to zero. This suggests that the blank spike was spiked twice and the duplicate not at all. However, when the data associated with these analyses were closely examined, no analytical errors 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:	11-11-88
Project:	Duluth ANGB		
Date Extracted:	9-15-88		
Date Analyzed (1):	10-15-88	Date Analyzed (2):	10-19-88
Time Analyzed (1):	14:15	Time Analyzed (2):	20:14
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
-	88092313	10-15-88	88092313	10-19-88
-	88092314	10-15-88	88092324	10-19-88
-	88092315	10-15-88	88092327	10-19-88
-	88092316	10-15-88		
-	88092317	10-15-88		
-	88092323	10-15-88		
-	88092324	10-15-88		
-	88092327	10-15-88		

ALL CONTRACT 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):
88092223-88092227
88092244-88092255

QC Report No: TPH-S-0075-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: NA
Date Prepared: 9-22-88
Date Analyzed: 9-23-88
Date Reported: 11-02-88
Dilution Factor: NA
%Moisture: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<10	8.6J	39.5	38.5	76	37.5	73	3	*

2087

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
J See Legend attached.
* The reporting limit for the sample in this batch is provided by the sub-contract laboratory.

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

MS = Spike Sample
MSD = Spike Duplicate

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

Percent Recovery (PR) = SSR - SR x 100

SR = Sample Result
SA = Spike Added (Concentration)

File: CONTCAL
24 Oct 88

50.V
9/20/88

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

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

Instrument ID.: CARbopak Calibration Date(s): 9/20/89 _____

LAB FILE ID: 77 , 78 Init. Calib. Date(s): 9/13/89 9/14/89

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzyl chloride	0.32	0.16	50
bis (2-chloroethoxy methane	—	—	—
bis (2-chloroisopropyl ether	—	—	—
Bromobenzene	1.0	1.2	20
Bromodichloromethane	3.7	4.2	14
Bromoform	1.9	2.3	21
Bromomethane	0.20	0.19	5
Carbon tetrachloride	4.2	4.8	14
Chloroacetaldehyde	—		
Chlorobenzene	1.4	1.6	14
Chloroethane	0.72	0.59	18
Chloroform	3.4	4.8	11
1-Chorohexane	0.87	1.0	15
2-Chloroethyl vinyl ether	—	—	—
Chloromethane	0.47	0.44	6
Chloromethyl methyl ether	—	—	—
o_,m_,& p_Chlorotoluenes	3.5	4.1	22
Dibromochloromethane	3.7	4.4	19
Dibromomethane	2.4	2.6	8
1,2_Dichlorobenzene	2.5	2.9	16
1,3_Dichlorobenzene	2.1	2.5	19
1,4_Dichlorobenzene	2.1	2.4	14
Dichlorodifluormethane	—	—	—
1,1_Dichloroethane	2.4	2.5	4
1,2_Dichloroethane	2.6	2.6	0
1,1_Dichloroethylene	2.6	2.7	4
trans_1,2_dichloroethylene	2.4	2.7	13
Dichloromethane	4.1	3.3	20
1,2_Dichloropropane	2.4	2.7	13
1,3_Dichloropropylene	4.5	5.2	16
1,1,2,2_Tetrachloroethane	7.5	8.4	12
1,1,1,2_Tetrachloroethane	4.1	4.5	10
Tetrachloroethylene	7.5	8.4	12
1,1,1_Trichloroethane	3.0	3.4	13
1,1,2_Trichloroethane	4.5	5.2	16
Trichloroethylene	4.0	4.5	13
Trichlorofluormethane	2.3	2.4	4
Trichloropropane	2.0	2.3	15
Vinyl chloride	0.94	0.94	0

50V
9/20/88

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): 9/20/89 _____

LAB FILE ID: 77 Init. Calib. Date(s): 9/13/89 _____

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	4.9	4.5	8
Chlorobenzene	53	52	2
1,2_Dichlorobenzene	4.7	4.7	0
1,3_Dichlorobenzene	4.7	4.2	11
1,4_Dichorobenzene	4.6	3.7	8
Ethyl Benzene	3.4	3.4	0
Toluene	3.9	4.0	3
Xylenes	12	13	8

This page intentionally left blank.

DATA PACKAGE #34

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 9-10-88 and 9-12-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092312	DANGB-4-MW23-GW1	BA-I	9-09-88		10-17-88	
88092312	DANGB-4-MW23-GW1	CD-F	9-09-88		10-24-88	
88092312	DANGB-4-MW23-GW1	CR-F	9-09-88		10-28-88	
88092312	DANGB-4-MW23-GW1	PB-F	9-09-88		10-20-88	
88092312	DANGB-4-MW23-GW1	418.1	9-09-88	9-28-88	10-05-88	
88092312	DANGB-4-MW23-GW1	8010	9-09-88		9-16-88	9-14-88
88092312	DANGB-4-MW23-GW1	8020	9-09-88		9-16-88	
88092313	DANGB-8-GW8C-GW1	BA-I	9-09-88		10-17-88	
88092313	DANGB-8-GW8C-GW1	CD-F	9-09-88		10-24-88	
88092313	DANGB-8-GW8C-GW1	CR-F	9-09-88		10-28-88	
88092313	DANGB-8-GW8C-GW1	PB-F	9-09-88		10-20-88	
88092313	DANGB-8-GW8C-GW1	8010	9-09-88		9-16-88	9-14-88
88092313	DANGB-8-GW8C-GW1	8020	9-09-88		9-16-88	
88092313	DANGB-8-GW8C-GW1	8080	9-09-88	9-15-88	10-16-88	10-19-88
88092314	DANGB-8-MW17-GW1	BA-I	9-09-88		10-17-88	
88092314	DANGB-8-MW17-GW1	CD-F	9-09-88		10-24-88	
88092314	DANGB-8-MW17-GW1	CR-F	9-09-88		10-28-88	
88092314	DANGB-8-MW17-GW1	PB-F	9-09-88		10-20-88	
88092314	DANGB-8-MW17-GW1	418.1	9-09-88	9-28-88	10-05-88	
88092314	DANGB-8-MW17-GW1	8010	9-09-88		9-16-88	9-15-88
88092314	DANGB-8-MW17-GW1	8020	9-09-88		9-16-88	
88092314	DANGB-8-MW17-GW1	8080	9-09-88	9-15-88	10-16-88	10-19-88

* 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.
88092315	DANGB-8-MW16-GW1	BA-I	9-09-88		10-17-88	
88092315	DANGB-8-MW16-GW1	CD-F	9-09-88		10-24-88	
88092315	DANGB-8-MW16-GW1	CR-F	9-09-88		10-28-88	
88092315	DANGB-8-MW16-GW1	PB-F	9-09-88		10-20-88	
88092315	DANGB-8-MW16-GW1	418.1	9-09-88	9-28-88	10-05-88	
88092315	DANGB-8-MW16-GW1	8010	9-09-88		9-16-88	9-15-88
88092315	DANGB-8-MW16-GW1	8020	9-09-88		9-16-88	
88092315	DANGB-8-MW16-GW1	8080	9-09-88	9-15-88	10-16-88	10-19-88
88092316	DANGB-BR2	BA-I	9-09-88		10-17-88	
88092316	DANGB-BR2	CD-F	9-09-88		10-24-88	
88092316	DANGB-BR2	CR-F	9-09-88		10-28-88	
88092316	DANGB-BR2	PB-F	9-09-88		10-20-88	
88092316	DANGB-BR2	418.1	9-09-88	9-28-88	10-05-88	
88092316	DANGB-BR2	8010	9-09-88		9-16-88	9-15-88
88092316	DANGB-BR2	8020	9-09-88		9-16-88	
88092316	DANGB-BR2	8080	9-09-88	9-15-88	10-16-88	10-19-88
88092317	DANGB-8-MW15-GW1	BA-I	9-09-88		10-17-88	
88092317	DANGB-8-MW15-GW1	CD-F	9-09-88		10-24-88	
88092317	DANGB-8-MW15-GW1	CR-F	9-09-88		10-28-88	
88092317	DANGB-8-MW15-GW1	PB-F	9-09-88		10-26-88	
88092317	DANGB-8-MW15-GW1	418.1	9-09-88	9-28-88	10-05-88	
88092317	DANGB-8-MW15-GW1	8010	9-09-88		9-16-88	9-15-88
88092317	DANGB-8-MW15-GW1	8020	9-09-88		9-16-88	
88092317	DANGB-8-MW15-GW1	8080	9-09-88	9-15-88	10-16-88	10-19-88

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092312-88092317
WORK ORDER NO.: 960

These water samples were received at the ES Berkeley Laboratory on 9-10-88 and 9-12-88. They were received cold and intact.

ENGINEERING-SCIENCE INC. PAGE 1
11/21/88

ANALYSIS REPORT

)RK ORDER NUMBER: 960
)B NUMBER : Z80000000440 APPROVED BY _____
)RK ORDER DATE : 09/12/88 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: 2, UNITS: mg/L

:ST COMPOUND	DANGB-4-MW23-GW-1 88092312	DANGB-8-GW8C-GW-1 88092313	DANGB-8-MW17-GW-1 88092314	DANGB-8-MW16-GW-1 88092315	DANGB-BR2 88092316	DANGB-8-MW15-GW-1 88092317
:ID DIG FLAME	NA	NA	NA	NA	NA	NA
:ID DIG FURNACE	NA	NA	NA	NA	NA	NA
\RIUM	0.14	0.22N	0.15BN	<0.05N	<0.05N	<0.05N
\DMIUM	<0.001	<0.001	<0.001	<0.001	<0.001 W	<0.001W
\ROMIUM	0.0024 B	0.0027B	0.0027 B	0.0021B	<0.002	<0.002W
:AD	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

- Not Detected

A - Not Analyzed

ANALYSIS REPORT

WORK ORDER NUMBER: 960
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/12/88

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-4-MW23-GW-1 88092312	DANGB-8-GW8C-GW-1 88092313	DANGB-8-MW17-GW-1 88092314	DANGB-8-MW16-GW-1 88092315	DANGB-BR2 88092316	DANGB-8-MW15-GW-1 88092317
418.1 PETROLEUM HYDROCARBONS	<1.5	NT	<1.5	<1.5	<1.5	<1.5

ND - Not Detected
NT - Not Tested

ANALYSIS REPORT

ORK ORDER NUMBER: 960
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/12/88

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-4-MW23-GW-1 88092312	DANGB-8-GW8C-GW-1 88092313	DANGB-8-MW17-GW-1 88092314	DANGB-8-MW16-GW-1 88092315	DANGB-BR2 88092316	DANGB-8-MW15-GW-1 88092317
ENZYL CHLORIDE	ND	ND	ND	ND	ND	ND
IS (2-CHLOROETHOXY)METHANE	ND	ND	ND	ND	ND	ND
S (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	0.16B	0.14B	0.65B	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
BROMOCHLOROMETHANE	ND	ND	ND	ND	ND	ND
BROMOMETHANE	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
CHLORODIFLUOROMETHANE	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
ANS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
CHLOROMETHANE	5.3B	2.2B	0.77B	0.12B	6.6B	2.8B
2-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND

- Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 960

TEST COMPOUND	DANGB-4-MW23-GW-1 88092312	DANGB-8-GW8C-GW-1 88092313	DANGB-8-MW17-GW-1 88092314	DANGB-8-MW16-GW-1 88092315	DANGB-BR2 88092316	DANGB-8-MW15-GW-1 88092317
1,3-DICHLOROPROPYLENE	ND	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
1,1,1,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
TETRACHLOROETHYLENE	ND	ND	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
TRICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
TRICHLOROFLUOROMETHANE	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: 960
)B NUMBER : ZB0000000440
)RK ORDER DATE : 09/12/88

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-4-MW23-GW-1 88092312	DANGB-8-GW8C-GW-1 88092313	DANGB-8-MW17-GW-1 88092314	DANGB-8-MW16-GW-1 88092315	DANGB-BR2 88092316	DANGB-8-MW15-GW-1 88092317
: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

WORK ORDER NUMBER: 960
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/12/88

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-8-GW8C-GW-1 88092313	DANGB-8-MW17-GW-1 88092314	DANGB-8-MW16-GW-1 88092315	DANGB-BR2 88092316	DANGB-8-MW15-GW-1 88092317
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

ND - Not Detected
NA - Not Analyzed

(Sol.)

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

960,963 Just print labels Sol 5

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

SAMPLER(S): (Signature) Kholy L. Dan

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 8010, 7060, 7151	SW7421, 7470	SW9310, 9315	SM429	REMARKS
9-9-88	0730	DANGB-BR2	5	X								882316
9-7-88	0930	0 DANGB-TB2	3	X								882330
9-9-88	0830	0 DANGB-FB4	2	X								882331
9-9-88	0840	DANGB-8-MW15-GW-1	5	X								882317
9-9-88	0930	0 DANGB-FB5	2	X								882332
9-9-88	0940	DANGB-8-MW17-GW-1	5	X								882314 ~~882313~~ JM
9-9-88	1100	DANGB-8-MW16-GW-1	5	X								882315 ~~882314~~
9-9-88	1330	DANGB-4-MW~~24~~-GW-1 ~~B20 EW 9/12/88~~	5	X								882312
9-9-88	1445	DANGB-8-GW8C-GW-1	5	X								882313

2202

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)
Kholy L. Dan	9-9-88 1400	FedEx Air Bill # 9490314293			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Jacqueline Hawkins	09/12/1988 14:00	Samples received cold and intact.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

ENGINEERING-SCIENCE

960

CHAIN OF CUSTODY RECORD

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

SAMPLER(S): (Signature) Kathy L Dean

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

DATE	TIME	SAMPLE DESCRIPTION (≤3 R.E 4-10-88)	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8020, 8020	EPA 608	EPA 625	EPA 418.1	SW 8010, 7000, 7131 (+Cd)	SW7421, 7420, 7191	SW9310, 9315	SM420	REMARKS
9-9-88	1330	DANGB-4-MW21-GW-1	4				X	X	X			~~882311~~ 882312
9-9-88	1415	DANGB-8-GW8C-GW-1	6		X		X	X	X			882313
9-9-88	1330	DANGB-4-MW23-GW-1										~~882314~~

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Kathy L Dean	9-9-88 1800	Fed Ex Air Bill # 9490314293			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Kathy Cardoza	9-10-88 11:00	Sample description on Custody sheet was not the same as on sample itself.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

2083

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) Richard L. Dunn				

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 601	EPA 625	EPA 418.1	SW 8010, 7000, 7131	SW7421, 7420, 7191	SW3510, 9315	SM429	REMARKS
9-9-88	0730	DANGB-1BR2	6		X		X	X	X			882316
9-9-88	0840	DANGB-8-MW15-GW-1	6		X		X	X	X			882317

2084

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Richard L. Dunn	9-9-88 1000	FedEx Airbill # 7490314293			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Cindy Faulkner	9-10-88 11:00	SAMPLES RECEIVED COLD AND INTACT.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

960

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

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

SAMPLER(S): (Signature) Kimberly 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, 7000 KLD	SW7421, 7470 5191	SW9310, 9315	SM426	REMARKS
9-7-88	0940	DANGB-8-MW17-GW-1	6		X		X	X	X			882314
9-8-88	1100	DANGB-8-MW16-GW-1	6		X		X	X	X			882315

3802

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Kimberly L. Davis	9-9-88 1800	Fed Ex Airbill # 949031429 3			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Rudy Chelson	9-10-88 11:00	Samples Received Cold and intact.

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 9490314293

9490314293

9 4 9 0 3 1 4 2 9 3

Sender's Federal Express Account Number: 1196-4207-8
Date: 9/9/88

From (Your Name) Please Print: Kim Davis
Your Phone Number (Very Important): (615) 481 3920
Company: Engineering-Science, Inc.
Department/Floor No: Ste F-103
Street Address: 710 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): (415) SA8 7990
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.): CR-001

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

PAYMENT ☐ Bill Sender ☐ Bill Recipient's FedEx Acct. No. Fill in Account Number below ☐ Bill 3rd Party FedEx Acct. No. Fill in Account Number below ☐ Bill Credit Card Fill in Credit Card Number below ☐ Cash

5 SERVICES	DELIVERY AND SPECIAL HANDLING	PACKAGES	WEIGHT	YOUR DECLARED VALUE (See right)	
1 ☒ PRIORITY 1 Overnight Delivery	1 ☐ HOLD FOR PICK-UP	1	52		
2 ☐ COURIER-PAK OVERNIGHT ENVELOPE*	2 ☐ DELIVER WEEKDAY	1	50		
3 ☐ OVERNIGHT BOX	3 DELIVER SATURDAY ☑	1	14		
4 ☐ OVERNIGHT TUBE	4 ☐ DANGEROUS GOODS	1	013		
5 ☐ STANDARD AIR Delivery not later than second business day	5 ☐ CONSTANT SURVEILLANCE SERVICE (CSS)	Total 4	Total 159	Total	
6 ☐ OVERNIGHT LETTER*	6 ☐ DRY ICE ____ Lbs				
7 ☐	7 ☐ OTHER SPECIAL SERVICE				
8 ☐	8 ☐				
9 ☐	9 ☐				
10 ☐	10 ☐				
	11 ☐				
	12 ☐ HOLIDAY DELIVERY				

* Declared Value Limit $100

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 $ 00 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, [illegible] of the package as well as for loss of [illegible] profit, interest, profit, attorneys' fees, costs and other forms of damages whether direct, incidental, consequential or special is limited to the greater of $100 or the declared value for which you paid a higher value.

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: _____

$16.19
9/9 1724

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

ORIGIN COPY

9802

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: QCP U-0051-88
Sample Matrix: Water
Conc. Unit: mg/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 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	88092291	88092291	10-17-88	10-14-88	6010	<0.2	<0.05	<0.05	NC	2.0	<0.05	1.38	69N	

2087

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

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: AAF-W-0032-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-01-88
Date Reported: 11-07-88
Dilution Factor: NA

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092256, 88092303-88092306, 88092291-88092293
88092312-88092316, 88092321-88092327

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	

8802

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: AAF-W-0031-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 8-31-88
Date Reported: 11-07-88
Dilution Factor: NA

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092348-88092350, 88092354-88092355, 88092317
88092388-88092390, 88092422-88092427, 88092189

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	88082189	88082189	10-26-88	10-18-88	7060	<0.010	<0.005	<0.005	NC	0.040	<0.005	0.0517	129N	
Chromium	88082189	88082189	10-26-88	10-18-88	6010	<0.005	<0.002	<0.002	NC	20.0	<0.002	21.6	108	
Lead	88082189	88082189	10-25-88	10-18-88	7421	<0.010	<0.005	<0.005	NC	0.020	<0.005	0.0227	114	

6802

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

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:

0603

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	10.3	103	10.7	107	2	40	59-137
	Aromatics: 8020									
8897092321	Benzene	10	20	30.8	108	30.8	108	0	20	56-146
	Toluene	10	ND	10.7	107	9.72	97	10	41	82-150
	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

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).:
88092303-88092306, 88092291-88092293
88092423-88092427, 88092313-88092317
88092323-88092327

QC Report No.: OCP-W-0034-88
QC Sample No.: 88092306
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	ND	NC*	56-123
Heptachlor epoxide	200	ND	0.200	100	40-131
Aldrin	200	ND	0.226	113	40-120
Dieldrin	500	ND	0.577	115	52-126
Endrin	500	ND	0.516	103	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	ND	NC*	NC*	NC*	15	56-123
Heptachlor epoxide	0.191	96	100	5	20	40-131
Aldrin	0.187	94	113	19	22	40-120
Dieldrin	0.478	96	115	19*	18	52-126
Endrin	0.465	93	103	10	21	56-121
4,4'-DDT	0.317	63	78	20	27	38-127

\# - Column to be used to flag recovery and RPD values with an asterisk
* - Values outside of QC limits
NC - Not Calculated

RPD: 2 out of 6 outside limits

2091

Spike Recovery: 2 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-0034-88B
QC Sample No.: Blank
Level (Low/Med): Low
Date Reported: 11-11-88

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s).:
88092303-88092306, 88092291-88092293
88092313-88092317, 88092323-88092324
88092327, 88092425 88092427

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/L)	MS Conc. In Extract (ug/L)	MS % Rec. #	QC Limits Rec.
Lindane	200	ND	0.177	89	56-123
Heptachlor epoxide	200	ND	0.194	97	40-131
Aldrin	200	ND	0.181	91	40-120
Dieldrin	500	ND	0.487	97	52-126
Endrin	500	ND	0.458	92	56-121
4,4'-DDT	500	ND	0.388	78	38-127

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.0110	6*	89	179*	15	56-123
Heptachlor epoxide	0.0141	7*	97	180*	20	40-131
Aldrin	ND	NC*	91	NC*	22	40-120
Dieldrin	0.0333	7*	97	177*	18	52-126
Endrin	0.0322	6*	92	176*	21	56-121
4,4'-DDT	0.0279	6*	78	171*	27	38-127

- Column to be used to flag recovery and RPD values with an asterisk
* - Values outside of QC limits
NC - Not Calculated
RPD: 6 out of 6 outside limits

2092

Spike Recovery: 6 out of 12 outside limits

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: OCP-W-0034-88
QC REPORT NO.: OCP-W-0034-88B

Analysis of matrix spikes showed lindane to be not quantifiable because it was swamped by an interference. The RPD for dieldrin was slightly higher than EPA QC guidelines. When spiked blanks were analyzed, an interference made the aldrin response not quantifiable. In addition, the blank spike recoveries were essentially twice what they should have been, while recoveries from the duplicate were close to zero. This suggests that the blank spike was spiked twice and the duplicate not at all. However, when the data associated with these analyses were closely examined, no analytical errors 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.

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.
50	9-10-88	VGC	Carbopack	75-09-2	Dichloromethane	4.6	0.25	88092312-88092317
				67-66-3	Chloroform	0.44	0.05	

V603

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:	9-15-88		
Date Analyzed (1):	10-15-88	Date Analyzed (2):	10-19-88
Time Analyzed (1):	14:15	Time Analyzed (2):	20:14
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
-	88092313	10-15-88	88092313	10-19-88
-	88092314	10-15-88	88092324	10-19-88
-	88092315	10-15-88	88092327	10-19-88
-	88092316	10-15-88		
-	88092317	10-15-88		
-	88092323	10-15-88		
-	88092324	10-15-88		
-	88092327	10-15-88		

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: 0R001

Client: EE 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
88092314-88092317, 88092312, 88092321,
88092354, 88092324, 88092349, 88092388-88092390

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

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	*

9603

* 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-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.

File: CONTENT
24 Oct 88

50.d Check
9/16/88

Sample 8809 2391, 2314, 2315, 231
2321, [redacted], 2322, 2303, 230.
2306, 2312, 2313, 2316

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

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

Instrument ID.: CARbopak Calibration Date(s): 9/16/89 _____

LAB FILE ID: 47, 48 Init. Calib. Date(s): 9/13/89 9/14/89

COMPOUND	RRF	RRF50	%D
Benzyl chloride	0.32	0.31	3
bis (2-chloroethoxy methane	—	—	
bis (2-chloroisopropyl ether	—	—	
Bromobenzene	1.0	1.1	10
Bromodichloromethane	3.5	4.0	14
Bromoform	1.7	2.0	18
Bromomethane	0.20	0.26	30
Carbon tetrachloride	4.0	4.5	13
Chloroacetaldehyde	—	—	
Chlorobenzene	1.2	1.5	25
Chloroethane	0.45	0.46	2
Chloroform	4.2	4.7	12
1-Chorohexane	0.87	0.87	0
2-Chloroethyl vinyl ether	—	—	—
Chloromethane	0.79	0.86	9
Chloromethyl methyl ether	—	—	—
o_,m_,& p_Chlorotoluenes	3.5	3.6	3
Dibromochloromethane	3.4	4.0	18
Dibromomethane	2.4	2.3	4
1,2_Dichlorobenzene	2.2	2.7	23
1,3_Dichlorobenzene	1.9	2.4	26
1,4_Dichlorobenzene	1.9	2.3	21
Dichlorodifluormethane	—	—	
1,1_Dichloroethane	2.3	2.4	4
1,2_Dichloroethane	2.6	2.9	12
1,1_Dichloroethylene	2.6	2.6	0
trans_1,2_dichloroethylene	2.4	2.6	8
Dichlororethane	3.5	3.7	6
1,2_Dichloropropane	2.3	2.5	7
1,3_Dichloropropylene	4.5	4.4	2
1,1,2,2_Tetrachloroethane	6.5	7.7	18
1,1,1,2_Tetrachloroethane	4.1	39	5
Tetrachloroethylene	6.5	7.7	18
1,1,1_Trichloroethane	2.9	3.2	10
1,1,2_Trichloroethane	4.5	4.4	2
Trichloroethylene	3.9	4.1	5
Trichlorofluormethane	2.4	2.3	4
Trichloropropane	2.0	1.8	10
Vinyl chloride	0.99	1.0	20

file: CONTCHL
21 Oct 88

50d check
9/16/89

Sample #8509239, 2314, 2315, 2317, 2321, 2322, 2363, 2365, 2306, 2312, 2313, 2316

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

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

Instrument ID.: CARbopak Calibration Date(s): 9/16/89 _____

LAB FILE ID: 47 Init. Calib. Date(s): 9/13/89 _____

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	1.6	4.8	
Chlorobenzene	4.7	4.6	
1,2_Dichlorobenzene	3.7	3.6	
1,3_Dichlorobenzene	4.3	4.2	
1,4_Dichorobenzene	3.3	3.3	
Ethyl Bazene	3.5	3.0	
Toluene	3.7	3.3	
Xylenes	12	10	

This page intentionally left blank.

DATA PACKAGE #35

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 soil samples received by this laboratory on 8-31-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092215	DANGB,2BH1,SS1,0-2'	MOIS	8-30-88		9-13-88	
88092215	DANGB,2BH1,SS1,0-2'	8010	8-30-88		9-08-88	9-09-88
88092215	DANGB,2BH1,SS1,0-2'	8020	8-30-88		9-08-88	9-09-88
88092216	DANGB,2BH1,SS2,2-4'	MOIS	8-30-88		9-13-88	
88092216	DANGB,2BH1,SS2,2-4'	8010	8-30-88		9-08-88	9-09-88
88092216	DANGB,2BH1,SS2,2-4'	8020	8-30-88		9-08-88	9-10-88
88092217	DANGB,2BH1,SS4,8-10'	MOIS	8-30-88		9-13-88	
88092217	DANGB,2BH1,SS4,8-10'	8010	8-30-88		9-09-88	9-09-88
88092217	DANGB,2BH1,SS4,8-10'	8020	8-30-88		9-09-88	9-10-88
88092218	DANGB,2BH1,SS3,6-8'	MOIS	8-30-88		9-13-88	
88092218	DANGB,2BH1,SS3,6-8'	8010	8-30-88		9-09-88	9-09-88
88092218	DANGB,2BH1,SS3,6-8'	8020	8-30-88		9-09-88	9-10-88
88092219	DANGB,2BH1,SS5,10-12'	MOIS	8-30-88		9-13-88	
88092219	DANGB,2BH1,SS5,10-12'	8010	8-30-88		9-09-88	9-10-88
88092219	DANGB,2BH1,SS5,10-12'	8020	8-30-88		9-09-88	9-10-88
88092220	DANGB,2BH2,SS1,0-2'	MOIS	8-30-88		9-13-88	
88092220	DANGB,2BH2,SS1,0-2'	8010	8-30-88		9-09-88	9-10-88
88092220	DANGB,2BH2,SS1,0-2'	8020	8-30-88		9-09-88	9-11-88
88092221	DANGB,2BH2,SS2,5-6'	MOIS	8-30-88		9-13-88	
88092221	DANGB,2BH2,SS2,5-6'	8010	8-30-88		9-09-88	9-09-88
88092221	DANGB,2BH2,SS2,5-6'	8020	8-30-88		9-09-88	9-11-88
88092222	DANGB,2BH2,SS3,10-12'	MOIS	8-30-88		9-13-88	
88092222	DANGB,2BH2,SS3,10-12'	8010	8-30-88		9-09-88	9-09-88
88092222	DANGB,2BH2,SS3,10-12'	8020	8-30-88		9-09-88	9-11-88

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092215-88092222

These soil samples were received at the ES Berkeley Laboratory on 8-31-88. They were received cold and intact.

[illegible]

ANALYSIS REPORT

WORK ORDER NUMBER: [illegible]
JOB NUMBER : [illegible]
WORK ORDER DATE : [illegible]

APPROVED BY [signature]
Lab Supervisor

REPORT DATA:
ES OAK RIDGE DULUTH ANGB
710 S ILLINOIS AVE. STE. S105
OAK RIDGE, TN [illegible]
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANGB [illegible]
710 S ILLINOIS AVE STE S105
OAK RIDGE, TN [illegible]

OF REPORT COPIES: 1

CONTRACT PO # : [illegible]
CONTACT : BILL HAYDEN
[illegible]

[illegible]

TEST COMPOUND	DANGB,2BH1,SS.. [illegible] 88092215	DANGB,2BH1,SS2, 2-4 88092216	DANGB,3BH1,SS4, 8-10 88092217	DANGB,2BH1,SS3, 6-8 88092218	DANGB,3BH1 SS5, 10-12 88092219	DANGB,2BH2,SS1, 0-2 88092220
% MOISTURE	[illegible]	[illegible]	2.0	15.8	[illegible]	[illegible]

ND - Not Detected

ENGINEERING-SCIENCE INC — PAGE [illegible]

10/[illegible] 58

ANALYSIS REPORT FOR WORK ORDER NUMBER 93[illegible]

RSK: [illegible], UNITS: NA

TEST COMPOUND	DAMSB,28H2,SS2, 5-6 6806222[illegible]	DANSB,25H2,SS3, 10-12 8509222[illegible]
MOISTURE	7.5	11.9

ND = Not Detected

[illegible]

ANALYSIS REPORT

WORK ORDER NUMBER: [illegible]
JOB NUMBER : ZE0000000440
WORK ORDER DATE : 09/01/88

APPROVED : [signature]
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANSD
710 S. ILLINOIS AVE STE 5.05
OAK RIDGE, TN 37830
BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE/DULUTH ANSD
710 S. ILLINOIS AVE STE 5105
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

CONTRACT [illegible] : [illegible]
CONTACT : BILL HAYDEN
[illegible]

TEST: [illegible] UNITS: ug/g, GROUP [illegible]

TEST COMPOUND	OAKGB.2BH1.5.1 0-2 88092215	OAKGB.2BH1.551 2-4 88092216	OAKGB.2BH1.554 8-10 88092217	OAKGB.2BH1.553 6-8 88092218	OAKGB.2BH1.555 10-12 88092219	OAKGB.2BH2.551 0-2 88092220
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
CHLOROACETALDEHYDE	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	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	[illegible]	**	[illegible]	[illegible]	[illegible]	[illegible]
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	ND	ND	[illegible]
1,1-DICHLOROETHYLENE	ND	ND	ND	[illegible]	ND	ND
TRANS-1,2-DICHLOROETHYLENE	ND	ND	[illegible]	[illegible]	[illegible]	[illegible]
DICHLOROMETHANE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND

** - This compound is possibly present but it was not confirmed on the second column. The sample was non-homogeneous and was [illegible]icult to subsample accurately..

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER [illegible]

TEST COMPOUND	RANGE.2BH1.SS1, 0-2' 880922218	RANGE.2BH1.SS2, 2-4 880922216	RANGE.2BH1.SS4, 8-10' 880922217	RANGE.2BH1.SS5, 6-8' 880922215	RANGE.2BH1.SS6, 10-12' 880922219	RANGE.2BH'.SS1, 0-2 880922220
TRANS-1,2-DICHLOROPROPYLENE	ND	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
TETRACHLOROETHYLENE	[illegible]	ND	[illegible]	[illegible]	[illegible]	[illegible]
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND	[illegible]
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
TRICHLOROETHYLENE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND	ND
[illegible]-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND	ND

ND = Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER [illegible]

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

TEST COMPOUND	DANGB.2EHZ.SS2, 5-6, 86?2221	DANGB..RHZ SS- 1?-1?, ???2???
BENZYL CHLORIDE	ND	ND
BIS (2-CHLOROETHOXY)METHANE	ND	ND
BIS (2-CHLOROISOPROPYL) ETHER	ND	ND
BROMOBENZENE	ND	ND
BROMODICHLOROMETHANE	ND	ND
BROMOFORM	ND	ND
BROMOMETHANE	ND	ND
CARBON TETRACHLORIDE	ND	ND
CHLOROACETALDEHYDE	ND	ND
CHLORAL	ND	ND
CHLOROBENZENE	ND	ND
CHLOROETHANE	ND	[illegible]
CHLOROFORM	ND	[illegible]
1-CHLOROHEXANE	ND	ND
2-CHLOROETHYL VINYL ETHER	ND	ND
CHLOROMETHANE	ND	ND
CHLOROMETHYL METHYL ETHER	ND	ND
CHLOROTOLUENE	ND	ND
DIBROMOCHLOROMETHANE	ND	ND
DIBROMOMETHANE	ND	ND
1,2-DICHLOROBENZENE	ND	ND
1,3-DICHLOROBENZENE	ND	ND
1,4-DICHLOROBENZENE	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND
1,1-DICHLOROETHANE	ND	ND
1,2-DICHLOROETHANE	2	ND
1,1-DICHLOROETHYLENE	ND	ND
TRANS-1,2-DICHLOROETHYLENE	[illegible]	[illegible]
DICHLOROMETHANE	1?2	[illegible]
1,2-DICHLOROPROPANE	ND	ND
1,3-DICHLOROPROPYLENE	ND	ND
1,1,2,2-TETRACHLOROETHANE	17	ND
1,1,1,2-TETRACHLOROETHANE	ND	ND
TETRACHLOROETHYLENE	150	[illegible]
1,1,1-TRICHLOROETHANE	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND
TRICHLOROETHYLENE	[illegible]	[illegible]
TRICHLOROFLUOROMETHANE	ND	ND
TRICHLOROPROPANE	ND	ND
VINYL CHLORIDE	ND	ND

[illegible]

ENGINEERING SCIENCE INC
12 17 88

ANALYSIS REPORT

WORK ORDER NUMBER: 88c
PO NUMBER : 28[illegible]
ORDER DATE : 09 11/88

APPROVED BY: _____
Lab Supervisor

REPORT DATA:
OAK RIDGE/DULUTH ENGR
710 S ILLINOIS AVE STE 510
OAK RIDGE, TN 37830
ATTN BILL HAYDEN

CLIENT DATA:
ES OAK RIDGE DULUTH ENGR - 154
710 S. ILLINOIS AVE. STE. 510
OAK RIDGE, TN 37830

COPIES OF REPORT SENT TO:

CONTRACT P.O. # : 0F101
CONTACT : BILL HAYDEN
(615) 481-8921

QA/QC - UNITS ug/L, SPIKE RECS

TEST COMPOUND	OAKGB.2EH1.551, 3-2 88092215	OAKGB.2EH1.552, 2-4 88092216	OAKGB.2EH1.554, 6-8 88092217	OAKGB.2EH1.555, 8-10' 88092218 **	OAKGB.2EH1,55E, 10-12' 88092219	OAKGB.2EH2.551, 0-2' 88092220
BENZENE	250'	1500	2100	1400	1900	1200
CHLOROBENZENE	ND	ND	ND	ND	ND	***
1,3-DICHLOROBENZENE	*	ND	*	*	*	*
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
TOTAL BENZENE	4400	8700	2200	14000	2400	2200
TOLUENE	2900	6400	1700	15000	1800	7600
XYLENES	5400	13000	2700	21000	6600	18000

* - 1,2 Dichlorobenzene was present by 8010 analysis but not quantifiable by 8020 due to fuel hydrocarbon interferences.

** - Surrogate recovery high due to matrix interferences - Sample 88092218.

*** - Chlorobenzene is present by 8010 analysis but is not quantitable by 8020 or confirmed due to fuel hydrocarbon interferences.

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 556

TASK: 4, UNITS: ug/kg, GROUP 90

TEST COMPOUND	ORANGE,ZPH2,SS2, 5-6 890F2221	ORANGE,ZE-2,SS2, 10-12 890F2222
BENZENE	1700	1100
CHLOROBENZENE	ND	ND
1,2-DICHLOROBENZENE	*	ND
1,3-DICHLOROBENZENE	ND	ND
1,4-DICHLOROBENZENE	ND	ND
ETHYL BENZENE	25000	5100
TOLUENE	7300	870
XYLENES	17000	2000

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).:
88082203
88082215-88082227

QC Report No: VGC-S-0043-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 9-01-88
Date Prepared: NA
Date Analyzed: 9-13-88
Date Reported: 10-19-88
Dilution Factor: NA
% Moisture: 7.9

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88082227	1,1-dichloroethane	10.9	ND	9.0	83	8.8	81	2	20	58-124
	Trichloroethene	10.9	ND	7.3	67*	7.4	68*	1	16	75-110
	Chlorobenzene	10.9	ND	6.8	62*	6.8	62*	0	21	71-125
	Aromatics: 8020									
88082227	Benzene	10.9	ND	7.1	65*	7.2	66*	1	26	75-123
	Toluene	10.9	0.2	6.1	56*	6.3	58*	3	16	79-115
	Chlorobenzene	10.9	ND	7.1	65*	7.2	66*	1	24	82-112

21112

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* 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).:
88082203
88082215-88082227

QC Report No: VGC-S-0043-88B
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: NA
Date Prepared: NA
Date Analyzed: 9-13-88
Date Reported: 10-19-88
Dilution Factor: NA
% Moisture: 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	10.3	103	10.6	106	3	20	58-124
	Trichloroethene	10	ND	10.1	101	10.3	103	2	16	75-110
	Chlorobenzene	10	ND	10.2	102	10.0	100	2	21	71-125
	Aromatics: 8020									
Blank	Benzene	10	ND	10.3	103	10.5	105	2	26	75-123
	Toluene	10	ND	10.4	104	10.5	105	1	16	79-115
	Chlorobenzene	10	ND	10.7	107	10.4	104	3	24	82-112

2113

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* 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

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: VGC-S-0043-88
QC REPORT NO.: VGC-S-0043-88B

Recoveries of SW8010 and SW8020 matrix spike compounds were generally low. This is probably due to masking by the fuel hydrocarbons present in the sample. Analysis of spiked blanks shows the laboratory to be in control.

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: 10-19-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
24	9-08-88	VGC	Carbopack	57-09-2	Dichloromethane	2.5	0.25	88082215-88082216
				67-66-3	Chloroform	0.4	0.05	
				108-88-3	Toluene	8.0	0.2	
35	9-08-88	VGC	Carbopack	75-09-2	Dichloromethane	5.8	0.25	88082217-88082222
				67-66-3	Chloroform	0.4	0.05	88082223-88082225
48	9-10-88	VGC	Carbopack	75-09-2	Dichloromethane	4.5	0.25	88082226-88082227
				67-66-3	Chloroform	0.5	0.05	

2115

This page intentionally left blank.

DATA PACKAGE #36

This page intentionally left blank.

ES
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 9-14-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092388	DANGB-4-GW4A-GW1	BA-I	9-13-88		10-19-88	
88092388	DANGB-4-GW4A-GW1	CD-F	9-13-88		10-24-88	
88092388	DANGB-4-GW4A-GW1	CR-F	9-13-88		11-07-88	
88092388	DANGB-4-GW4A-GW1	PB-F	9-13-88		10-25-88	
88092388	DANGB-4-GW4A-GW1	418.1	9-13-88	9-23-88	9-26-88	
88092388	DANGB-4-GW4A-GW1	8010	9-13-88		9-16-88	9-19-88
88092388	DANGB-4-GW4A-GW1	8020	9-13-88		9-16-88	
88092389	DANGB-4-GW4D-GW1	BA-I	9-13-88		10-19-88	
88092389	DANGB-4-GW4D-GW1	CD-F	9-13-88		10-24-88	
88092389	DANGB-4-GW4D-GW1	CR-F	9-13-88		11-07-88	
88092389	DANGB-4-GW4D-GW1	PB-F	9-13-88		10-25-88	
88092389	DANGB-4-GW4D-GW1	418.1	9-13-88	9-23-88	9-26-88	
88092389	DANGB-4-GW4D-GW1	8010	9-13-88		9-16-88	9-19-88
88092389	DANGB-4-GW4D-GW1	8020	9-13-88		9-16-88	
88092390	DANGB-4-MW8-GW1	BA-I	9-13-88		10-19-88	
88092390	DANGB-4-MW8-GW1	CD-F	9-13-88		10-24-88	
88092390	DANGB-4-MW8-GW1	CR-F	9-13-88		11-07-88	
88092390	DANGB-4-MW8-GW1	PB-F	9-13-88		10-25-88	
88092390	DANGB-4-MW8-GW1	418.1	9-13-88	9-23-88	9-26-88	
88092390	DANGB-4-MW8-GW1	8010	9-13-88		9-16-88	9-19-88
88092390	DANGB-4-MW8-GW1	8020	9-13-88		9-16-88	
88092391	DANGB-TB6	8010	9-13-88		9-20-88	9-16-88
88092391	DANGB-TB6	8020	9-13-88		9-20-88	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092388-88092391
WORK ORDER NO.: 979

These water samples were received at the ES Berkeley Laboratory on 9-14-88. They were received cold and intact.

ANALYSIS REPORT

WORK ORDER NUMBER: 979
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/14/88

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-GW4A-GW-1 88092388	DANGB-4-GW4D-GW-1 88092389	DANGB-4-MW8-GW-1 88092390
ACID DIG FLAME	NA	NA	NA
ACID DIG FURNACE	NA	NA	NA
BARIUM	0.17B	0.17B	<0.05
CADMIUM	<0.001	<0.001	<0.001
CHROMIUM	0.0039 SB	0.0028B	<0.002 W
LEAD	<0.005	<0.005	<0.005

NA - Not Analyzed
ND - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 979
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/14/88

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/Kg

EST COMPOUND	DANGB-4-GW4A-GW-1 88092388	DANGB-4-GW4D-GW-1 88092389	DANGB-4-MW8-GW-1 88092390
418.1 PETROLEUM HYDROCARBONS	3.24	<1.5	<1.5

) - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 979
OB NUMBER : ZB0000000440
WORK ORDER DATE : 09/14/88

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: 4, UNITS: ug/L, GROUP 8010

EST COMPOUND	DANGB-4-GW4A-GW-1 88092388	DANGB-4-GW4D-GW-1 88092389	DANGB-4-MW8-GW-1 88092390	DANGB-TB6 88092391
ENZYL CHLORIDE	ND	ND	ND	ND
IS (2-CHLOROETHOXY)METHANE	ND	ND	ND	ND
BIS (2-CHLOROISOPROPYL)ETHER	ND	ND	ND	ND
BROMOBENZENE	ND	ND	ND	ND
ROMODICHLOROMETHANE	ND	ND	ND	ND
ROMOFORM	ND	ND	ND	ND
BROMOETHANE	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND
HLORACETALDEHYDE	ND	ND	ND	ND
HLORAL	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND
HLOROFORM	ND	ND	ND	ND
-CHLOROHEXANE	ND	ND	ND	ND
2-CHLOROETHYL VINYL ETHER	ND	ND	ND	ND
HLOROMETHANE	ND	ND	ND	ND
HLOROMETHYL METHYL ETHER	ND	ND	ND	ND
CHLOROTOLUENE	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND
IBROMOMETHANE	ND	ND	ND	ND
,2-DICHLOROBENZENE	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND
,4-DICHLOROBENZENE	ND	ND	ND	ND
ICHLORODIFLUOROMETHANE	ND	ND	ND	ND
,1-DICHLOROETHANE	ND	ND	ND	ND
1,2-DICHLOROETHANE	ND	ND	ND	ND
,1-DICHLOROETHYLENE	ND	ND	ND	ND
RANS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND
DICHLOROMETHANE	0.31B	0.49B	0.67B	0.69B
1,2-DICHLOROPROPANE	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 979

ST COMPOUND	DANGB-4-GW4A-GW-1 88092388	DANGB-4-GW4D-GW-1 88092389	DANGB-4-MW8-GW-1 88092390	DANGB-TB6 88092391
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: 979
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/14/88

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-4-GW4A-GW-1 88092388	DANGB-4-GW4D-GW-1 88092389	DANGB-4-MW8-GW-1 88092390	DANGB-TB6 88092391
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

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 No: AAF-W-0031-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 8-31-88
Date Reported: 11-07-88
Dilution Factor: NA

Laboratory Supervisor Approval: _____

QC Report for Laboratory Sample No(s):
88092348-88092350, 88092354-88092355, 88092317
88092388-88092390, 88092422-88092427, 88092189

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	88082189	88082189	10-26-88	10-18-88	7060	<0.010	<0.005	<0.005	NC	0.040	<0.005	0.0517	129N	
Chromium	88082189	88082189	10-26-88	10-18-88	6010	<0.005	<0.002	<0.002	NC	20.0	<0.002	21.6	108	
Lead	88082189	88082189	10-25-88	10-18-88	7421	<0.010	<0.005	<0.005	NC	0.020	<0.005	0.0227	114	

2196

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):
88092348-88092350, 88092354-88092355
88092388-88092390, 88092422-88092427, 88082189

QC Report No: ICP-W-0050-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-13-88
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
Barium	88092348	88092348	10-20-88	10-18-88	6010	<0.2	0.089	0.064	NC	2.00	0.089	2.47	119	A
Cadmium	88092348	88092348	10-20-88	10-18-88	6010	<0.005	<0.001	<0.001	NC	0.050	<0.001	0.038	76	

2197

A - See Case Narrative attached.

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)

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 624	EPA 418.1	SW 8010, 7000, 7131	SW7421, 7420, 7191	SW9310, 9315	SM429	REMARKS
[illegible]	1415	DANGB-4-GW4A-GW-1	4				X	X	X			
[illegible]	1626	DANGB-4-GW4D-GW-1	4				X	X	X			

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[illegible]	[illegible]	[illegible]			

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

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

2128

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)				

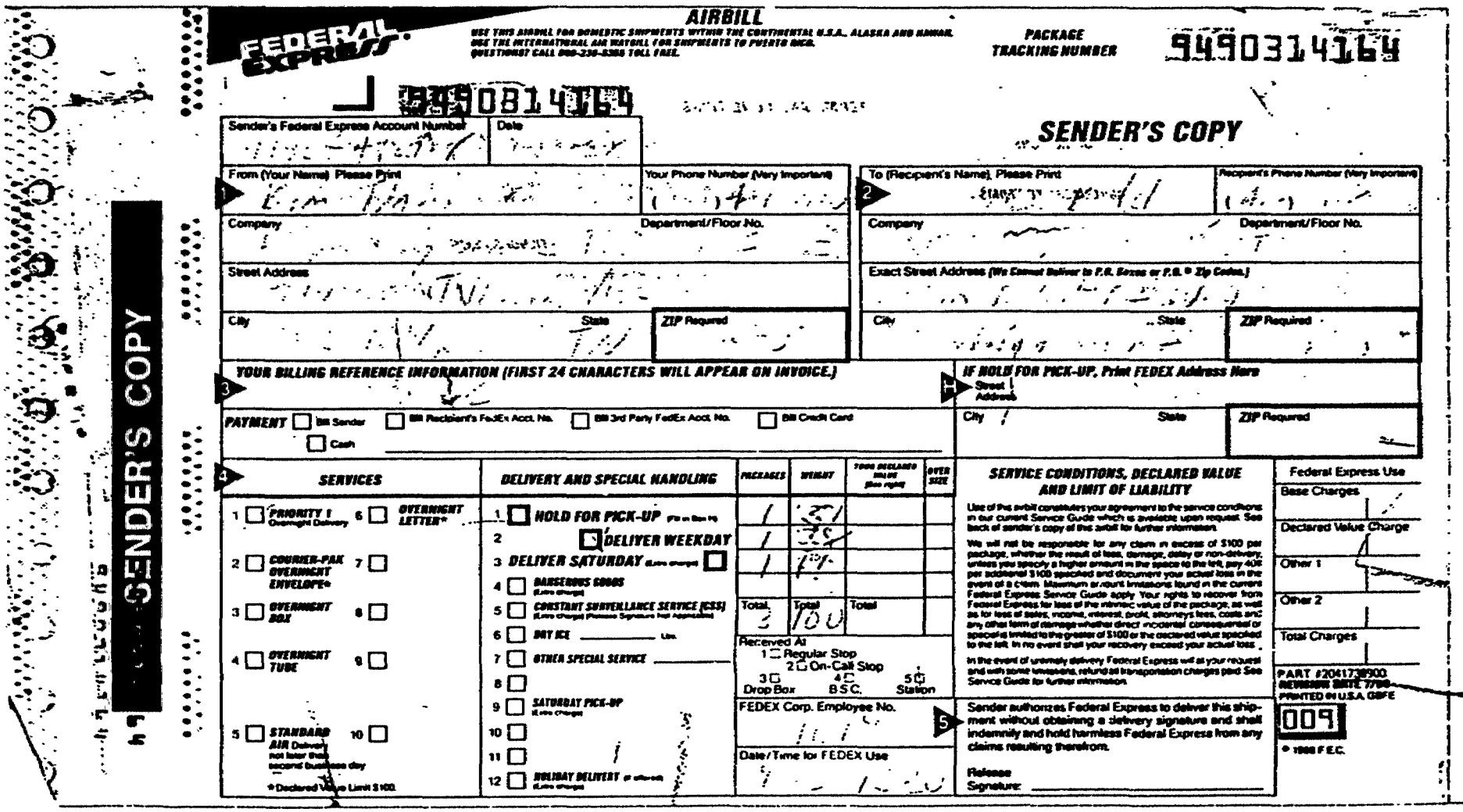
DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 8010, 7060, 7131	SW7421, 7470	SW9310, 9315	SM420	REMARKS
[illegible]	0915	DANGB-4-MW4-GW-1	5	X								
[illegible]	1100	DANGB-3-MW26-GW-1	5	X								
[illegible]	1415	DANGB-4-GW4A-GW-1	5	X								
[illegible]	[illegible]	DANGB-TB	[illegible]	X								
[illegible]	[illegible]	DANGB-A-[illegible]-1	5	X								

6612

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature]	[illegible]	[illegible]			

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 949031414164

949031414164

SENDER'S COPY

Sender's Federal Express Account Number | Date

1 From (Your Name) Please Print | Your Phone Number (Very Important)

Company | Department/Floor No.

Street Address

City | 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

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 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
2 ☐ 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	YOUR DECLARED VALUE (See reverse)	OVER SIZE
	1	21		
	1	29		
	1	10		
Total	3	100	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

IF HOLD FOR PICK-UP, Print FEDEX Address Here

Street Address

City | State | ZIP Required

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 or count 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 exceptions, 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 #204173900
REVISION DATE 7/96
PRINTED IN U.S.A. GBFE

009

© 1996 F.E.C.

SENDER'S COPY

0012

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: ICP-W-0050-88

The Relative Percent Difference is not calculated for Barium since the sample values are less than five times the reporting limit. Acceptable RPD in this case is defined as duplicate values within one detection limit of each other.

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):
88092322-88092325
88092327-88092332
88092348-88092356, 88092388

QC Report No: VGC-W-0051-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: NA
Date Prepared: NA
Date Analyzed: 9-26-88
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									
88092388	1,1-Dichloroethane	10	ND	9.50	95	9.36	94	2	26	70-130
	Trichloroethene	10	ND	11.3	113	10.8	108	5	19	65-131
	Chlorobenzene	10	ND	11.4	114	11.2	112	2	40	59-137
	Aromatics: 8020									
88092388	Benzene	10	ND	11.1	111	11.3	113	2	20	56-146
	Toluene	10	ND	11.4	114	11.6	116	2	41	42-150
	Chlorobenzene	10	ND	10.5	105	11.2	112	6	36	76-133

2132

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):
88092389-88092391
88092422-88092427

QC Report No: VGC-W-0053-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-17-88
Date Prepared: NA
Date Analyzed: 9-26-88
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									
88092425	1,1-Dichloroethane	10	ND	10.0	100	9.32	93	7	26	70-130
	Trichloroethene	10	ND	10.8	108	10.4	104	4	19	65-131
	Chlorobenzene	10	ND	11.3	113	11.1	111	2	40	59-137
	Aromatics: 8020									
88092425	Benzene	10	ND	10.8	108	10.8	108	0	20	56-146
	Toluene	10	ND	11.2	112	11.0	110	2	41	42-150
	Chlorobenzene	10	ND	10.5	105	10.6	106	1	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: 10-28-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
18	9-16-88	VGC	Vocol	75-09-2	Dichloromethane	3.6	0.25	88092388-88092390
				67-66-3	Chloroform	1.7	0.05	
2134								
50	9-16-88	VGC	Carbopack	75-09-2	Dichloromethane	4.6	0.25	88092391
				67-66-3	Chloroform	0.44	0.05	

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):
88092291-88092293, 88092305-88092306
88092315-88092317, 88092312, 88092321,
88092354, 88092324, 88092349, 88092388-88092390

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

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	*

21 of 25

* 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-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.

VOLATILE CONTINUING CALIBRATION CHECK

LabName: ENGINEERING SCIENCE Contract: _____

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

Instrument ID: VOCAL Calibration Date(s): 9/16/88

LAB FILE ID: 19,20 Init. Calib. Date(s 9/14/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzyl chloride	4.56	5.59	-22.53
bis (2-choroethoxy) methane	0.12		NA
bis (2-choroisopropyl ether	0.12		NA
Bromobenzene	3.08	4.01	-30.44
Bromodichloromethane	4.57	3.80	16.84
Bromoform	3.13	2.40	23.30
Bromomethane	0.43	0.15	66.37
Carbon tetrachloride	4.72	3.70	21.59
Chloroacetaldehyde	0.07		NA
Chlorobenzene	1.33	1.10	17.52
Chloroethane	0.73	0.32	55.70
Chloroform	3.99	3.20	19.82
1-Chorohexane	0.82	0.81	2.28
2-Chloroethyl vinyl ether	0.12		NA
Chloromethane	1.84	0.42	77.16
Chloromethyl methyl ether	0.02		NA
o-,m-,& p-Chlorotoluenes	3.34	2.90	13.09
Dibromochloromethane	4.22	3.80	9.87
Dibromomethane	3.06	2.60	14.96
1,2-Dichlorobenzene	2.04	1.80	11.65
1,3-Dichlorobenzene	1.75	1.60	8.47
1,4-Dichlorobenzene	1.70	1.60	6.10
Dichlorodifluormethane	0.54		NA
1,1-Dichloroethane	2.70	1.80	33.23
1,2-Dichloroethane	3.29	2.70	17.87
1,1-Dichloroethylene	1.64	1.20	26.67
trans-1,2-dichloroethylene	2.69	2.20	18.13
Dichloromethane	2.98	2.60	12.78
1,2-Dichloropropane	3.01	2.50	16.98
1,3-Dichloropropylene	0.47	0.39	17.05
1,1,2,2-Tetrachloroethane	3.38	2.80	17.15
1,1,1,2-Tetrachloroethane	4.83	4.01	16.88
Tetrachloroethylene	4.55	4.20	7.74
1,1,1-Trichloroethane	2.65	2.10	20.88
1,1,2-Trichloroethane	4.42	4.14	6.33
Trichloroethylene	3.90	3.20	17.96
Trichlorofluormethane	0.88	0.55	37.29
Trichloropropane	3.08	4.01	-30.44
Vinyl chloride	1.84	0.42	77.16

VOLATILE CONTINUING CALIBRATION CHECK

LabName:ENGINEERING SCIENCE_____ Contract:_____

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

Instrument ID.:VOCOL_____ Calibration Date(s):9/16/88_____

LAB FILE ID: RRF 50 ___19_____ Init cal Date = 9/14/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	4.93	4.80	-2.63
Chlorobenzene	4.65	4.90	5.35
1,2_Dichlorobenzene	4.64	4.00	-13.72
1,3_Dichlorobenzene	3.99	4.60	15.17
1,4_Dichorobenzene	3.20	3.80	18.68
Ethyl Bezene	2.98	3.20	7.21
Toluene	3.54	3.80	7.27
Xylenes	9.87	11.00	11.48

DATA PACKAGE #37

This page intentionally left blank.

ES
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 9-13-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092354	DANGB-BR5	BA-I	9-12-88		10-19-88	
88092354	DANGB-BR5	CD-F	9-12-88		10-24-88	
88092354	DANGB-BR5	CR-F	9-12-88		11-02-88	
88092354	DANGB-BR5	PB-F	9-12-88		10-25-88	
88092354	DANGB-BR5	418.1	9-12-88	9-28-88	10-05-88	
88092354	DANGB-BR5	8010	9-12-88		9-20-88	9-21-88
88092354	DANGB-BR5	8020	9-12-88		9-20-88	
88092354/5	~~DANGB-BR5~~	AS-F	9-12-88		10-26-88	
88092355	DANGB-3-MW29-GW1	BA-I	9-12-88		10-19-88	
88092355	DANGB-3-MW29-GW1	CD-F	9-12-88		10-24-88	
88092355	DANGB-3-MW29-GW1	CR-F	9-12-88		11-02-88	
88092355	DANGB-3-MW29-GW1	PB-F	9-12-88		10-26-88	
88092355	DANGB-3-MW29-GW1	8010	9-12-88		9-20-88	9-16-88
88092355	DANGB-3-MW29-GW1	8020	9-12-88		9-20-88	
88092356	DANGB-TB5	8010	9-07-88		9-20-88	9-21-88
88092356	DANGB-TB5	8020	9-07-88		9-20-88	

* If applicable

ENGINEERING-SCIENCE INC.
01/04/89

ANALYSIS REPORT

WORK ORDER NUMBER: 970
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/13/88

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-BR5 88092354	DANGB-3-MW29-GW-1 88092355
ACID DIG FLAME	NA	NA
ACID DIG FURNACE	NA	NA
ARSENIC		<.005N
BARIUM	<.05	<.05
CADMIUM	<.001W	<.001
CHROMIUM	0.002B	.0027B
MERCURY		NT
LEAD	<.005	<.005W

NA- NOT APPLICABLE
NT- NOT TESTED
ND- Not Detected

ENGINEERING-SCIENCE INC. PAGE 1
01/04/89

ANALYSIS REPORT

WORK ORDER NUMBER: 970
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/13/88

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-BR5 88092354	DANGB-3-MW29-GW-1 88092355
418.1 PETROLEUM HYDROCARBONS	<1.5	NT

ND - Not Detected
NT- NOT TESTED

ANALYSIS REPORT

ORK ORDER NUMBER: 970
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/13/88

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-BR5 88092354	DANGB-3-MW29-GW-1 88092355	DANGB-TB5 88092356
ENZYL CHLORIDE	ND	ND	ND
IS (2-CHLOROETHOXY)METHANE	ND	ND	ND
IS (2-CHLOROISOPROPYL)ETHER	ND	ND	ND
ROMOBENZENE	ND	ND	ND
ROMODICHLOROMETHANE	ND	ND	ND
ROMOFORM	ND	ND	ND
ROMOETHANE	ND	ND	ND
ARBON TETRACHLORIDE	ND	ND	ND
HLORACETALDEHYDE	ND	ND	ND
HLORAL	ND	ND	ND
HLOROBENZENE	ND	ND	ND
HLOROETHANE	ND	ND	ND
HLOROFORM	13B	0.26B	ND
-CHLOROHEXANE	ND	ND	ND
-CHLOROETHYL VINYL ETHER	ND	ND	ND
HLOROMETHANE	ND	ND	ND
HLOROMETHYL METHYL ETHER	ND	ND	ND
HLOROTOLUENE	ND	ND	ND
IBROMOCHLOROMETHANE	ND	ND	ND
IBROMOMETHANE	ND	ND	ND
,2-DICHLOROBENZENE	ND	ND	ND
,3-DICHLOROBENZENE	ND	ND	ND
,4-DICHLOROBENZENE	ND	ND	ND
ICHLORODIFLUOROMETHANE	ND	ND	ND
,1-DICHLOROETHANE	ND	1.3	ND
,2-DICHLOROETHANE	ND	ND	ND
,1-DICHLOROETHYLENE	ND	0.71	ND
ANS-1,2-DICHLOROETHYLENE	ND	1.7	ND
ICHLOROMETHANE	0.93B	0.32B	0.88B
,2-DICHLOROPROPANE	ND	ND	ND

D - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 970

TEST COMPOUND	DANGB-BR5 88092354	DANGB-3-MW29-GW-1 88092355	DANGB-TB5 88092356
1,3-DICHLOROPROPYLENE	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND
1,1,1,2-TETRACHLOROETHANE	ND	ND	ND
TETRACHLOROETHYLENE	ND	3.1	ND
1,1,1-TRICHLOROETHANE	ND	11	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND
TRICHLOROETHYLENE	ND	13	ND
TRICHLOROFLUOROMETHANE	ND	ND	ND
TRICHLOROPROPANE	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT

'ORK ORDER NUMBER: 970
OB NUMBER : ZB0000000440
'ORK ORDER DATE : 09/13/88

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 8020

'EST COMPOUND	DANGB-BR5 88092354	DANGB-3-MW29-GW-1 88092355	DANGB-TB5 88092356
;ENZENE	ND	ND	ND
:HLOROBENZENE	ND	ND	ND
,2-DICHLOROBENZENE	ND	ND	ND
,3-DICHLOROBENZENE	ND	ND	ND
,4-DICHLOROBENZENE	ND	ND	ND
:THYL BENZENE	ND	ND	ND
'OLUENE	ND	ND	ND
:YLENES	ND	ND	ND

'D - Not Detected

ENGINEERING-SCIENCE INC.
12/05/88

ANALYSIS REPORT

WORK ORDER NUMBER: 970
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/13/88

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-MW29-GW-1 88092355
ALDRIN	NT
ALPHA-BHC	NT
BETA-BHC	NT
DELTA-BHC	NT
GAMMA-BHC	NT
CHLORDANE	NT
4,4'-DDD	NT
4,4'-DDE	NT
4,4'-DDT	NT
DIELDRIN	NT
ENDOSULFAN I	NT
ENDOSULFAN II	NT
ENDOSULFAN SULFATE	NT
ENDRIN	NT
ENDRIN ALDEHYDE	NT
HEPTACHLOR	NT
HEPTACHLOR EPOXIDE	NT
KEPONE	NT
METHOXYCHLOR	NT
TOXAPHENE	NT
PCB-1016	NT
PCB-1221	NT
PCB-1232	NT
PCB-1242	NT
PCB-1248	NT
PCB-1254	NT
PCB-1260	NT

ND - Not Detected

NT - Not Tested

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

970

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 602	EPA 625	EPA 418.1	SW 6010, 7060, 7131	SW7421, 7470, 7191	SW8310, 9315	SM429	REMARKS
9/12/88	0930	DANGB-BRS	4				X	X	X			Do not run 7470 and 7060 582335
9/12/88	1415	DANGB3-MW29-GW-1	6		X	X		X	X			582355

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature]	9/12/88 1800	Fed Ex Airbill # 949031419 0			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		[signature]	09/13/88 9:30	Samples received cold and intact.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

2 of 8

ENGINEERING-SCIENCE

970

CHAIN OF CUSTODY RECORD

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

SAMPLER(S): (Signature) Kherly 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, 7470	SW8310, 9315	SM429	REMARKS
9/12/88	0930	DANGB-BRS	5	X								582354
9/12/88	1415	DANGB-3-MW24-GW-1	5	X			X					582355
9/7/88	0930	DANGB-TBS	3	X								582356
9/7/88	1415	DANGB-FB9	2	X								Field blanks not present ON 9/12/88 ~~582357~~
												FIELD BLANKS FOUND JM
												W/ MW24-GW-1
												LOGGED IN ON WO —

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Kherly L. Davis	9/12/88 1400	Fed Ex Airbill # 949031490			
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	
		Carolyn Harold Smith	09/13/88 9:30	Samples received cold and intact.	

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

2 of 2

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 9490314190

9490314190

SENDER'S COPY

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

1 From (Your Name) Please Print: [illegible] | Your Phone Number (Very Important): [illegible]
Company: Engineering [illegible] Inc. | Department/Floor No.
Street Address: [illegible] Illinois Ave [illegible] F-105
City: [illegible] | State: TN | ZIP Required: [illegible]

2 To (Recipient's Name) Please Print: [illegible] | Recipient's Phone Number (Very Important): (415) 54[illegible]
Company: [illegible] Inc. | Department/Floor No.
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): [illegible] Way
City: [illegible] | State: CA | ZIP Required: [illegible]

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.) 6A-0[illegible]-02

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 (Fill in Box H)
2 ☒ DELIVER WEEKDAY
3 DELIVER SATURDAY (Extra charge) ☐
4 ☐ DANGEROUS GOODS (Extra charge)
5 ☐ CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charge)
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	OVER SIZE
1	[illegible]		
	[illegible]		
	[illegible]		
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 #2041738800 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

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):
88092348-88092350, 88092354-88092355
88092388-88092390, 88092422-88092427, 88082189

QC Report No: ICP-W-0050-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-13-88
Date Reported: 11-07-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Sample Nos. Duplicates	Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	SR	SSR	PR	Notes
Barium	88092348	88092348	10-20-88	10-18-88	6010	<0.2	0.089	0.064	NC	2.00	0.089	2.47	119	A

2151

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)

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: ICI-W-0050-88

The Relative Percent Difference is not calculated for Barium since the sample values are less than five times the reporting limit. Acceptable RPD in this case is defined as duplicate values within one detection limit of each other.

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):
88092348-88092350, 88092354-88092355, 88092317
88092388-88092390, 88092422-88092427, 88092189

QC Report No: AAF-W-0031-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 8-31-88
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	SA	Spike Recovery SR	Spike Recovery SSR	PR	Notes
Arsenic	88082189	88082189	10-26-88	10-18-88	7060	<0.010	<0.005	<0.005	NC	0.040	<0.005	0.0517	129N	
Chromium	88082189	88082189	10-26-88	10-18-88	6010	<0.005	<0.002	<0.002	NC	20.0	<0.002	21.6	108	
Lead	88082189	88082189	10-25-88	10-18-88	7421	<0.010	<0.005	<0.005	NC	0.020	<0.005	0.0227	114	
Cadmium	88092348	88092348	10-20-88	10-18-88	6010	<0.005	<0.001	<0.001	NC	0.050	<0.001	0.038	76	

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
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

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88092291-88092293, 88092305-88092306
88092314-88092317, 88092312, 88092321,
88092354, 88092324, 88092349, 88092388-88092390

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	*

2154

* 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-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
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

Report for Laboratory Sample No(s):
88092322-88092325
88092327-88092332
88092348-88092356, 88092388

QC Report No: VGC-W-0051-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: NA
Date Prepared: NA
Date Analyzed: 9-26-88
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									
6 388	1,1-Dichloroethane	10	ND	9.50	95	9.36	94	2	26	70-130
	Trichloroethene	10	ND	11.3	113	10.8	108	5	19	65-131
	Chlorobenzene	10	ND	11.4	114	11.2	112	2	40	59-137
	Aromatics: 8020									
6 388	Benzene	10	ND	11.1	111	11.3	113	2	20	56-146
	Toluene	10	ND	11.4	114	11.6	116	2	41	42-150
	Chlorobenzene	10	ND	10.5	105	11.2	112	6	36	76-133

2156

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: 10-31-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
82	9-20-88	VGC	Carbopack	75-09-2	Dichloromethane	1.4	0.25	88092348-88092349
				67-66-3	Chloroform	0.42	0.05	88092354-88092356
35	9-15-88	VGC	Carbopack	75-09-2	Dichloromethane	1.4	0.25	88092350-88092353

2197

This page intentionally left blank.

DATA PACKAGE #38

This page intentionally left blank.

ES
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 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.
88092508	DANGB-3-MW27-GW-1	8270	9-16-88	9-23-88	10-30-88	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092508
WORK ORDER NO.: 1004

This water sample were received at the ES Berkeley Laboratory on 9-19-88. It was received cold and intact.

The matrix spike analysis associated with these samples resulted in good recoveries and RPD's for all spiked compounds, but the following non-standard situations were present.

First, the base neutral MSD was analyzed slightly out of tune time, i.e., more than twelve hours after the tuning of the instrument was verified. This extract was re-analyzed out of holding time. Both analyses met EPA QC limits for recoveries and RPD's. Both analyses are included in this report.

Secondly, the 6th internal standard of the acid MSD did not meet QC criteria. This analysis was repeated with the same result. This internal standard was not used for calculating any of the acid matrix spike compounds.

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	SW8010, 8020	EPA 602	EPA 625	EPA 418.1	SW 8010, 7060, 7131	SW7421, 7470 7191	SW9310, 9315	SM429	REMARKS
9-16-88	0800	DANGB - BR7	8		X	X	X	X	X			8 8 0 9 1 2
9-16-88	1245	DANGB-3-MW27-6W-1	2			X		X	X		X	Gave lab metals and VOA's for this well yesterday; this was all we got today - still lacking 608 & 418.1

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature]	9-16-88 1800	Fed Ex Airbill 949031004-5			
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	
		[signature]	9/19/88 11:47	1 sample from Sam. Des DANGB-BR7 was not received, only 7 samples received.	

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

EH12

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

Date Received: September 19, 1988
Date Reported: December 9, 1988

Work Order: 1004
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 3781.0

ATTN: Mr. Bill Hayden

Lab Number:	881921-8
Sample No.:	DANGB-3-MW27-GW-1
Date Sampled:	9-16-88
Time Sampled:	14:45
Date Extracted:	9-23-88
Date Analyzed:	10-20-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) 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
-Nitroso-n-propylamine	10	ND
exachlorobutadiene	10	ND
,2,4-Trichlorobenzene	10	ND
itrobenzene	10	ND
orophorone	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
-Bromophenyl	10	ND

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

Date Received: September 19, 1988
Date Reported: December 9, 1988

Work Order: 1004
Job Number: OR04-1

To: EL:Oak Ridge/Duluth AAGB
Address: 111 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88-12111
Sample ID:	DAN05-3-MW01-GW-1
Date Sampled:	9-13-8
Time Sampled:	1245
Date Extracted:	9-23-88
Date Analyzed:	10-30-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L
Phenanthrene	1	ND
Anthracene	10	ND
Dibutyl phthalate	10	ND
Fluoranthene	1	ND
4-Chlorophenyl phenyl ether	1	ND
Pyrene	1	ND
Butyl Benzyl phthalate	1	ND
Bis(2-ethylhexyl) phthalate	1	42 B
Chrysene	1	ND
4-Bromophenyl phenyl ether	1	ND
Benzo(a)anthracene	1	ND
3,3'-Dichlorobenzidine	10	ND
bis(2-Chloroethoxy)methane	10	ND
Benzo(b)fluoranthene	1	ND
Benzo(k)fluoranthene	1	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	8	ND

Priority Pollutant Analysis — Page 3 of 5
Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 19, 1988 — Work Order: 1079
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:	8809230B
Sample No.:	OANGB-1-MW27-GW-1
Date Sampled:	9-16-88
Time Sampled:	12:45
Date Extracted:	9-23-88
Date Analyzed:	10-30-88

Compound	Detection Limits ug/L	Analytical Results (dry weight) ug/L
Acetophenone	10	ND
Aniline	10	ND
4-Aminobiphenyl	10	ND
4-Chloroaniline	20	ND
2-Chloronaphthalene	10	ND
Dibenzofuran	10	ND
7,12-Dimethylbenz(a)anthracene	10	ND
3,3-Dimethylbenzidine	10	ND
alpha,alpha-Dimethylphenethylamine	10	ND
1,3-Dinitrobenzene	10	ND
Diphenylamine	10	ND
Ethyl methanesulfonate	10	ND
Hexachlorocyclopentadiene	10	ND
Hexachloropropene	10	ND
Isophorone	10	ND
Isosafrole	10	ND
Methapyrilene	50	ND
1-Naphthylamine	50	ND
2-Naphthylamine	50	ND
4-Nitroaniline	50	ND
N-Nitrosodi-n-butylamine	10	ND
N-Nitrosodiethylamine	10	ND
N-Nitrosodimethylamine	10	ND
N-Nitrosomethylethylamine	10	ND
N-Nitrosomorpholine	10	ND
N-Nitrosopiperidine	10	ND
N-Nitrosopyrrolidine	10	ND
Phenacetin	10	ND
Pronamide	10	ND
1,2,4,5-Tetrachlorobenzene	10	ND

EPA has not yet determined detection limits for these compounds.

Priority Pollutant Analysis
Pesticides and PCBs - SW 827
Matrix: Water

Date Received: September 19, 1988
Date Reported: December 9, 1988

Work Order: 1104
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:	88-[illegible]
Sample No.:	JAN[illegible]-MW.7-GW-1
Date Sampled:	9-15-88
Time Sampled:	17:45
Date Extracted:	9-23-88
Date Analyzed:	10-30-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L
alpha-BHC	--*	ND
Gamma-BHC	--*	ND
Beta-BHC	--	ND
Heptachlor	21	ND
Delta-BHC	19	ND
Aldrin	10	ND
Heptachlor Epoxide	10	ND
Endosulfan I	--*	ND
Dieldrin	15	ND
4,4'-DDE	--	ND
Endrin	--*	ND
Endosulfan II	--*	ND
4,4'-DDD	19	ND
4,4'-DDT	23	ND
Endosulfan Sulfate	50	ND
Endrin aldehyde	--*	ND
Endrin ketone	--*	ND
Chlordane	60	ND
Methoxychlor	--*	ND
Toxaphene	60	ND
Aroclor-1016	[illegible]	ND
Aroclor-1221	90	ND
Aroclor-1232	60	ND
Aroclor-1242	90	ND
Aroclor-1248	60	ND
Aroclor-1254	60	ND
Aroclor-1260	90	ND

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

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

ate Received: September 19, 1988
ate Reported: December 9, 1988

Work Order: 1004
Job Number: OK001

OR: ES:Oak Ridge/Duluth ANGB
ddress: 710 S. Illinois Ave, Suite F-193
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Number:	88-921-8
ample No.:	DANGE-3-MW27-GW-1
ate Sampled:	[illegible]-16-88
ime Sampled:	12:4[illegible]
ate Extracted:	[illegible]-23-88
ate Analyzed:	1[illegible]-30-88

ompound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L
-Chlorophenol	1[illegible]	ND
-Nitrophenol	1[illegible]	[illegible]
henol	1[illegible]	ND
,4-Dimethylphenol	[illegible]	ND
,4-Dichlorophenol	1[illegible]	ND
,4,6-Trichlorophenol	1[illegible]	[illegible]
-Chloro-3-methylphenol	10	ND
,4-Dinitrophenol	50	[illegible]
,6-Dichlorophenol	--*	ND
-Methyl-4,6-dinitrophenol	50	ND
entachlorophenol	[illegible]	ND
-Nitrophenol	50	ND
enzoic Acid	[illegible]	ND
-Methylphenol	[illegible]	ND
[illegible] 4-Methylphenol	10	ND
,3,4,6-Tetrachlorophenol	--*	ND
,4,5-Trichlorophenol	10	ND

Analyst

[illegible], Supervisor

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

= Compound was detected in the blank.

2163

[illegible]: Samples are discarded [illegible] days after results are reported unless other arrangements are made. [illegible] will be [illegible]

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: ORG01

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-0055-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-17-88
Date Prepared: 9-22-88
Date Analyzed: 10-29-88
Date Reported: 12-27-88
Dilution Factor: 1

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88092508

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limits RPD	RECOVERY
	1,2,4-Trichlorobenzene	100	ND	70.4	70	59.8	60	15	28	39-98
B/N	Acenaphthene	100	ND	68.2	68	67.6	68	1	31	46-118
Laboratory	2,4-Dinitrotoluene	100	ND	62.0	62	60.1	60	3	38	24-96
Sample #	Pyrene	100	ND	78.4	78	80.2	80	3	31	26-127
	N-Nitroso-di-n-Propylamine	100	ND	73.6	74	71.0	71	4	38	41-116
88092490	1,4-Dichlorobenzene	100	ND	62.9	63	60.4	60	5	28	36-97
ACID	Pentachlorophenol	200	ND	46.7	23	49.2	25	8	50	9-103
Laboratory	Phenol	200	ND	99.0	49	126	63	25	42	12-89
Sample #	2-Chlorophenol	200	ND	120	60	129	64	6	40	27-123
	4-Chloro-3-Methylphenol	200	ND	138	69	127	63	9	42	23-97
88092490	4-Nitrophenol	200	ND	101	51	98.9	49	4	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

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):
88092508

QC Report No: BNA-W-0055-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-17-88
Date Prepared: 9-22-88
Date Analyzed: 11-23-88
Date Reported: 12-20-88
Dilution Factor: 1

Laboratory Supervisor Approval:

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	4	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	6	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	30	50	9-103
Laboratory	Phenol	200	ND	99.0	49	115	58	17	42	12-89
Sample #	2-Chlorophenol	200	ND	120	60	128	64	6	40	27-123
	4-Chloro-3-Methylphenol	200	ND	138	69	120	60	14	42	23-97
88092490	4-Nitrophenol	200	ND	101	51	139	70	31	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

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 12-20-88

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(2ethylhexyl)phthalate	17	10	88092494-88092495 88092508, 88092511 88092540

2171

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 11/06/88 11:21

Lab ID >T1106::01 Data Release Authorized By: Dennis D. Lee

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	56.41 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	70.94	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	52.39 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peal, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	5.62 OK	
275	10.0 - 30.0% of mass 198	16.82 OK	
365	greater than 1.00% of mass 198	1.32 OK	
441	present, but less than mass 443	6.22 OK	
442	greater than 40.0% of mass 198	45.37 OK	
443	17.0 - 23.0% of mass 442	9.26 OK	(20.40) #2

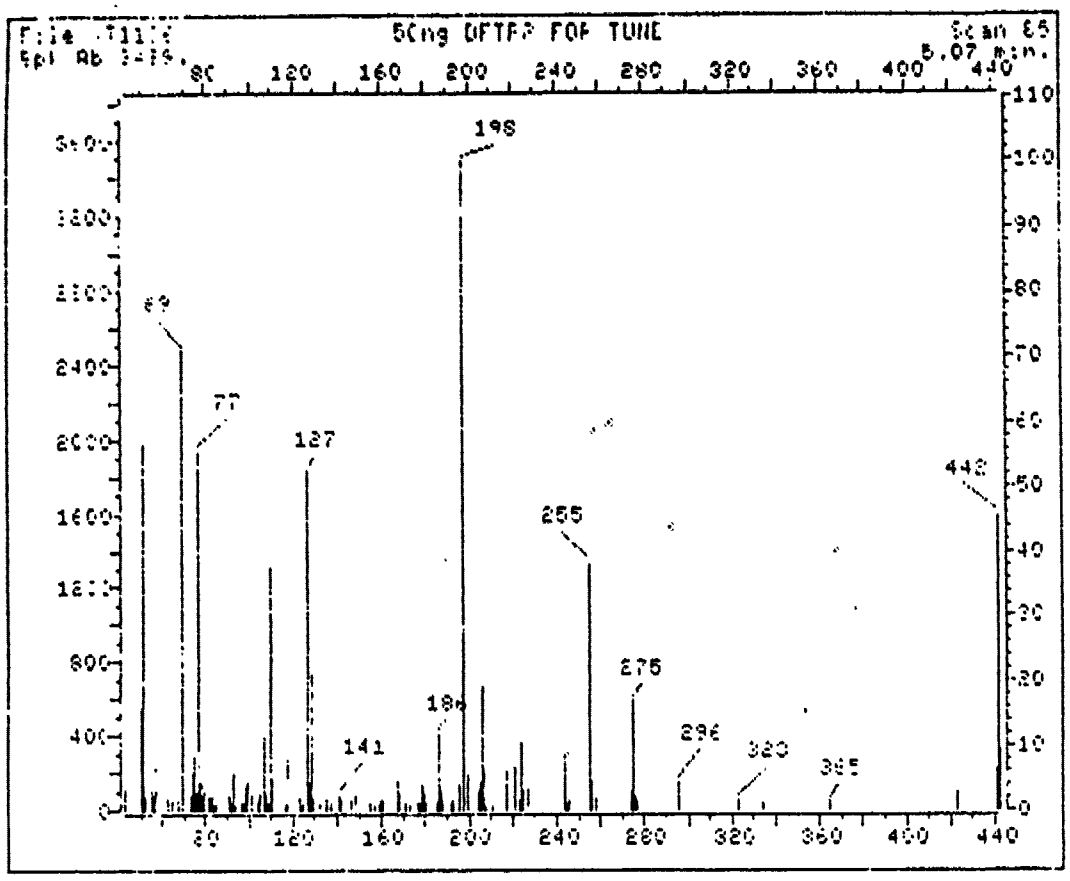
5 point 11/2/88

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
50ng DFTPP FOR TUN	>T1106	11/06/88	11:21
SSTD050C	50388		11:00
8804350' AC	50389		13:10
8804583-04 AC	50390		14:11
8804358 AC	50391		15:11
8804359 AC	50392		16:11
8804358 AC	50393		17:10
8804358 AC	50394		18:09
8804358 AC	50395		19:08
8804358 AC	50396		20:08
8804358 AC	50397		21:06
8804926'6 AC	50398		22:05
8804926'6 BN	50399		23:04

another project



File: TIIC Scan #: 85 Retn. time: 5.07

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.10	3.353	85.20	1 146	127.05	52.393	176.95	1 232	222.90	1.462
50 10	15.649	91.10	1.949	128.15	4.213	178.05	1.003	224.10	10.232
51.10	56.476	92 00	1.175	129.05	21.525	178.95	3.755	225.10	2.981
51 90	2.064	93 10	5.560	130.05	1.634	179.95	2.436	227.00	3.009
55.10	2.991	93.90	.717	132 15	1.261	180.95	1.204	244 00	8.627
56.10	2.178	96 90	1.093	134.85	1.605	185.05	1.433	244.90	.889
57.10	6.649	97.10	.974	135.05	1.634	185.95	11.579	245.90	1.347
63 10	1.777	98.10	3 497	136.95	1.003	187.05	2.981	255.00	38.005
65 00	1 549	99.00	4.242	141.05	2.264	188.15	1.863	256.00	4.643
67 20	1 318	101.00	2.436	142 05	1.433	192.05	1.032	257.90	2.264
69 00	70.937	104 00	1.347	147.05	1.576	193.05	1.290	274.15	2.694
73.10	1 978	105.10	2.551	148.05	2.178	196.00	3.783	275.05	16.824
74 10	5.474	107 00	13.041	148.85	.774	198 00	100.000	276.15	2.064
75.10	8.885	108.00	2.350	155.05	1.204	199.00	5.618	277.05	1.490
76.10	2.995	109.00	1.146	157.05	.803	204.10	2.780	295.95	4.185
77 10	55.632	110.00	37.518	158.85	.688	205.00	4.242	322.95	1.490
78.10	3.994	111.00	4.729	159.95	1.318	206.10	18.974	334.05	1.089
79.10	4 013	116.00	.803	160.95	1.376	207.10	5.962	364.90	1.318
80.10	2.809	117 00	8.111	167.05	4.443	207.90	.889	423.00	2.837
81.10	4.471	118 05	.917	167.95	2.293	211.00	1.060	441.05	6.220
82 10	1.892	123.15	1.748	171.05	.974	217.00	5.904	442.05	45.371
83.10	2.155	124.05	.745	173.05	.745	221.00	6.363	443.05	9.258

84 19 .774 125.15 1.060

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/06/88

Contractor: ENGINEERING-SCIENCE Time: 11:44

Contract No: _____ Laboratory ID: >S038S

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

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	.97022	7.60		
2-Fluorophenol	1.15802	1.36739	18.08		
bis-2-Chloroethyl)ether	1.11892	1.07064	4.32		
Phenol	1.41657	1.60275	13.15	*	
Phenol-d5	1.22488	1.50610	22.96		
Aniline	.54193	.57991	7.01		
2-Chlorophenol	1.23175	1.35064	9.65		
1,3-Dichlorobenzene	1.47535	1.45528	1.36		
1,4-Dichlorobenzene	1.40530	1.45988	3.88	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.38033	47.83		
1,2-Dichlorobenzene	1.32240	1.52645	15.43		
2-Methylphenol	1.17367	1.53010	30.37		
3-&-4-Methylphenol	1.07139	1.50450	40.42		
bis(2-chloroisopropyl)Ether	2.15627	2.67103	23.87		
N-Nitroso-Di-n-Propylamine	.84050	.93339	11.05		**
Hexachloroethane	.53840	.59820	11.11		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.41341	2.55		
Nitrobenzene-d5	.39137	.40011	2.23		
2-Nitrophenol	.24657	.26394	7.04	*	
Isophorone	.74170	.82948	11.83		
bis(2-Chloroethoxy)methane	.49386	.52280	5.86		
2,4-Dimethylphenol	.34849	.38210	9.65		
Benzoic Acid	.29725	.32394	8.98		
2,6-Dichlorophenol	.56733	.56407	.57	*	
1,2,4-Trichlorobenzene	.36913	.32938	10.77		
Naphthalene	.94589	.91662	3.10		
4-Chloroaniline	.36309	.34801	4.15		
Hexachlorobutadiene	.20283	.16403	19.13	*	
4-Chloro-3-Methylphenol	.31360	.32956	5.09	*	
2-Methylnaphthalene	.56397	.58648	3.99		

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: 11/06/88

Contractor: ENGINEERING-SCIENCE Time: 11:44

Contract No: _____ Laboratory ID: >50388

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

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.29213	1.20		**
2,4,6-Trichlorophenol	.42280	.35898	15.09	*	
2,4,5-Trichlorophenol	.52897	.35898	32.14		
2-Fluorobiphenyl	1.27220	1.10407	13.22		
2-Chloronaphthalene	1.23784	1.15459	6.73		
2-Nitroaniline	.47288	.49971	5.67		
Dimethylphthalate	1.40629	1.35792	3.44		
2,6-Dinitrotoluene	.37415	.38299	2.36		
Acenaphthylene	1.68918	1.59243	5.73		
3-Nitroaniline	.44557	.48487	8.81		
2,4-Dinitrophenol	.11898	.13457	13.11		**
Acenaphthene	1.13011	.98938	12.45	*	
Dibenzofuran	1.64131	1.50622	8.23		
2,4-Dinitrotoluene	.28418	.30629	7.78		
4-Nitrophenol	.28450	.28925	1.67		**
Fluorene	1.12850	.96085	14.86		
Diethylphthalate	1.20939	1.15317	4.65		
4-Chlorophenyl-phenylether	.59183	.52781	10.82		
4-Nitroaniline	.35956	.34170	4.97		
2,4,6-Tribromophenol	.21023	.17772	15.46		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.49637	23.21	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.22381	5.07		
Hexachlorobenzene	.26273	.26592	1.21		
Pentachlorophenol	.14536	.14450	.59	*	

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: 11/06/88

Contractor: ENVIRONMENTAL SCIENCE Time: 11:44

Contract No: _____ Laboratory ID: >S0388

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	1.02553	.85		
Anthracene	1.05155	1.19384	13.55		
Di-n-Butylphthalate	1.51956	1.89439	24.67		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.22227	2.67	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.07609	89.13		
Pyrene	1.56086	1.57500	.91		
Terphenyl-d14	1.05835	1.04103	1.64		
Butylbenzylphthalate	1.03390	1.17623	13.77		
3,3'-Dichlorobenzidine	.13689	.22532	64.60		
Chrysene	.99655	1.06159	6.53		
Benzo(a)Anthracene	1.10497	1.12702	2.00		
bis(2-Ethylhexyl)Phthalate	1.21073	1.40986	16.45		
Di-n-octylphthalate	3.40275	3.20518	5.81	*	
Benzo(a)Pyrene	1.32098	1.33824	1.31	*	
Benzo(b)Fluoranthene	1.60850	1.41072	12.30		
Indeno(1,2,3-cd)Pyrene	.96800	1.08629	12.22		
Dibenzo(a,h)Anthracene	.87481	.97925	11.94		
Benzo(k)Fluoranthene	1.44370	1.45799	.99		
Benzo(g,h,i)Perylene	.89761	.95915	6.86		

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 (**)

2377

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR0041

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

Sample No. (Standard): SSTD0416 Date Analyzed: 11/6/88

Lab File ID (Standard): S0388 Time Analyzed: 11:44

Instrument ID: 1

		IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
	12 HOUR STD	73819	9.29	266295	12.91	151029	18.37
	UPPER LIMIT	147638	9.79	332590	13.41	302058	18.87
	LOWER LIMIT	36910	8.79	133148	12.41	75515	17.87
	EPA SAMPLE NO.						
SSTD 01	8804 2508 AC	74949	9.27	213093	12.99	133491	18.39
02	8804 2583 MB ACBLK	63304	9.29	225992	13.02	112243	18.40
03	8804 2583 AC	66954	9.29	182787	13.00	124498	18.41
04	8804 2584 AC	65632	9.29	~~247079~~ 204	13.00	126591	18.40
05	8804 2585 AC	63059	9.28	202627	12.93	112116	18.40
06	8804 2586 AC	79535	9.28	~~465256~~ 367	12.97	149845	18.40
07	8804 2587 AC	51567	9.31	182801	13.03	91252	18.39
08	8804 2587 MS AC	61379	9.28	215637	12.96	119304	18.35
09	8804 2587 MSD AC	59980	9.28	198644	12.99	114637	18.35
11	8804 2616 AC	72372	9.28	204778	12.93	132457	18.39
11	8804 2616 BN	68421	9.29	217909	12.95	123270	18.43
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: 11/6/88

Lab File ID (Standard): 30388 Time Analyzed: 11:44

Instrument ID: 1

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS6(PRY) AREA #	RT
12 HOUR STD	215211	23.03	159417	31.49	124224	37.71
UPPER LIMIT	430422	23.53	318834	31.99	248448	38.21
LOWER LIMIT	107606	22.53	79709	30.99	62112	37.21
EPA SAMPLE NO.						
01 88042508 AC	200763	23.08	136695	31.52	56963	37.84
02 88042583 MS AC BN4	161323	23.11	94404	31.60	58077 *	37.90
03 88042553 AC	167903	23.09	99752	31.58	65590	37.86
04 88042584 AC	173886	23.10	106711	31.54	68372	37.78
05 88042585 AC	148197	23.07	87211	31.56	47886 *	37.83
06 88042586 AC	214903	23.09	134800	31.58	77517	37.83
07 88042587 AC	125888	23.09	76191 *	31.55	46900 *	37.87
08 88042587 MS AC	146698	23.03	108707	31.56	74693	37.83
09 88042587 MSD AC	154800	23.03	103308	31.57	68181	37.80
10 88042616 AC	182453	23.07	116578	31.49	56931 *	37.65
11 88042616 BN	153905	23.13	87547	31.54	48904	37.75
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

This page intentionally left blank.

DATA PACKAGE #39

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.: 881

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 8-19-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081966	DANGB-BG-MW43-SS3	AS-F	8-18-88		10-06-88	
88081966	DANGB-BG-MW43-SS3	BA-I	8-18-88		9-19-88	
88081966	DANGB-BG-MW43-SS3	CD-F	8-18-88		9-19-88	
88081966	DANGB-BG-MW43-SS3	CR-F	8-18-88		9-19-88	
88081966	DANGB-BG-MW43-SS3	HG-C	8-18-88		9-13-88	
88081966	DANGB-BG-MW43-SS3	PB-F	8-18-88		10-11-88	
88081966	DANGB-BG-MW43-SS3	418.1	8-18-88	9-14-88	9-15-88	
88081966	DANGB-BG-MW43-SS3	MOIS	8-18-88		8-29-88	
88081966	DANGB-BG-MW43-SS3	8010	8-18-88		8-31-88	8-30-88
88081966	DANGB-BG-MW43-SS3	8020	8-18-88		8-31-88	8-31-88
88081966	DANGB-BG-MW43-SS3	8080	8-18-88	8-27-88	9-26-88	
88081966	DANGB-BG-MW43-SS3	8270	8-18-88	8-27-88	10-06-88	
88081967	DANGB-BG-MW43-SS1	AS-F	8-18-88		10-06-88	
88081967	DANGB-BG-MW43-SS1	BA-I	8-18-88		9-19-88	
88081967	DANGB-BG-MW43-SS1	CD-F	8-18-88		9-19-88	
88081967	DANGB-BG-MW43-SS1	CR-F	8-18-88		9-19-88	
88081967	DANGB-BG-MW43-SS1	HG-C	8-18-88		9-13-88	
88081967	DANGB-BG-MW43-SS1	PB-F	8-18-88		10-11-88	
88081967	DANGB-BG-MW43-SS1	418.1	8-18-88	9-14-88	9-15-88	
88081967	DANGB-BG-MW43-SS1	MOIS	8-18-88		8-29-88	
88081967	DANGB-BG-MW43-SS1	8010	8-18-88		8-31-88	8-30-88
88081967	DANGB-BG-MW43-SS1	8020	8-18-88		8-31-88	8-31-88
88081967	DANGB-BG-MW43-SS1	8080	8-18-88	8-27-88	9-26-88	
88081967	DANGB-BG-MW43-SS1	8270	8-18-88	8-27-88	10-06-88	

* If applicable

Job No.: OR001

Work Order No.: 881

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081968	DANGB-BG-MW42-SS2	AS-F	8-18-88		10-06-88	
88081968	DANGB-BG-MW42-SS2	BA-I	8-18-88		9-19-88	
88081968	DANGB-BG-MW42-SS2	CD-F	8-18-88		9-19-88	
88081968	DANGB-BG-MW42-SS2	CR-F	8-18-88		9-19-88	
88081968	DANGB-BG-MW42-SS2	HG-C	8-18-88		9-13-88	
88081968	DANGB-BG-MW42-SS2	PB-F	8-18-88		10-11-88	
88081968	DANGB-BG-MW42-SS2	418.1	8-18-88	9-14-88	9-15-88	
88081968	DANGB-BG-MW42-SS2	MOIS	8-18-88		8-29-88	
88081968	DANGB-BG-MW42-SS2	8010	8-18-88		8-31-88	8-30-88
88081968	DANGB-BG-MW42-SS2	8020	8-18-88		8-31-88	8-31-88
88081968	DANGB-BG-MW42-SS2	8080	8-18-88	8-27-88	9-26-88	
88081968	DANGB-BG-MW42-SS2	8270	8-18-88	8-27-88	10-26-88	
88081969	DANGB-BG-MW43-SS2	AS-F	8-18-88		10-06-88	
88081969	DANGB-BG-MW43-SS2	BA-I	8-18-88		9-19-88	
88081969	DANGB-BG-MW43-SS2	CD-F	8-18-88		9-19-88	
88081969	DANGB-BG-MW43-SS2	CR-F	8-18-88		9-19-88	
88081969	DANGB-BG-MW43-SS2	HG-C	8-18-88		9-14-88	
88081969	DANGB-BG-MW43-SS2	PB-F	8-18-88		10-11-88	
88081969	DANGB-BG-MW43-SS2	418.1	8-18-88	9-14-88	9-15-88	
88081969	DANGB-BG-MW43-SS2	MOIS	8-18-88		8-29-88	
88081969	DANGB-BG-MW43-SS2	8010	8-18-88		8-31-88	8-30-88
88081969	DANGB-BG-MW43-SS2	8020	8-18-88		8-31-88	8-31-88
88081969	DANGB-BG-MW43-SS2	8080	8-18-88	8-27-88	9-26-88	
88081969	DANGB-BG-MW43-SS2	8270	8-18-88	8-27-88	10-26-88	
88081970	DANGB-BG-MW42-SS1	AS-F	8-18-88		10-06-88	
88081970	DANGB-BG-MW42-SS1	BA-I	8-18-88		9-19-88	
88081970	DANGB-BG-MW42-SS1	CD-F	8-18-88		9-19-88	
88081970	DANGB-BG-MW42-SS1	CR-F	8-18-88		9-19-88	
88081970	DANGB-BG-MW42-SS1	HG-C	8-18-88		9-14-88	
88081970	DANGB-BG-MW42-SS1	PB-F	8-18-88		10-11-88	
88081970	DANGB-BG-MW42-SS1	418.1	8-18-88	9-14-88	9-15-88	
88081970	DANGB-BG-MW42-SS1	MOIS	8-18-88		8-29-88	
88081970	DANGB-BG-MW42-SS1	8010	8-18-88		8-31-88	8-30-88
88081970	DANGB-BG-MW42-SS1	8020	8-18-88		8-31-88	8-31-88
88081970	DANGB-BG-MW42-SS1	8080	8-18-88	8-27-88	9-26-88	
88081970	DANGB-BG-MW42-SS1	8270	8-18-88	11-02-88	11-21-88	

* If applicable

Job No.: OR001

Work Order No.: 881

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081971	DANGB-BG-MW42-SS3	AS-F	8-18-88		10-06-88	
88081971	DANGB-BG-MW42-SS3	BA-I	8-18-88		9-19-88	
88081971	DANGB-BG-MW42-SS3	CD-F	8-18-88		9-19-88	
88081971	DANGB-BG-MW42-SS3	CR-F	8-18-88		9-19-88	
88081971	DANGB-BG-MW42-SS3	HG-C	8-18-88		9-14-88	
88081971	DANGB-BG-MW42-SS3	PB-F	8-18-88		10-11-88	
88081971	DANGB-BG-MW42-SS3	418.1	8-18-88	9-14-88	9-15-88	
88081971	DANGB-BG-MW42-SS3	MOIS	8-18-88		8-29-88	
88081971	DANGB-BG-MW42-SS3	8010	8-18-88		8-31-88	8-30-88
88081971	DANGB-BG-MW42-SS3	8020	8-18-88		8-31-88	8-31-88
88081971	DANGB-BG-MW42-SS3	8080	8-18-88	8-27-88	9-26-88	
88081971	DANGB-BG-MW42-SS3	8270	8-18-88	11-02-88	11-21-88	
88081972	DANGB3-SS-EZ	AS-F	8-18-88		10-06-88	
88081972	DANGB3-SS-EZ	BA-I	8-18-88		9-19-88	
88081972	DANGB3-SS-EZ	CD-F	8-18-88		9-19-88	
88081972	DANGB3-SS-EZ	CR-F	8-18-88		9-19-88	
88081972	DANGB3-SS-EZ	HG-C	8-18-88		9-14-88	
88081972	DANGB3-SS-EZ	PB-F	8-18-88		10-11-88	
88081972	DANGB3-SS-EZ	418.1	8-18-88	9-14-88	9-15-88	
88081972	DANGB3-SS-EZ	MOIS	8-18-88		8-29-88	
88081972	DANGB3-SS-EZ	8010	8-18-88		8-31-88	8-31-88
88081972	DANGB3-SS-EZ	8020	8-18-88		8-31-88	8-31-88
88081972	DANGB3-SS-EZ	8080	8-18-88	8-27-88	9-26-88	
88081972	DANGB3-SS-EZ	8270	8-18-88	8-27-88	11-28-88	
88081973	DANGB3-SS-DO	AS-F	8-18-88		10-06-88	
88081973	DANGB3-SS-DO	BA-I	8-18-88		9-19-88	
88081973	DANGB3-SS-DO	CD-F	8-18-88		9-19-88	
88081973	DANGB3-SS-DO	CR-F	8-18-88		9-19-88	
88081973	DANGB3-SS-DO	HG-C	8-18-88		9-14-88	
88081973	DANGB3-SS-DO	PB-F	8-18-88		10-11-88	
88081973	DANGB3-SS-DO	418.1	8-18-88	9-14-88	9-15-88	
88081973	DANGB3-SS-DO	MOIS	8-18-88		8-29-88	
88081973	DANGB3-SS-DO	8010	8-18-88		8-31-88	8-31-88
88081973	DANGB3-SS-DO	8020	8-18-88		8-31-88	8-31-88
88081973	DANGB3-SS-DO	8080	8-18-88	8-27-88	9-26-88	
88081973	DANGB3-SS-DO	8270	8-18-88	8-27-88	11-28-88	

* If applicable

Job No.: OR001

Work Order No.: 881

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081974	DANGB3-SS-49	AS-F	8-18-88		10-06-88	
88081974	DANGB3-SS-49	BA-I	8-18-88		9-19-88	
88081974	DANGB3-SS-49	CD-F	8-18-88		9-19-88	
88081974	DANGB3-SS-49	CR-F	8-18-88		9-19-88	
88081974	DANGB3-SS-49	HG-C	8-18-88		9-14-88	
88081974	DANGB3-SS-49	PB-F	8-18-88		10-11-88	
88081974	DANGB3-SS-49	418.1	8-18-88	9-14-88	9-15-88	
88081974	DANGB3-SS-49	MOIS	8-18-88		8-29-88	
88081974	DANGB3-SS-49	8010	8-18-88		8-31-88	8-31-88
88081974	DANGB3-SS-49	8020	8-18-88		8-31-88	8-31-88
88081974	DANGB3-SS-49	8080	8-18-88	8-27-88	9-26-88	10-03-88
88081974	DANGB3-SS-49	8270	8-18-88	8-27-88	10-28-88	
88081975	DANGB3-SS-D1	AS-F	8-18-88		10-06-88	
88081975	DANGB3-SS-D1	BA-I	8-18-88		9-19-88	
88081975	DANGB3-SS-D1	CD-F	8-18-88		9-19-88	
88081975	DANGB3-SS-D1	CR-F	8-18-88		9-19-88	
88081975	DANGB3-SS-D1	HG-C	8-18-88		9-14-88	
88081975	DANGB3-SS-D1	PB-F	8-18-88		10-11-88	
88081975	DANGB3-SS-D1	418.1	8-18-88	9-14-88	9-15-88	
88081975	DANGB3-SS-D1	MOIS	8-18-88		8-29-88	
88081975	DANGB3-SS-D1	8010	8-18-88		8-31-88	8-31-88
88081975	DANGB3-SS-D1	8020	8-18-88		8-31-88	8-31-88
88081975	DANGB3-SS-D1	8080	8-18-88	8-27-88	9-26-88	10-03-88
88081975	DANGB3-SS-D1	8270	8-18-88	11-02-88	11-21-88	
88081976	DANGB3-SS-EO	AS-F	8-18-88		10-06-88	
88081976	DANGB3-SS-EO	BA-I	8-18-88		9-19-88	
88081976	DANGB3-SS-EO	CD-F	8-18-88		9-19-88	
88081976	DANGB3-SS-EO	CR-F	8-18-88		9-19-88	
88081976	DANGB3-SS-EO	HG-C	8-18-88		9-14-88	
88081976	DANGB3-SS-EO	PB-F	8-18-88		10-11-88	
88081976	DANGB3-SS-EO	418.1	8-18-88	9-14-88	9-15-88	
88081976	DANGB3-SS-EO	MOIS	8-18-88		8-29-88	
88081976	DANGB3-SS-EO	8010	8-18-88		8-31-88	8-31-88
88081976	DANGB3-SS-EO	8020	8-18-88		8-31-88	8-31-88
88081976	DANGB3-SS-EO	8080	8-18-88	8-27-88	9-26-88	10-04-88
88081976	DANGB3-SS-EO	8270	8-18-88	11-02-88	12-01-88	

* If applicable

Job No.: OR001

Work Order No.: 881

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081977	DANGB3-SS-E1	AS-F	8-18-88		10-06-88	
88081977	DANGB3-SS-E1	BA-I	8-18-88		9-19-88	
88081977	DANGB3-SS-E1	CD-F	8-18-88		9-19-88	
88081977	DANGB3-SS-E1	CR-F	8-18-88		9-19-88	
88081977	DANGB3-SS-E1	HG-C	8-18-88		9-14-88	
88081977	DANGB3-SS-E1	PB-F	8-18-88		10-11-88	
88081977	DANGB3-SS-E1	418.1	8-18-88	9-14-88	9-15-88	
88081977	DANGB3-SS-E1	MOIS	8-18-88		8-29-88	
88081977	DANGB3-SS-E1	8010	8-18-88		8-31-88	8-31-88
88081977	DANGB3-SS-E1	8020	8-18-88		8-31-88	8-31-88
88081977	DANGB3-SS-E1	8080	8-18-88	8-27-88	9-26-88	
88081977	DANGB3-SS-E1	8270	8-18-88	8-27-88	11-28-88	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88081966-88081977
WORK ORDER NO.: 881

These soil samples were received at the ES Berkeley Laboratory on 8-19-88.

They were received cold and intact.

CHAIN OF CUSTODY RECORD 881-1

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

SAMPLER(S): (Signature) Peter E Sherman

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	SW8080	SW8270	EPA 418.1	SW6010, 7181	SW7131, 7421,	SW7060, 7471	REMARKS
8/18/88	4:14pm	DANGB-BG-MW43 SS4 23-24	1		✓	✓	✓	✓	✓	✓	881966
8/18/88	3:41PM	DANGB-BG-MW43 SS1 1-3'	1		✓	✓	✓	✓	✓	✓	881967
8/18/88	13:19	DANGB-BG-MW42 SS2 7-8	1		✓	✓	✓	✓	✓	✓	881968
8/18/88	3:53PM	DANGB-BG-MW43 SS4 14-15	1		✓	✓	✓	✓	✓	✓	881969
8/18/88	13:15	DANGB-BG-MW42 SS1 0-1	1		✓	✓	✓	✓	✓	✓	881970
8/18/88	13:25	DANGB-BG-MW42 SS3 145-155	1		✓	✓	✓	✓	✓	✓	881971
8/18/88	13:19	DANGB-BG-MW42 SS1	1	✓							881968
8/18/88	3:53PM	DANGB-BG-MW43 SS3	1	✓							881969
8/18/88	13:25	DANGB-BG-MW42 SS2	1	✓							881971
8/18/88	13:15	DANGB-BG-MW42 SS1	1	✓							881970
8/18/88	4:14pm	DANGB-MW43-SS3	1	✓							881966
8/18/88	3:41PM	DANGB-BG MW43	1	✓							881967

6812

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)
John Sherman					

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
			8-19-88 10:50	One bag per labeled DANGB-BG-MW43 Logged in as DANGB-BG-MW43-SS1, as all other 403 jars were accounted for. B.F.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

CHAIN OF CUSTODY RECORD 88/-2.

ES JOB NO.	PROJECT NAME/LOCATION	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.	ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA. 94710

SAMPLER(S): (Signature) Jo-Ann Sherwin, Richard Davis, Mike Rodolf (MR 8/18/88)

SOILS ANALYSES REQUIRED

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CON-TAINERS	SW8010, 8020	SW8080	SW8270	EPA 418.1	SW6010, 7191	SW7131, 7421	[illegible]		REMARKS
8/18/88	1:00pm	DANGB 3SS E2	1	✓								881972
8/18/88	11:25am	DANGB 3SS D0	1		✓	✓	✓	✓	✓	✓		881973
8/18/88	11:00am	DANGB 3SS 49	1		✓	✓	✓	✓	✓	✓		881974
8/18/88	1:05pm	DANGB 3SS E2	1		✓	✓	✓	✓	✓	✓		881972
8/18/88	11:45am	DANGB 3SS D1	1	✓								881975
8/18/88	12:30	DANGB 3SS E0	1	✓								881976
8/18/88	11:20a	DANGB 3SS D0	1	✓								881973
8/18/88	10:55	DANGB 3SS 49	1	✓								881974
8/18/88	1:15	DANGB 3SS E1	1		✓	✓	✓	✓	✓	✓		881977
8/18/88	11:50a	DANGB 3SS D1	1		✓	✓	✓	✓	✓	✓		881975
8/18/88	12:35	DANGB 3SS E0	1		✓	✓	✓	✓	✓	✓		881976
8/18/88	12:10	DANGB 3SS E1	1	✓								881977

2190

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Jo-Ann Sherwin	8/18/88 3:05p				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Bill [illegible]	8-19-88 10:32	rec'd cold & intact. Logged in for [illegible] as requested on bottles and in previous shipments [illegible]

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

J 949030664 1

SENDER'S COPY

Sender's Federal Express Account Number: 1496-4207-8
Date: 4/12/88

1 From (Your Name) Please Print: Jo-Ann Sheerin
Your Phone Number (Very Important): ( )
Company: Engineering Science
Department/Floor No.:
Street Address: 710 S. Illinois Ave
City: Oak Ridge State: TN ZIP Required: 37830

2 To (Recipient's Name) Please Print: Kurt Bill Kidd
Recipient's Phone Number (Very Im...): ( )
Company: Engineering Science
Department/Floor No.:
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): 1000 Bancroft Way
City: Berkeley State: CA 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

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
2 ☐ 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	YOUR DECLARED VALUE (See right)	OVER SIZE
	3		
	30		
	12½		
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.: 1147

Date/Time for FEDEX Use: 4/12 1741

SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY

Use of the 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.

SENDER'S COPY

2191

ANALYSIS REPORT

K ORDER NUMBER: 881
NUMBER : ZB0000000440
K ORDER DATE : 08/19/88

APPROVED BY _____
Lab Supervisor

ORT DATA:
OAK RIDGE/DULUTH ANGB
S. ILLINOIS AVE. STE. S103
RIDGE, TN 37830
L HAYDEN

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

F REPORT COPIES: 1

TRACT / PO # : OR001
TACT : BILL HAYDEN
(615)-481-3920

K: 2, UNITS: mg/Kg

T COMPOUND	DANGB-BG-MW43 SS3 88081966	DANGB-BG-MW43- SS1 88081967	DANGB-BG-MW42- SS2 88081968	DANGB-BG-MW43- SS2 88081969	DANGB-BG-MW42- SS1 88081970	DANGB-BG-MW42- SS3 88081971
D DIG SOIL	NA	NA	NA	NA	NA	NA
ENIC	<5.0E	<5.0E	<5.0E	<5.0E	<5.0E	<5.0E
IUM	51.3	61.8	48.4	96.7*	69.7*	39.7*
MIUM	9.5N	7.6N	10.4N	13.6*N	11.5*N	10.1*N
OMIUM	17.2	14.4	20.0	36.8	42.2	27.6
CURY	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
D	4.2*N	5.1*N	3.6*N	4.7*N	4.9*N	3.4*N

NOT APPLICABLE
Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 881

SK: 2, UNITS: mg/Kg

	DANGB3-SS-E2	DANGB3-SS-DO	DANGB3-SS-49	DANGB3-SS-D1	DANGB3-SS-EO	DANGB3-SS-E1
ST COMPOUND	88081972	88081973	88081974	88081975	88081976	88081977
ACID DIG SOIL	NA	NA	NA	NA	NA	NA
SENIC	<5.0E	<5.0E	<5.0E	<5.0E	<5.0E	<5.0E
RIUM	60.5*	104*	64.0*	43.1*	57.6*	98.7*
CADMIUM	11.0*N	11.9*N	11.2*N	10.4*N	11.5*N	9.3*N
CHROMIUM	31.8	38.0	44.3	27.5	28.9	36.2
RCURY	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
LEAD	6.5*N	6.0*N	16.8*N	4.0*N	5.7*N	10.2*N

NA- NOT APPLICABLE
ND - Not Detected

ANALYSIS REPORT

< ORDER NUMBER: 881
NUMBER : Z80000000440
< ORDER DATE : 08/19/88

APPROVED BY _____
Lab Supervisor

)RT DATA:
)AK 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

F REPORT COPIES: 1

TRACT / PO # : OR001
TACT : BILL HAYDEN
(615)-481-3920

K: 3, UNITS: mg/Kg

F COMPOUND	DANGB-BG-MW43-SS3 88081966	DANGB-BG-MW43-SS1 88081967	DANGB-BG-MW42-SS2 88081968	DANGB-BG-MW43-SS2 88081969	DANGB-BG-MW42-SS1 88081970	DANGB-BG-MW42-SS3 88081971
.1 PETROLEUM HYDROCARBONS	<100	200	<100	<100	<100	<100
DISTURE	14.0	29.3	11.3	17.2	15.6	9.1

- Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 881

SK: 3, UNITS: mg/Kg

ST COMPOUND	DANGB3-SS-E2 88081972	DANGB3-SS-DO 88081973	DANGB3-SS-49 88081974	DANGB3-SS-D1 88081975	DANGB3-SS-EO 88081976	DANGB3-SS-E1 88081977
418.1 PETROLEUM HYDROCARBONS	100	<100	2700	<100	<100	<100
MOISTURE	9.8	16.3	10.6	8.3	8.1	17.3

ND - Not Detected

ANALYSIS REPORT

K ORDER NUMBER: 881
NUMBER : ZB0000000440
K ORDER DATE : 08/19/88

APPROVED BY _____
Lab Supervisor

ORT DATA:
OAK RIDGE,DULUTH ANGB
S. ILLINOIS AVE. STE. S103
RIDGE, TN 37830
L HAYDEN

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

F REPORT COPIES: 1

TRACT / PO # : OR001
TACT : BILL HAYDEN
(615)-481-3920

K: 4, UNITS: ug/Kg, GROUP 8010

T COMPOUND	DANGB-BG-MW43-SS3 88081966	DANGB-BG-MW43-SS1 88081967	DANGB-BG-MW42-SS2 88081968	DANGB-BG-MW43-SS2 88081969	DANGB-BG-MW42-SS1 88081970	DANGB-BG-MW42-SS3 88081971
ZYL CHLORIDE	ND	ND	ND	ND	ND	ND
(2-CHLOROETHOXY)METHANE	ND	ND	ND	ND	ND	ND
(2-CHLOROISOPROPYL)ETHER	ND	ND	ND	ND	ND	ND
MOBENZENE	ND	ND	ND	ND	ND	ND
MODICHLOROMETHANE	ND	ND	ND	ND	ND	ND
MOFORM	ND	ND	ND	ND	ND	ND
MOETHANE	ND	ND	ND	ND	ND	ND
BON TETRACHLORIDE	ND	ND	ND	ND	ND	ND
ORACETALDEHYDE	ND	ND	ND	ND	ND	ND
ORAL	ND	ND	ND	ND	ND	ND
OROBENZENE	ND	ND	ND	ND	ND	ND
OROETHANE	ND	ND	ND	ND	ND	ND
OROFORM	ND	ND	ND	0.12B	ND	0.22B
HLOROHEXANE	ND	ND	ND	ND	ND	ND
HLOROETHYL VINYL ETHER	ND	ND	ND	ND	ND	ND
OROMETHANE	ND	ND	ND	ND	ND	ND
OROMETHYL METHYL ETHER	ND	ND	ND	ND	ND	ND
OROTOLUENE	ND	ND	ND	ND	ND	ND
ROMOCHLOROMETHANE	ND	ND	ND	ND	ND	ND
ROMOMETHANE	ND	ND	ND	ND	ND	ND
-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
HLORODIFLUOROMETHANE	ND	ND	ND	ND	ND	ND
-DICHLOROETHANE	ND	ND	ND	ND	ND	ND
-DICHLOROETHANE	ND	ND	ND	ND	ND	ND
-DICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
NS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
HLOROMETHANE	7.4B	3.1B	0.29B	4.8B	1.3B	2.2B
-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND

- Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 881

TEST COMPOUND	DANGB-BG-MW43-SS3 88081966	DANGB-BG-MW43-SS1 88081967	DANGB-BG-MW42-SS2 88081968	DANGB-BG-MW43-SS2 88081969	DANGB-BG-MW42-SS1 88081970	DANGB-BG-MW42-SS3 88081971
,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
TRACHLOROETHYLENE	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
ICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
ICHLOROFLUOROMETHANE	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 881

K: 4, UNITS: ug/Kg, GROUP 8010

T COMPOUND	DANGB3-SS-E2 88081972	DANGB3-SS-DO 88081973	DANGB3-SS-49 88081974	DANGB3-SS-D1 88081975	DANGB3-SS-EO 88081976	DANGB3-SS-E1 88081977
ZYL CHLORIDE	ND	ND	ND	ND	ND	ND
(2-CHLOROETHOXY)METHANE	ND	ND	ND	ND	ND	ND
(2-CHLOROISOPROPYL)ETHER	ND	ND	ND	ND	ND	ND
MOBENZENE	ND	ND	ND	ND	ND	ND
MODICHLOROMETHANE	ND	ND	ND	ND	ND	ND
MOFORM	ND	ND	ND	ND	ND	ND
MOETHANE	ND	ND	ND	ND	ND	ND
BON TETRACHLORIDE	ND	ND	ND	ND	ND	ND
ORACETALDEHYDE	ND	ND	ND	ND	ND	ND
ORAL	ND	ND	ND	ND	ND	ND
OROBENZENE	ND	ND	ND	ND	ND	ND
OROETHANE	ND	ND	ND	ND	ND	ND
OROFORM	0.23B	ND	0.30B	ND	ND	ND
HLOROHEXANE	ND	ND	ND	ND	ND	ND
HLOROETHYL VINYL ETHER	ND	ND	ND	ND	ND	ND
OROMETHANE	ND	ND	ND	ND	ND	ND
OROMETHYL METHYL ETHER	ND	ND	ND	ND	ND	ND
OROTOLUENE	ND	ND	ND	ND	ND	ND
ROMODICHLOROMETHANE	ND	ND	ND	ND	ND	ND
ROMOMETHANE	ND	ND	ND	ND	ND	ND
-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
HLORODIFLUOROMETHANE	ND	ND	ND	ND	ND	ND
-DICHLOROETHANE	ND	ND	1.2	ND	ND	ND
-DICHLOROETHANE	ND	ND	ND	ND	ND	ND
-DICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
NS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
HLOROMETHANE	1.3B	1.3B	2.4B	1.4B	1.4B	3.5B
-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND
-DICHLOROPROPYLENE	ND	ND	ND	ND	ND	ND
,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
,1,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
RACHLOROETHYLENE	ND	ND	37B	ND	ND	ND
,1-TRICHLOROETHANE	ND	ND	4.5B	ND	ND	ND
,2-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
CHLOROETHYLENE	ND	4.4	0.73	ND	ND	ND
CHLOROFLUOROMETHANE	ND	ND	ND	ND	ND	ND
CHLOROPROPANE	ND	ND	ND	ND	ND	ND
YL CHLORIDE	ND	ND	ND	ND	ND	ND

- Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 881
OB NUMBER : ZB000000[illegible]0
WORK ORDER DATE : 08/19/88

APPROVED BY _____
Lab Supervisor

PORT DATA:
ES 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

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

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

TEST COMPOUND	DANGB-BG-MW43-SS3 88081966	DANGB-BG-MW43-SS1 88081967	DANGB-BG-MW42-SS2 88081968	DANGB-BG-MW43-SS2 88081969	DANGB-BG-MW42-SS1 88081970	DANGB-BG-MW42-SS3 88081971
NZENE	ND	ND	ND	ND	ND	ND
HLOROBENZENE	ND	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
3-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
4-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
ETHYL BENZENE	ND	ND	ND	ND	ND	ND
TOLUENE	160B	25B	ND	8.3B	1.8B	198B
LENES	ND	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 881

K: 4, UNITS: ug/Kg, GROUP 8020

	DANGB3-SS-E2	DANGB3-SS-DO	DANGB3-SS-49	DANGB3-SS-D1	DANGB3-SS-EO	DANGB3-SS-E1
T COMPOUND	88081972	88081973	88081974	88081975	88081976	88081977
ZENE	ND	ND	900	ND	ND	ND
OROBENZENE	ND	ND	ND	ND	ND	ND
-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
YL BENZENE	ND	ND	260	ND	ND	ND
UENE	38B	20B	1300B	12B	3.1B	53B
ENES	ND	ND	2000	ND	ND	ND

- Not Detected

ANALYSIS REPORT

RK ORDER NUMBER: 881
NUMBER : 280000000440
WORK ORDER DATE : 08/19/88

APPROVED BY _____
Lab Supervisor

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

TASK: 4, UNITS: ug/Kg, GROUP 8080

TEST COMPOUND	DANGB-BG-MW43-SS3 88081966	DANGB-BG-MW43-SS1 88081967	DANGB-BG-MW42-SS2 88081968	DANGB-BG-MW43-SS2 88081969	DANGB-BG-MW42-SS1 88081970	DANGB-BG-MW42-SS3 88081971
DRIN	ND	ND	ND	ND	ND	ND
PHA-BHC	ND	ND	ND	ND	ND	ND
BETA-BHC	ND	ND	ND	ND	ND	ND
TA-BHC	ND	ND	ND	ND	ND	ND
MA-BHC	ND	ND	ND	ND	ND	ND
CHLORDANE	ND	ND	ND	ND	ND	ND
4,4'-DDD	ND	ND	ND	ND	ND	ND
4'-DDE	ND	ND	ND	ND	ND	ND
4'-DDT	ND	ND	ND	ND	ND	ND
DIELDRIN	ND	ND	ND	ND	ND	ND
ENDOSULFAN I	ND	ND	ND	ND	ND	ND
DOSULFAN II	ND	ND	ND	ND	ND	ND
ENDOSULFAN SULFATE	ND	ND	ND	ND	ND	ND
ENDRIN	ND	ND	ND	ND	ND	ND
DRIN ALDEHYDE	NA	NA	NA	NA	NA	NA
PTACHLOR	ND	ND	ND	ND	ND	ND
HEPTACHLOR EPOXIDE	ND	ND	ND	ND	ND	ND
KEPONE	NA	NA	NA	NA	NA	NA
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	ND	ND	ND	ND	ND	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

NA- NOT ANALYZED
ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 881

K: 4, UNITS: ug/Kg, GROUP 8080

T COMPOUND	DANGB3-SS-E2 88081972	DANGB3-SS-DO 88081973	DANGB3-SS-49 88081974	DANGB3-SS-D1 88081975	DANGB3-SS-EO 88081976	DANGB3-SS-E1 88081977
RIN	ND	ND	ND	ND	ND	ND
HA-BHC	ND	ND	ND	ND	ND	ND
A-BHC	ND	ND	ND	ND	ND	ND
TA-BHC	ND	ND	ND	ND	ND	ND
HA-BHC	ND	ND	ND	ND	ND	ND
ORDANE	ND	ND	ND	ND	ND	ND
'-DDD	ND	ND	190	62	ND	ND
'-DDE	ND	ND	ND	ND	ND	ND
'-DDT	ND	ND	45	51	25	ND
LDRIN	ND	ND	ND	ND	ND	ND
OSULFAN I	ND	ND	ND	ND	ND	ND
OSULFAN II	ND	ND	ND	ND	ND	ND
OSULFAN SULFATE	ND	ND	ND	ND	ND	ND
RIN	ND	ND	ND	ND	ND	ND
RIN ALDEHYDE	NA	NA	NA	NA	NA	NA
TACHLOR	ND	ND	ND	ND	ND	ND
TACHLOR EPOXIDE	ND	ND	ND	ND	ND	ND
ONE	NA	NA	NA	NA	NA	NA
HOXYCHLOR	ND	ND	ND	ND	ND	ND
APHENE	ND	ND	ND	ND	ND	ND
-1016	ND	ND	ND	ND	ND	ND
-1221	ND	ND	ND	ND	ND	ND
-1232	ND	ND	ND	ND	ND	ND
-1242	ND	ND	ND	ND	ND	ND
-1248	ND	ND	ND	ND	ND	ND
-1254	ND	ND	ND	ND	ND	ND
-1260	ND	ND	ND	ND	ND	ND

- NOT ANALYZED
- Not Detected

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

Date Received: August 19, 1988
Date Reported: December 6, 1988

Work Order: 881
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:	88081966	88081967
Sample No.:	DANGB-BG-MW43-SS3 23-24'	DANGB-BG-MW43-SS1 1-2'
Date Sampled:	8-18-88	8-18-88
Time Sampled:	16:14	15:41
Date Extracted:	8-27-88	8-27-88
Date Analyzed:	10-6-88	10-6-88
Percent Moisture:	14	29

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-propylamine	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

B = Compound was detected in the blank.

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

ate Received: August 19, 1988
ate Reported: December 6, 1988

Work Order: 881
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:	88081966	88081967
ample No.:	DANGB-BG-MW43-SS3 23-24'	DANGB-BG-MW43-SS1 1-2'
ate Sampled:	8-18-88	8-18-88
ime Sampled:	16:14	15:41
ate Extracted:	8-27-88	8-27-88
ate Analyzed:	10-6-88	10-6-88
ercent Moisture:	14	29

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
henanthrene	330	ND	ND
nthracene	330	ND	ND
ibutyl phthalate	330	ND	ND
luoranthene	330	ND	ND
-Chlorophenyl phenyl ether	330	ND	ND
yrene	330	ND	ND
utyl Benzyl phthalate	330	ND	ND
is(2-ethylhexyl) phthalate	330	ND	ND
hrysene	330	ND	ND
-Bromophenyl phenyl ether	330	ND	ND
enzo(a)anthracene	330	ND	ND
i-n-octylphthalate	330	ND	ND
enzo(b)fluoranthene	330	ND	ND
enzo(k)fluoranthene	330	ND	ND
enzidine	2000	ND	ND
,3'-Dichlorobenzidine	660	ND	ND
enzo(a)pyrene	330	ND	ND
ndeno(1,2,3-cd)pyrene	330	ND	ND
ibenzo(a,h)anthracene	330	ND	ND
enzo(ghi)perylene	330	ND	ND
enzyl Alcohol	660	ND	ND

= Compound was detected in the blank.

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

Date Received: August 19, 1988
Date Reported: December 6, 1988

Work Order: 881
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:	88081966	88081967
Sample No.:	DANGB-BG-MW43-SS3 23-24'	DANGB-BG-MW43-SS1 1-2'
Date Sampled:	8-18-88	8-18-88
Time Sampled:	16:14	15:41
Date Extracted:	8-27-88	8-27-88
Date Analyzed:	10-6-88	10-6-88
Percent Moisture:	14	29

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.

B = Compound was detected in the blank.

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

ate Received: August 19, 1988
ate Reported: December 6, 1988

Work Order: 881
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:	88081966	88081967
ample No.:	DANGB-BG-MW43-SS3 23-24'	DANGB-BG-MW43-SS1 1-2'
ate Sampled:	8-18-88	8-18-88
ime Sampled:	16:14	15:41
ate Extracted:	8-27-88	8-27-88
ate Analyzed:	10-6-88	10-6-88
ercent Moisture:	14	29

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
lpha-BHC	--*	ND	ND
amma-BHC	--*	ND	ND
eta-BHC	660	ND	ND
eptachlor	330	ND	ND
elta-BHC	500	ND	ND
ldrin	330	ND	ND
eptachlor epoxide	330	ND	ND
ndosulfan I	--*	ND	ND
ieldrin	500	ND	ND
,4'-DDE	1000	ND	ND
ndrin	--*	ND	ND
ndosulfan II	--*	ND	ND
,4'-DDD	500	ND	ND
,4'-DDT	830	ND	ND
ndosulfan Sulfate	1000	ND	ND
ndrin aldehyde	--*	ND	ND
ndrin Ketone	--*	ND	ND
nlordane	2000	ND	ND
ethoxychlor	--*	ND	ND
oxaphene	2000	ND	ND
roclor-1016	2000	ND	ND
roclor-1221	2000	ND	ND
roclor-1232	2000	ND	ND
roclor-1242	2000	ND	ND
roclor-1248	2000	ND	ND
roclor-1254	2000	ND	ND
roclor-1260	2000	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: Soil

Date Received: August 19, 1988
Date Reported: December 6, 1988

Work Order: 881
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:	88081966	88081967
Sample No.:	DANGB-BG-MW43-SS3 23-24'	DANGB-BG-MW43-SS1 1-2'
Date Sampled:	8-18-88	8-18-88
Time Sampled:	16:14	15:41
Date Extracted:	8-27-88	8-27-88
Date Analyzed:	10-6-88	10-6-88
Percent Moisture:	14	29

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.

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: Soil

:e Received: August 19, 1988
:e Reported: December 6, 1988

Work Order: 881
Job Number: OR001

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

ATTN: Mr. Bill Hayden

) Number:	88081968	88081969
mple No.:	DANGB-BG-MW42-SS2 7-8'	DANGB-BG-MW43-SS2 14-15'
:e Sampled:	8-18-88	8-18-88
me Sampled:	13:19	15:53
:e Extracted:	11-2-88	8-27-88
:e Analyzed:	11-21-88	10-26-88
rcent Moisture:	11	17

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
3-Dichlorobenzene	330	ND	ND
4-Dichlorobenzene	330	ND	ND
xachloroethane	330	ND	ND
s(2-chloroethyl)ether	330	ND	ND
2-Dichlorobenzene	330	ND	ND
Nitrosodimethylamine	330	ND	ND
s(2-chloroisopropyl)ether	330	ND	ND
Nitrosodi-n-propylamine	330	ND	ND
xachlorobutadiene	330	ND	ND
2,4-Trichlorobenzene	330	ND	ND
trobenzene	330	ND	ND
ophorone	330	ND	ND
phthalene	330	ND	ND
s(2-chloroethoxy)methane	330	ND	ND
Chloronaphthalene	330	ND	ND
xachlorocyclopentadiene	330	ND	ND
enaphthylene	330	ND	ND
enaphthene	330	ND	ND
methyl phthalate	330	ND	ND
6-Dinitrotoluene	330	ND	ND
orene	330	ND	ND
4-Dinitrotoluene	330	ND	ND
ethyl phthalate	330	ND	ND
Nitrosodiphenylamine	330	ND	ND
xachlorobenzene	330	ND	ND

= Compound was detected in the blank.

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

Date Received: August 19, 1988 Work Order: 881
Date Reported: December 6, 1988 Job Number: OR001

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

Lab Number:	88081968	88081969
Sample No.:	DANGB-BG-MW42-SS2 7-8'	DANGB-BG-MW43-SS2 14-15'
Date Sampled:	8-18-88	8-18-88
Time Sampled:	13:19	15:53
Date Extracted:	11-2-88	8-27-88
Date Analyzed:	11-21-88	10-26-88
Percent Moisture:	11	17

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Phenanthrene	330	ND	ND
Anthracene	330	ND	ND
Dibutyl phthalate	330	ND	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	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	2000	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

B = Compound was detected in the blank.

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

te Received: August 19, 1988
te Reported: December 6, 1988

Work Order: 881
Job Number: OR001

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

ATTN: Mr. Bill Hayden

o Number:	88081968	88081969
mple No.:	DANGB-BG-MW42-SS2 7-8'	DANGB-BG-MW43-SS2 14-15'
te Sampled:	8-18-88	8-18-88
me Sampled:	13:19	15:53
te Extracted:	11-2-88	8-27-88
te Analyzed:	11-21-88	10-26-88
rcent Moisture:	11	17

mpound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg	ug/kg
etophenone	--*	ND	ND
iline	--*	ND	ND
Aminobiphenyl	--*	ND	ND
Chloroaniline	660	ND	ND
Chloronaphthalene	--*	ND	ND
benzofuran	330	ND	ND
Dimethylaminoazobenzene	--*	ND	ND
12-Dimethylbenz(a)anthracene	--*	ND	ND
,a-Dimethylphenethylamine	--*	ND	ND
phenylamine	--*	ND	ND
2-Diphenylhydrazine	--*	ND	ND
nyl methanesulfonate	--*	ND	ND
Methylcholanthrene	--*	ND	ND
thyl methanesulfonate	--*	ND	ND
Methylnaphthalene	330	ND	ND
Naphthylamine	--*	ND	ND
Naphthylamine	--*	ND	ND
Nitroaniline	1600	ND	ND
Nitroaniline	1600	ND	ND
Nitroaniline	1600	ND	ND
Nitroso-di-n-butylamine	--*	ND	ND
Nitrosopiperidine	--*	ND	ND
ntachlorobenzene	--*	ND	ND
ntachloronitrobenzene	--*	ND	ND
enacetin	--*	ND	ND
Picoline	--*	ND	ND
namide	--*	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: Soil

Date Received: August 19, 1988 Work Order: 881
Date Reported: December 6, 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:	88081968	88081969
Sample No.:	DANGB-BG-MW42-SS2 7-8'	DANGB-BG-MW43-SS2 14-15'
Date Sampled:	8-18-88	8-18-88
Time Sampled:	13:19	15:53
Date Extracted:	11-2-88	8-27-88
Date Analyzed:	11-21-88	10-26-88
Percent Moisture:	11	17

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.

B = Compound was detected in the blank.

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

te Received: August 19, 1988
te Reported: December 6, 1988

Work Order: 881
Job Number: OR001

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

ATTN: Mr. Bill Hayden

o Number:	88081968	88081969
mple No.:	DANGB-BG-MW42-SS2 7-8'	DANGB-BG-MW43-SS2 14-15'
te Sampled:	8-18-88	8-18-88
me Sampled:	13:19	15:53
te Extracted:	11-2-88	8-27-88
te Analyzed:	11-21-88	10-26-88
rcent Moisture:	11	17

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
hlorophenol	330	ND	ND
itrophenol	330	ND	ND
enol	330	ND	ND
-Dimethylphenol	330	ND	ND
-Dichlorophenol	330	ND	ND
,6-Trichlorophenol	330	ND	ND
hloro-3-methylphenol	660	ND	ND
-Dinitrophenol	1600	ND	ND
-Dichlorophenol	--*	ND	ND
ethyl-4,6-Dinitrophenol	1600	ND	ND
tachlorophenol	1600	ND	ND
itrophenol	1600	ND	ND
zoic Acid	1600	ND	ND
ethylphenol	330	ND	ND
& 4-Methylphenol	330	ND	ND
,4,6-Tetrachlorophenol	--*	ND	ND
,5-Trichlorophenol	330	ND	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
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Soil

Date Received: August 19, 1988
Date Reported: December 6, 1988

Work Order: 881
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:	88081970	88081971
Sample No.:	DANGB-BG-MW42-SS1 0-1'	DANGB-BG-MW42-SS3 14.5-15.5'
Date Sampled:	8-18-88	8-18-88
Time Sampled:	13:15	13:25
Date Extracted:	11-2-88	11-2-88
Date Analyzed:	11-21-88	11-21-88
Percent Moisture:	16	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-propylamine	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

B = Compound was detected in the blank.

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

ate Received: August 19, 1988
ate Reported: December 6, 1988

Work Order: 881
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:	88081970	88081971
ample No.:	DANGB-BG-MW42-SS1 0-1'	DANGB-BG-MW42-SS3 14.5-15.5'
ate Sampled:	8-18-88	8-18-88
ime Sampled:	13:15	13:25
ate Extracted:	11-2-88	11-2-88
ate Analyzed:	11-21-88	11-21-88
ercent Moisture:	16	9

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
henanthrene	330	ND	ND
nthracene	330	ND	ND
ibutyl phthalate	330	ND	ND
luoranthene	330	ND	ND
-Chlorophenyl phenyl ether	330	ND	ND
yrene	330	ND	ND
tyl Benzyl phthalate	330	ND	ND
is(2-ethylhexyl) phthalate	330	ND	ND
rysene	330	ND	ND
-Bromophenyl phenyl ether	330	ND	ND
enzo(a)anthracene	330	ND	ND
-n-octylphthalate	330	ND	ND
enzo(b)fluoranthene	330	ND	ND
nzo(k)fluoranthene	330	ND	ND
enzidine	3000	ND	ND
,3'-Dichlorobenzidine	660	ND	ND
enzo(a)pyrene	330	ND	ND
ndeno(1,2,3-cd)pyrene	330	ND	ND
ibenzo(a,h)anthracene	330	ND	ND
enzo(ghi)perylene	330	ND	ND
enzyl Alcohol	660	ND	ND

= Compound was detected in the blank.

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

Date Received: August 19, 1988
Date Reported: December 6, 1988

Work Order: 881
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:	88081970	88081971
Sample No.:	DANGB-BG-MW42-SS1 0-1'	DANGB-BG-MW42-SS3 14.5-15.5'
Date Sampled:	8-18-88	8-18-88
Time Sampled:	13:15	13:25
Date Extracted:	11-2-88	11-2-88
Date Analyzed:	11-21-88	11-21-88
Percent Moisture:	16	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.

B = Compound was detected in the blank.

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

Date Received: August 19, 1988
Date Reported: December 6, 1988

Work Order: 881
Job Number: OR001

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

ATTN: Mr. Bill Hayden

Lab Number:	88081970	88081971
Sample No.:	DANGB-BG-MW42-SS1 0-1'	DANGB-BG-MW42-SS3 14.5-15.5'
Date Sampled:	8-18-88	8-18-88
Time Sampled:	13:15	13:25
Date Extracted:	11-2-88	11-2-88
Date Analyzed:	11-21-88	11-21-88
Percent Moisture:	16	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.

= Compound was detected in the blank.

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

Date Received: August 19, 1988
Date Reported: December 6, 1988

Work Order: 881
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:	88081970	88081971
Sample No.:	DANGB-BG-MW42-SS1 0-1'	DANGB-BG-MW42-SS3 14.5-15.5'
Date Sampled:	8-18-88	8-18-88
Time Sampled:	13:15	13:25
Date Extracted:	11-2-88	11-2-88
Date Analyzed:	11-21-88	11-21-88
Percent Moisture:	16	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.

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: Soil

ate Received: August 19, 1988
ate Reported: December 6, 1988

Work Order: 881
Job Number: OR001

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

ATTN: Mr. Bill Hayden

ab Number:	88081972	88081973
ample No.:	DANGB-3SS-E2	DANGB-3SS-D0
ate Sampled:	8-18-88	8-18-88
ime Sampled:	13:00	11:25
ate Extracted:	8-27-88	8-27-88
ate Analyzed:	11-28-88	11-28-88
ercent Moisture:	10	16

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
,3-Dichlorobenzene	330	ND	ND
,4-Dichlorobenzene	330	ND	ND
exachloroethane	330	ND	ND
is(2-chloroethyl)ether	330	ND	ND
,2-Dichlorobenzene	330	ND	ND
-Nitrosodimethylamine	330	ND	ND
is(2-chloroisopropyl)ether	330	ND	ND
-Nitrosodi-n-propylamine	330	ND	ND
exachlorobutadiene	330	ND	ND
,2,4-Trichlorobenzene	330	ND	ND
itrobenzene	330	ND	ND
sophorone	330	ND	ND
aphthalene	330	ND	ND
is(2-chloroethoxy)methane	330	ND	ND
-Chloronaphthalene	330	ND	ND
exachlorocyclopentadiene	330	ND	ND
cenaphthylene	330	ND	ND
cenaphthene	330	ND	ND
imethyl phthalate	330	ND	ND
,6-Dinitrotoluene	330	ND	ND
luorene	330	ND	ND
,4-Dinitrotoluene	330	ND	ND
iethyl phthalate	330	ND	ND
-Nitrosodiphenylamine	330	ND	ND
exachlorobenzene	330	ND	ND

= Compound was detected in the blank.

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

Date Received: August 19, 1988
Date Reported: December 6, 1988

Work Order: 881
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:	88081972	88081973
Sample No.:	DANGB-3SS-E2	DANGB-3SS-D0
Date Sampled:	8-18-88	8-18-88
Time Sampled:	13:00	11:25
Date Extracted:	8-27-88	8-27-88
Date Analyzed:	11-28-88	11-29-88
Percent Moisture:	10	16

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Phenanthrene	330	ND	ND
Anthracene	330	ND	ND
Dibutyl phthalate	330	ND	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	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	2000	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

B = Compound was detected in the blank.

ate Received: August 19, 1988
ate Reported: December 6, 1988

Work Order: 881
Job Number: OR001

r: ES:Oak Ridge/Duluth ANGB
ddress: 720 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

ab Number:	88081972	88081973
ample No.:	DANGB-3SS-E2	DANGB-3SS-D0
ate Sampled:	8-18-88	8-18-88
ime Sampled:	13:00	11:25
ate Extracted:	8-27-88	8-27-88
ate Analyzed:	11-28-88	11-28-88
ercent Moisture:	10	16

mpound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg	ug/kg
etophenone	--*	ND	ND
iline	--*	ND	ND
-Aminobiphenyl	--*	ND	ND
-Chloroaniline	660	ND	ND
-Chloronaphthalene	--*	ND	ND
benzofuran	330	ND	ND
-Dimethylaminoazobenzene	--*	ND	ND
,12-Dimethylbenz(a)anthracene	--*	ND	ND
-,a-Dimethylphenethylamine	--*	ND	ND
phenylamine	--*	ND	ND
,2-Diphenylhydrazine	--*	ND	ND
hyl methanesulfonate	--*	ND	ND
-Methylcholanthrene	--*	ND	ND
ethyl methanesulfonate	--*	ND	ND
-Methylnaphthalene	330	ND	ND
-Naphthylamine	--*	ND	ND
-Naphthylamine	--*	ND	ND
-Nitroaniline	1600	ND	ND
-Nitroaniline	1600	ND	ND
-Nitroaniline	1600	ND	ND
-Nitroso-di-n-butylamine	--*	ND	ND
Nitrosopiperidine	--*	ND	ND
entachlorobenzene	--*	ND	ND
entachloronitrobenzene	--*	ND	ND
enacetin	--*	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: Soil

Date Received: August 19, 1988
Date Reported: December 6, 1988

Work Order: 881
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:	88081972	88081973
Sample No.:	DANGB-3SS-E2	DANGB-3SS-D0
Date Sampled:	8-18-88	8-18-88
Time Sampled:	13:00	11:25
Date Extracted:	8-27-88	8-27-88
Date Analyzed:	11-28-88	11-28-88
Percent Moisture:	10	16

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.

B = Compound was detected in the blank.

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

ate Received: August 19, 1988
ate Reported: December 6, 1988

Work Order: 881
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:	88081972	88081973
ample No.:	DANGB-3SS-E2	DANGB-3SS-D0
ate Sampled:	8-18-88	8-18-88
ime Sampled:	13:00	11:25
ate Extracted:	8-27-88	8-27-88
ate Analyzed:	11-28-88	11-28-88
ercent Moisture:	10	16

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
-Chlorophenol	330	ND	ND
-Nitrophenol	330	ND	ND
henol	330	ND	ND
,4-Dimethylphenol	330	ND	ND
,4-Dichlorophenol	330	ND	ND
,4,6-Trichlorophenol	330	ND	ND
-Chloro-3-methylphenol	660	ND	ND
,4-Dinitrophenol	1600	ND	ND
,6-Dichlorophenol	--*	ND	ND
-Methyl-4,6-Dinitrophenol	1600	ND	ND
entachlorophenol	1600	ND	ND
-Nitrophenol	1600	ND	ND
enzoic Acid	1600	ND	ND
-Methylphenol	330	ND	ND
& 4-Methylphenol	330	ND	ND
,3,4,6-Tetrachlorophenol	--*	ND	ND
,4,5-Trichlorophenol	330	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: Soil

Date Received: August 19, 1988
Date Reported: December 6, 1988

Work Order: 881
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:	88081974	88081975
Sample No.:	DANGB-3SS-49	DANGB-3SS-D1
Date Sampled:	8-18-88	8-18-88
Time Sampled:	11:00	11:45
Date Extracted:	8-27-88	11-2-88
Date Analyzed:	10-28-88	11-21-88
Percent Moisture:	11	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-propylamine	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

B = Compound was detected in the blank.

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

ate Received: August 19, 1988
ate Reported: December 6, 1988

Work Order: 881
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:	88081974	88081975
ample No.:	DANGB-3SS-49	DANGB-3SS-D1
ate Sampled:	8-18-88	8-18-88
ime Sampled:	11:00	11:45
ate Extracted:	8-27-88	11-2-88
ate Analyzed:	10-28-88	11-21-88
ercent Moisture:	11	8

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
nenanthrene	330	ND	ND
nthracene	330	ND	ND
ibutyl phthalate	330	ND	ND
luoranthene	330	ND	ND
-Chlorophenyl phenyl ether	330	ND	ND
yrene	330	ND	ND
utyl Benzyl phthalate	330	ND	ND
is(2-ethylhexyl) phthalate	330	ND	ND
hrysene	330	ND	ND
-Bromophenyl phenyl ether	330	ND	ND
enzo(a)anthracene	330	ND	ND
i-n-octylphthalate	330	ND	ND
enzo(b)fluoranthene	330	ND	ND
enzo(k)fluoranthene	330	ND	ND
enzidine	2000	ND	ND
,3'-Dichlorobenzidine	660	ND	ND
enzo(a)pyrene	330	ND	ND
ndeno(1,2,3-cd)pyrene	330	ND	ND
ibenzo(a,h)anthracene	330	ND	ND
enzo(ghi)perylene	330	ND	ND
enzyl Alcohol	660	ND	ND

= Compound was detected in the blank.

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

Date Received: August 19, 1988
Date Reported: December 6, 1988

Work Order: 881
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:	88081974	88081975
Sample No.:	DANGB-3SS-49	DANGB-3SS-D1
Date Sampled:	8-18-88	8-18-88
Time Sampled:	11:00	11:45
Date Extracted:	8-27-88	11-2-88
Date Analyzed:	10-28-88	11-21-88
Percent Moisture:	11	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.

B = Compound was detected in the blank.

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

ate Received: August 19, 1988
ate Reported: December 6, 1988

Work Order: 881
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:	88081974	88081975
ample No.:	DANGB-3SS-49	DANGB-3SS-D1
ate Sampled:	8-18-88	8-18-88
ime Sampled:	11:00	11:45
ate Extracted:	8-27-88	11-2-88
ate Analyzed:	10-28-88	11-21-88
ercent Moisture:	11	8

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
lpha-BHC	--*	ND	ND
amma-BHC	--*	ND	ND
eta-BHC	660	ND	ND
eptachlor	330	ND	ND
elta-BHC	500	ND	ND
ldrin	330	ND	ND
eptachlor epoxide	330	ND	ND
ndosulfan I	--*	ND	ND
eldrin	500	ND	ND
,4'-DDE	1000	ND	ND
ndrin	--*	ND	ND
ndosulfan II	--*	ND	ND
,4'-DDD	500	ND	ND
,4'-DDT	830	ND	ND
ndosulfan Sulfate	1000	ND	ND
ndrin aldehyde	--*	ND	ND
ndrin Ketone	--*	ND	ND
hlordane	2000	ND	ND
ethoxychlor	--*	ND	ND
oxaphene	2000	ND	ND
roclor-1016	2000	ND	ND
roclor-1221	2000	ND	ND
roclor-1232	2000	ND	ND
roclor-1242	2000	ND	ND
roclor-1248	2000	ND	ND
roclor-1254	2000	ND	ND
roclor-1260	2000	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: Soil

Date Received: August 19, 1988
Date Reported: December 6, 1988

Work Order: 881
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:	88081974	88081975
Sample No.:	DANGB-3SS-49	DANGB-3SS-D1
Date Sampled:	8-18-88	8-18-88
Time Sampled:	11:00	11:45
Date Extracted:	8-27-88	11-2-88
Date Analyzed:	10-28-88	11-21-88
Percent Moisture:	11	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

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: Soil

ate Received: August 19, 1988 Work Order: 881
ate Reported: December 6, 1988 Job Number: OR001

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

ab Number:	88081976	88081977
ample No.:	DANGB-3SS-E0	DANGB-3SS-E1
ate Sampled:	8-18-88	8-18-88
ime Sampled:	12:35	13:15
ate Extracted:	11-2-88	8-27-88
ate Analyzed:	12-1-88	11-28-88
ercent Moisture:	8	17

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
,3-Dichlorobenzene	330	ND	ND
,4-Dichlorobenzene	330	ND	ND
exachloroethane	330	ND	ND
is(2-chloroethyl)ether	330	ND	ND
,2-Dichlorobenzene	330	ND	ND
-Nitrosodimethylamine	330	ND	ND
is(2-chloroisopropyi)ether	330	ND	ND
-Nitrosodi-n-propylamine	330	ND	ND
exachlorobutadiene	330	ND	ND
,2,4-Trichlorobenzene	330	ND	ND
itrobenzene	330	ND	ND
sophorone	330	ND	ND
aphthalene	330	ND	ND
is(2-chloroethoxy)methane	330	ND	ND
-Chloronaphthalene	330	ND	ND
exachlorocyclopentadiene	330	ND	ND
cenaphthylene	330	ND	ND
cenaphthene	330	ND	ND
imethyl phthalate	330	ND	ND
,6-Dinitrotoluene	330	ND	ND
luorene	330	ND	ND
,4-Dinitrotoluene	330	ND	ND
iethyl phthalate	330	ND	ND
-Nitrosodiphenylamine	330	ND	ND
exachlorobenzene	330	ND	ND

= Compound was detected in the blank.

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

Date Received: August 19, 1988
Date Reported: December 6, 1988

Work Order: 881
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:	88081976	88081977
Sample No.:	DANGB-3SS-E0	DANGB-3SS-E1
Date Sampled:	8-18-88	8-18-88
Time Sampled:	12:35	13:15
Date Extracted:	11-2-88	8-27-88
Date Analyzed:	12-1-88	11-28-88
Percent Moisture:	8	17

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Phenanthrene	330	ND	ND
Anthracene	330	ND	ND
Dibutyl phthalate	330	ND	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	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	2000	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

B = Compound was detected in the blank.

ate Received: August 19, 1988
ate Reported: December 6, 1988

Work Order: 881
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:	88081976	88081977
ample No.:	DANGB-3SS-E0	DANGB-3SS-E1
ate Sampled:	8-18-88	8-18-88
ime Sampled:	12:35	13:15
ate Extracted:	11-2-88	8-27-88
ate Analyzed:	12-1-88	11-28-88
ercent Moisture:	8	17

ompound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg	ug/kg
cetophenone	--*	ND	ND
niline	--*	ND	ND
-Aminobiphenyl	--*	ND	ND
-Chloroaniline	660	ND	ND
-Chloronaphthalene	--*	ND	ND
ibenzofuran	330	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	330	ND	ND
-Naphthylamine	--*	ND	ND
-Naphthylamine	--*	ND	ND
-Nitroaniline	1600	ND	ND
-Nitroaniline	1600	ND	ND
-Nitroaniline	1600	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: Soil

Date Received: August 19, 1988
Date Reported: December 6, 1988

Work Order: 881
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:	88081976	88081977
Sample No.:	DANGB-3SS-E0	DANGB-3SS-E1
Date Sampled:	8-18-88	8-18-88
Time Sampled:	12:35	13:15
Date Extracted:	11-2-88	8-27-88
Date Analyzed:	12-1-88	11-28-88
Percent Moisture:	8	17

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.

B = Compound was detected in the blank.

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

ate Received: August 19, 1988
ate Reported: December 6, 1988

Work Order: 881
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:	88081976	88081977
ample No.:	DANGB-3SS-E0	DANGB-3SS-E1
ate Sampled:	8-18-88	8-18-88
ime Sampled:	12:35	13:15
ate Extracted:	11-2-88	8-27-88
ate Analyzed:	12-1-88	11-28-88
ercent Moisture:	8	17

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
-Chlorophenol	330	ND	ND
-Nitrophenol	330	ND	ND
henol	330	ND	ND
,4-Dimethylphenol	330	ND	ND
,4-Dichlorophenol	330	ND	ND
,4,6-Trichlorophenol	330	ND	ND
-Chloro-3-methylphenol	660	ND	ND
,4-Dinitrophenol	1600	ND	ND
,6-Dichlorophenol	--*	ND	ND
-Metnyl-4,6-Dinitrophenol	1600	ND	ND
entachlorophenol	1600	ND	ND
-Nitrophenol	1600	ND	ND
enzoic Acid	1600	ND	ND
-Methylphenol	330	ND	ND
- & 4-Methylphenol	330	ND	ND
,3,4,6-Tetrachlorophenol	--*	ND	ND
,4,5-Trichlorophenol	330	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.

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE #: BLANK

Lab Name: Engineering Science Contract: _____

Lab Code: ~~ES~~ Case No.: 881 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: BLANK

Sample wt/vol: 30 (g/mL) g Lab File ID: S0143

Level: (low/med) low Date Received: —

% Moisture: not dec. — dec. _____ Date Extracted: 8-27-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/1/88

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1

Number TICs found: 20 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		Unknown	4.09	1200	
2.		Unknown hydrocarbon	4.28	700	
3.		Unknown	4.47	5000	
4.		Unknown hydrocarbon	5.20	13,000	
5.		Unknown	5.45	770	
6.		Unknown	5.57	1700	
7.			5.97	4000	
8.			6.96	230	
9.					
10.			7.40	730	
11.			7.96	730	
12.			8.03	~~37~~ 370	
13.			8.11	370	
14.			9.75	170	
15.			11.36	230	
16.		↓	12.78	970	
17.	57-10-3	Hexadecanoic Acid	25.26	1300	
18.		Unknown	30.00	430	
19.			30.64	300	
20.			32.14	370	
21.		↓	34.69	230	
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

IF

EPA SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BLANK

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 881 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) soil Lab Sample ID: 8808 1939-2378 Rerun Blk

Sample wt/vol: 30 (g/mL) g Lab File ID: S0564

Level: (low/med) low Date Received: —

% Moisture: not dec. — dec. _____ Date Extracted: 11-2-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11-21-88

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: 1

Number TICs found: 19 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	27	Benzene	3.26	3700	
2.		Unknown	3.39	300	
3.			3.84	330	
4.			4.03	600	
5.			4.22	570	
6.			4.39	230	
7.			4.52	170	
8.			4.72	170	
9.			4.99	7700	
10.			5.14	1000	
11.			5.28	1100	
12.			5.79	13000	
13.			5.83	130	
14.			6.74	170	
15.	94	Hexadecanoic Acid	25.00	830	
16.		Unknown	29.75	1300	
17.			30.07	1100	
18.			34.65	560	
19.			37.93	180	
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client:
Attn:
Address:

Project: DULUTH

TICs Found: 10

Sample
Project No: DANGB-BG-MW43-SS3 23-24'
Sample Matrix: Soil
Conc. Unit: ug/kg
Work Order No: 881
Lab Sample ID: 8805196
Lab File ID: 60144
Date Received: 8-19-88
Date Extracted: 8-27-88
Date Analyzed: 10-6-88
Date Reported:
Dilution Factor: 1
% Moisture: 14

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown C11H24	4.36	390	
2.		Unknown branched Unsat hydrocarbon	5.05	270	
3.		unknown	5.53	660	
4.		unknown	6.03	19,000	
5.		unknown	7.36	350	
6.		unknown	7.94	660	
7.		Unknown unsat hydrocarbon C18H36	8.01	350	
8.		Unknown alkyl acid C14H28O2	25.24	1600	
9.		unknown	30.00	800	
10.		unknown	30.73	220	

1F

EPA SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DANGB-B6-mw
SS1 1-2'

Lab Name: Engineering Science Contract: _____

Lab Code: ~~881~~ Case No.: 881 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 8808196.7

Sample wt/vol: 30 (g/mL) g Lab File ID: SO145

Level: (low/med) low Date Received: 8-19-88

% Moisture: not dec. 29 dec ~~29~~ 31 (89) Date Extracted: 8-27-88 10/6/88 2nd

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/6/88

GPC Cleanup: (Y/N) N pH: ___ Dilution Factor: 1

Number TICs found: 18 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		Unknown	4.09	1400	
2.		Unknown	5.25	1500	
3.		Unknown	5.74	7000	
4.		Unknown	5.85	4000	
5.		Unknown	6.13	15000	
6.		"	6.17	3200	
7.			7.27	4200	
8.		↓	23.65	610	
9.					
10.	57-10-3	Hexadecanoic Acid	25.27	2600	
11.		Unknown	25.87	1200	
12.		Unknown hydrocarbon	26.90	800	
13.		Unknown	29.21	1500	
14.		Unknown	30.20	2500	
15.		Unknown	31.72	2100	
16.		Unknown hydrocarbon	33.54	2400	
17.		Unknown	33.94	1700	
18.		Unknown hydrocarbon	36.35	2100	
19.		Unknown	36.72	1000	
20.			40.33	1100	
21.			41.34	1800	
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

DAN68-BG-MW42-552 7-8'

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 881 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 8808.968 Rex

Sample wt/vol: 30 (g/mL) gm Lab File ID: 50566

Level: (low/med) low Date Received: 8-19-88

% Moisture: not dec. 11.8 DPM 9/1/89 dec. _____ Date Extracted: 11-2-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/21/88

GPC Cleanup: (Y/N) N pH: ___ Dilution Factor: 1

Number TICs found: 17 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	71-43-2	benzene	3.23	400	
2.		unknown	3.31	220	
3.			3.58	340	
4.			3.83	2200	
5.			4.39	260	
6.			4.51	190	
7.			4.72	190	
8.			4.89	450	
9.	127-18-4	tetrachloroethene	5.12	430	
10.		unknown	5.38	2800	
11.			5.77	14000	
12.			5.92	190	
13.			7.12	560	
14.			29.76	1900	
15.			30.66	560	
16.			32.66	980	
17.			36.45	220	
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES. Oakridge
Attn:
Address:

Project: Duluth

TICs Found: 17

Sample
Project No: DAN0B-BG-MW43-552 14-15'
Sample Matrix: Soil
Conc. Unit: ug/kg
Work Order No: 881
Lab Sample ID: 8808196 9
Lab File ID: E5972
Date Received: 8-19-88
Date Extracted: 8-27-88
Date Analyzed: 10-26-88
Date Reported:
Dilution Factor: 1
% Moisture: 17

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	unknown	4.09	280	
2.	unknown	4.50	760	
3.	unknown	4.95	15,000	
4.	unknown	6.02	200	
5.	1,1,2,2-tetrachloroethane	6.06	250	96
6.	unknown	6.16	720	
7.	unknown	6.38	200	
8.	unknown	6.71	320	
9.	unknown	6.76	240	
10.	unknown	23.90	520	
11.	unknown	25.49	280	
12.	unknown	26.28	300	
13.	unknown	28.57	920	
14.	unknown	28.73	1900	
15.	unknown	30.21	320	
16.	unknown	32.98	280	
17.	unknown	35.51	24,000	
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.

SS1 0-1'

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 881 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081970 Rx

Sample wt/vol: 30 (g/mL) gm Lab File ID: S0567

Level: (low/med) low Date Received: 8-19-88

% Moisture: not dec. 15.6 16 dec. _____ Date Extracted: 11-2-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/21/88

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1

Number TICs found: 2 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	71-43-2	benzene	3.24	2000	
2.		unknown	5.66	2800	
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

EPA SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DANOB-BG-MW42I
-553 145-155'

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 881 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081971 Rex

Sample wt/vol: 30 (g/mL) gm Lab File ID: 50568

Level: (low/med) low 3/1/89 Date Received: 8-19-88

% Moisture: not dec. 9% DAD dec. _____ Date Extracted: 11-2-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/21/88

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: 1

Number TICs found: 17 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	71-43-2	benzene	3.27	4200	
2.		unknown	3.41	620	
3.	79-01-6	trichloroethene	3.61	150	
4.		unknown	3.86	950	
5.		unknown	4.37	550	
6.	79-00-5	1,1,2-trichloroethane	4.61	220	
7.		unknown aliphatic - mwt. 114	4.93	330	
8.	127-18-4	tetrachloroethene	5.13	820	
9.		unknown	5.29	1,200	
~~10.~~		~~1,1,2,2-tetrachloroethane~~	~~5.76~~	~~11000~~	
10.		unknown	5.78	12,000	
11.	79-34-5	1,1,2,2-tetrachloroethane	7.03	510	
12.		unknown	12.01	290	
14.			26.71	990	
15.			29.76	1900	
16.			30.07	330	
17.			34.65	950	
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

FORM I SV-TIC 1/87 Rev.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES. OAK RIDGE
Attn:
Address:

Project: DULUTH

TICs Found:

Sample
~~Project~~ No: DAN6B-355-E2
Sample Matrix: SOIL
Conc. Unit: UG/KG
Work Order No: 881
Lab Sample ID: 8808197 2 RA
Lab File ID: E6327
Date Received: 8-19-88
Date Extracted: 8-27-88
Date Analyzed: 11/28/88
Date Reported:
Dilution Factor: 1
% Moisture: 10

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	Unknown	3.32	180	
	Unknown	3.36	220	
	Unknown	3.51	440	
	Unknown	3.74	670	
	Unknown	3.99	3400	
	Unknown	4.40	410	
	Unknown	4.45	810	
	Unknown	4.55	260	
	Unknown	4.83	17000	
	Unknown	4.92	520	
	Unknown	6.01	300	
	Unknown	6.20	520	
	Unknown	8.83	180	
	Unknown	9.05	180	
57-10-3	Hexadecanoic Acid	23.63	2300	
	Unknown carboxylic acid	25.97	330	
	Unknown	28.35	2900	
	Unknown hydrocarbon	33.95	1300	
	Unknown hydrocarbon	37.29	1600	

1F

EPA SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DMGB-355-DØ

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 881 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081973 REAN

Sample wt/vol: 30 (g/mL) gm Lab File ID: E6334

Level: (low/med) low DA 3/1/89 Date Received: 8-19-88

% Moisture: not dec. 16.8 dec. _____ Date Extracted: 8-27-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/28/88

GPC Cleanup: (Y/N) N pH: ___ Dilution Factor: 1

Number TICs found: 17 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.30	240	
2.			3.39	520	
3.			3.46	240	
4.			4.14	200	
5.			4.39	480	
6.			4.83	18,000	
7.	57-10-3	hexadecanoic acid	23.65	2300	
8.	57-11-4	octadecanoic acid	25.99	400	
9.		unknown	28.26	400	
10.			28.41	1100	
11.			31.58	360	
12.			33.16	240	
13.			33.94	280	
14.			34.92	20,000	
15.			35.02	190	
16.			36.23	400	
17.			37.29	320	
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

EPA SAMPLE N

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

~~JAN 6B~~ 355-49

Lab Name: ES Contract:

Lab Code: 881 Case No.: 881 SAS No.: SDG No.:

Matrix: (soil/water) Soil Lab Sample ID: 88081974

Sample wt/vol: 30 (g/mL) g Lab File ID: S0266

Level: (low/med) low Date Received: 8-19-88

% Moisture: not dec. 11 dec. ~~11~~ JAD 3/1/89 Date Extracted: 8-27-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/28/88

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1

Number TICs found: 16 CONCENTRATION UNITS: (ug/L or ug/Kg) ~~ug~~/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		Unknown	3.31	1600	
2.			3.45	1400	
3.			3.86	260	
4.			4.19	180	
5.			4.30	590	
6.			5.00	2000	
7.			5.45	740	
8.			5.98	13000	
9.		~~Unknown~~	~~6.04~~	~~450~~	
10.			6.04	450	
11.			7.30	560	
12.			7.89	180	
13.			9.52	440	
14.			10.32	440	
15.		Unknown hydrocarbon	11.16	3600	
16.		Unknown	30.94	1000	
17.		Unknown	38.13	290	
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

EPA SAMPLE NO.

DANGB-355-D1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 881 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081975 Rex

Sample wt/vol: 30 (g/mL) gm Lab File ID: 50569

Level: (low/med) low Date Received: 8-19-88

% Moisture: not dec. 8% DD 3/1/89 dec. _____ Date Extracted: 11-2-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/23/88

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1

Number TICs found: 20 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	71-43-2	benzene	3.25	5000	
2.		unknown	3.32	290	
3.		↓	3.39	950	
4.			3.84	1300	
5.		unknown alkene - mol.wt 84	4.03	580	
6.		unknown	4.22	250	
7.			4.40	250	
8.			4.52	250	
9.			4.73	330	
10.		↓	4.98	8000	
11.	127-18-4	tetrachloroethene	5.14	980	
12.		unknown	5.33	1900	
13.		↓	5.80	14000	
14.			5.84	2600	
15.			6.76	180	
16.			6.98	180	
17.			7.11	250	
18.			8.04	140	
19.			29.76	1600	
20.		↓	34.67	730	
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

FORM I SV-TIC 1/87 Rev.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

JAN6B-355-EB

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 881 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 8809197G REX

Sample wt/vol: 30 (g/mL) gm Lab File ID: S0617

Level: (low/med) low Date Received: 8-19-88

% Moisture: not dec. 8.1 DRO 7/1/89 dec. _____ Date Extracted: 11-2-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 12/1/88

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: 1

Number TICs found: 18 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.78	940	
2.		"	3.98	360	
3.		"	4.16	250	
4.		"	4.35	220	
5.		"	4.46	180	
6.		"	4.69	180	
7.		"	4.92	5400	
8.		"	5.11	690	
9.		"	5.31	120	
10.		"	5.81	13000	
11.		"	6.96	220	
12.		"	7.19	330	
13.		"	12.36	330	
14.		"	24.20	220	
15.	57-10-3	hexadecanoic acid	24.95	290	
16.		"	27.17	180	
17.		"	29.77	1300	
18.		"	32.67	150	
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

FORM I SV-TIC 1/87 Rev.

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: DANGB-355 -E1

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 881 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081977 REANA

Sample wt/vol: 30 (g/mL) gm Lab File ID: E6335

Level: (low/med) low Date Received: 8-19-88

% Moisture: not dec. 17% dec. _____ Date Extracted: 8-27-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/28/88

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: 1

Number TICs found: 20 CONCENTRATION UNITS: (ug/L or ug/Kg): ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.32	400	
2.			3.42	810	
3.			3.49	320	
4.			3.79	360	
5.			3.99	520	
6.			4.21	480	
7.			4.65	18,000	
8.			6.21	320	
9.			8.82	160	
10.			9.26	160	
11.	57-10-3	hexadecanoic acid	23.65	2300	
12.	57-11-4	octadecanoic acid	25.99	440	
13.		unknown	27.62	200	
14.			28.29	760	
15.			31.58	360	
16.			33.93	330	
17.			34.91	21,000	
18.			34.95	290	
19.			36.21	190	
20.			37.28	490	
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
Samples No.: 88081943-88081959
Samples No.: 88081966-88081977

The results obtained for the laboratory control sample (LCS) analyzed with these samples for the analytes Cadmium, Chromium, Mercury and Barium exceeded the recommended EPA recoveries. All data associated with this batch was closely inspected and no analytical problems were found. The initial and continuing calibration verification standards and blanks and precision and accuracy recoveries were within acceptable limits with the following exceptions: The LCS for Barium, Cadmium and Chromium applies only to Sample Nos. 88081943-88081959, and 88081966-88081968.

Cadmium spike recoveries and precision exceeded acceptable limits. The spike sample was followed by an analytical spike as required by laboratory standard operating procedure. The results of the analytical spike recovery for Cadmium were within acceptable ranges.

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88081969-88081976, 88082043-88082049
SAMPLE NO(S).: 88082099-88082101, 88082102-88082104
SAMPLE NO(S).: 88082130-88082133, 88082146-88082148
QC REPORT NO.: ICP-S-0028-88
QC REPORT NO.: ICP-S-0031-88

Due to a suspected interelement matrix interference, all cadmium data at levels reportable by ICP analysis ($\geq$1 mg/KG dry weight) are potentially false positives. This is being investigated and follow-up will be provided when available.

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):
88081943-88081959
88081966-88081968

QC Report No: ICP-S-0030-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-18-88
Date Reported: 10-25-88
Dilution Factor: NA
%Moisture: 16.9

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
Barium	88081943	88081943	9-16-88	9-11-88	SW6010	<20	56.4	52.2	8	214	56.4	277	103	
Cadmium	88081943	88081943	9-16-88	9-11-88	SW6010	<0.5	10.9	11.3	4	5.35	10.9	14.7	71N	
Chromium	88081943	88081943	9-16-88	9-11-88	SW6010	<1.0	19.2	21.7	12	21.4	19.2	42.6	109	

2249

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
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)

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: TCP-S-0031-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-19-88
Date Reported: 10-26-88
Dilution Factor: NA
%Moisture: 3.1

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88031969-88081977
88082043-88082049

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	88081976	88081976	9-10-88	9-11-88	SW6010	<20	57.6	104	58*	218	57.6	271	98	
Cadmium	88081976	88081976	9-10-88	9-11-88	SW6010	<0.5	11.5	9.25	22*	5.44	11.5	14.3	51N	A
Chromium	88081976	88081976	9-10-88	9-11-88	SW6010	<1.0	28.9	27.5	5	21.8	28.9	52.2	107	

0225

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* See Legend attached.
N See Legend attached.
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

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88081966-88081977

QC Report No: AAF-S-0032-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-19-88
Date Reported: 10-26-88
Dilution Factor: See Notes
%Moisture: 8.1

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	Nc
Arsenic	88081976	88081976	10-05-88	9-21-88	7060	<0.5	<5.0E	<5.0E	NC	4.35E	0.98E	5.66	108	DF
Selenium	88081976	88081976	10-11-88	9-21-88	7421	<0.5	5.71	8.54	40*	5.44	5.71	28.2	413N	DF

2251

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* See Case Narrative attached.
E See Legend attached.
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 ANG8

QC Report for Laboratory Sample No(s):
88081943-88081959
88081966-88081968

QC Report No: CVM-S-0019-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-18-88
Date Reported: 10-25-88
Dilution Factor: NA
%Moisture: 28.7

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
Mercury	88081944	88081944	9-13-88	9-13-88	7471	<0.1	<0.1	<0.1	NC	1.4	<0.1	1.5	107	

2252

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)

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):
88081969-88081977

QC Report No: CVM-S-0020-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-19-88
Date Reported: 10-26-88
Dilution Factor: NA
%Moisture: 8.1

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	88081976	88081976	9-14-88	9-14-88	7471	<0.1	<0.1	<0.1	NC	1.09	<0.1	1.03	95	

3523

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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

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):
88081966-88081977, 88081938-88081942
88082102-88082104

QC Report No: TPH-S-0051-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-19-88
Date Prepared: 9-14-88
Date Analyzed: 9-15-88
Date Reported: 9-26-88
Dilution Factor: 6
%Moisture: 29.3

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88081967	418.1	<100	200	1400	1400	86	1600	100	13	

2254

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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):
88081966-88081977, 88081938-88081942
88082102-88082104

QC Report No: TPH-S-0051-88B
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: NA
Date Prepared: 9-14-88
Date Analyzed: 9-15-88
Date Reported: 11-15-88
Dilution Factor: NA
%Moisture: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<100	<100	1000	730	73	770	77	5	

2255

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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).:
88081943-88081953
88081966-88081970

QC Report No: VGC-S-0039-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 8-19-88
Date Prepared: NA
Date Analyzed: 8-31-88
Date Reported: 9-28-88
Dilution Factor: NA
% Moisture: 29.3

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88081967	1,1-dichloroethane	14.1	ND	13.0	92	12.7	90	2	20	58-124
	Trichloroethene	14.1	ND	14.0	99	12.3	87	13	16	75-110
	Chlorobenzene	14.1	ND	13.0	92	12.4	88	5	21	71-125
	Aromatics; 8020									
88081967	Benzene	14.1	ND	10.9	77	10.6	75	3	26	75-123
	Toluene	14.1	ND	14.0	99	14.2	101	1	16	79-115
	Chlorobenzene	14.1	ND	12.7	90	12.7	90	0	24	82-112

9253

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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: Soil
Conc. Unit: ug/KG
Date Reported: 10-07-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
31	8-29-88	VGC	Carbopack	79-09-2	Dichloromethane	2.5	0.25	88081954-88081959
				67-66-3	Chloroform	0.5	0.05	88081938-88081940
6081/6058	8-30-88	VGC	Carbopack	75-09-2	Dichloromethane	3.8	0.25	88081948-88081949
57	8-30-88	VGC	Carbopack	75-09-2	Dichloromethane	4.0	0.25	88081943-88081947
					Trichloroethene	0.35	0.25	88081950-88081953
								88081966-88081971

2257

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).:
88081971-88081977
88082000-88082002

QC Report No: VGC-S-0038-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 8-20-88
Date Prepared: NA
Date Analyzed: 9-01-88
Date Reported: 9-27-88
Dilution Factor: NA
% Moisture: 11.7

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88082000	1,1-dichloroethane	11.3	ND	10.2	90	9.04	80	12	20	58-124
	Trichloroethene	11.3	ND	10.6	94	9.9	88	7	16	75-110
	Chlorobenzene	11.3	ND	10.7	95	9.9	88	8	21	71-125
	Aromatics: 8020									
88082000 8529	Benzene	11.3	ND	10.7	95	9.9	88	8	26	75-123
	Toluene	11.3	ND	11.4	101	10.7	95	6	16	79-115
	Chlorobenzene	11.3	ND	10.5	93	10.1	89	4	24	82-112

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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: Soil
Conc. Unit: ug/KG
Date Reported: 10-07-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
02	8-31-88	VGC	Carbopack	75-09-2	Dichloromethane	2.9	0.25	88082000-88082002
				67-66-3	Chloroform	0.15	0.5	
57	8-30-88	VGC	Carbopack	75-09-2	Dichloromethane	4.0	0.25	88081971
				71-55-6	1,1,1-Trichloromethane	0.35	0.25	
77	9-26-88	VGC	Carbopack	75-09-2	Dichloromethane	2.5	0.5	88081972-88081977
				75-35-4	1,1-Dichloroethene	0.41	0.13	
				67-66-3	Chloroform	0.07	0.05	
				71-55-6	1,1,1-Trichloroethane	0.30	0.03	
				127-18-4	Tetrachloroethene	0.32	0.12	
				108-88-3	Toluene	2.8	0.20	

6522

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).:
88081966-88081977
88081958-88081959

QC Report No.: OCP-S-0031-88
QC Sample No.: 88081967
Level (Low/Med): Low
Date Reported: 11-10-88

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	2830	ND	101	107	46-127
Heptachlor	2830	ND	100	106	35-130
Aldrin	2830	ND	127	135*	34-132
Dieldrin	7070	ND	310	132	31-134
Endrin	7070	ND	288	122	42-139
4,4'-DDT	7070	ND	326	138*	23-134

	MSD Conc. In Extract (ug/Kg)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	110	117	107	9	50	46-127
Heptachlor	109	116	106	9	31	35-130
Aldrin	149	158*	135*	16	43	34-132
Dieldrin	336	143*	132	8	38	31-134
Endrin	306	130	122	6	45	42-139
4,4'-DDT	347	147*	138*	6	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: 5 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).:
88081966-88081977
88081958-88081959

QC Report No.: OCP-S-0031-88B
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/Kg)	MS Conc. In Extract (ug/Kg)	MS % Rec. #	QC Limits Rec.
Lindane	2000	ND	94.0	141*	46-127
Heptachlor	2000	ND	107	161*	35-130
Aldrin	2000	ND	162	243*	34-132
Dieldrin	5000	ND	314	188*	31-134
Endrin	5000	ND	267	160*	42-139
4,4'-DDT	5000	ND	266	160*	23-134

	MSD Conc. In Extract (ug/Kg)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	98.0	147*	141*	4	50	46-127
Heptachlor	107	161*	161*	0	31	35-130
Aldrin	125	188*	243*	26	43	34-132
Dieldrin	317	190*	188*	10	38	31-134
Endrin	265	159*	160*	1	45	42-139
4,4'-DDT	293	176*	160*	10	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: 12 out of 12 outside limits

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: OCP-S-0031-88
QC REPORT NO.: OCP-S-0031-88B

Analysis of matrix spikes resulted in recoveries of aldrin, dieldrin and DDT that were higher than EPA QC limits. Analysis of spiked blanks resulted in excessively high recoveries of all spiked compounds. The data associated with these analyses were closely examined. No analytical errors were found. The results suggest that the blanks were spiked twice.

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:	Soil
Address:	710 S. Illinois Avenue	Level (low/med):	Low
	Suite F-103	Extraction:	
	Oak Ridge, Tn. 37830	(SepF/Cont/Sonc):	Sonc
		Date Reported:	11-11-88
Project:	Duluth ANGB		
Date Extracted:	8-27-88		
Date Analyzed (1):	9-26-88	Date Analyzed (2):	10-3-88
Time Analyzed (1):	05:47	Time Analyzed (2):	21:50
Instrument ID (1):	5890 #2	Instrument ID (2):	5890 #2
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
-	88081966	9-26-88	88081974	10-03-88
-	88081967	9-26-88	88081975	10-03-88
-	88081968	9-26-88	88081976	10-03-88
-	88081969	9-26-88		
-	88081970	9-26-88		
-	88081971	9-26-88		
-	88081972	9-26-88		
-	88081973	9-26-88		
-	88081974	9-26-88		
-	88081975	9-26-88		
-	88081976	9-26-88		
-	88081977	9-26-88		
-	88081958	9-26-88		
-	88081959	9-26-88		

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 8270

Job No.: 0R001

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

Project: Duluth AAGB

QC Report for Laboratory Sample No(s):
88081966-88081977

QC Report No: BNA-S-0047-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 8-19-88
Date Prepared: 8-27-88
Date Analyzed: 10-21-88
Date Reported: 12-08-88
Dilution Factor: NA
%Moisture: 29

Laboratory Supervisor Approval:

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
B/N Laboratory Sample # 88081967	1,2,4-Trichlorobenzene	4690	ND	2570	55	769	16*	110*	23	38-107
	Acenaphthene	4690	ND	2630	56	922	20*	95*	19	31-137
	2,4-Dinitrotoluene	4690	ND	1800	38	580	12*	104*	47	28-89
	Pyrene	4690	ND	4060	87	1310	28*	102*	36	35-142
	N-Nitroso-di-n-Propylamine	4690	ND	3090	66	1270	27*	84*	38	41-126
	1,4-Dichlorobenzene	4690	ND	1740	37	512	11*	108*	27	28-104
ACID Laboratory Sample # 88081967	Pentachlorophenol	9390	ND	6630	71	1570	17	120*	47	17-109
	Phenol	9390	ND	5600	60	2190	23*	89*	35	26-90
	2-Chlorophenol	9390	ND	4590	49	1890	20*	84*	50	25-102
	4-Chloro-3-Methylphenol	9390	ND	5450	58	1950	21*	94*	33	26-103
	4-Nitrophenol	9390	ND	5870	63	1630	17	115*	50	11-114

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* See Case Narrative attached. 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

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 8270

Job No.: 08001

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-S-0047-88B
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: NA
Date Prepared: 8-27-88
Date Analyzed: 11-01-88
Date Reported: 12-08-88
Dilution Factor: NA
%Moisture: NA

Laboratory Supervisor Approval:

Report for Laboratory Sample No(s):
88081966-88081977

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
B/N Laboratory Sample # Blank	1,2,4-Trichlorobenzene	3330	ND	1220	37*	2300	69	61*	23	38-107
	Acenaphthene	3330	ND	2180	65	2550	76	16	19	31-137
	2,4-Dinitrotoluene	3330	ND	3360	101	3400	102	1	47	28-89
	Pyrene	3330	ND	2910	87	2870	86	1	36	35-142
	N-Nitroso-di-n-Propylamine	3330	ND	2330	70	2660	80	13	38	41-126
	1,4-Dichlorobenzene	3330	ND	823	25*	1630	49	66*	27	28-104
ACID Laboratory Sample # Blank	Pentachlorophenol	6670	ND	5170	78	6100	91	16	47	17-109
	Phenol	6670	ND	4670	70	5000	75	7	35	26-90
	2-Chlorophenol	6670	ND	3800	57	4530	68	18	50	25-102
	4-Chloro-3-Methylphenol	6670	ND	6730	101	7330	110	8	33	26-103
	4-Nitrophenol	6670	ND	2360	35	1430	21	49	50	11-114

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* 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

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88081966-88081977
QC REPORT NO.: BNA-S-0047-88
QC REPORT NO.: BNA-S-0047-88
WORK ORDER NO.: 881

Samples 88081968-88081977 were first analyzed out of extract holding time.

Analysis of matrix spike samples resulted in recoveries and/or RPD's for some compounds that were outside EPA QC limits. Spiked blanks were subsequently analyzed; results showed certain RPD's and recoveries to be outside of EPA QC limits. The data associated with these analyses was closely examined; no errors or problems were found. None of the recoveries were severely out of range. Since no compounds were found, this may not adversely affect the data quality objectives of these tests.

The initial analysis of samples 88081968 and 88081976 resulted in low recoveries of two or more surrogate spikes. These samples were re-extracted out of holding time. Analysis of the second extract showed acceptable surrogate spike recoveries.

The initial analysis of samples 88081971 and 88081971 resulted in low recoveries for more than one surrogate spike. A second extraction and analysis of these samples gave the same results, suggesting a matrix effect.

Initial analysis of sample 88081975 resulted in both surrogate spike recoveries and internal standard area counts that did not meet EPA QC criteria. A second extraction and analysis of this sample give surrogate spike recoveries and internal standard area counts that were within EPA QC limits.

Initial analysis of samples 88081971-88081974 resulted in good surrogate spike recoveries but internal area counts that were below EPA QC limits. Examination of the reconstructed ion chromatogram of sample 88081974 showed a hydrocarbon interference. This extract was diluted ten-fold and re-analyzed. Acceptable area counts for the internal standards were obtained. Data from the first analysis is presented in this report. The extracts of samples 88081972 and 88081973 were re-analyzed. Low internal standard area counts were again obtained, indicating a matrix effect.

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: 12-29-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
S0143	10-06-88	BNA	1	-	None Detected	-	-	88081966-88081977

7922

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):
88081939Re, 88081968Re, 88081970Re-88081971Re
88081975Re, 88081976Re

QC Report No: BNA-S-0059-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 08-27-88
Date Prepared: 11-02-88
Date Analyzed: 11-21-88
Date Reported: 01-09-89
Dilution Factor: NA
%Moisture: 11

Laboratory Supervisor Approval:

8278

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
	1,2,4-Trichlorobenzene	3740	ND	2030	54	809	22*	86*	23	38-107
B/N	Acenaphthene	3740	ND	3110	83	2470	66	23*	19	31-137
Laboratory	2,4-Dinitrotoluene	3740	ND	3000	80	2870	77	4	47	28-89
Sample #	Pyrene	3740	ND	3300	88	3150	84	5	36	35-142
88082150Re	N-Nitroso-di-n-Propylamine	3740	ND	3480	93	2760	74	23	38	41-126
	1,4-Dichlorobenzene	3740	ND	502	13*	90	2*	139*	27	28-104
	Pentachlorophenol	7490	ND	7080	94	7150	95	1	47	17-109
ACID	Phenol	7490	ND	5920	79	4980	66	17	35	26-90
Laboratory	2-Chlorophenol	7490	ND	5320	71	4080	54	26	50	25-102
Sample #	4-Chloro-3-Methylphenol	7490	ND	7720	103	7230	96	6	33	26-103
88082150Re	4-Nitrophenol	7490	ND	1350	18	1310	17	3	50	11-114

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* 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

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):
88081939Re, 88081968Re, 88081970Re-88081971Re
88081975Re, 88081976Re

8227

QC Report No: BNA-S-0059-88B
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: NA
Date Prepared: 11-02-88
Date Analyzed: 12-07-88
Date Reported: 01-09-89
Dilution Factor: NA
%Moisture: —

Laboratory Supervisor Approval:

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
B/N Laboratory Sample # Blank	1,2,4-Trichlorobenzene	3330	ND	2590	77	2840	85	10	23	38-107
	Acenaphthene	3330	ND	2580	77	2850	86	10	19	31-137
	2,4-Dinitrotoluene	3330	ND	2860	86	2840	85	1	47	28-89
	Pyrene	3330	ND	2930	88	3290	99	12	36	35-142
	N-Nitroso-di-n-Propylamine	3330	ND	3670	110	3020	115	4	38	41-126
	1,4-Dichlorobenzene	3330	ND	2380	71	2540	76	6	27	28-104
ACID Laboratory Sample # Blank	Pentachlorophenol	6670	ND	5800	87	6070	91	4	47	17-109
	Phenol	6670	ND	4670	70	5270	79	12	35	26-90
	2-Chlorophenol	6670	ND	4200	63	4800	72	13	50	25-102
	4-Chloro-3-Methylphenol	6670	ND	5770	86	6270	94	8	33	26-103
	4-Nitrophenol	6670	ND	3180	48	2890	43	10	50	11-114

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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

PESTICIDE/PCB STANDARDS SUMMARY

Job No.: OR001

Instrument ID: 5890 #2
GC Column ID: OV-1

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

Date Reported: 11-14-88

Project: Duluth ANGB

	Date(s) of Analysis	From: 9-25-88	Date of Analysis:	9-26-88
		To: 9-28-88	Time of Analysis:	10:45
	Time(s) of Analysis	From: 19:25	Lab Sample ID: (Standard)	
		To: 13:17		

Compound	RT	RT Window From	RT Window To	Calibration Factor	RT	Calibration Factor	QNT Y/N	%D
alpha-BHC	1.35			315068				
beta-BHC	1.45			151451				
delta-BHC	1.64			206150				
gamma-BHC	1.59			280025	1.60	281032	Y	0.36
Heptachlor	2.57			312200	2.59	318167	Y	1.9
Aldrin	3.19			259717	3.21	263183	Y	1.3
Hept. Epoxide	3.91			262500	3.94	268683	Y	2.4
Endosulfan I	4.89			240050	4.92	244633	Y	1.9
Dieldrin	5.73			227750	5.77	232400	Y	
4,4'-DDE	5.78			243333				
Endrin	6.40			220663				
Endosulfan II	6.54			259925	6.58	266692	Y	2.6
4,4'-DDD	7.31			171750				
Endo. Sulfate	8.47			147217				
4,4'-DDT	9.65			168892	9.72	159200	Y	5.7
Methoxychlor	14.64			123600	14.74	121035	Y	2.1
Endrin Ketone	10.90			275033				
a. Chlordane	4.99			282450				
g. Chlordane	4.50			267983				
Toxaphene								
Aroclor-1016								
Aroclor-1221								
Aroclor-1232								
Aroclor-1242								
Aroclor-1248								
Aroclor-1254								
Aroclor-1260								

Under QNT Y/N: enter Y if quantitation was performed, N if not performed.
%D must be less than or equal to 15.0% for quantitation, and less than or equal to 20.0% for confirmation.

Note: Determining that no compounds were found above the CRQL is a form of quantitation, and therefore at least one column must meet the 15.0% criteria.

For multicomponent analytes, the single largest peak that is characteristic of the component should be used to establish retention time and %D. Identification of such analytes is based primarily on pattern recognition.

PESTICIDE/PCB STANDARDS SUMMARY

Job No.: OR001

Instrument ID: 5890 #2
GC Column ID: OV-1

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

Date Reported: 11-14-88

Project: Duluth ANGB

	Date(s) of Analysis	From:	9-25-88	Date of Analysis:	9-26-88
		To:	9-28-88	Time of Analysis:	19:43
	Time(s) of Analysis	From:	19:25	Lab Sample ID: (Standard)	
		To:	13:17		

Compound	RT	RT Window From	RT Window To	Calibration Factor	RT	Calibration Factor	QNT Y/N	%D
alpha-BHC	1.35			315068	1.35	314363	Y	0.2
beta-BHC	1.45			151451	1.45	150384	Y	0.7
delta-BHC	1.64			206150	1.64	204783	Y	0.7
gamma-BHC	1.59			280025				
Heptachlor	2.57			312200				
Aldrin	3.19			259717				
Hept. Epoxide	3.91			262500				
Endosulfan I	4.89			240050				
Dieldrin	5.73			227750				
4,4'-DDE	5.78			243333	5.79	250150	Y	2.8
Endrin	6.40			220663	6.41	232783	Y	5.5
Endosulfan II	6.54			259925				
4,4'-DDD	7.31			171750	7.33	179650	Y	4.6
Endo. Sulfate	8.47			147217	8.49	163817	Y	11.3
4,4'-DDT	9.65			168892				
Methoxychlor	14.64			123600				
Endrin Ketone	10.90			275033	10.91	285650	Y	3.9
a. Chlordane	4.99			282450	5.00	288033	Y	2.0
g. Chlordane	4.50			267983	4.50	272217	Y	1.6
Toxaphene								
Aroclor-1016								
Aroclor-1221								
Aroclor-1232								
Aroclor-1242								
Aroclor-1248								
Aroclor-1254								
Aroclor-1260								

Under QNT Y/N: enter Y if quantitation was performed, N if not performed.
%D must be less than or equal to 15.0% for quantitation, and less than or equal to 20.0% for confirmation.

Note: Determining that no compounds were found above the CRQL is a form of quantitation, and therefore at least one column must meet the 15.0% criteria.

For multicomponent analytes, the single largest peak that is characteristic of the component should be used to establish retention time and %D. Identification of such analytes is based primarily on pattern recognition.

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

Calibration Date: 9-15-88
Instrument I.D.: Perkin Elmer 257
Grating Infrared Spectrophotometer

Unit: mg/L
Date Reported: 11-09-88
R= 0.9953

Laboratory Supervisor Approval: RW Burton

Laboratory Sample No(s).:
88082043-88082049, 88081966-88081977
88081938-88081942, 88082001-88082002

Standard	Concentration	Absorbance	/Continuous RF /Calibration /Verification
No. 1	0.59	0.115	
No. 2	1.2	0.236	RF = 6.32
No. 3	1.8	0.305	
No. 4	2.4	0.407	
Cont. Cal. No. 2 (88081938-88081942) (88081966-88081967)	1.36	0.213	114%
Cont. Cal. No. 2 (88081968-88081975)	1.35	0.238	112%
Cont. Cal. No. 2 (88081976-88081977) (88082001-88082002) (88082043-88082044)	1.35	0.230	112%
Cont. Cal. No. 2 (88082045-88082049)	1.35	0.243	112%

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 03-60
Lab File ID: S0143
Matrix: Soil
Level (low/med):
Date Analyzed: 10-6-88
Time Analyzed: 02:02
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-MW43-SS3 23-24	88081966	S0144	10-6-88
DANGB-BG-MW43 SS1 1-2'	88081967	S0145	10-6-88
	88081967 MS	S0248	10-26-88
	88081967 MSD	S0249	10-26-88
-MW42 SS2 7-8	88081968	E5971	10-26-88
-MW43 SS2 14-15	88081969	E5972	10-26-88
-MW42 SS1 0-1	88081970	E5973	10-26-88
-MW42 SS3 14.5-15.5	88081971	E5974, E6325	10-26-88, 11-23-88
DANGB-SS-E2	88081972	E5975, E6327	10-26-88, 11-28-88
-D0	88081973	E5976, E6334	10-26-88, 11-28-88
-49	88081974	E6128, S0266	11-4-88 10-28-88
-D1	88081975	S0267	10-29-88
-E0	88081976	S0268, E6338	10-29-88, 11-29-88
-E1	88081977	S0411, E6335	11-7-88, 11-28-88
	BLANK MS	E6042	11-1-88
	BLANK MSD	E6043	11-1-88

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. AD-76 Contractor ENG SCI(9/7/88) Contract No. 99-99-99

Instrument ID #1 Date / Time ~~10/05/88~~ 17:19

Lab ID >T2005::03 Data Release Authorized By:

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	54.44 OK
68	less than 2.0% of mass 69	0.00 OK (0.00) #1
69	mass 69 relative abundance	69.27
70	less than 2.0% of mass 69	.50 OK (.7253) #1
127	40.0 - 60.0% of mass 198	44.73 OK
197	less than 1.0% of mass 198	0.60 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	18.14 OK
365	greater than 1.00% of mass 198	2.05 OK
441	present, but less than mass 443	10.55 OK
442	greater than 40.0% of mass 198	73.57 OK
443	17.0 - 23.0% of mass 442	14 26 OK (19.39) #2

initial calibration all 5 files 10/5/88

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
SSTD010	50135	10-5-88	18:14
SSTD025	50136		19:13
SSTD040	50137		20:12
SSTD060	50138		21:10
SSTD080	50139		22:09
SSTD120	50140		23:08
88081959 MS	50141	10-6-88	00:06
88081959 MSD	50142		01:04
88081966-77 BLK	50143		02:02
88081966	50144		03:00
88081967	50145		03:59

80.[illegible]	2.830 132.05	.538 135.00	1.444 245.00	1.094 422.00	.493
60.[illegible]	4.363 13[illegible].95	.610 186.00	10.918 245.90	1.597 423.00	4.414
[illegible].05	1.238 134.05	.529 187.00	2.548 249.70	.556 423.90	.987
[illegible]05	1.22[illegible] 134.95	1.803 189.00	.754 253.70	.323 441.00	10.550
85.65	1.525 136.05	.969 191.00	.484 254.90	37.624 442.00	73.571
85.95	1.[illegible].75 137.05	.825 192.00	.601 256.00	5.015 443.00	14.264
87.0.	.[illegible]84 140.05	.233 193.00	.673 257.00	.789 443.90	1.364
90.25	.224 140.95	1.803 194.90	.188		

Initial Calibration Data
HSL Compounds

Case No: _____ Instrument ID: 1

Contractor: ENGINEERING-SCIENCE Calibration Date: ~~10/06/88~~ 10/5/88

Contract No: _____

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

Laboratory ID:	>S0135	>S0136	>S0137	>S0138	>S0139	>S0140	-				
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	CCC	SPCC
N-Nitroso-Dimethylamine	1.45371	1.32253	1.24628	1.22664	1.20725	1.26111	-	.445	1.28625	7.073		
2-Fluorophenol	1.35397	1.48611	1.43927	1.31650	1.22813	1.11673	-	.693	1.32345	10.287		
bis(2-Chloroethyl)ether	1.88910	1.73264	1.57636	1.56212	1.69445	1.62928	-	.944	1.68066	7.234		
Phenol	2.29094	2.32960	2.17194	1.91744	1.91165	1.63181	-	.937	2.04223	13.181	*	
Phenol-d5	2.01134	1.98190	1.80051	1.57782	1.44100	1.27193	-	.934	1.68075	17.840		
Aniline	2.14882	2.55103	2.29106	2.17744	2.04222	1.87764	-	.924	2.18137	10.481		
2-Chlorophenol	1.71028	1.54457	1.38783	1.38666	1.38788	1.33747	-	.955	1.45912	9.721		
1,3-Dichlorobenzene	2.02360	1.77816	1.52466	1.38608	1.34777	1.20382	-	.989	1.54401	19.738		
1,4-Dichlorobenzene	2.04619	1.70352	1.45260	1.31673	1.19086	1.05579	-	1.005	1.46095	24.856	*	
Benzyl Chloride	-	-	-	-	-	-	-	-	-	-		
Benzyl Alcohol	.64800	.57035	.39687	1.05133	.67890	.36178	-	1.240	.61787	40.247		
1,2-Dichlorobenzene	2.02430	1.74448	1.47956	1.36620	1.27472	1.14097	-	1.056	1.50504	21.683		
2-Methylphenol	1.32236	1.49910	1.43306	1.27976	1.31532	1.36481	-	1.101	1.36907	6.029		
~~3~~-&-4-Methylphenol	1.66632	1.41989	1.16768	1.17553	1.19627	1.21631	-	1.157	1.30700	15.265		(Conc=20.
bis(2-chloroisopropyl)Ether	3.81234	3.45568	3.16830	3.00319	2.89862	2.79956	-	1.098	3.18962	11.984		
N-Nitroso-Di-n-Propylamine	1.67158	1.51367	1.20205	.79728	.94087	1.14207	-	1.150	1.21125	27.449		**
Hexachloroethane	1.00747	.83043	.58690	.50388	.49692	.43996	-	1.146	.64426	34.917		
Dibromochloropropane	-	-	-	-	-	-	-	-	-	-		
Nitrobenzene	.83898	.70111	.55559	.56430	.58430	.62049	-	.848	.64413	16.945		
Nitrobenzene-d5	-	-	-	-	-	-	-	-	-	-		
2-Nitrophenol	.26765	.26350	.23970	.23177	.23284	.22863	-	.919	.24402	7.023	*	
Isophorone	1.22815	1.12124	1.02055	1.06460	1.07550	1.08499	-	.905	1.09917	6.467		
bis(2-Chloroethoxy)methane	.72163	.68119	.61530	.59303	.58892	.58017	-	.959	.63004	9.192		
2,4-Dimethylphenol	-	.38160	.28812	.31590	.39167	.32100	-	.958	.33966	13.194		
Benzoic Acid	-	.23110	.26658	.31561	.32175	.34408	-	.995	.29583	15.524		
2,4-Dichlorophenol	.31008	.34391	.30930	.32172	.32106	.29371	-	.986	.31663	5.307	*	
1,2,4-Trichlorobenzene	.48648	.41535	.37861	.34042	.33577	.31462	-	.991	.37854	16.863		
Naphthalene	1.29201	1.11432	.95407	.90622	.88027	.77328	-	1.005	.98670	18.902		
4-Chloroaniline	.41419	.55247	.48831	.47939	.47989	.49873	-	1.026	.48550	9.129		
Hexachlorobutadiene	.28289	.24332	.21648	.20588	.19501	.18427	-	1.050	.22131	16.419	*	

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

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

Initial Calibration Data
HSL Compounds

Case No: ---------- Instrument ID: 1

Contractor: ENGINEERING-SCIENCE Calibration Date: ~~10/06/88~~ 10/5/88

Contract No: ----------

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

Laboratory ID:	>S0135	>S0136	>S0137	>S0138	>S0139	>S0140	-				
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	CCC	SPCC
4-Chloro-3-Methylphenol	.19327	.37046	.49473	.33925	.42590	.43292	-	1.174	.38442	26.782	*	
2-Methylnaphthalene	.73727	.67448	.58012	.53760	.53771	.49074	-	1.168	.59299	15.856		
Hexachlorocyclopentadiene	.55003	.53856	.50045	.47145	.43574	.39406	-	.860	.48172	12.507		**
2,4,6-Trichlorophenol	.26465	.36054	.34528	.35296	.32772	.30946	-	.887	.32677	10.888	*	
2,4,5-Trichlorophenol	-	.78824	.79945	.52490	.61881	.57179	-	.898	.66064	19.090		
2-Fluorobiphenyl	-	-	-	-	-	-	-	-	-	-		
2-Chloronaphthalene	1.62781	1.48473	1.35045	1.23417	1.13029	.97137	-	.902	1.29980	18.376		
2-Nitroaniline	-	.70534	.69175	.69020	.66554	.59353	-	.930	.66927	6.680		
Dimethylphthalate	1.84930	1.74372	1.54469	1.40882	1.28149	1.03329	-	.969	1.47688	20.405		
2,6-Dinitrotoluene	.48330	.46766	.45800	.42183	.38302	.34843	-	.980	.42704	12.355		
Acenaphthylene	2.30603	2.15064	1.89316	1.64540	1.43686	1.09570	-	.973	1.75463	25.831		
3-Nitroaniline	-	.57727	.63651	.64805	.64981	.58150	-	1.002	.61863	5.854		
2,4-Dinitrophenol	-	.16272	.19870	.19161	.21725	.23877	-	1.020	.20181	14.116		**
cenaphthene	1.44944	1.31395	1.20116	1.06798	.99457	.79884	-	1.006	1.13765	20.519	*	
Dibenzofuran	2.07078	1.86049	1.75565	1.61630	1.50990	1.31944	-	1.034	1.68876	15.746		
2,4-Dinitrotoluene	.38614	.41634	.41254	.40997	.38261	.33897	-	1.046	.39109	7.470		
4-Nitrophenol	-	-	.10112	.34329	.36508	.35108	-	1.055	.29014	43.544		**
Fluorene	1.56947	1.29480	1.07426	.95164	.91375	.80067	-	1.092	1.10076	25.865		
Diethylphthalate	1.84831	1.56663	1.28345	1.10984	.97447	.69160	-	1.093	1.24572	33.420		
4-Chlorophenyl-phenylether	.85307	.76676	.69999	.58164	.49066	.28789	-	1.096	.61333	33.453		
4-Nitroaniline	-	.31776	.40267	.40954	.41837	.40025	-	1.112	.38971	10.479		
2,4,6-Tribromophenol	-	.07263	.30802	.35994	.26798	.31199	-	1.159	.26411	42.367		
1,2-Diphenylhydrazine	-	-	-	-	-	-	-	-	-	-		
Alpha-BHC	-	-	-	-	-	-	-	-	-	-		
Beta-BHC	-	-	-	-	-	-	-	-	-	-		
Gamma-BHC	-	-	-	-	-	-	-	-	-	-		
Delta-BHC	-	-	-	-	-	-	-	-	-	-		
Heptachlor	-	-	-	-	-	-	-	-	-	-		
Aldrin	-	-	-	-	-	-	-	-	-	-		
N-Nitrosodiphenylamine	.70491	.60217	.51517	.43381	.40945	.31097	-	.895	.49608	28.633	*	

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

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

Initial Calibration Data
HSL Compounds

Case No: _____ Instrument ID: 1

Contractor: ENGINEERING - SCIENCE Calibration Date: ~~10/06/88~~ 10/5/88

Contract No: _____

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

Laboratory ID:	>S0135	>S0136	>S0137	>S0138	>S0139	>S0140	-				
	RF	RF	RF	RF	RF	RF	RF				
Compound	10.00	25.00	40.00	60.00	80.00	120.00	160.00	$\overline{RRT}$	$\overline{RF}$	% RSD	CCC SPCC
4,6-Dinitro-2-Methylphenol	-	.18554	.17555	.14995	.15527	.10108	-	.892	.15348	21.303	
4-Bromophenyl-phenylether	.32451	.28840	.25069	.23737	.23820	.21552	-	.941	.25912	15.452	
Hexachlorobenzene	.47227	.40581	.35905	.33819	.35183	.32592	-	.959	.37551	14.569	
Pentachlorophenol	-	-	.15813	.20565	.23165	.24925	-	1.015	.21117	18.770	*
Phenanthrene	1.34660	1.11786	.99601	.95087	.93572	.85897	-	1.004	1.03434	16.934	
Anthracene	1.41674	1.25862	1.08200	.97578	.92640	.78526	-	1.010	1.07413	21.490	
Di-n-Butylphthalate	2.19936	1.89988	1.65466	1.57652	1.54396	1.40455	-	1.097	1.71315	16.862	
4,4'-Dibromobiphenyl	3.05749	2.34552	1.92998	1.67416	1.60313	1.35172	-	1.133	1.99367	31.133	
Fluoranthene	1.49564	1.40111	1.22762	1.16738	1.12602	1.00687	-	1.168	1.23744	14.637	*
Heptachlor Epoxide	-	-	-	-	-	-	-	-	-	-	
Endosulfan I	-	-	-	-	-	-	-	-	-	-	
4,4'-DDE	-	-	-	-	-	-	-	-	-	-	
Dieldrin	-	-	-	-	-	-	-	-	-	-	
Endrin	-	-	-	-	-	-	-	-	-	-	
4,4'-DDD	-	-	-	-	-	-	-	-	-	-	
Endosulfan II	-	-	-	-	-	-	-	-	-	-	
Endrin Aldehyde	-	-	-	-	-	-	-	-	-	-	
4,4'-DDT	-	-	-	-	-	-	-	-	-	-	
Endosulfan Sulfate	-	-	-	-	-	-	-	-	-	-	
Dibutylchlorendate	-	-	-	-	-	-	-	-	-	-	
Benzidine	-	-	.02490	.01352	.08561	.15529	-	.873	.06983	93.331	
Pyrene	1.86662	1.68167	1.50458	1.45760	1.38360	1.44554	-	.877	1.55660	11.724	
Terphenyl-d14	-	-	-	-	-	-	-	-	-	-	
Butylbenzylphthalate	1.29143	1.14997	1.00344	.95073	.92295	.95552	-	.951	1.04567	13.876	
3,3'-Dichlorobenzidine	.12358	.14134	.17629	.16471	.19060	.21424	-	1.001	.16846	19.527	
Chrysene	1.22075	1.16008	1.02348	1.01426	.99473	1.00810	-	1.003	1.07023	8.924	
Benzo(a)Anthracene	1.28234	1.28303	1.19727	1.17659	1.11738	1.17536	-	.998	1.20533	5.439	
bis(2-Ethylhexyl)Phthalate	1.60479	1.40048	1.17557	1.11671	1.04666	1.04261	-	1.013	1.23114	18.309	
Di-n-octylphthalate	3.35506	3.03716	2.74510	2.88816	2.61951	2.38337	-	.920	2.83806	11.924	*
Benzo(a)Pyrene	1.24506	1.27047	1.21663	1.29463	1.21299	1.15648	-	.993	1.23271	3.953	*

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

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

Initial Calibration Data
HSL Compounds

Case No: _____ Instrument ID: 1

Contractor: ENGINEERING-SCIENCE Calibration Date: ~~10/06/88~~ 10/5/88

Contract No: _____

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

Laboratory ID:	>S0135	>S0136	>S0137	>S0138	>S0139	>S0140	-					
	RF	RF	RF	RF	RF	RF	RF					
Compound	10.00	25.00	40.00	60.00	80.00	120.00	160.00	$\overline{RRT}$	$\overline{RF}$	% RSD	CCC	SPCC
Benzo(b)Fluoranthene	1.63530	1.55612	1.48339	1.83502	1.67930	1.90647	-	.955	1.68260	9.630		
Indeno(1,2,3-cd)Pyrene	.94440	1.00036	1.01959	1.14572	1.05725	1.10766	-	1.174	1.04583	7.023		
Dibenzo(a,h)Anthracene	.79378	.91041	.91430	1.00248	.93121	.92361	-	1.181	.91263	7.378		
Benzo(k)Fluoranthene	1.40661	1.33925	1.30942	1.25195	1.14557	.75144	-	.958	1.20071	19.741		
Benzo(g,h,i)Perylene	.91907	.97683	.98727	1.02485	.94726	.93959	-	1.226	.96581	3.952		

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

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: 10/5/88

Lab File ID (Standard): S0138 Time Analyzed: 21:10

Instrument ID: 1

	IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT	
12 HOUR STD	42895	9.33	154096	12.95	82324	18.45	
UPPER LIMIT	85790	9.83	308192	13.45	164648	18.95	
LOWER LIMIT	21448	883	77048	12.45	41162	17.95	
EPA SAMPLE NO.							
S0141 01 88081959 MS	44492	9.34	169738	12.92	93805	18.44	
02 88081959 MSD	44213	9.35	170533	12.92	94375	18.44	
03 88081966-77RE1	46209	9.31	173258	12.90	89477	18.42	
04 88081966	44568	9.32	174462	12.92	*~~86745~~	18.42	93640
05 88081967	46604	9.33	181651	12.91	99323	18.42	
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: Engineering Science Contract: OR01

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

Sample No. (Standard): SSTD060 Date Analyzed: 10/5/88

Lab File ID (Standard): So138 Time Analyzed: 21:10

Instrument ID: 1

		IS4 (PHN) AREA #	RT	IS5 (CRY) AREA #	RT	IS6 (PRY) AREA #	RT
12 HOUR STD		149748	23.10	116116	31.57	82938	37.12
UPPER LIMIT		299496	23.60	232232	32.07	165876	37.62
LOWER LIMIT		74874	22.60	58058	31.07	41469	36.62
EPA SAMPLE NO.							
So141 01	88081959 ms	156756	23.09	130428	31.52	70925	37.08
42 02	88081959msD	157108	23.09	131967	31.52	58811	37.07
43 03	88081966-77BLK	164999	23.07	137914	31.54	42346	37.08
44 04	88081966	146745	23.07	123462	31.52	85645	37.09
45 05	88081967	155827	23.06	105261	31.51	40367*	37.09
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 __

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: >T1012 DFTPP Injection Date: 10/12/88

Instrument ID: 70 1 DFTPP Injection Time: 8:31

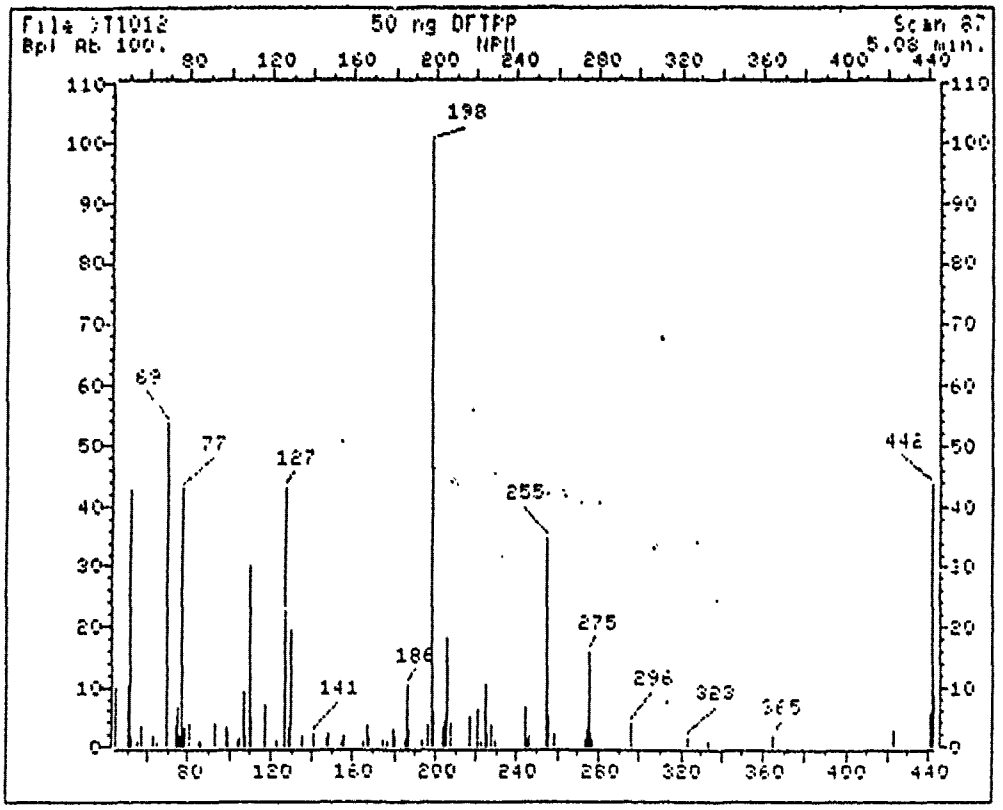
m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	42.5
68	Less than 2.0% of mass 69	0.0(0.0)1
69	Mass 69 relative abundance	54.
70	Less than 2.0% of mass 69	0.0(0.0)1
127	40.0 - 60.0% of mass 198	43.1
197	Less than 1.0% of mass 198	0.0
198	Base Peak, 100% relative abundance	100.
199	5.0 - 9.0% of mass 198	5.7
275	10.0 - 30.0% of mass 198	15.7
365	Greater than 1.00% of mass 198	1.63
441	Present, but less than mass 443	5.6
442	Greater than 40.0% of mass 198	43.6
443	17.0 - 23.0% of mass 442	8.5(19.5)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 ZZ	SSTD010	S0147	10/12/88	08:50
02 ZZ	SSTD025	S0148		09:50
03	SSTD040	S0149		10:50
04	SSTD060	S0150		11:52
05	SSTD080	S0151		12:51
06	SSTD120	S0152		13.51
07	120 STD 4 bd.s	o-2-methylphenol S0153		14:50
08				
09				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

initial calibration
all s file
10/12/88 - 2/16/89



File: >T1012 Scan #: 87 Retn. time: 5.08

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
44.10	10.042	85.00	.682	141.05	2.176	198.00	100.000	255.00	34.662
50.10	10.147	86.00	.760	147.05	1.416	199.00	5.742	256.00	5.296
51.10	42.528	93.10	3.880	148.05	2.019	204.10	3.251	258.00	2.202
52.20	1.783	98.00	3.015	155.05	.813	205.10	1.248	273.00	1.075
55.00	.813	99.00	2.596	156.05	1.704	206.10	18.013	274.05	2.910
57.10	3.304	104.00	1.127	164.95	.891	207.10	3.933	275.05	15.732
63.10	1.757	105.00	1.390	167.05	3.566	208.00	1.101	276.15	2.124
65.00	.760	107.00	9.150	168.05	1.599	217.00	4.851	277.05	1.259
69.00	53.671	108.00	1.652	175.05	1.101	221.10	6.214	296.05	3.854
74.10	3.435	110.00	30.257	176.95	.760	223.00	.839	323.05	1.573
75.00	6.397	111.00	4.798	178.95	2.937	224.10	10.252	333.95	.918
76.20	1.914	117.00	6.765	180.05	1.862	225.10	2.202	365.00	1.626
77.10	42.993	123.05	1.154	185.05	1.259	227.00	3.356	423.10	2.648
78.10	2.989	127.05	43.052	186.05	10.304	229.00	.970	441.05	5.585
79.00	3.015	128.15	2.989	187.05	2.753	244.10	6.476	442.05	43.603
80.10	1.993	129.05	19.481	193.05	1.023	245.10	1.049	443.05	8.495
81.00	3.880	135.05	1.757	196.10	3.382	246.00	1.730		

Initial Calibration Data
HSL Compounds

Case No: ---------- Instrument ID: 1

Contractor: ENGINEERING-SCIENCE Calibration Date: ~~10/13/88~~ 10/12/88

Contract No: ----------

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

Compound	Laboratory ID: >S0147 RF 10.00	>S0148 RF 25.00	>S0149 RF 40.00	>S0150 RF 60.00	>S0151 RF 80.00	>S0152 RF 120.00	- RF 160.00	$\overline{RRT}$	$\overline{RF}$	% RSD	CCC	SPCC
N-Nitroso-Dimethylamine	.90066	.94185	.94392	.88516	.88670	.85188	-	.443	.90169	3.960		
2-Fluorophenol	1.17581	1.22794	1.25400	1.17215	1.09851	1.01973	-	.692	1.15802	7.457		
bis(2-Chloroethyl)ether	1.03104	1.08442	1.14219	1.11200	1.22007	1.12381	-	.944	1.11892	5.618		
Phenol	1.52905	1.50953	1.52490	1.40466	1.31601	1.21525	-	.930	1.41657	9.140	*	
Phenol-d5	1.25759	1.28644	1.28389	1.24398	1.19461	1.08277	-	.926	1.22488	6.305		
Aniline	.64382	.65978	.67957	.59404	.37289	.30145	-	.923	.54193	30.020		
2-Chlorophenol	1.22637	1.22826	1.30937	1.27696	1.20930	1.14022	-	.953	1.23175	4.733		
1,3-Dichlorobenzene	1.70227	1.56016	1.56285	1.46373	1.33366	1.22942	-	.989	1.47535	11.623		
1,4-Dichlorobenzene	1.60415	1.58473	1.52935	1.33007	1.23116	1.15234	-	1.005	1.40530	13.765	*	
Benzyl Chloride	-	-	-	-	-	-	-	-	-	-		
Benzyl Alcohol	.70256	.78793	.83127	.73111	.68568	.63582	-	1.055	.72906	9.736		
1,2-Dichlorobenzene	1.58111	1.50879	1.44256	1.23450	1.12527	1.04213	-	1.056	1.32240	16.611		
2-Methylphenol	1.19931	1.23930	1.25261	1.18987	1.13222	1.02872	-	1.096	1.17367	7.045		
3-&-4-Methylphenol	1.26093	1.27555	1.24755	.98463	.84730	.81239	-	1.143	1.07139	20.169		
bis(2-chloroisopropyl)Ether	2.18255	2.24900	2.28383	2.21007	2.10444	1.90770	-	1.099	2.15627	6.323		
N-Nitroso-Di-n-Propylamine	.89387	.86434	.84649	.81219	.84343	.78270	-	1.148	.84050	4.639		**
Hexachloroethane	.73320	.66729	.60217	.46735	.39602	.36437	-	1.146	.53840	28.074		
Dibromochloropropane	-	-	-	-	-	-	-	-	-	-		
Nitrobenzene	.42817	.42509	.41201	.40247	.39152	.35942	-	.848	.40312	6.308		
Nitrobenzene-d5	.39046	.41231	.39349	.39780	.40102	.35317	-	.843	.39137	5.157		
2-Nitrophenol	.23964	.24540	.24634	.25708	.25938	.23156	-	.918	.24657	4.251	*	
Isophorone	.75667	.74378	.72642	.77683	.77199	.67452	-	.905	.74170	5.090		
bis(2-Chloroethoxy)methane	.50665	.50869	.50359	.50287	.49561	.44573	-	.959	.49386	4.859		
2,4-Dimethylphenol	.33514	.36242	.35177	.35927	.36227	.32007	-	.939	.34849	4.965		
Benzoic Acid	.17299	.27723	.33386	.34937	.33894	.31109	-	.991	.29725	22.228		
2,4-Dichlorophenol	.61379	.62766	.59116	.56480	.53399	.47258	-	.977	.56733	10.114	*	
1,2,4-Trichlorobenzene	.41394	.39073	.37522	.36401	.35830	.31261	-	.992	.36913	9.266		
Naphthalene	1.09837	1.07142	.97699	.91881	.85912	.75065	-	1.005	.94589	13.894		
4-Chloroaniline	.29172	.34904	.37525	.38983	.40668	.36603	-	1.031	.36309	11.060		
Hexachlorobutadiene	.22743	.21636	.20185	.19939	.19481	.17715	-	1.051	.20283	8.609	*	

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

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

Initial Calibration Data
HSL Compounds

Case No: _____ Instrument ID: 1

Contractor: ENGINEERING - SCIENCE Calibration Date: ~~10/13/88~~ 10/12/88

Contract No: _____

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

Laboratory ID:	>S0147	>S0148	>S0149	>S0150	>S0151	>S0152	-				
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	CCC	SPCC
4-Chloro-3-Methylphenol	.29832	.33082	.32801	.32304	.31346	.28794	-	1.151	.31360	5.496	*	
2-Methylnaphthalene	.61549	.61109	.57140	.56575	.53826	.48185	-	1.169	.56397	8.808		
Hexachlorocyclopentadiene	.30966	.27656	.30443	.33130	.30816	.24396	-	.860	.29568	10.410		**
2,4,6-Trichlorophenol	.42456	.43026	.44198	.44785	.42012	.37202	-	.876	.42280	6.381	*	
2,4,5-Trichlorophenol	.51933	.55051	.56445	.55883	.52425	.45644	-	.883	.52897	7.557		
2-Fluorobiphenyl	1.39270	1.32515	1.33857	1.30034	1.20242	1.07400	-	.889	1.27220	9.077		
2-Chloronaphthalene	1.31257	1.27028	1.31952	1.28644	1.18725	1.05096	-	.902	1.23784	8.329		
2-Nitroaniline	.40894	.46378	.50154	.50934	.49813	.45555	-	.929	.47288	6.058		
Dimethylphthalate	1.46165	1.47109	1.48824	1.46712	1.33373	1.21591	-	.969	1.40629	7.737		
2,6-Dinitrotoluene	.34868	.37586	.39198	.39480	.37845	.35512	-	.979	.37415	5.038		
Acenaphthylene	1.90582	1.85006	1.83295	1.68395	1.51148	1.35081	-	.973	1.68918	12.959		
3-Nitroaniline	.27339	.42325	.47906	.51816	.50706	.47248	-	1.001	.44557	20.333		
2,4-Dinitrophenol	.03908	.10067	.13437	.15541	.15560	.12875	-	1.018	.11898	37.056		**
Acenaphthene	1.24663	1.22805	1.20589	1.13575	1.02934	.93701	-	1.006	1.13011	10.936	*	
Dibenzofuran	1.71125	1.70020	1.72572	1.67418	1.60939	1.42709	-	1.033	1.64131	6.865		
2,4-Dinitrotoluene	.24045	.27966	.29892	.30746	.29942	.27915	-	1.045	.28418	8.547		
4-Nitrophenol	.09719	.23315	.31551	.36650	.36084	.33380	-	1.042	.28450	36.416		**
Fluorene	1.31930	1.25417	1.21498	1.07212	1.00539	.90506	-	1.093	1.12850	14.175		
Diethylphthalate	1.41682	1.36977	1.31463	1.19028	1.03053	.93432	-	1.093	1.20939	16.027		
4-Chlorophenyl-phenylether	.63776	.62384	.64527	.61191	.54842	.48380	-	1.097	.59183	10.672		
4-Nitroaniline	.10784	.30651	.41640	.46593	.44669	.41398	-	1.110	.35956	37.577		
2,4,6-Tribromophenol	.18019	.19789	.22184	.23017	.22317	.20814	-	1.138	.21023	8.921		
1,2-Diphenylhydrazine	-	-	-	-	-	-	-	-	-	-		
Alpha-BHC	-	-	-	-	-	-	-	-	-	-		
Beta-BHC	-	-	-	-	-	-	-	-	-	-		
Gamma-BHC	-	-	-	-	-	-	-	-	-	-		
Delta-BHC	-	-	-	-	-	-	-	-	-	-		
Heptachlor	-	-	-	-	-	-	-	-	-	-		
Aldrin	-	-	-	-	-	-	-	-	-	-		
N-Nitrosodiphenylamine	.45984	.38858	.41237	.40912	.38827	.35898	-	.894	.40286	8.394	*	

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

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

Initial Calibration Data
HSL Compounds

Case No: _____ Instrument ID: 1

Contractor: ENGINEERING-SCIENCE Calibration Date: ~~10/13/88~~ 10/12/88

Contract No: _____

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

Laboratory ID:	>S0147	>S0148	>S0149	>S0150	>S0151	>S0152	-				
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	CCC SPCC
4,6-Dinitro-2-Methylphenol	-	-	-	-	-	.10514	-	.889	.10514	-	
4-Bromophenyl-phenylether	.22556	.21762	.22271	.21078	.21018	.19123	-	.941	.21301	5.788	
Hexachlorobenzene	.27697	.27084	.27492	.25719	.25850	.23795	-	.959	.26273	5.594	
Pentachlorophenol	.09569	.13314	.15747	.16224	.16688	.15675	-	.987	.14536	18.565	*
Phenanthrene	1.14931	1.11829	1.09106	1.01023	.96033	.87667	-	1.004	1.03431	10.085	
Anthracene	1.15317	1.14102	1.11541	1.02181	.98435	.89352	-	1.010	1.05155	9.771	
Di-n-Butylphthalate	1.64122	1.63329	1.63090	1.49769	1.41327	1.30096	-	1.097	1.51956	9.293	
4,4'-Dibromobiphenyl	-	-	-	-	-	-	-	-	-	-	
Fluoranthene	1.36288	1.36068	1.26507	1.13505	1.05865	.96048	-	1.168	1.19047	13.935	*
Heptachlor Epoxide	-	-	-	-	-	-	-	-	-	-	
Endosulfan I	-	-	-	-	-	-	-	-	-	-	
4,4'-DDE	-	-	-	-	-	-	-	-	-	-	
Dieldrin	-	-	-	-	-	-	-	-	-	-	
Endrin	-	-	-	-	-	-	-	-	-	-	
,4'-DDD	-	-	-	-	-	-	-	-	-	-	
Endosulfan II	-	-	-	-	-	-	-	-	-	-	
Endrin Aldehyde	-	-	-	-	-	-	-	-	-	-	
4,4'-DDT	-	-	-	-	-	-	-	-	-	-	
Endosulfan Sulfate	-	-	-	-	-	-	-	-	-	-	
Dibutylchlorendate	-	-	-	-	-	-	-	-	-	-	
Benzidine	-	.00935	.02705	.01524	.11005	.03945	-	.876	.04023	101.177	
Pyrene	1.54293	1.60613	1.64968	1.52682	1.51496	1.52464	-	.876	1.56086	3.490	
Terphenyl-d14	1.02399	1.08928	1.11806	1.04957	1.03383	1.03537	-	.896	1.05835	3.512	
Butylbenzylphthalate	1.03976	1.09397	1.08899	1.01671	.99984	.96414	-	.952	1.03390	4.932	
3,3'-Dichlorobenzidine	.06133	.09189	.14882	.16520	.19319	.16091	-	.999	.13689	36.415	
Chrysene	1.02911	1.02334	1.04273	.98463	1.00670	.89280	-	1.003	.99655	5.481	
Benzo(a)Anthracene	1.11257	1.15249	1.15796	1.10992	1.09138	1.00011	-	.998	1.10407	5.175	
bis(2-Ethylhexyl)Phthalate	1.26144	1.33989	1.26858	1.19068	1.14544	1.05833	-	1.015	1.21073	8.300	
Di-n-octylphthalate	3.25450	4.11915	3.54160	3.21011	3.18000	3.11113	-	.914	3.40275	11.200	*
Benzo(a)Pyrene	1.25982	1.36463	1.35114	1.31337	1.34816	1.28878	-	.992	1.32098	3.101	*

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

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

Initial Calibration Data
HSL Compounds

Case No: _____ Instrument ID: 1

Contractor: ENGINEERING - SCIENCE Calibration Date: ~~10/13/88~~ 10/12/88

Contract No: _____

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

Compound	Laboratory ID: >S0147 RF 10.00	>S0148 RF 25.00	>S0149 RF 40.00	>S0150 RF 60.00	>S0151 RF 80.00	>S0152 RF 120.00	- RF 160.00	$\overline{RRT}$	$\overline{RF}$	% RSD	CCC	SPCC
Benzo(b)Fluoranthene	1.45767	1.64832	1.56440	1.66938	1.65806	1.65321	-	.950	1.60850	5.160		
Indeno(1,2,3-cd)Pyrene	.88674	.92332	1.00146	1.01832	1.00215	.97603	-	1.195	.96800	5.364		
Dibenzo(a,h)Anthracene	.76140	.84087	.90269	.93942	.91372	.89077	-	1.203	.87481	7.361		
Benzo(k)Fluoranthene	1.49764	1.62755	1.52462	1.33979	1.40346	1.26912	-	.953	1.44370	9.092		
Benzo(g,h,i)Perylene	.81932	.88183	.94465	.93095	.90234	.90654	-	1.253	.89761	4.934		

RF - Response Factor (Subscript is amount in mg/L)

$\overline{RRT}$ - Average Relative Retention Time ($\overline{RT}$ Std/$\overline{RT}$ Istd)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

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

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 10/26/88 12:23

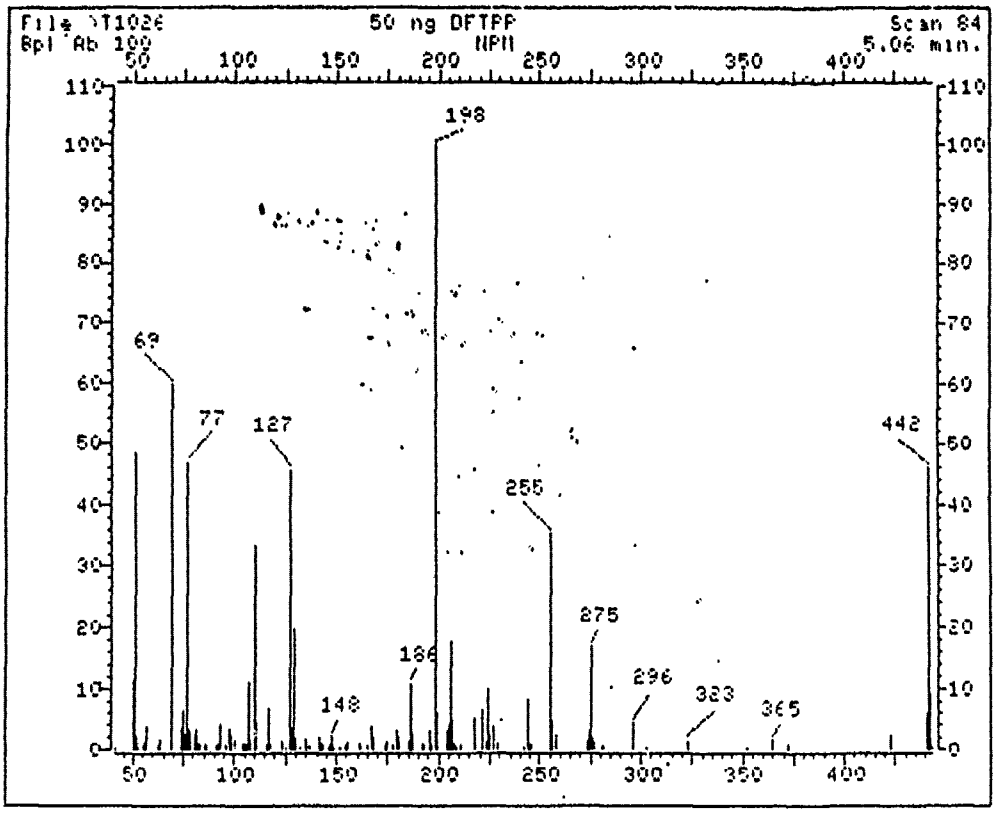
Lab ID)I1026::02 Data Release Authorized By: _____

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	48.46 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	59.45	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	45.39 OK	
197	less than 1.0% of mass 198	.94 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	6.22 OK	
275	10.0 - 30.0% of mass 198	16.83 OK	
365	greater than 1.00% of mass 198	1.63 OK	
441	present, but less than mass 443	6.24 OK	
442	greater than 40.0% of mass 198	45.88 OK	
443	17.0 - 23.0% of mass 442	9.07 OK	(19.77) #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	)I1026	10/26/88	12:23	
SSTD960	50241		12:43	
8809357-59 ACBLK MS	50242		13:48	
8809357-59 ACBLK MSD	50243		14:48	
8808225 7	50244		15:48	Another project
8808225 8	50245		:48	
8809357-59 BWBLK MS	50246		:47	
8809357-59 BWBLK MSD	50247		18:47	
8808196 7 ms	50248		19:47	
8808196 7 msD	50249		20:46	
8809235 7 BWAA	50250		21:45	Another Project
8809235 8 ACRA	50251		22:45	
8809235 9 ACRA	50252		23:45	
8808196 8 ms	50253	10/27/88	00:44	



File:)T1026 Scan #: 84 Retn. time: 5.06

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
40.90	.506	92.10	.731	135.05	1.724	186.95	2.642	244.00	8.115
50.10	11.132	93.00	4.160	137.05	.712	191.95	.975	245.00	.918
51.10	48.463	95.80	.618	140.95	2.061	192.95	.900	246.00	1.143
52.10	2.474	98.00	3.448	141.95	1.106	196.00	3.148	255.00	35.082
53.20	.394	99.00	2.474	142.95	.937	196.90	.937	255.90	4.948
55.10	.787	101.00	1.780	145.95	.506	198.00	100.000	257.90	2.399
56.00	1.462	104.00	1.124	146.95	1.162	199.00	6.222	273.00	1.368
57.00	3.786	105.00	1.087	148.05	2.324	204.00	3.130	274.05	3.092
62.10	.712	106.20	.731	148.85	.543	205.00	1.235	275.05	16.829
63.10	1.612	107.00	10.907	151.45	.431	206.10	17.672	276.05	2.230
69.00	59.445	108.00	1.668	155.05	.881	207.10	4.741	276.95	1.274
74.00	3.298	110.00	33.115	156.05	1.387	208.10	1.237	280.95	.768
75.10	6.672	111.00	4.498	160.95	1.068	208.90	.487	295.95	4.329
76.10	2.380	116.10	.918	165.05	.787	210.50	.600	303.05	.412
77.10	46.645	117.00	6.897	167.05	3.936	211.00	.843	323.05	1.555
78.10	3.467	118.05	.600	168.05	2.024	217.00	5.097	351.95	.581
79.00	3.111	123.05	1.387	173.95	.731	221.00	6.484	365.00	1.630
80.10	2.305	125.05	.581	174.95	1.499	223.00	1.349	372.00	.731
81.10	3.561	127.05	45.390	177.95	.656	224.00	9.839	422.90	2.605
82.00	1.031	128.05	3.411	178.95	2.999	225.00	2.305	441.05	6.241
83.10	1.087	129.05	19.584	180.05	1.949	227.00	3.673	442.05	45.877
85.00	.618	130.05	1.987	185.05	1.331	229.00	1.049	443.05	9.070
85.90	.637	132.05	.581	186.05	10.701	242.00	.431	443.85	.562
91.00	.806								

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 10/26/88

Contractor: ENGINEERING-SCIENCE Time: 12:43

Contract No: Laboratory ID:)S0241

Instrument ID: 1 Initial Calibration Date: 10/13/88 10 200

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	.99900	3.41		
Anthracene	1.05155	1.16443	10.74		
Di-n-Butylphthalate	1.51956	1.63167	7.38		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.12552	5.46	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.05211	29.53		
Pyrene	1.56086	1.70404	9.17		
Terphenyl-d14	1.05835	1.21176	14.50		
Butylbenzylphthalate	1.03390	1.19497	15.58		
3,3'-Dichlorobenzidine	.13689	.20906	52.72		
Chrysene	.99655	1.02965	3.32		
Benzo(a)Anthracene	1.10407	1.09279	1.02		
bis(2-Ethylhexyl)Phthalate	1.21073	1.50584	24.37		
Di-n-octylphthalate	3.40275	3.63348	6.78	*	
Benzo(a)Pyrene	1.32098	1.28882	2.43	*	
Benzo(b)Fluoranthene	1.60850	1.41028	12.32		
Indeno(1,2,3-cd)Pyrene	.96800	.95838	.99		
Dibenzo(a,h)Anthracene	.87481	.99213	13.41		
Benzo(i)Fluoranthene	1.44370	1.45936	1.09		
Benzo(g,h,i)Perylene	.89761	.99080	10.38		

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 (**)

2290

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 10/26/88

Contractor: ENGINEERING-SCIENCE Time: 12:43

Contract No: Laboratory ID:)S0241

Instrument ID: 1 Initial Calibration Date: 10/19/88

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.34157	15.52		**
2,4,6-Trichlorophenol	.42280	.38541	8.84	*	
2,4,5-Trichlorophenol	.52897	.53752	1.62		
2-Fluorobiphenyl	1.27220	1.14341	10.12		
2-Chloronaphthalene	1.23784	1.16327	6.02		
2-Nitroaniline	.47288	.46742	1.16		
Dimethylphthalate	1.40629	1.32280	5.94		
2,6-Dinitrotoluene	.37415	.37925	1.36		
Acenaphthylene	1.68918	1.55205	8.12		
3-Nitroaniline	.44557	.44366	.43		
2,4-Dinitrophenol	.11898	.10650	10.49		**
Acenaphthene	1.13011	.94937	15.99	*	
Dibenzofuran	1.64131	1.52395	7.15		
2,4-Dinitrotoluene	.28418	.27622	2.10		
4-Nitrophenol	.28450	.18722	34.19		**
Fluorene	1.12850	.94323	16.42		
Diethylphthalate	1.20939	1.05551	12.72		
4-Chlorophenyl-phenylether	.59183	.54564	7.81		
4-Nitroaniline	.35956	.33292	7.41		
2,4,6-Tribromophenol	.21023	.20763	1.24		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.47679	18.35	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.24487	14.96		
Hexachlorobenzene	.26273	.30863	17.47		
Pentachlorophenol	.14536	.12614	13.22	*	

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: 10/26/88

Contractor: ENGINEERING-SCIENCE Time: 12:43

Contract No: Laboratory ID: >S0241

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
N-Nitroso-Dimethylamine	.90169	.90823	.72		
2-Fluorophenol	1.15802	1.30038	-12.29		
bis(2-Chloroethyl)ether	1.11892	.99021	11.50		
Phenol	1.41657	1.47123	3.86	*	
Phenol-d5	1.22488	1.38963	13.45		
Aniline	.54193	.62820	15.93		
2-Chlorophenol	1.23175	1.35004	9.60		
1,3-Dichlorobenzene	1.47535	1.43172	2.96		
1,4-Dichlorobenzene	1.40530	1.39856	1.19	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.81265	11.47		
1,2-Dichlorobenzene	1.32240	1.43758	8.71		
2-Methylphenol	1.17367	1.16727	.55		
3-&-4-Methylphenol	1.07139	1.38639	29.40		
bis(2-chloroisopropyl)Ether	2.15627	2.38670	10.69		
N-Nitroso-Di-n-Propylamine	.84050	.72436	-13.82	**	
Hexachloroethane	.53840	.56165	4.32		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.44108	10.16		
Nitrobenzene-d5	.39137	.40730	4.07		
2-Nitrophenol	.24657	.26166	6.12	*	
Isophorone	.74170	.80943	9.13		
bis(2-Chloroethoxy)methane	.49386	.51469	4.22		
2,4-Dimethylphenol	.34849	.40522	16.28		
Benzoic Acid	.29725	.27525	7.40		
2,4-Dichlorophenol	.56733	.61081	7.66	*	
1,2,4-Trichlorobenzene	.36913	.36032	2.39		
Naphthalene	.94589	.90284	4.55		
4-Chloroaniline	.36309	.39808	9.64		
Hexachlorobutadiene	.20283	.20322	.19	*	
4-Chloro-3-Methylphenol	.31360	.35449	13.04	*	
2-Methylnaphthalene	.56397	.59665	5.79		

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 (**)

2292

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR00 1

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

Sample No. (Standard): SSTD060 Date Analyzed: 10/26/88

Lab File ID (Standard): S0241 Time Analyzed: 12:43

Instrument ID: 1

		IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
12 HOUR STD		60975	9.24	212303	12.86	127656	18.34
UPPER LIMIT		121950	9.74	424606	13.36	255312	18.84
LOWER LIMIT		30488	8.74	106152	12.36	63828	17.84
EPA SAMPLE NO.							
	01	64680	9.22	253048	12.85	136555	18.32
	02	53511	9.23	202436	12.85	111232	18.32
~~88092257~~	03						
	04	51681	9.24	195929	12.86	106988	18.34
	05	57597	9.22	219566	12.84	120733	18.33
88081967 MS	06	55733	9.24	205337	12.83	107210	18.33
88081967 MSD	07	65312	9.22	242311	12.83	129984	18.33
88081982	08	80925	9.23	305478	12.83	172761	18.34
	09	58129	9.23	193379	12.84	113396	18.33
	10	54277	9.23	173996	12.85	109221	18.34
	11	55930	9.23	182415	12.85	114172	18.34
88081871	12	68748	9.24	245371	12.86	137535	18.35
88081872	13	70514	9.23	249664	12.84	145220	18.33
88081873	14	70639	9.22	253745	12.84	146694	18.34
	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: OR01

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

Sample No. (Standard): SSTD060 Date Analyzed: 10/26/88

Lab File ID (Standard): S0241 Time Analyzed: 12:43

Instrument ID: 1

	EPA SAMPLE NO.	IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
	12 HOUR STD	60975	9.24	212303	12.86	127656	18.34
	UPPER LIMIT	121950	9.74	424606	13.36	255312	18.84
	LOWER LIMIT	30488	8.74	106152	12.36	63828	17.84
01	8809235?-59 BLK MS	64680	9.22	253048	12.85	136555	18.32
02	8809235?-59 BLK MSD	53511	9.23	202436	12.85	111232	18.32
~~03~~	~~8809225?~~						
04	8809235?-59 BLK MS	51681	9.24	195929	12.86	106988	18.34
05	8809235?-59 BLK MSD	57597	9.22	219566	12.84	120733	18.33
06	8808196? MS	55733	9.24	205337	12.83	107210	18.33
07	8808196? MSD	65312	9.22	242311	12.83	129984	18.33
08	8808198?	80925	9.23	305478	12.83	172761	18.34
~~09~~ 08	8809253? BNA	58129	9.23	193379	12.84	113396	18.33
10	8809235? ACID	54277	9.23	173996	12.85	109221	18.34
11	8809235?-59 BLK ACID	55930	9.23	182415	12.85	114172	18.34
12	8808187? BLK	68768	9.24	245371	12.86	137535	18.35
13	8808187? BLK	70514	9.23	249664	12.84	145220	18.33
14	8808187? BLK	70639	9.22	253745	12.84	146694	18.34
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: 10/26/88

Lab File ID (Standard): 30241 Time Analyzed: 12:43

Instrument ID: |

	EPA SAMPLE NO.	IS4 (PHN) AREA #	RT	IS5 (CRY) AREA #	RT	IS4 (PRY) AREA #	RT
	12 HOUR STD	181647	22.99	113883	31.47	76129	37.64
	UPPER LIMIT	363294	23.49	227766	31.97	152258	38.14
	LOWER LIMIT	90824	22.49	56942	30.97	38065	37.14
01	8809235751 AC BLK MS	188084	22.99	109407	31.50	61085	37.66
02	8809235759 AC BLK MSD	157633	22.99	75621	31.51	40006	37.70
03	88092257						
04	8809235759 RW BLK MS	170177	23.05	86087	31.53	43117	37.71
05	8809235759 RW BLK MSD	188750	23.03	92733	31.52	46657	37.69
06	88081967 MS	136178	22.99	61612	31.47	2820*	37.66
07	88081967 MSD	165225	23.01	85242	31.47	33721*	37.67
08	88081982	268938	23.02	147901	31.49	90866	37.68
09	8809235759 RW BLK	164914	23.01	91062	31.49	47288	37.66
10	8809235758 AC BLK	164761	23.01	88540	31.51	49866	37.67
11	8809235759 AC BLK	168688	23.02	95474	31.52	51241	37.70
12	88081871 BLK	196786	23.04	98593	31.51	39503	37.68
13	88081872 BLK	210983	23.02	107903	31.50	45211	37.66
14	88081873 BLK	205571	23.01	106986	31.49	53328	37.66
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 __

FORM VIII [illegible] 12/87

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: >T2121 DFTPP Injection Date: 11/21/88

Instrument ID: 70 1 DFTPP Injection Time: 15:22

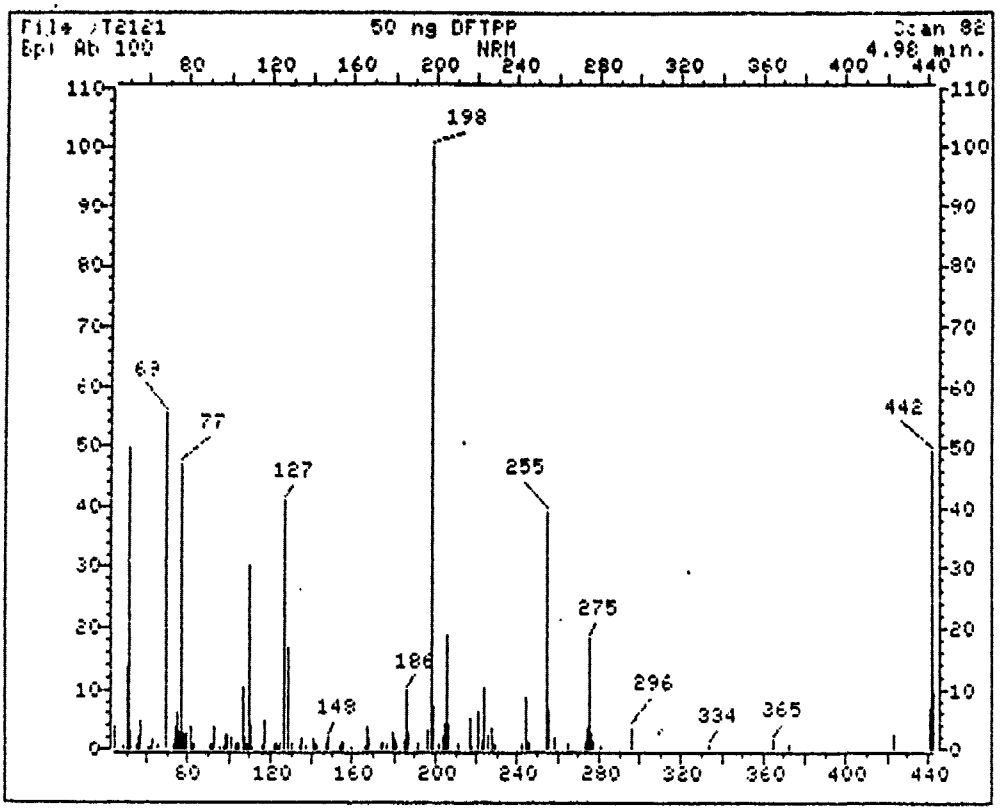
m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	49.6
68	Less than 2.0% of mass 69	0.0(0.0)1
69	Mass 69 relative abundance	55.
70	Less than 2.0% of mass 69	0.0(0.0)1
127	40.0 - 60.0% of mass 198	40.9
197	Less than 1.0% of mass 198	0.0
198	Base Peak, 100% relative abundance	100.
199	5.0 - 9.0% of mass 198	7.1
275	10.0 - 30.0% of mass 198	18.2
365	Greater than 1.00% of mass 198	1.71
441	Present, but less than mass 443	6.7
442	Greater than 40.0% of mass 198	49.4
443	17.0 - 23.0% of mass 442	9.5(19.3)2

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

5 point 10/1

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	>S0561	11/21/88	15:40	
02	88092881 AC 1ml + IS	>S0562	11/21/88	16:42	another proj
03	88092981 BN 1ml + IS	>S0563	11/21/88	17:41	
04	88081939-2378 RE-EX	>S0564	11/21/88	18:40	
05	88081939 REX 1ml +IS	>S0565	11/21/88	19:39	
06	88081968 REX 1ml +IS	>S0566	11/21/88	20:39	
07	88081970 REX 1ml +IS	>S0567	11/21/88	21:38	
08	88081971 REX 1ml +IS	>S0568	11/21/88	22:38	
09	88081975 REX 1ml +IS	>S0569	11/21/88	23:37	
10	88082374 REX 1ml +IS	>S0570	11/22/88	0:36	another proj
11	88082378 REX 1ml +IS	>S0571	11/22/88	1:35	
12	88082296 REX 1ml +IS	>S0572	11/22/88	2:35	
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					



File: T2121 Scan #: 82 Retn. time: 4.98

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
44.10	3.788	91.10	.866	128.15	2.868	181.05	1.064	229.10	.758
49.00	.722	92.10	.776	129.05	16.504	185.05	1.389	242.10	.649
50.10	13.258	93.00	3.824	130.05	1.046	186.05	9.722	244.20	8.550
51.10	49.639	95.80	.541	133.95	.379	187.05	2.706	245.10	1.046
52.10	3.030	97.10	.469	135.05	1.768	192.05	1.064	246.10	.938
55.10	.722	98.10	2.345	137.15	.740	196.10	3.193	255.10	39.051
56.10	2.074	99.10	2.471	141.05	1.876	198.10	100.000	256.10	6.439
57.10	4.726	100.90	1.948	141.95	.667	199.10	7.107	258.00	2.128
61.10	.559	103.10	.866	143.05	.649	201.60	.613	265.10	.685
62.20	.577	104.10	.956	146.95	1.136	204.00	1.948	273.10	1.190
63.00	1.623	105.00	1.118	148.05	2.110	204.20	1.966	274.15	3.301
65.20	.830	107.10	10.335	154.05	.433	205.10	4.203	275.15	18.236
69.00	55.375	108.10	1.948	155.15	.992	206.10	18.579	276.05	2.922
73.40	.631	108.80	.613	156.05	1.263	207.10	4.076	277.05	1.497
74.20	3.824	110.00	30.032	160.05	.559	211.20	.884	281.15	.577
75.10	6.079	111.10	4.149	166.05	.541	217.10	5.141	296.05	3.499
76.10	2.633	111.80	.415	167.05	3.878	218.00	.487	334.05	.685
77.10	46.717	116.10	.884	168.05	1.822	221.00	6.187	365.10	1.714
78.10	2.688	117.00	4.924	174.15	.758	223.10	1.299	372.20	.613
79.10	2.471	122.15	.830	175.05	1.028	224.10	10.281	423.20	2.561
80.10	2.814	122.95	1.136	176.15	.722	225.10	2.309	441.25	6.728
81.10	3.860	124.05	.577	179.05	2.850	227.10	3.355	442.25	49.369
82.00	.794	125.15	1.082	180.05	1.750	228.10	.812	443.25	9.542
83.00	1.010	127.05	40.873						

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: _____.

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

Lab File ID (Standard): >S0561 Date Analyzed: 11/21/88

Instrument ID: 70 | Time Analyzed: 15:40

	IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
	12 HOUR STD	92801.	9.12	308578.	12.74	203487.	18.21
	UPPER LIMIT	185602.		617156.		406974.	
	LOWER LIMIT	46400.		154289.		101743.	
	SAMPLE NO.						
01	88092881 AC	16804.*	9.11	62446.*	12.82	43508.*	18.21
02	88092881 BN	81069.	9.10	287886.	12.72	160990.	18.20
03	88081939-237	74856.	9.09	284529.	12.69	172575.	18.18
04	89081939 REX	74614.	9.09	278247.	12.69	157023.	18.19
05	88081968 REX	74006.	9.09	271774.	12.70	145358.	18.18
06	88081970 REX	76251.	9.09	270569.	12.70	158620.	18.18
07	88081971 REX	71196.	9.08	268908.	12.69	149113.	18.18
08	89081975 REX	70587.	9.09	265719.	12.70	147292.	18.18
09	88082374 REX	73017.	9.09	277643.	12.67	150867.	18.18
10	88082373 REX	69175.	9.10	259891.	12.69	139193.	18.17
11	88082296 REX	74558.	9.10	268047.	12.69	105499.	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): >S0561 Date Analyzed:11/21/88

Instrument ID: 70 1 Time Analyzed: 15:40

	IS4(PHN)		IS5(CRY)		IS3(PRY)	
	AREA #	RT	AREA #	RT	AREA #	RT
12 HOUR STD	335083.	22.84	238128.	31.31	162207.	37.29
UPPER LIMIT	670166.		476256.		324414.	
LOWER LIMIT	167541.		119064.		81103.	
EPA SAMPLE NO.						
01 88092881 AC	78082.*	22.88	63509.*	31.30	35104.*	37.30
02 88092881 BN	245988.	22.85	173881.	31.29	101083.	37.30
03 88081939-237	277500.	22.84	205285.	31.28	139483.	37.26
04 88081939 REX	252543.	22.83	177430.	31.27	104808.	37.26
05 88081968 REX	232911.	22.84	161159.	31.28	100673.	37.27
06 88081970 REX	240973.	22.85	160901.	31.28	101255.	37.27
07 88081971 REX	231964.	22.84	161526.	31.27	102059.	37.26
08 88081975 REX	231079.	22.84	159796.	31.27	97691.	37.26
09 88082374 REX	231793.	22.83	159643.	31.27	94244.	37.27
10 88082373 REX	230468.	22.85	162546.	31.27	105150.	37.27
11 88082296 REX	229175.	22.85	114497.*	31.29	5605.*	37.36
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

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 10/26/88 9:32

Lab ID >D1026::01 Data Release Authorized By: Donna Kuck

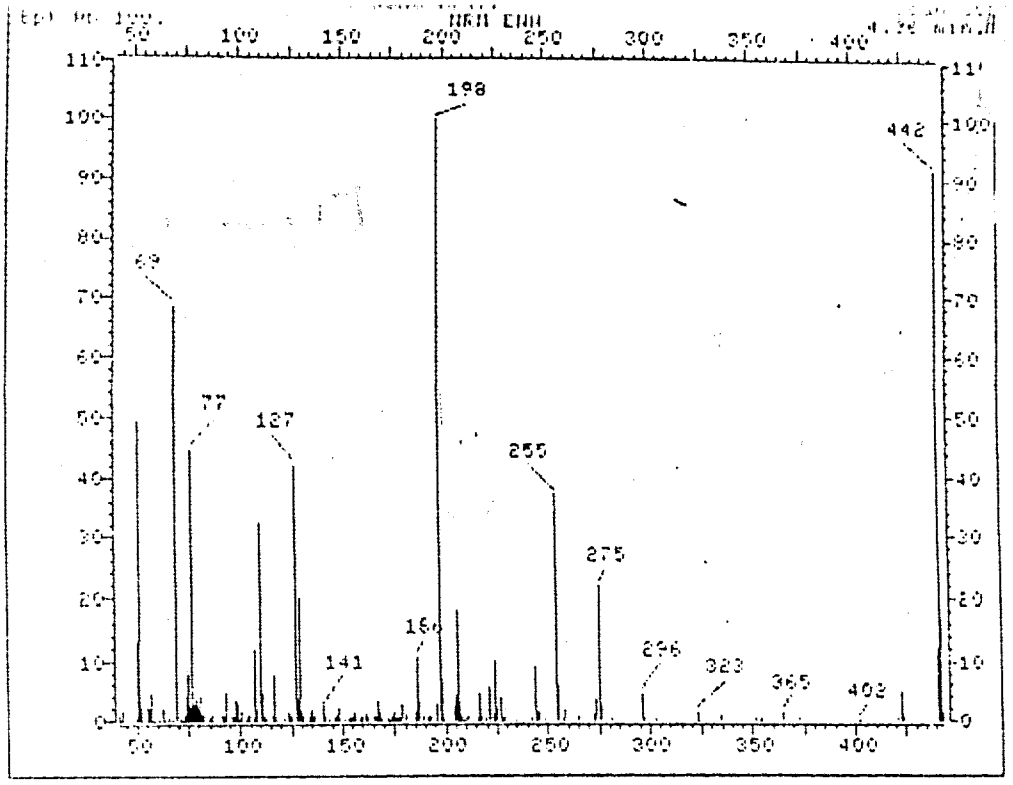
m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	49.38 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	68.40	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	42.09 OK	
197	less than 1.0% of mass 198	0.00 OK	
199	base peak, 100% relative abundance	100.00 OK	
275	5.0 - 9.0% of mass 198	6.86 OK	
365	10.0 - 30.0% of mass 198	21.98 OK	
441	greater than 1.00% of mass 198	1.57 OK	
442	present, but less than mass 443	11.95 OK	
443	greater than 40.0% of mass 198	91.51 OK	
	17.0 - 23.0% of mass 442	16.91 OK	(18.47) #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.

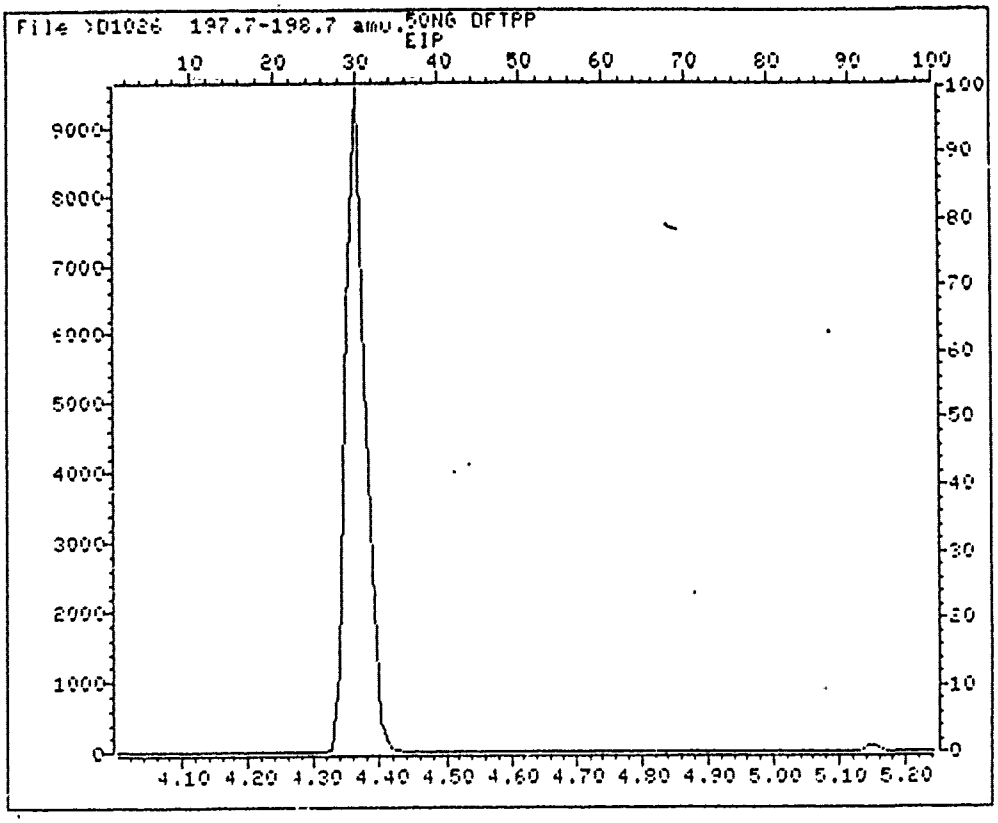
SAMPLE ID (50ng DFTPP)	LAB_ID	DATE_OF_ANALYSIS	TIME_OF_ANALYSIS	
	>D1026	10/26/88	9:32	
60ng/L	E5963		10:04	
8808197J	E5970		17:00	SS out IS out, recalc
88081968	E5971		17:55	SS out, Rec good, use
8808196A	E5972		18:50	" good
8808197D	E5973		19:45	SS out, Rec bad, use
88081971	E5974		20:40	SS out Rec bad, use
88081972	E5975		21:35	>12 hr time, notified
88081973	E5976		22:30	



File: 9010C6 Scan #: 30 Retn. time: 4.36

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.00	1.05[illegible]	87.05	.230	137.05	.766	183.00	.634	248.90	.366
42.10	.13[illegible]	91.05	1.193	140.95	2.410	190.80	.578	251.00	.080
43.10	1.646	91.95	.846	141.95	.676	192.00	.537	252.90	.099
45.00	.155	92.90	4.928	142.95	.404	192.90	.916	254.90	37.204
49.10	.301	96.10	.719	145.95	.310	196.00	2.781	255.90	5.970
50.00	13.01[illegible]	97.10	.714	146.95	1.235	197.90	100.000	257.00	.348
51.10	43.385	98.00	3.490	147.95	1.966	198.90	6.877	257.90	1.931
52.10	2.439	99.00	2.884	148.95	.371	199.90	.568	265.00	.827
53.00	.249	99.90	.503	151.15	.456	201.00	.103	272.90	1.245
54.00	.155	101.00	1.837	152.95	.437	201.50	.197	274.00	3.359
55.10	2.331	102.10	.065	153.95	.460	203.95	2.386	275.00	21.980
56.05	2.160	103.00	.629	154.95	.653	204.95	4.115	276.00	2.790
57.05	4.627	103.90	.911	156.05	1.588	205.95	17.868	276.85	1.217
57.95	.141	104.90	1.212	157.15	.319	206.95	3.082	280.95	.352
58.85	.094	106.00	.456	158.95	.362	207.95	.705	282.95	.070
60.95	.329	107.00	11.819	159.95	.653	208.95	.221	295.95	4.486
62.05	2.104	108.00	1.851	161.05	.930	210.15	.409	296.95	.404
63.95	.089	110.00	32.347	161.95	.287	210.35	.329	302.95	.465
65.05	.653	111.00	4.387	164.95	.888	210.95	.761	322.90	1.578
67.05	.479	112.00	.658	165.95	.686	215.85	.287	323.90	.235
68.95	68.395	113.00	.272	166.90	3.274	216.95	4.444	326.90	.099
70.95	.789	116.00	.850	168.00	1.536	217.95	.672	334.00	.831
71.95	.056	117.00	7.399	168.90	.334	218.95	.451	351.85	.267
73.05	1.033	118.00	.554	171.90	.272	220.95	5.421	352.95	.221
74.05	4.264	122.00	.559	172.90	.155	222.85	.963	353.85	.395
74.95	7.840	123.00	1.583	174.00	.620	223.95	9.771	364.95	1.574
76.05	2.419	124.00	.606	175.00	1.390	224.95	2.175	371.95	.531
77.05	11.772	125.00	.648	175.90	.385	226.95	3.744	401.90	.249

78.05	2.870	127.00	42.089	177.00	.650	227.85	.404	402.90	.202
78.95	3.767	128.00	3.396	177.80	.291	228.95	.850	420.90	.521
79.95	2.588	129.00	19.927	178.90	2.917	230.95	.249	423.00	4.674
81.05	4.087	129.95	1.827	180.00	1.203	234.85	.169	423.95	.921
82.05	1.080	130.95	.883	180.90	1.029	241.90	.413	440.95	11.946
83.05	1.550	132.95	.207	185.00	1.527	243.90	8.831	441.95	91.512
84.05	.498	133.95	.662	186.00	10.565	245.00	1.297	442.95	16.906
85.05	.869	134.95	1.823	187.00	3.133	245.90	1.325	443.95	1.550
86.05	1.066	135.95	.648						


File >D1026 197.7-198.7 amu. 50NG DFTPP
EIP
10 20 30 40 50 60 70 80 90 100
9000 8000 7000 6000 5000 4000 3000 2000 1000 0
100 90 80 70 60 50 40 30 20 10 0
4.10 4.20 4.30 4.40 4.50 4.60 4.70 4.80 4.90 5.00 5.10 5.20

Calibration Check Report

Title: 8 625 ACID AND BASE/NEUTRALS + ETPHENOL,DMSEP&2-MO2-4-MEPH
Calibrated: 881013 04:31

Check Standard Data File:)C5963
Injection Time: 881026 10:04

Compound	$\overline{RF}$	RF	%Diff	Calib Meth	
N-Nitroso-Dimethylamine	1.24043	1.25389	1.08	Average	
2-Fluorophenol	1.41912	1.46850	3.48	Average	
bis(2-Chloroethyl)Ether	1.41737	1.37102	3.27	Average	
Phenol	1.70209	1.76609	.22	Average	
Phenol-d5	1.35470	1.22738	9.40	Average	
Aniline	.74553	.78717	5.59	Average	
2-Chlorophenol	1.32089	1.37539	4.13	Average	
1,3-Dichlorobenzene	1.51101	1.44846	4.14	Average	
1,4-Dichlorobenzene	1.51574	1.41851	6.41	Average	
Benzyl Chloride	-	-	-	Average	
Benzyl Alcohol	.56944	.62510	9.77	Average	
1,2-Dichlorobenzene	1.45179	1.48567	2.33	Average	
2-Methylphenol	1.42392	1.53160	7.56	Average	
3-&-4-Methylphenol	1.58422	1.49422	5.68	Average	(Conc=60.00)
bis(2-chloroisopropyl)Ether	2.35722	2.68003	13.69	Average	
N-Nitroso-Di-n-Propylamine	1.13410	1.40585	23.96	Average	
Hexachloroethane	.70056	.67830	3.18	Average	
Dibromochloropropane	-	-	-	Average	
Nitrobenzene	.56663	.54961	3.04	Average	
Nitrobenzene-d5	.49938	.53295	6.72	Average	
2-Nitrophenol	.22040	.24583	11.54	Average	
Isophorone	.67207	.99600	14.21	Average	
bis(2-Chloroethoxy)methane	.58240	.62044	6.53	Average	
2,4-Dimethylphenol	.40962	.43046	5.34	Average	
Benzoic Acid	.29595	.26629	10.02	Average	
2,4-Dichlorophenol	.53135	.52389	1.41	Average	
1,2,4-Trichlorobenzene	.31939	.33559	5.73	Average	
Naphthalene	.98196	.95037	3.22	Average	
4-Chloroaniline	.33116	.40350	21.84	Average	
Hexachlorobutadiene	.18652	.17677	5.23	Average	
4-Chloro-3-Methylphenol	.28631	.29860	4.29	Average	
2-Methylnaphthalene	.54468	.54865	.73	Average	
Hexachlorocyclopentadiene	.33769	.31557	5.20	Average	
2,4,6-Trichlorophenol	.32295	.34822	7.82	Average	
2,4,5-Trichlorophenol	.49539	.52952	6.89	Average	
2-Fluorobiphenyl	1.26699	1.07735	14.97	Average	
2-Chloronaphthalene	1.24653	1.10687	11.20	Average	
2-Nitroaniline	.63129	.64596	2.32	Average	
Dimethylphthalate	1.33033	1.26669	4.78	Average	
2,6-Dinitrotoluene	.31816	.37232	17.02	Average	

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

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

%Diff - % Difference from original average or curve

2304

Calibration Check Report

Title: 0 625 ACID AND BASE/NEUTRALS + CIPHENOL,DMSBPG2-NO2-4-METH
Calibrated: 881013 04:31

Check Standard Data File: >C5963
Injection Time: 881026 10:04

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
Acenaphthylene	1.65820	1.43814	13.27	Average
3-Nitroaniline	.63702	.67801	6.43	Average
2,4-Dinitrophenol	.05753	.06652	15.64	Average
Acenaphthene	1.12644	.93946	16.60	Average
Dibenzofuran	1.50204	1.49428	.52	Average
2,4-Dinitrotoluene	.32099	.38234	19.11	Average
4-Nitrophenol	.18425	.21496	16.67	Average
Fluorene	1.09332	1.07233	1.92	Average
Diethylphthalate	1.32354	1.16840	11.72	Average
4-Chlorophenyl-phenylether	.40214	.40605	15.78	Average
4-Nitroaniline	.27495	.38020	38.28	Average
2,4,6-Tribromophenol	.14218	.20741	45.88	Average
1,2-Diphenylhydrazine	-	-	-	Average
Alpha-BHC	-	-	-	Average
Beta-BHC	-	-	-	Average
Gamma-BHC	-	-	-	Average
Delta-BHC	-	-	-	Average
Heptachlor	-	-	-	Average
Aldrin	-	-	-	Average
N-Nitrosodiphenylamine	.44983	.43629	3.01	Average
4,6-Dinitro-2-Methylphenol	.08606	-	-	Average
4-Bromophenyl-phenylether	.22979	.24543	6.81	Average
Hexachlorobenzene	.28768	.31794	10.52	Average
Pentachlorophenol	.11390	.10877	4.51	Average
Phenanthrene	1.07960	1.01549	5.94	Average
Anthracene	1.13334	1.09724	3.19	Average
Di-n-Butylphthalate	1.71746	1.83785	7.01	Average
4,4'-Dibromobiphenyl	-	-	-	Average
Fluoranthene	1.17568	1.10431	6.07	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 60.00 ng/L

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

%Diff - % Difference from original average or curve

2305

Calibration Check Report

Title: D 625 ACID AND BASE/NEUTRALS + C(PHENOL,DMSBP&2-NO2-4-MEPH
Calibrated: 881013 04:31

Check Standard Data File: >C5963
Injection Time: 881026 10:04

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
Benzidine	.03775	.17676	368.27	Average
Pyrene	1.65647	1.79444	8.33	Average
Terphenyl-d14	1.09647	1.29902	18.47	Average
Butylbenzylphthalate	1.15097	1.43523	24.70	Average
3,3'-Dichlorobenzidine	.12990	.25445	95.88	Average
Chrysene	1.01423	1.03753	2.30	Average
Benzo(a)Anthracene	1.09006	1.24137	13.88	Average
bis(2-Ethylhexyl)Phthalate	1.34247	1.76833	31.72	Average
Di-n-octylphthalate	3.72331	4.35008	16.83	Average
Benzo(a)Pyrene	1.27071	1.23544	2.78	Average
Benzo(b)Fluoranthene	1.46902	1.59508	7.12	Average
Indeno(1,2,3-cd)Pyrene	.82543	.85244	3.27	Average
Dibenzo(a,h)Anthracene	.78966	.81567	3.29	Average
Benzo(k)Fluoranthene	1.51900	1.20932	20.39	Average
Benzo(g,h,i)Perylene	.74580	.73755	1.11	Average

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

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

%Diff - % Difference from original average or curve

2306

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR01

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	89249	8.01	322385	11.55	182885	16.96
UPPER LIMIT	178498		644770		365770	
LOWER LIMIT	44624		161192		91442	
EPA SAMPLE NO.						
01 SB081939	129202	8.04	529229	11.52	275093	16.96
02 SB051968	78493	8.01	293702	11.50	156954	16.94
03 SB081969	81327	8.01	312883	11.50	165253	16.93
04 SB081970	74982	8.01	303965	11.50	165519	16.94
05 SB051971	80407	8.00	316672	11.49	168679	16.93
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
IS2 (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): _____ 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	256091		21.56	144451		29.99	99323		34.97
UPPER LIMIT	512182			288902			198646		
LOWER LIMIT	128045			72225			49662		
EPA SAMPLE NO.									
01 SY081929	433752		21.59	294508	*	30.00	27223	*	34.95
02 SY081968	279952	*	21.55	151859		29.92	72584		34.95
03 SY081969	254035		21.56	157100		29.96	75376		34.96
04 SY081970	249054		21.56	160354		29.97	70223		34.95
05 SY081971	250791		21.55	166445		29.96	94237		34.96
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
IS4 (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 11/07/88 14:36

Lab ID >D1107::03 Data Release Authorized By: Laura Kuck

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	53.88 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	69.21	
70	less than 2.0% of mass 69	.65 OK	(.9336) #1
127	40.0 - 60.0% of mass 198	43.91 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	6.11 OK	
275	10.0 - 30.0% of mass 198	18.06 OK	
365	greater than 1.00% of mass 198	1.38 OK	
441	present, but less than mass 443	9.24 OK	
442	greater than 40.0% of mass 198	65.21 OK	
443	17.0 - 23.0% of mass 442	12.36 OK	(18.95) #2

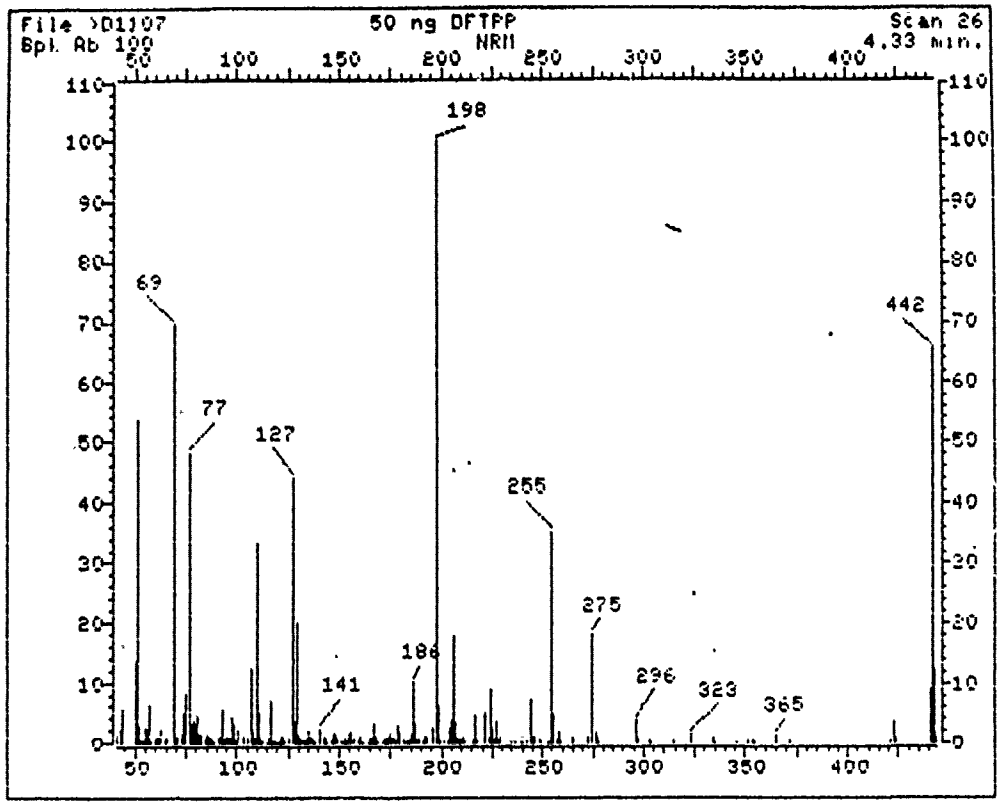
5 point
10/12/88

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	
50 ng DFTPP	>D1107	11/07/88	14:36	
60mg/L std	E6116	11/7/88	15:05	
8809 2613 BN	E6117		16:13	vae
2614 BN	E6118		17:08	"
2615 BN	E6119		18:03	"
2612 BN	E6120		19:58	"
2586 BN	E6121		19:53	
MS 2587 BN	E6122		20:48	
MSD 2587 BN	E6123		21:43	SSout, MSoK
BLK 2622 AC	E6124		22:38	
BLK 2622 BN	E6125		23:33	
2622 AC	E6126	11/8/88	00:29	
2622 BN	E6127		01:23	ISout
8808 974 10ml	E6128		02:18	+ SSout - not needed

another proje



File: >D1107 Scan #: 26 Retn. time: 4.33

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.00	1.553	94.05	.479	140.90	2.157	187.05	2.970	252.85	.208
42.20	.198	95.05	.959	142.00	.646	187.95	.396	253.85	.229
43.10	1.980	95.95	.646	143.00	.615	188.95	.813	254.95	35.025
44.00	5.523	97.05	.782	144.00	.125	191.05	.333	255.95	4.940
50.00	13.610	97.95	4.293	146.00	.333	191.95	1.000	257.15	.469
51.00	53.877	98.95	3.220	147.00	1.292	193.05	1.042	257.95	1.740
52.00	2.730	99.95	.302	147.90	1.386	195.35	2.386	259.05	.292
53.00	.459	100.95	1.990	149.10	.594	197.90	100.000	265.05	.667
54.00	.271	103.05	.761	151.00	.323	198.90	6.107	272.15	.167
55.10	2.459	103.95	1.198	151.70	.219	199.90	.417	272.95	1.198
56.10	2.241	104.95	1.188	152.90	.719	201.60	.542	274.05	2.730
57.10	6.086	106.95	12.245	153.95	.552	203.00	.500	274.95	18.060
58.00	.469	107.95	1.647	154.95	1.376	203.90	2.491	276.05	1.928
60.00	.594	108.95	.823	155.95	1.688	204.90	3.950	277.05	1.063
61.00	1.011	109.90	33.118	157.05	.427	206.00	17.507	277.95	.177
62.10	.771	110.90	5.002	158.05	.594	207.00	3.345	281.05	.219
63.00	1.990	111.80	.646	159.95	.584	208.00	.698	296.00	3.804
64.10	.333	113.00	.333	160.95	1.063	209.00	.365	296.90	.594
65.10	1.209	115.00	.250	161.75	.177	209.90	.323	302.90	.417
66.95	.552	115.90	.802	161.95	.188	211.00	.740	303.90	.115
68.95	69.206	116.90	6.836	163.95	.125	211.80	.271	314.80	.302
70.05	.646	117.90	.584	164.85	.677	216.00	.531	316.10	.198
71.05	1.198	119.00	.438	165.95	.646	216.90	4.377	323.00	1.323
73.05	1.553	120.00	.219	167.05	3.001	217.80	.563	326.70	.146
74.05	4.867	120.70	.156	167.85	1.105	221.00	4.835	333.95	.677
74.95	8.108	122.00	.771	168.85	.354	222.90	.771	334.95	.208
77.05	48.166	122.90	1.251	170.85	.250	224.00	8.962	340.85	.188
78.05	3.085	123.90	.552	171.95	.417	225.00	2.334	345.95	.167
78.95	3.877	124.90	.698	172.95	.604	226.10	.333	351.85	.375
80.05	3.085	126.90	43.914	173.95	.782	226.90	3.345	352.95	.281

82.05	1.282	128.90	20.040	175.95	.688	228.90	1.011	355.05	.188
82.05	1.480	129.90	1.501	176.85	.886	230.80	.219	365.05	1.376
84.05	.667	131.00	.823	177.85	.333	234.90	.240	371.90	.511
85.05	1.334	132.00	.438	178.85	2.626	236.90	.250	420.85	.427
85.95	1.073	133.00	.417	179.95	1.688	238.90	.167	422.95	3.554
86.95	.636	133.90	.438	180.95	.927	240.00	.198	423.95	.636
87.85	.261	135.00	1.772	181.95	.250	241.85	.448	440.95	9.243
88.85	.219	135.90	.782	183.05	.396	243.95	7.128	442.05	65.215
90.95	.917	137.00	.657	183.95	.271	245.05	1.136	442.95	12.359
91.95	1.105	137.90	.323	184.95	1.271	245.85	1.230	443.95	1.170
92.95	5.471	139.00	.177	185.95	10.150	248.95	.344		

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/07/88

Contractor: Time: 15:05

Contract No: Laboratory ID: >E6116

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	1.08163	12.80		
2-fluorophenol	1.41912	1.43506	1.12		
bis(2-Chloroethyl)ether	1.41737	1.31603	7.15		
Phenol	1.78209	1.73300	2.75	*	
Phenol-d5	1.35470	1.54823	14.29		
Aniline	.74553	.53219	28.62		
2-Chlorophenol	1.32089	1.38633	4.95		
1,3-Dichlorobenzene	1.51101	1.56259	3.41		
1,4-Dichlorobenzene	1.51574	1.53092	1.00	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.56944	.41059	27.90		
1,2-Dichlorobenzene	1.45179	1.58127	8.92		
2-Methylphenol	1.42392	1.33571	6.20		
3-&-4-Methylphenol	1.58422	1.41241	10.84		
bis(2-chloroisopropyl)Ether	2.35722	2.53136	7.39		
N-Nitroso-Di-n-Propylamine	1.13410	1.30576	15.14		**
Hexachloroethane	.70056	.71417	1.94		
Dibromochloropropane	-	-	-		
Nitrobenzene	.56683	.54865	3.21		
Nitrobenzene-d5	.49938	.51302	2.73		
2-Nitrophenol	.22040	.24161	9.63	*	
Isophorone	.87207	.90844	4.17		
bis(2-Chloroethoxy)methane	.58240	.62186	6.77		
2,4-Dimethylphenol	.40862	.41691	2.03		
Benzoic Acid	.29595	.31925	7.87		
2,4-Dichlorophenol	.53135	.51710	2.68	*	
1,2,4-Trichlorobenzene	.31739	.33911	6.84		
Naphthalene	.98196	1.01280	3.14		
4-Chloroaniline	.33116	.33220	.31		
Hexachlorobutadiene	.18652	.19704	5.64	*	
4-Chloro-3-Methylphenol	.28631	.31546	10.18	*	
2-Methylnaphthalene	.54468	.56122	3.04		

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 (**)

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/07/88

Contractor: Time: 15:05

Contract No: Laboratory ID: XC6116

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	.27629	17.00		**
2,4,6-Trichlorophenol	.32295	.38149	18.12	*	
2,4,5-Trichlorophenol	.49539	.45812	7.52		
2-Fluorobiphenyl	1.26699	1.19734	5.50		
2-Chloronaphthalene	1.24653	1.21802	2.29		
2-Nitroaniline	.63129	.59899	5.12		
Dimethylphthalate	1.33033	1.35590	1.92		
2,6-Dinitrotoluene	.31816	.35971	13.06		
Acenaphthylene	1.65820	1.57693	4.90		
3-Nitroaniline	.63702	.59503	6.59		
2,4-Dinitrophenol	.05753	.06628	15.21		**
Acenaphthene	1.12644	1.07466	4.60	*	
Dibenzofuran	1.50204	1.50669	.31		
2,4-Dinitrotoluene	.32099	.33944	5.75		
4-Nitrophenol	.18425	.17321	5.99		**
Fluorene	1.09332	1.10114	.99		
Diethylphthalate	1.32354	1.27372	3.76		
4-Chlorophenyl-phenylether	.48214	.46318	3.93		
4-Nitroaniline	.27495	.28139	2.34		
2,4,6-Tribromophenol	.14218	.21269	49.59		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.44983	.47132	4.78	*	
4,6-Dinitro-2-Methylphenol	.09606	-	-		
4-Bromophenyl-phenylether	.22979	.26039	13.32		
Hexachlorobenzene	.28768	.33174	15.31		
Pentachlorophenol	.11390	.13882	21.87	*	

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: 11/07/88

Contractor: Time: 15:05

Contract No: Laboratory ID: >E6116

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	1.00591	6.83		
Anthracene	1.13334	1.07579	5.08		
Di-n-Butylphthalate	1.71746	1.82978	6.54		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.17568	1.04217	11.36	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.03775	.00065	98.28		
Pyrene	1.65647	1.55134	6.35		
Terphenyl-d14	1.09647	1.14545	4.47		
Butylbenzylphthalate	1.15097	1.18772	3.19		
3,3'-Dichlorobenzidine	.12990	.22692	74.69		
Chrysene	1.01423	.99850	1.55		
Benzo(a)Anthracene	1.09006	1.12008	2.75		
bis(2-Ethylhexyl)Phthalate	1.34247	1.47029	9.52		
Di-n-octylphthalate	3.72331	3.08273	17.20	*	
Benzo(a)Pyrene	1.27071	1.22065	3.94	*	
Benzo(b)fluoranthene	1.48902	1.68444	13.12		
Indeno(1,2,3-cd)Pyrene	.82543	.59967	27.35		
Dibenzo(a,h)Anthracene	.78966	.99504	26.01		
Benzo(K)fluoranthene	1.51900	.92950	38.81		
Benzo(g,h,i)Perylene	.74580	1.00143	34.28		

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 (**)

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	131547	8.04	459245	11.55	236280	16.94
	UPPER LIMIT	263094		916490		472560	
	LOWER LIMIT	65773		229122		118140	
	EPA SAMPLE NO.						
01	810926BBN	139536	8.02	474029	11.52	235368	16.91
02	2614BN	120772	8.07	407352	11.57	207025	16.98
03	2615BN	130176	8.01	459110	11.50	230062	16.90
04	2586BN	251098	8.01	895353	11.52	435983	16.93
05	MS 2587BN	214054	8.03	782157	11.53	377590	16.94
06	MSD 2587BN	198749	8.03	737474	11.52	364466	16.94
07	BLK 2622NC	110501	8.00	392514	11.50	193242	16.90
08	BLK 2622BN	111072	8.00	382650	11.50	200209	16.91
09	2622AC	127260	8.01	432973	11.50	227505	16.91
10	2622BN	92535	8.00	313784	11.50	160544	16.89
11	2622BN	124082	8.01	438949	11.51	224223	16.90
12	SB081924/um1	96216	8.00	311031	11.49	144520	16.92
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):_____ 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	312566	21.53	192899	29.91	152913	34.85
UPPER LIMIT	625132		385798		305826	
LOWER LIMIT	156283		96449		76456	
EPA SAMPLE NO.						
01 8809263BN	320466	21.52	225430	29.90	164971	34.85
02 2614BN	283891	21.57	173487	29.94	120378	34.91
03 2615BN	300860	21.50	202840	29.86	141170	34.82
04 2586BN	~~294667~~	~~21.50~~	~~194148~~	~~29.87~~	~~136499~~	~~34.85~~
05 LS 2587BN	479649	21.55	314628	29.92	256648	34.87
06 LSD 2587BN	428720	21.55	291223	2993	210601	34.85
07 BLK 2622AC	267791	21.50	156130	29.87	101842	34.87
08 BLK 2622BN	292828	21.50	179545	29.86	115084	34.82
09 2622AC	316316	21.50	209505	29.88	137870	34.84
10 2622BN	205151	21.49	102379	29.86	57677	34.83
11 2612BN	298661	21.50	191981	29.87	136479	34.82
12 8809274/10mL	192134	21.51	129485	29.87	87051	34.82
13						
14 8809258BN	621101	21.52	~~385823~~ 376550	29.90	297793	34.86
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: >D1123 DFTPP Injection Date: 11/23/88

Instrument ID: 70 2 DFTPP Injection Time: 9:36

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	.5
68	Less than 2.0% of mass 69	4.5(31.7)1
69	Mass 69 relative abundance	14.
70	Less than 2.0% of mass 69	12.3(86.6)1
127	40.0 - 60.0% of mass 198	0.0
197	Less than 1.0% of mass 198	37.3
198	Base Peak, 100% relative abundance	0.
199	5.0 - 9.0% of mass 198	0.0
275	10.0 - 30.0% of mass 198	0.0
365	Greater than 1.00% of mass 198	0.00
441	Present, but less than mass 443	239249.
442	Greater than 40.0% of mass 198	313955.
443	17.0 - 23.0% of mass 442	338427.(107.8)2

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

10/12 - 5

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 ABN STD+IS	>E6313	11/23/88	9:57	✓
02	88092881 AC 1ml REAN	>E6314	11/23/88	11:10	
03	88092632 1ml REANAL.	>E6315	11/23/88	12:10	
04	88092633 1ml REANAL.	>E6316	11/23/88	13:05	IS out
05	88092681 AC REANAL.	>E6317	11/23/88	13:59	good
06	88092724 AC REANAL.	>E6318	11/23/88	14:56	IS out, n
07	88092456 BN 1ml	>E6319	11/23/88	15:56	
08	88092772 BN REANALYS	>E6320	11/23/88	16:51	IS out, n
09	88092558 AC REANALYS	>E6321	11/23/88	17:46	[illegible]
10	BLK 88092513-16,23-2	>E6322	11/23/88	18:41	AC SS g
11	88092551 BN REANALYS	>E6323	11/23/88	19:35	use
12	88092623 AC REANALYS	>E6324	11/23/88	20:30	IS out,
13	88091971 REX REANAL.	>E6325	11/23/88	21:26	SS out, n
14					
15					
16					
17					
18					
19					
20					
21					
22					

another project

2317

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/23/88

Contractor: Time: 09:57

Contract No: Laboratory ID:)E6313

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	1.14367	7.80		
2-fluorophenol	1.41912	1.30684	7.91		
bis(2-Chloroethyl)ether	1.41737	1.19920	15.39		
Phenol	1.78209	1.64344	7.78	*	
Phenol-d5	1.35470	1.54822	14.29		
Aniline	.74553	.38172	48.80		
2-Chlorophenol	1.32089	1.31982	.08		
1,3-Dichlorobenzene	1.51101	1.43340	5.14		
1,4-Dichlorobenzene	1.51574	1.53226	1.09	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.56944	.37166	34.73		
1,2-Dichlorobenzene	1.45179	1.35802	6.46		
2-Methylphenol	1.42392	1.17755	17.30		
3-&-4-Methylphenol	1.58422	1.25540	20.76		
bis(2-chloroisopropyl)Ether	2.35722	2.42195	2.75		
N-Nitroso-Di-n-Propylamine	1.13410	1.05281	7.17		**
Hexachloroethane	.70056	.68472	2.26		
Dibromochloropropane	-	-	-		
Nitrobenzene	.56683	.56579	.18		
Nitrobenzene-d5	.49938	.50178	.48		
2-Nitrophenol	.22040	6806	21.62	*	
Isophorone	.87207	.88510	1.49		
bis(2-Chloroethoxy)methane	.58240	.61362	5.36		
2,4-Dimethylphenol	.40862	.40368	1.21		
Benzoic Acid	.29595	.31245	5.58		
2,4-Dichlorophenol	.53135	.58407	9.92	*	
1,2,4-Trichlorobenzene	.31739	.32512	2.43		
Naphthalene	.98196	1.01560	3.43		
4-Chloroaniline	.33116	.33698	1.76		
Hexachlorobutadiene	.18652	.17352	6.97	*	
4-Chloro-3-Methylphenol	.28631	.28386	.86	*	
2-Methylnaphthalene	.54468	.56888	4.44		

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 (**)

2318

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/23/88

Contractor: Time: 09:57

Contract No: Laboratory ID:)E6313

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	.31692	4.80		**
2,4,6-Trichlorophenol	.32295	.34145	5.73	*	
2,4,5-Trichlorophenol	.49539	.46043	7.06		
2-Fluorobiphenyl	1.26699	1.27217	.41		
2-Chloronaphthalene	1.24653	1.23914	.59		
2-Nitroaniline	.63129	.59989	4.97		
Dimethylphthalate	1.33033	1.39974	5.22		
2,6-Dinitrotoluene	.31816	.37136	16.72		
Acenaphthylene	1.65820	1.63890	1.16		
3-Nitroaniline	.63702	.59097	7.23		
2,4-Dinitrophenol	.05753	.07696	33.78		**
Acenaphthene	1.12644	1.13868	1.09	*	
Dibenzofuran	1.50204	1.53769	2.37		
2,4-Dinitrotoluene	.32099	.34252	6.71		
4-Nitrophenol	.18425	.15925	13.57		**
Fluorene	1.09332	1.15413	5.56		
Diethylphthalate	1.32354	1.36877	3.42		
4-Chlorophenyl-phenylether	.48214	.50126	3.96		
4-Nitroaniline	.27495	.31503	14.58		
2,4,6-Tribromophenol	.14218	.14296	.55		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.44983	.47987	6.68	*	
4,6-Dinitro-2-Methylphenol	.08606	-	-		
4-Bromophenyl-phenylether	.22979	.23459	2.09		
Hexachlorobenzene	.26768	.29634	3.01		
Pentachlorophenol	.11390	.13672	20.03	*	

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 (**)

2319

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/23/88

Contractor: Time: 09:57

Contract No: Laboratory ID: >E6313

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	1.02675	4.90		
Anthracene	1.13334	1.13577	.21		
Di-n-Butylphthalate	1.71746	1.86982	8.87		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.17568	1.00590	14.44	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.03775	.02044	45.86		
Pyrene	1.65647	1.83008	10.48		
Terphenyl-d14	1.09647	1.38571	26.38		
Butylbenzylphthalate	1.15097	1.48234	28.79		
3,3'-Dichlorobenzidine	.12990	.24645	89.73		
Chrysene	1.01423	1.03099	1.65		
Benzo(a)Anthracene	1.09006	1.13540	4.16		
bis(2-Ethylhexyl)Phthalate	1.34247	1.79732	33.88		
Di-n-octylphthalate	3.72331	4.35290	16.91	*	
Benzo(a)Pyrene	1.27071	1.32335	4.14	*	
Benzo(b)Fluoranthene	1.48902	1.55878	4.68		
Indeno(1,2,3-cd)Pyrene	.82543	1.17335	42.15		
Dibenzo(a,h)Anthracene	.78966	.99906	26.52		
Benzo(k)fluoranthene	1.51900	1.43481	5.54		
Benzo(g,h,i)Perylene	.74580	.91644	22.88		

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 (**)

2320

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: _____.

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

Lab File ID (Standard): >E6313 Date Analyzed: 11/23/88

Instrument ID: 70 2 Time Analyzed: 9:57

	IS1(DCB) AREA	#	RT	IS2(NPT) AREA	#	RT	IS3(ANT) AREA	#	RT
12 HOUR STD	104232.		7.88	347133.		11.38	175830.		16.76
UPPER LIMIT	208416.			694266.			351660.		
LOWER LIMIT	52116.			173566.			87915.		
SAMPLE NO.									
01 88092881 AC	111956.		7.84	360115.		11.33	189807.		16.71
02 88092632 1ml	88158.		7.85	279242.		11.31	145225.		16.70
03 88092633 1ml	84629.		7.84	239892.		11.32	131738.		16.70
04 88092681 AC	95588.		7.84	316989.		11.31	172491.		16.71
05 88092724 AC	102064.		7.83	332892.		11.32	172141.		16.70
06 88092456 BN	107979.		7.84	369824.		11.32	181070.		16.71
07 88092772 BN	89747.		7.86	309192.		11.34	159692.		16.73
08 88092558 AC	85604.		7.83	279254.		11.32	147350.		16.70
09 BLK 88092513	105876.		7.84	361732.		11.31	190325.		16.71
10 88092551 BN	104281.		7.82	340311.		11.32	178759.		16.70
11 88092623 AC	97809.		7.83	311411.		11.31	161186.		16.69
12 88081971 REX	81825.		7.84	289046.	1	11.30	143584.		16.69
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): >E6313 Date Analyzed:11/23/88

Instrument ID: 70 2 Time Analyzed: 9:57

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS3(PRY) AREA #	RT
12 HOUR STD	247660.	21.34	122552.	29.71	70049.	34.56
UPPER LIMIT	495320.		245104.		140098.	
LOWER LIMIT	123830.		61276.		35024.	
EPA SAMPLE NO.						
01 88092881 AC	278291.	21.32	126724.	29.68	64861.	34.53
02 88092632 1ml	211234.	21.30	95662.	29.66	46974.	34.53
03 88092633 1ml	208253.	21.31	96413.	29.68	27889.*	34.54
04 88092681 AC	245057.	21.29	118840.	29.67	51340.	34.52
05 88092724 AC	248108.	21.30	112376.	29.67	27217.*	34.56
06 88092456 BN	257631.	21.31	118722.	29.67	43084.	34.54
07 88092772 BN	222286.	21.31	90838.	29.69	31928.*	34.57
08 88092558 AC	197511.	21.30	92883.	29.67	43344.	34.54
09 BLK 88092513	276728.	21.30	127663.	29.67	42597.	34.53
10 88092551 BN	253125.	21.29	134990.	29.67	39331.	34.52
11 88092623 AC	226706.	21.30	96940.	29.65	33042.*	34.54
12 88081971 REX	207825.	21.29	95700.	29.65	47769.	34.51
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

LATILE CONTINUING CALIBRATION CHECK

bName:_____ Contract:_____

b Code:_____ Case No.:_____ SAS No.:_____

:rument ID:carbopak_____ Calibration Date(s):_8/31/89

LAB FILE ID:__74_____ Init. Calib. Date(s):8/30/89, 8/15/89

OMPOUND	RRF	RRF50	%D
nzyl chloride	0.08		100.00
is (2-chloroethoxy) ethane	0.04		100.00
s (2-chloroisopropy) ether	0.26		100.00
romobenzene	1.21	1.28	-5.89
romodichloromethane	2.99	3.26	-8.66
romoform	0.79	1.33	-68.36
romomethane	0.23	0.22	2.96
rbon tetrachloride	2.98	2.58	13.33
loroacetaldehyde	ERR		ERR
hlorobenzene	1.39	1.23	11.39
loroethane	0.40	0.39	2.20
loroform	3.64	3.52	3.12
Chloroethane	0.97	0.75	18.75
-Chloroethyl vinyl ether	0.09		100.00
loromethane	0.23	0.41	-78.18
loromethyl methyl ether	0.17		100.00
,m,& p-Chlorotoluenes	3.99	3.22	19.33
bromochloromethane	3.54	3.28	8.47
promomethane	2.98	2.20	26.23
,2-Dichlorobenzene	2.36	1.92	18.56
,3-Dichlorobenzene	3.38	1.59	53.06
,4-Dichlorobenzene	2.51	1.95	22.40
chlorodifluormethane	0.54		100.00
,1-Dichloroethane	1.43	1.42	0.97
,2-Dichloroethane	1.69	2.09	-23.46
,1-Dichloroethylene	1.26	1.76	-39.37
ans-1,2-dichloroethylene	1.42	1.19	15.90
chloromethane	4.11	2.96	27.85
,2-Dichloropropane	1.93	1.96	-1.60
,3-Dichloropropylene	4.60	3.18	30.90
,1,2,2-Tetrachloroethane	6.89	5.44	21.02
,1,2,2-Tetrachloroethane	3.61	2.48	31.35
rachloroethylene	6.89	5.44	21.07
,1,1-Trichloroethane	1.75	1.51	13.89
,1,2-Trichloroethane	4.60	3.18	30.90
richloroethylene	4.22	3.48	17.41
richlorofluoromethane	1.76	1.13	35.71
richloropropane	3.59	2.69	25.12
yl acetate	0.46	0.62	-34.97

2323

ATILE CONTINUING CALIBRATION CHECK

Name:ENGINEERING SCIENCE_____ Contract:_____

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

rument ID.:carbopak Calibration Date(s):8/30/88 _____

FILE ID: RRF 50 __74_____ Inital calib = 8/30/88

MPOUND	$\overline{RRF}$	RRF50	%D
zene	4.27	4.99	16.85
orobenzene	4.19	4.71	12.30
_Dichlorobenzene	2.24	2.34	4.32
_Dichlorobenzene	2.73	2.49	-8.62
_Dichlorobenzene	3.09	2.65	-14.15
yl Benzene	2.54	2.53	-0.54
zene	3.22	3.73	15.72
enes	8.05	7.17	-10.95

DATA PACKAGE #40

This page intentionally left blank.

ENGINEERING-SCIENCE, INC.

RESEARCH AND DEVELOPMENT
LABORATORY
600 BANCROFT WAY
BERKELEY, CALIFORNIA 94710
(415) 841-7353

REVISED REPORT

Job No.: OR001

Work Order No.: 877

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 8-18-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081943	DANGB3-SS-D5	8270	8-17-88	8-26-88	11-28-88	
88081944	DANGB3-SS-C5	8270	8-17-88	8-26-88	12-01-88	
88081945	DANGB3-SS-A4	8270	8-17-88	8-26-88	10-05-88	
88081946	DANGB3-SS-A5	8270	8-17-88	8-26-88	12-12-88	
88081947	DANGB3-SS-Z2	8270	8-17-88	8-26-88	10-27-88	
88081948	DANGB3-SS-Y2	8270	8-17-88	8-26-88	11-28-88	
88081949	DANGB3-SS-B2	8270	8-17-88	8-26-88	11-28-88	
88081950	DANGB3-SS-A2.5	8270	8-17-88	8-26-88	10-05-88	
88081951	DANGB3-SS-A3.5	8270	8-17-88	8-26-88	11-28-88	
88081952	DANGB3-SS-D2	8270	8-17-88	8-26-88	11-28-88	
88081953	DANGB3-SS-D4	8270	8-17-88	8-26-88	11-29-88	
88081954	DANGB3-SS-A3	8270	8-16-88	8-26-88	11-29-88	
88081955	DANGB3-SS-A1	8270	8-16-88	10-28-88	11-01-88	
88081956	DANGB3-SS-C0	8270	8-16-88	10-28-88	11-02-88	
88081957	DANGB3-SS-C1	8270	8-16-88	8-26-88	11-29-88	
88081958	DANGB3-SS-C3	8270	8-16-88	8-26-88	11-29-88	
88081959	DANGB3-SS-A2	8270	8-16-88	8-26-88	11-28-88	

* If applicable

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	SOILS ANALYSES REQUIRED								SHIP TO:	
OR001	Duluth ANGB/Duluth, Mn.		SW6010, 8020	SW8080	SW8270	EPA 418.1	SW6010, 7181	SW7131, 7421,	SW7060, 7471		ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA. 94710	
SAMPLER(S): (Signature) Peter E Rheingrover Jo Ann Sherwin												
DATE	TIME	SAMPLE DESCRIPTION									REMARKS	
8-17-87	0914	DANGB3 - SS - A4.	1	X								
8-17-87	0917	DANGB3 - SS - A4.	1		X	X	X	X	X	X	SW6010 is for Ba only	
8-17-87	0935	DANGB3 - SS - A5.	1	X								
8-17-87	0937	DANGB3 - SS - A5.	1		X	X	X	X	X	X	"	"
8-17-87	1011	DANGB3 - SS - Z2.	1	X								
8-17-87	1020	DANGB3 - SS - Z2.	1		X	X	X	X	X	X	"	"
8-17-87	1029	DANGB3 - SS - Y2.	1	X								
8-17-87	1037	DANGB3 - SS - Y2.	1		X	X	X	X	X	X	"	"
8-17-87	1135	DANGB3 - SS - B2.	1	X								
8-17-87	1140	DANGB3 - SS - B2.	1		X	X	X	X	X	X	"	"
8-17-87	1158	DANGB3 - SS - A2.5.	1	X								
8-17-87	1206	DANGB3 - SS - A2.5.	1		X	X	X	X	X	X	"	"
8-17-87	1230	DANGB3 - SS - A3.5.	1	X								
8-17-87	1233	DANGB3 - SS - A3.5.	1		X	X	X	X	X	X	"	"
8-17-87	1506	DANGB3 - SS - D2.	1	X								

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	8-17-87 1745				

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

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

2328

CHAIN OF CUSTODY RECORD - PAGE 2 OF

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

SAMPLER(S): (Signature) Peter E Rasmussen

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

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SOILS ANALYSES REQUIRED: SW8010, 8020	SW8080	SW8270	EPA 418.1	SW8010, 7191	SW7131, 7421	SW7040, 7471		REMARKS
8-17-88	1511	DANGB3-SS-02	1		X	X	X	X	X	X		SW6010 is for Ba only.
8-17-88	1537	DANGB3-SS-04	1	X		X						
8-17-88	1545	DANGB3-SS-04	1		X	X	X	X	X	X		

9233

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	8-17-88 1745				
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 **9490306766**

9490306766

SENDER'S COPY

Sender's Federal Express Account Number: 11964267 8
Date: [illegible]

1 From (Your Name) Please Print: Kim Davis
Your Phone Number (Very Important): (615) 481-[illegible]
Company: Engineering Science Inc
Department/Floor No.:
Street Address: 702 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: Engineering Science
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.): [illegible] 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
6 ☐ OVERNIGHT LETTER*
2 ☐ COURIER-PAK OVERNIGHT ENVELOPE*
7 ☐
3 ☐ OVERNIGHT BOX
8 ☐
4 ☐ OVERNIGHT TUBE
9 ☐
5 ☐ STANDARD AIR Delivery not later than second business day
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) (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	40		
1	37		
Total 2	Total 77	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: [illegible] 1500

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 #2041736900
REVISION DATE 7/88
PRINTED IN U.S.A. GBFE

009

SENDER'S COPY

REVISED

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
EPA 8270 ANALYSIS
WORK ORDER NO.: 877

The extraction date for sample 88081955 and 88081956 was originally reported as 8-26-88. Due to surrogate spike recoveries that were out of EPA QC limits, these samples were re-extracted on 10-28-88. Surrogate spike recoveries in the second extraction met EPA criteria. The later extraction date should be used.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Soil

:e Received: August 18, 1988
-e Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

) Number:	88081943	88081944
mple No.:	DANGB3-SS-D5	DANGB3-SS-C5
:e Sampled:	08-17-88	08-17-88
ne Sampled:	16:04	16:25
:e Extracted:	08-26-88	08-26-88
:e Analyzed:	11-28-88	12-01-88
rcent Moisture:	17	29

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
3-Dichlorobenzene	330	ND	ND
4-Dichlorobenzene	330	ND	ND
xachloroethane	330	ND	ND
s(2-chloroethyl)ether	330	ND	ND
2-Dichlorobenzene	330	ND	ND
Nitrosodimethylamine	330	ND	ND
s(2-chloroisopropyl)ether	330	ND	ND
Nitrosodi-n-propylamine	330	ND	ND
xachlorobutadiene	330	ND	ND
2,4-Trichlorobenzene	330	ND	ND
trobenzene	330	ND	ND
ophorone	330	ND	ND
phthalene	330	ND	ND
s(2-chloroethoxy)methane	330	ND	ND
Chloronaphthalene	330	ND	ND
xachlorocyclopentadiene	330	ND	ND
enaphthylene	330	ND	ND
enaphthene	330	ND	ND
methyl phthalate	330	ND	ND
o-Dinitrotoluene	330	ND	ND
lorene	330	ND	ND
4-Dinitrotoluene	330	ND	ND
ethyl phthalate	330	ND	ND
Nitrosodiphenylamine	330	ND	ND
xachlorobenzene	330	ND	ND

= Compound was detected in the blank.

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

Date Received: August 18, 1988
Date Reported: December 7, 1988

Work Order: 877
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:	88081943	88081944
Sample No.:	DANGB3-SS-D5	DANGB3-SS-C5
Date Sampled:	08-17-88	08-17-88
Time Sampled:	16:04	16:25
Date Extracted:	08-26-88	08-26-88
Date Analyzed:	11-28-88	12-01-88
Percent Moisture:	17	29

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Phenanthrene	330	ND	ND
Anthracene	330	ND	ND
Butyl phthalate	330	ND	ND
Fluoranthene	330	ND	ND
4-Chlorophenyl phenyl ether	330	ND	ND
Pyrene	330	ND	ND
Butyl Benzyl phthalate	330	ND	480
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	2000	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

Compound was detected in the blank.

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

:e Received: August 18, 1988
:e Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

› Number:	88081943	88081944
mple No.:	DANGB3-SS-D5	DANGB3-SS-C5
:e Sampled:	08-17-88	08-17-88
ne Sampled:	16:04	16:25
:e Extracted:	08-26-88	08-26-88
:e Analyzed:	11-28-88	12-01-88
:cent Moisture:	17	29

mpound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg	ug/kg
etophenone	--*	ND	ND
:line	--*	ND	ND
minobiphenyl	--*	ND	ND
Chloroaniline	660	ND	ND
Chloronaphthalene	--*	ND	ND
benzofuran	330	ND	ND
Dimethylaminoazobenzene	--*	ND	ND
12-Dimethylbenz(a)anthracene	--*	ND	ND
,a-Dimethylphenethylamine	--*	ND	ND
phenylamine	--*	ND	ND
2-Diphenylhydrazine	--*	ND	ND
:yl methanesulfonate	--*	ND	ND
Methylcholanthrene	--*	ND	ND
:hyl methanesulfonate	--*	ND	ND
Methylnaphthalene	330	ND	ND
Naphthylamine	--*	ND	ND
Naphthylamine	--*	ND	ND
Nitroaniline	1600	ND	ND
Nitroaniline	1600	ND	ND
Nitroaniline	1600	ND	ND
Nitroso-di-n-butylamine	--*	ND	ND
Nitrosopiperidine	--*	ND	ND
ntachlorobenzene	--*	ND	ND
ntachloronitrobenzene	--*	ND	ND
enacetin	--*	ND	ND
Picoline	--*	ND	ND
namide	--*	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: Soil

Date Received: August 18, 1988
Date Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

Lab Number:	88081943	88081944
Sample No.:	DANGB3-SS-D5	DANGB3-SS-C5
Date Sampled:	08-17-88	08-17-88
Time Sampled:	16:04	16:25
Date Extracted:	08-26-88	08-26-88
Date Analyzed:	11-28-88	12-01-88
Percent Moisture:	17	29

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.

+ = Compound was detected in the blank.

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

te Received: August 18, 1988
te Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

Number:	88081943	88081944
mple No.:	DANGB3-SS-D5	DANGB3-SS-C5
te Sampled:	08-17-88	08-17-88
me Sampled:	16:04	16:25
te Extracted:	08-26-88	08-26-88
te Analyzed:	11-28-88	12-01-88
rcent Moisture:	17	29

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Chlorophenol	330	ND	ND
Nitrophenol	330	ND	ND
enol	330	ND	ND
4-Dimethylphenol	330	ND	ND
4-Dichlorophenol	330	ND	ND
4,6-Trichlorophenol	330	ND	ND
Chloro-3-methylphenol	660	ND	ND
4-Dinitrophenol	1600	ND	ND
6-Dichlorophenol	--*	ND	ND
Methyl-4,6-Dinitrophenol	1600	ND	ND
ntachlorophenol	1600	ND	ND
Nitrophenol	1600	ND	ND
nzoic Acid	1600	ND	ND
Methylphenol	330	ND	ND
& 4-Methylphenol	330	ND	ND
3,4,6-Tetrachlorophenol	--*	ND	ND
4,5-Trichlorophenol	330	ND	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
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Soil

ate Received: August 18, 1988
Date Reported: December 7, 1988

Work Order: 877
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:	88081945	88081946
ample No.:	DANGB3-SS-A4	DANGB3-SS-A5
ite Sampled:	08-17-88	08-17-88
ime Sampled:	09:17	09:37
Date Extracted:	08-26-88	08-26-88
ite Analyzed:	10-05-88	12-12-88
ercent Moisture:	11	56

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
,3-Dichlorobenzene	330	ND	ND
,4-Dichlorobenzene	330	ND	ND
exachloroethane	330	ND	ND
.s(2-chloroethyl)ether	330	ND	ND
,2-Dichlorobenzene	330	ND	ND
N-Nitrosodimethylamine	330	ND	ND
is(2-chloroisopropyl)ether	330	ND	ND
-Nitrosodi-n-propylamine	330	ND	ND
exachlorobutadiene	330	ND	ND
,2,4-Trichlorobenzene	330	ND	ND
itrobenzene	330	ND	ND
sophorone	330	ND	ND
Naphthalene	330	ND	ND
.s(2-chloroethoxy)methane	330	ND	ND
-Chloronaphthalene	330	ND	ND
exachlorocyclopentadiene	330	ND	ND
cenaphthylene	330	ND	ND
enaphthene	330	ND	ND
imethyl phthalate	330	ND	ND
2,6-Dinitrotoluene	330	ND	ND
luorene	330	ND	ND
,4-Dinitrotoluene	330	ND	ND
Diethyl phthalate	330	ND	ND
-Nitrosodiphenylamine	330	ND	ND
exachlorobenzene	330	ND	ND

= Compound was detected in the blank.

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

:e Received: August 18, 1988
:e Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

› Number:	88081945	88081946
mple No.:	DANGB3-SS-A4	DANGB3-SS-A5
:e Sampled:	08-17-88	08-17-88
me Sampled:	09:17	09:37
:e Extracted:	08-26-88	08-26-88
:e Analyzed:	10-05-88	12-12-88
rcent Moisture:	11	56

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
enanthrene	330	ND	ND
:hracene	330	ND	ND
butyl phthalate	330	ND	ND
ioranthene	330	ND	ND
Chlorophenyl phenyl ether	330	ND	ND
:ene	330	ND	ND
:yl Benzyl phthalate	330	ND	ND
s(2-ethylhexyl) phthalate	330	ND	ND
rysene	330	ND	ND
Bromophenyl phenyl ether	330	ND	ND
nzo(a)anthracene	330	ND	ND
-n-octylphthalate	330	ND	ND
nzo(b)fluoranthene	330	ND	ND
nzo(k)fluoranthene	330	ND	ND
nzidine	2000	ND	ND
3'-Dichlorobenzidine	660	ND	ND
nzo(a)pyrene	330	ND	ND
deno(1,2,3-cd)pyrene	330	ND	ND
benzo(a,h)anthracene	330	ND	ND
nzo(ghi)perylene	330	ND	ND
nzyl Alcohol	660	ND	ND

= Compound was detected in the blank.

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

Date Received: August 18, 1988
Date Reported: December 7, 1988

Work Order: 877
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:	88081945	88081946
Sample No.:	DANGB3-SS-A4	DANGB3-SS-A5
Date Sampled:	08-17-88	08-17-88
Time Sampled:	09:17	09:37
Date Extracted:	08-26-88	08-26-88
Date Analyzed:	10-05-88	12-12-88
Percent Moisture:	11	56

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
2-Chloronaphthalene	--*	ND	ND
Dibenzofuran	330	ND	ND
4-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.

= Compound was detected in the blank.

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

te Received: August 18, 1988
te Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

o Number:	88081945	88081946
mple No.:	DANGB3-SS-A4	DANGB3-SS-A5
te Sampled:	08-17-88	08-17-88
me Sampled:	09:17	09:37
te Extracted:	08-26-88	08-26-88
te Analyzed:	10-05-88	12-12-88
rcent Moisture:	11	56

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
pha-BHC	--*	ND	ND
mma-BHC	--*	ND	ND
ta-BHC	660	ND	ND
ptachlor	330	ND	ND
lta-BHC	500	ND	ND
drin	330	ND	ND
ptachlor epoxide	330	ND	ND
dosulfan I	--*	ND	ND
eldrin	500	ND	ND
4'-DDE	1000	ND	ND
drin	--*	ND	ND
dosulfan II	--*	ND	ND
4'-DDD	500	ND	ND
4'-DDT	830	ND	ND
dosulfan Sulfate	1000	ND	ND
drin aldehyde	--*	ND	ND
drin Ketone	--*	ND	ND
lordane	2000	ND	ND
thoxychlor	--*	ND	ND
xaphene	2000	ND	ND
oclor-1016	2000	ND	ND
oclor-1221	2000	ND	ND
oclor-1232	2000	ND	ND
oclor-1242	2000	ND	ND
oclor-1248	2000	ND	ND
oclor-1254	2000	ND	ND
oclor-1260	2000	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: Soil

Date Received: August 18, 1988
Date Reported: December 7, 1988

Work Order: 877
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:	88081945	88081946
Sample No.:	DANGB3-SS-A4	DANGB3-SS-A5
Date Sampled:	08-17-88	08-17-88
Time Sampled:	09:17	09:37
Date Extracted:	08-26-88	08-26-88
Date Analyzed:	10-05-88	12-12-88
Percent Moisture:	11	56

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
4-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.

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: Soil

te Received: August 18, 1988
te Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

o Number:	88081947	88081948
mple No.:	DANGB3-SS-Z2	DANGB3-SS-Y2
te Sampled:	08-17-88	08-17-88
me Sampled:	10:20	10:37
te Extracted:	08-26-88	08-26-88
te Analyzed:	10-27-88	11-28-88
rcent Moisture:	13	21

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
3-Dichlorobenzene	330	ND	ND
4-Dichlorobenzene	330	ND	ND
xachloroethane	330	ND	ND
s(2-chloroethyl)ether	330	ND	ND
2-Dichlorobenzene	330	ND	ND
Nitrosodimethylamine	330	ND	ND
s(2-chloroisopropyl)ether	330	ND	ND
Nitrosodi-n-propylamine	330	ND	ND
xachlorobutadiene	330	ND	ND
2,4-Trichlorobenzene	330	ND	ND
trobenzene	330	ND	ND
ophorone	330	ND	ND
phthalene	330	ND	ND
s(2-chloroethoxy)methane	330	ND	ND
Chloronaphthalene	330	ND	ND
xachlorocyclopentadiene	330	ND	ND
enaphthylene	330	ND	ND
enaphthene	330	ND	ND
methyl phthalate	330	ND	ND
6-Dinitrotoluene	330	ND	ND
uorene	330	ND	ND
4-Dinitrotoluene	330	ND	ND
ethyl phthalate	330	ND	ND
Nitrosodiphenylamine	330	ND	ND
xachlorobenzene	330	ND	ND

= Compound was detected in the blank.

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

Date Received: August 18, 1988
Date Reported: December 7, 1988

Work Order: 877
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:	88081947	88081948
Sample No.:	DANGB3-SS-Z2	DANGB3-SS-Y2
Date Sampled:	08-17-88	08-17-88
Time Sampled:	10:20	10:37
Date Extracted:	08-26-88	08-26-88
Date Analyzed:	10-27-88	11-28-88
Percent Moisture:	13	21

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Phenanthrene	330	ND	ND
Anthracene	330	ND	ND
Di-n-butyl phthalate	330	ND	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	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	2000	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

* = Compound was detected in the blank.

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

te Received: August 18, 1988
te Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

o Number:	88081947	88081948
mple No.:	DANGB3-SS-Z2	DANGB3-SS-Y2
te Sampled:	08-17-88	08-17-88
me Sampled:	10:20	10:37
te Extracted:	08-26-88	08-26-88
te Analyzed:	10-27-88	11-28-88
rcent Moisture:	13	21

mpound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg	ug/kg
etophenone	--*	ND	ND
iline	--*	ND	ND
Aminobiphenyl	--*	ND	ND
Chloroaniline	660	ND	ND
Chloronaphthalene	--*	ND	ND
benzofuran	330	ND	ND
Dimethylaminoazobenzene	--*	ND	ND
12-Dimethylbenz(a)anthracene	--*	ND	ND
,a-Dimethylphenethylamine	--*	ND	ND
phenylamine	--*	ND	ND
2-Diphenylhydrazine	--*	ND	ND
yl methanesulfonate	--*	ND	ND
Methylcholanthrene	--*	ND	ND
thyl methanesulfonate	--*	ND	ND
Methylnaphthalene	330	ND	ND
Naphthylamine	--*	ND	ND
Naphthylamine	--*	ND	ND
Nitroaniline	1600	ND	ND
Nitroaniline	1600	ND	ND
Nitroaniline	1600	ND	ND
Nitroso-di-n-butylamine	--*	ND	ND
Nitrosopiperidine	--*	ND	ND
ntachlorobenzene	--*	ND	ND
ntachloronitrobenzene	--*	ND	ND
enacetin	--*	ND	ND
Picoline	--*	ND	ND
namide	--*	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: Soil

Date Received: August 18, 1988
Date Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

Lab Number:	88081947	88081948
Sample No.:	DANGB3-SS-Z2	DANGB3-SS-Y2
Date Sampled:	08-17-88	08-17-88
Time Sampled:	10:20	10:37
Date Extracted:	08-26-88	08-26-88
Date Analyzed:	10-27-88	11-28-88
Percent Moisture:	13	21

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.

B = Compound was detected in the blank.

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

te Received: August 18, 1988
te Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

o Number:	88081947	88081948
mple No.:	DANGB3-SS-Z2	DANGB3-SS-Y2
te Sampled:	08-17-88	08-17-88
me Sampled:	10:20	10:37
te Extracted:	08-26-88	08-26-88
te Analyzed:	10-27-88	11-28-88
rcent Moisture:	13	21

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Chlorophenol	330	ND	ND
Nitrophenol	330	ND	ND
enol	330	ND	ND
4-Dimethylphenol	330	ND	ND
4-Dichlorophenol	330	ND	ND
4,6-Trichlorophenol	330	ND	ND
Chloro-3-methylphenol	660	ND	ND
4-Dinitrophenol	1600	ND	ND
6-Dichlorophenol	--*	ND	ND
Methyl-4,6-Dinitrophenol	1600	ND	ND
ntachlorophenol	1600	ND	ND
Nitrophenol	1600	ND	ND
nzoic Acid	1600	ND	ND
Methylphenol	330	ND	ND
& 4-Methylphenol	330	ND	ND
3,4,6-Tetrachlorophenol	--*	ND	ND
4,5-Trichlorophenol	330	ND	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
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Soil

Date Received: August 18, 1988
Date Reported: December 7, 1988

Work Order: 877
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:	88081949	88081950
Sample No.:	DANGB3-SS-B2	DANGB3-SS-A2.5
Date Sampled:	08-17-88	08-17-88
Time Sampled:	11:40	12:06
Date Extracted:	08-26-88	08-26-88
Date Analyzed:	11-28-88	10-05-88
Percent Moisture:	25	14

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-propylamine	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

B = Compound was detected in the blank.

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

:e Received: August 18, 1988
:e Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

ɔ Number:	88081949	88081950
mple No.:	DANGB3-SS-B2	DANGB3-SS-A2.5
:e Sampled:	08-17-88	08-17-88
me Sampled:	11:40	12:06
:e Extracted:	08-26-88	08-26-88
:e Analyzed:	11-28-88	10-05-88
rcent Moisture:	25	14

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
enanthrene	330	ND	ND
thracene	330	ND	ND
butyl phthalate	330	ND	ND
uoranthene	330	ND	ND
Chlorophenyl phenyl ether	330	ND	ND
rene	330	ND	ND
tyl Benzyl phthalate	330	ND	ND
s(2-ethylhexyl) phthalate	330	ND	ND
rysene	330	ND	ND
Bromophenyl phenyl ether	330	ND	ND
nzo(a)anthracene	330	ND	ND
-n-octylphthalate	330	ND	ND
nzo(b)fluoranthene	330	ND	ND
nzo(k)fluoranthene	330	ND	ND
nzidine	2000	ND	ND
3'-Dichlorobenzidine	660	ND	ND
nzo(a)pyrene	330	ND	ND
deno(1,2,3-cd)pyrene	330	ND	ND
benzo(a,h)anthracene	330	ND	ND
nzo(ghi)perylene	330	ND	ND
nzyl Alcohol	660	ND	ND

= Compound was detected in the blank.

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

Date Received: August 18, 1988 Work Order: 877
Date Reported: December 7, 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:	88081949	88081950
Sample No.:	DANGB3-SS-B2	DANGB3-SS-A2.5
Date Sampled:	08-17-88	08-17-88
Time Sampled:	11:40	12:06
Date Extracted:	08-26-88	08-26-88
Date Analyzed:	11-28-88	10-05-88
Percent Moisture:	25	14

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
2-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.

B = Compound was detected in the blank.

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

te Received: August 18, 1988
te Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

) Number:	88081949	88081950
mple No.:	DANGB3-SS-B2	DANGB3-SS-A2.5
te Sampled:	08-17-88	08-17-88
me Sampled:	11:40	12:06
te Extracted:	08-26-88	08-26-88
te Analyzed:	11-28-88	10-05-88
rcent Moisture:	25	14

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
pha-BHC	--*	ND	ND
mma-BHC	--*	ND	ND
ta-BHC	660	ND	ND
ptachlor	330	ND	ND
lta-BHC	500	ND	ND
drin	330	ND	ND
ptachlor epoxide	330	ND	ND
dosulfan I	--*	ND	ND
eldrin	500	ND	ND
4'-DDE	1000	ND	ND
drin	--*	ND	ND
dosulfan II	--*	ND	ND
4'-DDD	500	ND	ND
4'-DDT	830	ND	ND
dosulfan Sulfate	1000	ND	ND
drin aldehyde	--*	ND	ND
drin Ketone	--*	ND	ND
lordane	2000	ND	ND
thoxychlor	--*	ND	ND
xaphene	2000	ND	ND
oclor-1016	2000	ND	ND
oclor-1221	2000	ND	ND
oclor-1232	2000	ND	ND
oclor-1242	2000	ND	ND
oclor-1248	2000	ND	ND
oclor-1254	2000	ND	ND
oclor-1260	2000	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: Soil

Date Received: August 18, 1988
Date Reported: December 7, 1988

Work Order: 877
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:	88081949	88081950
Sample No.:	DANGB3-SS-B2	DANGB3-SS-A2.5
Date Sampled:	08-17-88	08-17-88
Time Sampled:	11:40	12:06
Date Extracted:	08-26-88	08-26-88
Date Analyzed:	11-28-88	10-05-88
Percent Moisture:	25	14

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
4-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 nas 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 ocher 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

te Received: August 18, 1988
te Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

o Number:	88081951	88081952
mple No.:	DANGB3-SS-A3.5	DANGB3-SS-D2
te Sampled:	08-17-88	08-17-88
me Sampled:	12:33	15:11
te Extracted:	08-26-88	08-26-88
te Analyzed:	11-28-88	11-28-88
rcent Moisture:	14	6

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
3-Dichlorobenzene	330	ND	ND
4-Dichlorobenzene	330	ND	ND
xachloroethane	330	ND	ND
s(2-chloroethyl)ether	330	ND	ND
2-Dichlorobenzene	330	ND	ND
Nitrosodimethylamine	330	ND	ND
s(2-chloroisopropyl)ether	330	ND	ND
Nitrosodi-n-propylamine	330	ND	ND
xachlorobutadiene	330	ND	ND
2,4-Trichlorobenzene	330	ND	ND
trobenzene	330	ND	ND
ophorone	330	ND	ND
phthalene	330	ND	ND
s(2-chloroethoxy)methane	330	ND	ND
Chloronaphthalene	330	ND	ND
xachlorocyclopentadiene	330	ND	ND
enaphthylene	330	ND	ND
enaphthene	330	ND	ND
nethyl phthalate	330	ND	ND
6-Dinitrotoluene	330	ND	ND
lorene	330	ND	ND
4-Dinitrotoluene	330	ND	ND
ethyl phthalate	330	ND	ND
Nitrosodiphenylamine	330	ND	ND
xachlorobenzene	330	ND	ND

= Compound was detected in the blank.

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

Date Received: August 18, 1988
Date Reported: December 7, 1988

Work Order: 877
Job Number: OR001

FOR: ES:Oak Ridge/Duluth ANG3
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88081951	88081952
Sample No.:	DANGB3-SS-A3.5	DANGB3-SS-D2
Date Sampled:	08-17-88	08-17-88
Time Sampled:	12:33	15:11
Date Extracted:	08-26-88	08-26-88
Date Analyzed:	11-28-88	11-28-88
Percent Moisture:	14	6

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Phenanthrene	330	ND	ND
Anthracene	330	ND	ND
Dibutyl phthalate	330	ND	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	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	2000	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

= Compound was detected in the blank.

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

te Received: August 18, 1988
te Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

o Number:	88081951	88081952
mple No.:	DANGB3-SS-A3.5	DANGB3-SS-D2
te Sampled:	08-17-88	08-17-88
me Sampled:	12:33	15:11
te Extracted:	08-26-88	08-26-88
te Analyzed:	11-28-88	11-28-88
rcent Moisture:	14	6

mpound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg	ug/kg
etophenone	--*	ND	ND
iline	--*	ND	ND
Aminobiphenyl	--*	ND	ND
Chloroaniline	660	ND	ND
Chloronaphthalene	--*	ND	ND
benzofuran	330	ND	ND
Dimethylaminoazobenzene	--*	ND	ND
12-Dimethylbenz(a)anthracene	--*	ND	ND
,a-Dimethylphenethylamine	--*	ND	ND
phenylamine	--*	ND	ND
2-Diphenylhydrazine	--*	ND	ND
yl methanesulfonate	--*	ND	ND
Methylcholanthrene	--*	ND	ND
thyl methanesulfonate	--*	ND	ND
Methylnaphthalene	330	ND	ND
Naphthylamine	--*	ND	ND
Naphthylamine	--*	ND	ND
Nitroaniline	1600	ND	ND
Nitroaniline	1600	ND	ND
Nitroaniline	1600	ND	ND
Nitroso-di-n-butylamine	--*	ND	ND
Nitrosopiperidine	--*	ND	ND
ntachlorobenzene	--*	ND	ND
ntachloronitrobenzene	--*	ND	ND
enacetin	--*	ND	ND
Picoline	--*	ND	ND
namide	--*	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: Soil

Date Received: August 18, 1988 Work Order: 877
Date Reported: December 7, 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:	88081951	88081952
Sample No.:	DANGB3-SS-A3.5	DANGB3-SS-D2
Date Sampled:	08-17-88	08-17-88
Time Sampled:	12:33	15:11
Date Extracted:	08-26-88	08-26-88
Date Analyzed:	11-28-88	11-28-88
Percent Moisture:	14	6

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.

B = Compound was detected in the blank.

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

te Received: August 18, 1988
te Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

o Number:	88081951	88081952
mple No.:	DANGB3-SS-A3.5	DANGB3-SS-D2
te Sampled:	08-17-88	08-17-88
me Sampled:	12:33	15:11
te Extracted:	08-26-88	08-26-88
te Analyzed:	11-28-88	11-28-88
rcent Moisture:	14	6

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Chlorophenol	330	ND	ND
Nitrophenol	330	ND	ND
enol	330	ND	ND
4-Dimethylphenol	330	ND	ND
4-Dichlorophenol	330	ND	ND
4,6-Trichlorophenol	330	ND	ND
Chloro-3-methylphenol	660	ND	ND
4-Dinitrophenol	1600	ND	ND
6-Dichlorophenol	--*	ND	ND
Methyl-4,6-Dinitrophenol	1600	ND	ND
ntachlorophenol	1600	ND	ND
Nitrophenol	1600	ND	ND
nzoic Acid	1600	ND	ND
Methylphenol	330	ND	ND
& 4-Methylphenol	330	ND	ND
3,4,6-Tetrachlorophenol	--*	ND	ND
4,5-Trichlorophenol	330	ND	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
Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Soil

Date Received: August 18, 1988
Date Reported: December 7, 1988

Work Order: 877
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:	88081953	88081954
Sample No.:	DANGB3-SS-D4	DANGB3-SS-A3
Date Sampled:	08-17-88	08-16-88
Time Sampled:	15:45	14:10
Date Extracted:	08-26-88	08-26-88
Date Analyzed:	11-29-88	11-29-88
Percent Moisture:	12	14

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-propylamine	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

B = Compound was detected in the blank.

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

te Received: August 18, 1988
te Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

o Number:	88081953	88081954
mple No.:	DANGB3-SS-D4	DANGB3-SS-A3
te Sampled:	08-17-88	08-16-88
me Sampled:	15:45	14:10
te Extracted:	08-26-88	08-26-88
te Analyzed:	11-29-88	11-29-88
rcent Moisture:	12	14

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
enanthrene	330	ND	ND
thracene	330	ND	ND
utyl phthalate	330	ND	ND
oranthene	330	ND	ND
hlorophenyl phenyl ether	330	ND	ND
rene	330	ND	ND
tyl Benzyl phthalate	330	ND	ND
s(2-ethylhexyl) phthalate	330	ND	ND
rysene	330	ND	ND
Bromophenyl phenyl ether	330	ND	ND
nzo(a)anthracene	330	ND	ND
-n-octylphthalate	330	ND	ND
nzo(b)fluoranthene	330	ND	ND
nzo(k)fluoranthene	330	ND	ND
nzidine	2000	ND	ND
3'-Dichlorobenzidine	660	ND	ND
nzo(a)pyrene	330	ND	ND
deno(1,2,3-cd)pyrene	330	ND	ND
benzo(a,h)anthracene	330	ND	ND
nzo(ghi)perylene	330	ND	ND
nzyl Alcohol	660	ND	ND

= Compound was detected in the blank.

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

Date Received: August 18, 1988
Date Reported: December 7, 1988

Work Order: 877
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:	88081953	88081954
Sample No.:	DANGB3-SS-D4	DANGB3-SS-A3
Date Sampled:	08-17-88	08-16-88
Time Sampled:	15:45	14:10
Date Extracted:	08-26-88	08-26-88
Date Analyzed:	11-29-88	11-29-88
Percent Moisture:	12	14

Compound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg	ug/kg
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
2-Chloroaniline	660	ND	ND
2-Chloronaphthalene	--*	ND	ND
Dibenzofuran	330	ND	ND
3,3-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
4-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

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

ND = Compound was detected in the blank.

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

te Received: August 18, 1988
te Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

o Number:	88081953	88081954
mple No.:	DANGB3-SS-D4	DANGB3-SS-A3
te Sampled:	08-17-88	08-16-88
me Sampled:	15:45	14:10
te Extracted:	08-26-88	08-26-88
te Analyzed:	11-29-88	11-29-88
rcent Moisture:	12	14

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
oha-BHC	--*	ND	ND
mma-BHC	--*	ND	ND
ta-BHC	660	ND	ND
ptachlor	330	ND	ND
lta-BHC	500	ND	ND
drin	330	ND	ND
ptachlor epoxide	330	ND	ND
dosulfan I	--*	ND	ND
eldrin	500	ND	ND
4'-DDE	1000	ND	ND
drin	--*	ND	ND
dosulfan II	--*	ND	ND
4'-DDD	500	ND	ND
4'-DDT	830	ND	ND
dosulfan Sulfate	1000	ND	ND
drin aldehyde	--*	ND	ND
drin Ketone	--*	ND	ND
lordane	2000	ND	ND
thoxychlor	--*	ND	ND
xaphene	2000	ND	ND
oclor-1016	2000	ND	ND
oclor-1221	2000	ND	ND
oclor-1232	2000	ND	ND
oclor-1242	2000	ND	ND
oclor-1248	2000	ND	ND
oclor-1254	2000	ND	ND
oclor-1260	2000	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: Soil

Date Received: August 18, 1988
Date Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

Lab Number:	88081953	88081954
Sample No.:	DANGB3-SS-D4	DANGB3-SS-A3
Date Sampled:	08-17-88	08-16-88
Time Sampled:	15:45	14:10
Date Extracted:	08-26-88	08-26-88
Date Analyzed:	11-29-88	11-29-88
Percent Moisture:	12	14

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
4-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.

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: Soil

ate Received: August 18, 1988
ate Reported: December 7, 1988

Work Order: 877
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:	88081955	88081956
ample No.:	DANGB3-SS-A1	DANGB3-SS-C0
ate Sampled:	08-16-88	08-16-88
ime Sampled:	13:35	10:55
ate Extracted:	10-28-88	10-28-88
ate Analyzed:	11-01-88	11-02-88
ercent Moisture:	14	14

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
,3-Dichlorobenzene	330	ND	ND
,4-Dichlorobenzene	330	ND	ND
exachloroethane	330	ND	ND
is(2-chloroethyl)ether	330	ND	ND
,2-Dichlorobenzene	330	ND	ND
-Nitrosodimethylamine	330	ND	ND
is(2-chloroisopropyl)ether	330	ND	ND
-Nitrosodi-n-propylamine	330	ND	ND
exachlorobutadiene	330	ND	ND
,2,4-Trichlorobenzene	330	ND	ND
itrobenzene	330	ND	ND
sophorone	330	ND	ND
aphthalene	330	ND	ND
is(2-chloroethoxy)methane	330	ND	ND
-Chloronaphthalene	330	ND	ND
exachlorocyclopentadiene	330	ND	ND
cenaphthylene	330	ND	ND
cenaphthene	330	ND	ND
imethyl phthalate	330	ND	ND
,6-Dinitrotoluene	330	ND	ND
luorene	330	ND	ND
,4-Dinitrotoluene	330	ND	ND
iethyl phthalate	330	ND	ND
-Nitrosodiphenylamine	330	ND	ND
exachlorobenzene	330	ND	ND

= Compound was detected in the blank.

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

Date Received: August 18, 1988
Date Reported: December 7, 1988

Work Order: 877
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:	88081955	88081956
Sample No.:	DANGB3-SS-A1	DANGB3-SS-C0
Date Sampled:	08-16-88	08-16-88
Time Sampled:	13:35	10:55
Date Extracted:	10-28-88	10-28-88
Date Analyzed:	11-01-88	11-02-88
Percent Moisture:	14	14

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Phenanthrene	330	ND	ND
Anthracene	330	ND	ND
Dibutyl phthalate	330	ND	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	590	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	2000	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

B = Compound was detected in the blank.

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

ate Received: August 18, 1988
ate Reported: December 7, 1988

Work Order: 877
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:	88081955	88081956
ample No.:	DANGB3-SS-A1	DANGB3-SS-C0
ate Sampled:	08-16-88	08-16-88
ime Sampled:	13:35	10:55
ate Extracted:	10-28-88	10-28-88
ate Analyzed:	11-01-88	11-02-88
ercent Moisture:	14	14

ompound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg	ug/kg
cetophenone	--*	ND	ND
niline	--*	ND	ND
-Aminobiphenyl	--*	ND	ND
-Chloroaniline	660	ND	ND
-Chloronaphthalene	--*	ND	ND
ibenzofuran	330	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	330	ND	ND
-Naphthylamine	--*	ND	ND
-Naphthylamine	--*	ND	ND
-Nitroaniline	1600	ND	ND
-Nitroaniline	1600	ND	ND
-Nitroaniline	1600	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: Soil

Date Received: August 18, 1988
Date Reported: December 7, 1988

Work Order: 877
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:	88081955	88081956
Sample No.:	DANGB3-SS-A1	DANGB3-SS-C0
Date Sampled:	08-16-88	08-16-88
Time Sampled:	13:35	10:55
Date Extracted:	10-28-88	10-28-88
Date Analyzed:	11-01-88	11-02-88
Percent Moisture:	14	14

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.

B = Compound was detected in the blank.

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

ate Received: August 18, 1988
ate Reported: December 7, 1988

Work Order: 877
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:	88081955	88081956
ample No.:	DANGB3-SS-A1	DANGB3-SS-C0
ate Sampled:	08-16-88	08-16-88
ime Sampled:	13:35	10:55
ate Extracted:	10-28-88	10-28-88
ate Analyzed:	11-01-88	11-02-88
ercent Moisture:	14	14

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
-Chlorophenol	330	ND	ND
-Nitrophenol	330	ND	ND
nenol	330	ND	ND
,4-Dimethylphenol	330	ND	ND
,4-Dichlorophenol	330	ND	ND
,4,6-Trichlorophenol	330	ND	ND
-Chloro-3-methylphenol	660	ND	ND
,4-Dinitrophenol	1600	ND	ND
,6-Dichlorophenol	--*	ND	ND
-Methyl-4,6-Dinitrophenol	1600	ND	ND
entachlorophenol	1600	ND	ND
-Nitrophenol	1600	ND	ND
enzoic Acid	1600	ND	ND
-Methylphenol	330	ND	ND
- & 4-Methylphenol	330	ND	ND
,3,4,6-Tetrachlorophenol	--*	ND	ND
,4,5-Trichlorophenol	330	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: Soil

ate Received: August 18, 1988
ate Reported: December 7, 1988

Work Order: 877
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:	88081957	88081958
ample No.:	DANGB3-SS-C1	DANGB3-SS-C3
ate Sampled:	08-16-88	08-16-88
ime Sampled:	11:25	10:25
ate Extracted:	08-26-88	08-26-88
ate Analyzed:	11-29-88	11-29-88
ercent Moisture:	21	11

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
,3-Dichlorobenzene	330	ND	ND
,4-Dichlorobenzene	330	ND	ND
exachloroethane	330	ND	ND
is(2-chloroethyl)ether	330	ND	ND
,2-Dichlorobenzene	330	ND	ND
-Nitrosodimethylamine	330	ND	ND
is(2-chloroisopropyl)ether	330	ND	ND
-Nitrosodi-n-propylamine	330	ND	ND
exachlorobutadiene	330	ND	ND
,2,4-Trichlorobenzene	330	ND	ND
itrobenzene	330	ND	ND
sophorone	330	ND	ND
aphthalene	330	ND	ND
is(2-chloroethoxy)methane	330	ND	ND
-Chloronaphthalene	330	ND	ND
exachlorocyclopentadiene	330	ND	ND
cenaphthylene	330	ND	ND
enaphthene	330	ND	ND
imethyl phthalate	330	ND	ND
2,6-Dinitrotoluene	330	ND	ND
luorene	330	ND	ND
,4-Dinitrotoluene	330	ND	ND
iethyl phthalate	330	ND	ND
N-Nitrosodiphenylamine	330	ND	ND
exachlorobenzene	330	ND	ND

= Compound was detected in the blank.

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

:e Received: August 18, 1988
:e Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

> Number:	88081957	88081958
mple No.:	DANGB3-SS-C1	DANGB3-SS-C3
:e Sampled:	08-16-88	08-16-88
ne Sampled:	11:25	10:25
:e Extracted:	08-26-88	08-26-88
:e Analyzed:	11-29-88	11-29-88
:cent Moisture:	21	11

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
enanthrene	330	ND	ND
:hracene	330	ND	ND
>utyl phthalate	330	ND	ND
ıoranthene	330	ND	ND
Chlorophenyl phenyl ether	330	ND	ND
rene	330	ND	ND
:yl Benzyl phthalate	330	ND	ND
3(2-ethylhexyl) phthalate	330	ND	ND
rysene	330	ND	ND
Bromophenyl phenyl ether	330	ND	ND
ızo(a)anthracene	330	ND	ND
-n-octylphthalate	330	ND	ND
ızo(b)fluoranthene	330	ND	ND
ızo(k)fluoranthene	330	ND	ND
ızidine	2000	ND	ND
3'-Dichlorobenzidine	660	ND	ND
ızo(a)pyrene	330	ND	ND
ieno(1,2,3-cd)pyrene	330	ND	ND
>enzo(a,h)anthracene	330	ND	ND
ızo(ghi)perylene	330	ND	ND
ızyl Alcohol	660	ND	ND

= Compound was detected in the blank.

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

Date Received: August 18, 1988 Work Order: 877
Date Reported: December 7, 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:	88081957	88081958
Sample No.:	DANGB3-SS-C1	DANGB3-SS-C3
Date Sampled:	08-16-88	08-16-88
Time Sampled:	11:25	10:25
Date Extracted:	08-26-88	08-26-88
Date Analyzed:	11-29-88	11-29-88
Percent Moisture:	21	11

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
2-Chloronaphthalene	--*	ND	ND
Dibenzofuran	330	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	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.

* = Compound was detected in the blank.

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

te Received: August 18, 1988
te Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

o Number:	88081957	88081958
mple No.:	DANGB3-SS-C1	DANGB3-SS-C3
te Sampled:	08-16-88	08-16-88
me Sampled:	11:25	10:25
te Extracted:	08-26-88	08-26-88
te Analyzed:	11-29-88	11-29-88
rcent Moisture:	21	11

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
bha-BHC	--*	ND	ND
mma-BHC	--*	ND	ND
ta-BHC	660	ND	ND
otachlor	330	ND	ND
lta-BHC	500	ND	ND
drin	330	ND	ND
otachlor epoxide	330	ND	ND
dosulfan I	--*	ND	ND
eldrin	500	ND	ND
4'-DDE	1000	ND	ND
drin	--*	ND	ND
dosulfan II	--*	ND	ND
4'-DDD	500	ND	ND
4'-DDT	830	ND	ND
dosulfan Sulfate	1000	ND	ND
drin aldehyde	--*	ND	ND
drin Ketone	--*	ND	ND
ordane	2000	ND	ND
thoxychlor	--*	ND	ND
xaphene	2000	ND	ND
oclor-1016	2000	ND	ND
oclor-1221	2000	ND	ND
oclor-1232	2000	ND	ND
oclor-1242	2000	ND	ND
oclor-1248	2000	ND	ND
oclor-1254	2000	ND	ND
oclor-1260	2000	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: Soil

ate Received: August 18, 1988
Date Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

Lab Number:	88081957	88081958
mple No.:	DANGB3-SS-C1	DANGB3-SS-C3
ate Sampled:	08-16-88	08-16-88
Time Sampled:	11:25	10:25
ate Extracted:	08-26-88	08-26-88
ate Analyzed:	11-29-88	11-29-88
ercent Moisture:	21	11

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
-Chlorophenol	330	ND	ND
2-Nitrophenol	330	ND	ND
henol	330	ND	ND
.4-Dimethylphenol	330	ND	ND
,4-Dichlorophenol	330	ND	ND
2,4,6-Trichlorophenol	330	ND	ND
-Chloro-3-methylphenol	660	ND	ND
,4-Dinitrophenol	1600	ND	ND
2,6-Dichlorophenol	--*	ND	ND
-Methyl-4,6-Dinitrophenol	1600	ND	ND
ntachlorophenol	1600	ND	ND
-Nitrophenol	1600	ND	ND
enzoic Acid	1600	ND	ND
-Methylphenol	330	ND	ND
3- & 4-Methylphenol	330	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
4,5-Trichlorophenol	330	ND	ND

Analyst

Laboratory Supervisor

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

B = 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: Soil

:e Received: August 18, 1988
:e Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

) Number:	88081959
mple No.:	DANGB3-SS-A2
:e Sampled:	08-16-88
ne Sampled:	12:20
:e Extracted:	08-26-88
:e Analyzed:	11-28-88
rcent Moisture:	18

mpound	Detection Limit ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
3-Dichlorobenzene	330	ND
4-Dichlorobenzene	330	ND
Hachloroethane	330	ND
s(2-chloroethyl)ether	330	ND
2-Dichlorobenzene	330	ND
Nitrosodimethylamine	330	ND
s(2-chloroisopropyl)ether	330	ND
Nitrosodi-n-propylamine	330	ND
Hachlorobutadiene	330	ND
2,4-Trichlorobenzene	330	ND
:robenzene	330	ND
)phorone	330	ND
)hthalene	330	ND
s(2-chloroethoxy)methane	330	ND
Chloronaphthalene	330	ND
Hachlorocyclopentadiene	330	ND
enaphthylene	330	ND
enaphthene	330	ND
nethyl phthalate	330	ND
6-Dinitrotoluene	330	ND
uorene	330	ND
4-Dinitrotoluene	330	ND
ethyl phthalate	330	ND
Nitrosodiphenylamine	330	ND
Hachlorobenzene	330	ND

= Compound was detected in the blank.

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

Date Received: August 18, 1988
Date Reported: December 7, 1988

Work Order: 877
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:	88081959
Sample No.:	DANGB3-SS-A2
Date Sampled:	08-16-88
Time Sampled:	12:20
Date Extracted:	08-26-88
Date Analyzed:	11-28-88
Percent Moisture:	18

Compound	Detection Limit ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
Phenanthrene	330	ND
Anthracene	330	ND
Dibutyl phthalate	330	ND
Fluoranthene	330	ND
4-Chlorophenyl phenyl ether	330	ND
Pyrene	330	ND
Butyl Benzyl phthalate	330	ND
Bis(2-ethylhexyl)phthalate	330	ND
Chrysene	330	ND
4-Bromophenyl phenyl ether	330	ND
Benzo(a)anthracene	330	ND
Di-n-octylphthalate	330	ND
Benzo(b)fluoranthene	330	ND
Benzo(k)fluoranthene	330	ND
Benzidine	2000	ND
3,3'-Dichlorobenzidine	660	ND
Benzo(a)pyrene	330	ND
Indeno(1,2,3-cd)pyrene	330	ND
Dibenzo(a,h)anthracene	330	ND
Benzo(ghi)perylene	330	ND
Benzyl Alcohol	660	ND

= Compound was detected in the blank.

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

te Received: August 18, 1988 Work Order: 877
te Reported: December 7, 1988 Job Number: OR001

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

o Number:	88081959
mple No.:	DANGB3-SS-A2
te Sampled:	08-16-88
ne Sampled:	12:20
te Extracted:	08-26-88
te Analyzed:	11-28-88
rcent Moisture:	18

mpound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg
etophenone	--*	ND
iline	--*	ND
Aminobiphenyl	--*	ND
Chloroaniline	660	ND
Chloronaphthalene	--*	ND
benzofuran	330	ND
Dimethylaminoazobenzene	--*	ND
12-Dimethylbenz(a)anthracene	--*	ND
,a-Dimethylphenethylamine	--*	ND
phenylamine	--*	ND
2-Diphenylhydrazine	--*	ND
nyl methanesulfonate	--*	ND
Methylcholanthrene	--*	ND
thyl methanesulfonate	--*	ND
Methylnaphthalene	330	ND
Naphthylamine	--*	ND
Naphthylamine	--*	ND
Nitroaniline	1600	ND
Nitroaniline	1600	ND
Nitroaniline	1600	ND
Nitroso-di-n-butylamine	--*	ND
Nitrosopiperidine	--*	ND
ntachlorobenzene	--*	ND
ntachloronitrobenzene	--*	ND
enacetin	--*	ND
Picoline	--*	ND
onamide	--*	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: Soil

Date Received: August 18, 1988
Date Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

Lab Number:	88081959
Sample No.:	DANGB3-SS-A2
Date Sampled:	08-16-88
Time Sampled:	12:20
Date Extracted:	08-26-88
Date Analyzed:	11-28-88
Percent Moisture:	18

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
Alpha-BHC	--*	ND
Gamma-BHC	--*	ND
Beta-BHC	660	ND
Heptachlor	330	ND
Delta-BHC	500	ND
Aldrin	330	ND
Heptachlor epoxide	330	ND
Endosulfan I	--*	ND
Dieldrin	500	ND
4,4'-DDE	1000	ND
Endrin	--*	ND
Endosulfan II	--*	ND
4,4'-DDD	500	ND
4,4'-DDT	830	ND
Endosulfan Sulfate	1000	ND
Endrin aldehyde	--*	ND
Endrin Ketone	--*	ND
Chlordane	2000	ND
Methoxychlor	--*	ND
Toxaphene	2000	ND
Aroclor-1016	2000	ND
Aroclor-1221	2000	ND
Aroclor-1232	2000	ND
Aroclor-1242	2000	ND
Aroclor-1248	2000	ND
Aroclor-1254	2000	ND
Aroclor-1260	2000	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: Soil

te Received: August 18, 1988
te Reported: December 7, 1988

Work Order: 877
Job Number: OR001

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

ATTN: Mr. Bill Hayden

o Number:	88081959
mple No.:	DANGB3-SS-A2
te Sampled:	08-16-88
me Sampled:	12:20
te Extracted:	08-26-88
te Analyzed:	11-28-88
rcent Moisture:	18

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
Chlorophenol	330	ND
Nitrophenol	330	ND
enol	330	ND
i-Dimethylphenol	330	ND
i-Dichlorophenol	330	ND
4,6-Trichlorophenol	330	ND
Chloro-3-methylphenol	660	ND
4-Dinitrophenol	1600	ND
6-Dichlorophenol	--*	ND
Methyl-4,6-Dinitrophenol	1600	ND
ntachlorophenol	1600	ND
Nitrophenol	1600	ND
nzoic Acid	1600	ND
Methylphenol	330	ND
& 4-Methylphenol	330	ND
3,4,6-Tetrachlorophenol	--*	ND
i,5-Trichlorophenol	330	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.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES! OAK RIDGE
Attn:
Address:

Project: DULUTH

TICs Found: 14

Project No: BLANK
Sample Matrix: SOIL
Conc. Unit: NG/KG
Work Order No: 874
Lab Sample ID: BLANK
Lab File ID: E5797
Date Received: —
Date Extracted: 8-26-88
Date Analyzed: 10/3/88
Date Reported: —
Dilution Factor: 1
% Moisture: —

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	Unknown	3.42	630	
	Unknown	3.46	530	
	Unknown	3.75	1200	
	Unknown	4.42	530	
	Unknown	4.55	1200	
	Unknown	4.89	530	
	Unknown	5.09	2400	
	Unknown	5.30	17000	
	Unknown	6.39	330	
	Unknown	6.93	430	
	Unknown hydrocarbon	6.99	230	
	Unknown	21.73	330	
	Unknown	28.83	400	
	Unknown	35.09	8700	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client:
Attn:
Address:

Project: DULUTH

TICs Found: 9

Project No:
Sample Matrix: Soil
Conc. Unit: ug/kg
Work Order No: 877
Lab Sample ID: BLANK Bank4 @ 16
Lab File ID: E6065
Date Received: —
Date Extracted: 10-28-88
Date Analyzed: 11-2-88
Date Reported:
Dilution Factor: 1
% Moisture: —

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.20	430	
2.		unknown	3.51	700	
3.		unknown alkene m.w. 98	4.10	870	
4.		unknown	4.29	1000	
5.			4.49	700	
6.			4.94	14000	
7.			19.60	200	
8.			28.48	270	
9.			35.07	1300	
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

EPA SAMPLE NO.

DANGB3-
SS-D5

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 877 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081943 RE-AN

Sample wt/vol: 30 (g/mL) gm Lab File ID: E632-8

Level: (low/med) low Date Received: 8-18-88

% Moisture: not dec. 16.4 dec. _____ Date Extracted: 8-26-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/28/88

GPC Cleanup: (Y/N) N pH: ___ Dilution Factor: 1

Number TICs found: 20 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.26	280	
2.			3.37	800	
3.			3.45	360	
4.			3.74	480	
5.			3.95	160	
6.			4.50	320	
7.			4.82	16000	
8.			4.93	3600	
9.			4.96	320	
10.			6.05	960	
11.			6.24	160	
12.			10.73	200	
13.			18.41	160	
14.	57-10-3	hexadecanoic acid	23.6 J	3200	
15.	57-11-4	octadecanoic acid	25.97	280	
16.		unknown	28.26	440	
17.			31.58	240	
18.			31.83	160	
19.			33.94	190	
20.			34.71	890	
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES: OAK RIDGE
Attn:
Address:

Project: DULUTH

TICs Found: 20

Sample
~~Project~~ No: DANGB3-55-CS
Sample Matrix: SOIL
Conc. Unit: MG/KG
Work Order No: 877
Lab Sample ID: 8808944-RA
Lab File ID: E6364
Date Received: 8-18-88
Date Extracted: 8-26-88
Date Analyzed: 10/1/88
Date Reported:
Dilution Factor: 1
% Moisture: ~~[illegible]~~ 29
Then

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	Unknown	4.44	1600	
	Unknown	21.92	1900	
	Unknown	23.97	3600	
	Unknown hydrocarbon	25.16	14000	
	" "	26.34	520	
	" "	27.49	4700	
	Unknown	27.59	610	
	Unknown	27.69	12000	
	Unknown	27.99	6100	
	Unknown	28.16	1300	
	Unknown	28.38	850	
	Unknown	29.44	660	
	Unknown	29.93	800	
	Unknown	30.67	560	
	Unknown	30.93	560	
	Unknown	31.93	1100	
	Unknown hydrocarbon	31.57	1700	
	Unknown	33.92	240	
	Unknown	34.66	1800	
	Unknown hydrocarbon	37.22	420	
		~~37.69~~		

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ED. OAK RIDGE
Attn:
Address:

Project: DULUTH

TICs Found: 21

Sample
~~Project~~ No: DANG33-SS-A4
Sample Matrix: SOIL
Conc. Unit: ug/kg
Work Order No: 877
Lab Sample ID: 8808 1945
Lab File ID: E5825
Date Received: 8-18-88
Date Extracted: 8-26-88
Date Analyzed: 10/5/88
Date Reported:
Dilution Factor: 1
% Moisture: 11

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	Unknown	4.33	3000	
	Unknown	4.53	2300	
	Unknown	4.89	590	
		6.28	260	
		6.41	440	
		6.60	220	
		6.68	220	
		6.95	330	
		23.99	180	
57-10-3	Hexadecanoic Acid	24.16	2500	
	Unknown	26.53	370	
		28.82	1100	
		29.49	300	
		31.70	630	
		32.16	410	
		33.12	370	
		33.70	370	
	Unknown hydrocarbon	34.46	440	
	Unknown	35.35	30,000	
	Unknown	36.63	410	
	Unknown		300	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES: OAK RIDGE
Attn:
Address:

Project: DULUTH

TICs Found: 22

Sample No: DEN6B3-SS-A5
Sample Matrix: SOIL
Conc. Unit: µg/kg
Work Order No: 877
Lab Sample ID: 8808 1946 RA
Lab File ID: 5067
Date Received: 8-18-88
Date Extracted: 8-26-88
Date Analyzed: 10/12/88
Date Reported:
Dilution Factor: 1
% Moisture: 56

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	Unknown	3.32	5100	
	Unknown	3.47	4100	
		3.72	2300	
		3.85	3000	
		4.00	5500	
		4.91	40,000	
		5.07	3000	
		5.46	30,000	
		5.66	14,000	
	↓	6.05	4400	
57-10-3	Hexadecanoic Acid	24.99	3500	
	Unknown	25.59	2700	
	Unknown hydrocarbon	26.63	2200	
	" "	28.95	1700	
	Unknown	29.21	7300	
	Unknown	29.50	4700	
		29.61	1900	
	↓	29.86	1400	
	Unknown hydrocarbon	33.37	1900	
	Unknown	33.69	4200	
		41.14	1700	
	↓	41.54	3000	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client:
Attn:
Address:

Project:

TICs Found: 17

Sample
~~Project~~ No:
Sample Matrix: Soil
Conc. Unit: ug/kg
Work Order No: 877
Lab Sample ID: [illegible]
Lab File ID: S 0261
Date Received: 8-18-88
Date Extracted: 8-26-88
Date Analyzed: 10-27-88
Date Reported:
Dilution Factor: 1
% Moisture: 13

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	unknown	4.35	960	
	unknown	4.78	1100	
	unknown	5.05	7700	
	unknown	5.59	7300	
	unknown	5.85	10,000	
	unknown	7.13	1100	
	unknown	7.22	2100	
	unknown	7.[illegible]	2300	
	unk. dehydrobenz	18.16	690	
	benzoic acid	25.18	1700	
	unknown	29.72	600	
	unknown	30.[illegible]	900	
	unknown	31.42	340	
	unknown hydrocarbon	34.26	270	
	unknown	37.44	260	
	unknown	38.15	1100	

SEMIVOLATILE TENTATIVELY IDENTIFIED COMPOUNDS

1F

EPA SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DANSB3 - SS - 42

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 877 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081948

Sample wt/vol: 30 (g/mL) gm Lab File ID: E6329

Level: (low/med) low Date Received: 8-18-88

% Moisture: not dec. 21.2 dec. _____ Date Extracted: 8-26-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/28/88

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: 1

Number TICs found: 20

CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.90	3700	
2.			4.39	2400	
3.			4.64	7600	
4.			4.84	3900	
5.			6.04	1000	
6.			23.43	340	
7.	57-10-3	hexadecanoic acid	23.64	3300	
8.		unknown	23.80	460	
9.			24.89	550	
10.			25.18	890	
11.			25.73	420	
12.		octadecanoic acid	26.00	510	
13.		unknown	27.49	1100	
14.			28.18	380	
15.			28.31	1300	
16.			31.58	460	
17.			31.81	720	
18.			33.96	630	
19.			34.12	2800	
20.			34.40	820	
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

DANGB3-SS-B2

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 817 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081949 REANA

Sample wt/vol: 30 (g/mL) gm Lab File ID: E6330

Level: (low/med) low Date Received: 8-18-88

% Moisture: not dec. 24.9 75 dec. _____ Date Extracted: 8-26-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/28/88

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: 1

Number TICs found: 20 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.87	3400	
2.			3.98	1900	
3.			4.34	1900	
4.			4.53	560	
5.			5.26	1500	
6.			6.47	1200	
7.			6.82	1200	
8.	57-10-3	hexadecanoic acid	23.64	3300	
9.		unknown aromatic - mw. wt. 226	24.03	530	
10.		unknown	25.08	720	
11.			25.72	220	
12.	57-11-4	octadecanoic acid	26.00	220	
13.		unknown	27.09	220	
14.			27.85	240	
15.			28.32	1200	
16.			31.77	360	
17.			34.3	520	
18.			34.83	1100	
19.			36.26	340	
20.			37.33	340	
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES, OAK RIDGE
Attn:
Address:

Project: DULUTH

TICs Found:

Sample
~~Project~~ No: DRNGB3-SS-A2.5
Sample Matrix: SOIL
Conc. Unit: ug/kg
Work Order No: 877
Lab Sample ID: 8808195O
Lab File ID: E5827
Date Received: 8-18-88
Date Extracted: 8-26-88
Date Analyzed: 10/5/88
Date Reported:
Dilution Factor: 1
% Moisture: 14

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	Unknown	4.36	4700	
		4.83	700	
		4.96	230	
		5.21	20,000	
		6.33	660	
		6.41	430	
		6.50	2000	
		6.65	660	
		6.97	430	
	Unknown hydrocarbon	7.02	230	
57-10-3	Hexadecanoic Acid	24.16	2300	
	Unknown	26.55	200	
		28.83	780	
		29.18	1600	
		30.99	430	
		34.47	200	
		35.43	20,000	
		36.66	230	

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: DAN683-SS-A35

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 877 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 8808 1951 REANA

Sample wt/vol: 30 (g/mL) gm Lab File ID: E6331

Level: (low/med) low Date Received: 8-18-88

% Moisture: not dec. 13.8 14 dec. _____ Date Extracted: 8-26-88
DRO 31.89

Extraction (SepF/Cont/Sonc) Sonc Date Analyzed: 11/28/88

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: 1

Number TICs found: 30 CONCENTRATION UNITS: (ug/L or ug/Kg): ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.97	370	
2.			4.47	350	
3.			2.87	27,000	
4.			6.04	890	
5.	57-10-3	hexadecanoic acid	23.66	3,100	
6.	57-11-4	octadecanoic acid	26.50	420	
7.		unknown	27.61	190	
8.			28.29	1700	
9.			28.34	1900	
10.			31.09	580	
11.			31.99	420	
12.			32.27	270	
13.			32.57	380	
14.			33.17	470	
15.			33.96	680	
16.			34.89	3400	
17.			35.22	300	
18.			36.28	810	
19.			37.30	360	
20.			40.65	260	
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: DANOB 3-SS-D2

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 877 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 8808 1952 REANA

Sample wt/vol: 30 (g/mL) gm Lab File ID: E6332

Level: (low/med) low Date Received: 8-18-88

% Moisture: not dec. 5.9 dec. _____ Date Extracted: 8-26-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/28/88

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: 1

Number TICs found: 17 CONCENTRATION UNITS: (ug/L or ug/Kg): ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.07	140	
2.			3.11	210	
3.			3.34	250	
4.			3.80	180	
5.			4.10	4600	
6.			4.24	180	
7.			4.53	1,200	
8.			4.92	4900	
9.			5.13	460	
10.			5.99	330	
11.			6.13	180	
12.			6.84	140	
13.	57-10-3	hexadecanoic acid	23.65	2,100	
14.		unknown	28.26	420	
15.			29.48	250	
16.			34.77	840	
17.			35.15	160	
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.

DAN083-SS-D4

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 877 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081953 REANA

Sample wt/vol: 30 (g/mL) gm Lab File ID: E6345

Level: (low/med) low Date Received: 8-18-88

% Moisture: not dec. 12.0 dec. _____ Date Extracted: 8-26-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/29/88

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: 1

Number TICs found: 19 CONCENTRATION UNITS: (ug/L or ug/Kg): ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.04	380	
2.			3.35	450	
3.			3.98	1600	
4.			4.14	450	
5.			4.44	1000	
6.			4.88	23000	
7.			4.91	230	
8.			5.87	230	
9.			6.01	420	
10.			6.19	490	
11.	57-10-3	hexadecanoic acid	23.58	1600	
12.		unknown	28.23	640	
13.			28.67	190	
14.			31.55	190	
15.			33.12	160	
16.			33.41	160	
17.			34.79	2200	
18.			35.04	190	
19.			36.18	230	
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

SANG83-SS-A3

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 877 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081954 REANAL.

Sample wt/vol: 30 (g/mL) gm Lab File ID: E6346

Level: (low/med) low Date Received: 8-18-88

% Moisture: not dec. 14% dec. _____ Date Extracted: 8-26-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/29/88

GPC Cleanup: (Y/N) N pH: ___ Dilution Factor: 1

Number TICs found: 18 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.97	1300	
2.			4.56	190	
3.			4.88	12,000	
4.			5.93	160	
5.			6.05	230	
6.	57-10-3	hexadecanoic acid	23.65	2900	
7.	57-11-4	octadecanoic acid	25.98	350	
8.		unknown	28.24	820	
9.			28.55	270	
10.			28.87	310	
11.			31.57	450	
12.			32.56	160	
13.			33.13	350	
14.			33.92	2600	
15.			34.84	2300	
16.			35.09	160	
17.			36.22	580	
18.			37.24	310	
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES: OAK RIGDE
Attn:
Address:

Project: DULUTH

TICs Found: 13

Sample
~~Project~~ No: DAN6B3-SS-A1
Sample Matrix: SOIL
Conc. Unit: µg/kg
Work Order No: 877
Lab Sample ID: 8808/955 RE-EXTRACT
Lab File ID: E6057
Date Received: 8-18-88
Date Extracted: ~~8-30-88~~ 10-28-88
Date Analyzed: 11/1/88
Date Reported:
Dilution Factor: 1
% Moisture: 14

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	Unknown	3.20	2700	
	Unknown	3.52	510	
	Unknown	4.11	1400	
	Unknown	4.29	1000	
	Unknown	4.68	1200	
	Unknown	5.02	30,000	
	Unknown	6.15	470	
	Unknown	25.41	940	
	Unknown	27.71	200	
	Unknown	28.49	1600	
	Unknown	28.80	200	
	Unknown	31.85	390	
	Unknown	32.86	270	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES! OAK RIDGE
Attn:
Address:

Project: DULUTH

TICs Found: 16

Sample
~~Project~~ No: DAN683-SS-CO
Sample Matrix: SOIL
Conc. Unit: µg/kg
Work Order No: ~~SOIL~~ 877
Lab Sample ID: 8808195b RE EXTRACT
Lab File ID: E6058
Date Received: 8-18-88
Date Extracted: ~~8-26-88~~ 10-28-88
Date Analyzed: 11/2/88
Date Reported:
Dilution Factor: 1
% Moisture: 14

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	Unknown	3.92	430	
	Unknown	3.99	550	
	Unknown hydrocarbon	4.09	270	
127-18-4	Tetrachloroethene	4.25	230	
	Unknown	4.42	200	
	Unknown	4.81	5100	
79-34-5	1,1,2,2-Tetrachloroethane	6.07	230	
	Unknown	6.20	860	
	Unknown	25.79	200	
	Unknown	28.48	1500	
	Unknown hydrocarbon	28.80	390	
	Unknown ester	30.39	310	
	Unknown hydrocarbon	31.85	200	
	Unknown	32.86	950	
	Unknown	35.13	3400	
	Unknown	37.82	620	

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: DANGB3-SS-C1

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 877 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 8808 1957 REANAL

Sample wt/vol: 30 (g/mL) gm Lab File ID: E6347

Level: (low/med) low Date Received: 8-18-88

% Moisture: not dec. 21 DAS 9/1/89 dec. _____ Date Extracted: 8-26-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/29/88

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: 1

Number TICs found: 20 CONCENTRATION UNITS: (ug/L or ug/Kg): ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.33	970	
2.			4.07	8400	
3.			4.19	1200	
4.			4.52	2600	
5.			4.96	21000	
6.			5.96	680	
7.			6.10	1000	
8.			8.62	380	
9.	57-10-3	hexadecanoic acid	23.63	3000	
10.		unknown	27.45	340	
11.			28.26	510	
12.			28.97	2400	
13.		unknown phthalate	30.13	560	
14.		unknown	31.59	1800	
15.			32.65	550	
16.			33.15	720	
17.			35.96	1700	
18.			39.81	1800	
19.			36.26	840	
20.			37.29	760	
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

EPA SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

JANGB3-
SS-03

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 877 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081958 REANA

Sample wt/vol: 30 (g/mL) gm Lab File ID: E6348

Level: (low/med) low Date Received: 8-18-88

% Moisture: not dec. 11.6 DRF 3/1/89 dec. _____ Date Extracted: 8-26-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/29/88

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1

Number TICs found: 18 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.29	220	
2.			3.33	1000	
3.			4.01	3800	
4.			4.13	490	
5.			4.46	2000	
6.			4.66	2900	
7.			5.89	490	
8.			6.04	560	
9.			~~6.~~ 9.24	340	
10.	57-10-3	hexadecanoic acid	23.62	2200	
11.	57-11-4	octadecanoic acid	25.96	260	
12.		unknown aromatic - mol. wt. 286	27.60	450	
13.		unknown aromatic - mol. wt. 286	27.91	260	
14.		unknown	28.24	900	
15.		unknown ~~phthalate~~ BP	28.54	530	
16.		unknown phthalate	30.12	250	
17.		unknown	34.84	2000	
18.		unknown	37.24	290	
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

FORM I SV-TIC 1/87 Rev.

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: DAN6B3-SS-A2

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 877 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081959 REANAL

Sample wt/vol: 30 (g/mL) gm Lab File ID: E6333

Level: (low/med) low 18 Date Received: 8-18-88

% Moisture: not dec. 17.7 dec. _____ Date Extracted: 8-26-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/28/88

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: 1

Number TICs found: 20 CONCENTRATION UNITS: (ug/L or ug/Kg): ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.41	490	
2.			3.77	1100	
3.			3.98	2000	
4.			4.46	1500	
5.			4.71	6500	
6.			5.05	650	
7.			6.10	1700	
8.	57-10-3	hexadecanoic acid	23.64	2000	
9.	57-11-4	octadecanoic acid	25.99	250	
10.		unknown	28.27	570	
11.			28.41	2000	
12.			28.56	320	
13.			30.15	640	
14.			31.59	360	
15.			32.59	280	
16.			33.95	280	
17.			34.81	1600	
18.			35.26	400	
19.			36.28	400	
20.			37.30	320	
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

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):
88081591Re, 88081593Re
88081943-88081959

2396

QC Report No: BNA-S-0056-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 08-18-88
Date Prepared: 08-26-88
Date Analyzed: 10-06-88
Date Reported: 04-21-89
Dilution Factor: NA
%Moisture: 18

Laboratory Supervisor Approval:

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
B/N Laboratory Sample # 88081959	1,2,4-Trichlorobenzene	4060	ND	2030	50	2100	52	3	23	38-107
	Acenaphthene	4060	ND	2140	53	2220	55	4	19	31-137
	2,4-Dinitrotoluene	4060	ND	2190	54	1760	43	22	47	28-89
	Pyrene	4060	ND	2130	52	2180	54	2	36	35-142
	N-Nitroso-di-n-Propylamine	4060	ND	1890	46	1990	49	5	38	41-126
	1,4-Dichlorobenzene	4060	ND	1600	39	1630	40	2	27	28-104
ACID Laboratory Sample # 88091959	Pentachlorophenol	8130	ND	5940	73	6040	74	2	47	17-109
	Phenol	8130	ND	3630	45	3270	40	10	35	26-90
	2-Chlorophenol	8130	ND	3630	45	3460	42	5	50	25-102
	4-Chloro-3-Methylphenol	8130	ND	5410	66	5540	68	2	33	26-103
	4-Nitrophenol	8130	ND	6420	79	6400	79	<1	50	11-114

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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.: 877

Sample Matrix: Soil
Conc. Unit: ug/KG
Date Reported: 12-07-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E5797	10-03-88	BNA	2	-	None Detected	-	-	88081898-88081906 88081938-88081942 88081943-88081959

2397

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).:
88081947-88081959

Calibration Date: 9-14-88
Instrument I.D.: Perkin Elmer 257
Grating Infrared Spectrophotometer

Unit: mg/L
Date Reported: 11-09-88
R= 0.9994

Laboratory Supervisor Approval:

Standard	Concentration	Absorbance	/Continuous RF /Calibration /Verification
No. 1	0.59	0.118	
No. 2	1.2	0.218	RF = 6.46
No. 3	1.8	0.301	
No. 4	2.4	0.401	
Cont. Cal. No. 2 (88081947)	1.2	0.213	100%
Cont. Cal. No. 2 (88081948-88081952)	1.18	0.210	98%
Cont. Cal. No. 2 (88081953-88081959)	1.2	0.215	100%

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 03-57
Lab File ID: ES797 (continued)
Matrix: Soil
Level (low/med):
Date Analyzed: 10-3-88
Time Analyzed: 18:18
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
DANGD3 - SS - D5	88081943	S0180, E6328	10-15-88, 11-28-88
- C5	88081944	S0197, E6364	10-17-88, 12-1-88
- A4	88081945	ES825	10-5-88
- A5	88081946	ES826, S0696	10-5-88, 12-12-88
- Z2	88081947	ES844, S0261	10-11-88, 10-27-88
- Y2	88081948	S0189, E6329	10-17-88, 11-28-88
- B2	88081949	S0190, E6330	10-17-88, 11-28-88
- A2.5	88081950	ES827	10-5-88
- A3.5	88081951	S0191, E6331	10-17-88, 11-28-88
- D2	88081952	S0192, E6332	10-17-88, 11-28-88
- D4	88081953	S0181, E6345	10-15-88, 11-29-88
- A3	88081954	S0193, E6346	10-17-88, 11-29-88
- A1	88081955	S0182	10 15-88
- C0	88081956	S0183	10-15-88
- C1	88081957	S0194, E6347	10-17-88, 11-29-88
- C3	88081958	S0195, E6348	10-17-88, 11-29-88
- A2	88081959	S0196, E6333	10-17-88, 11-28-88
↓	88081959 MS	S0141	10-6-88
↓	88081959 MSD	S0142	10-6-88

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 04-16
Lab File ID: E6065
Matrix: Soil
Level (low/med):
Date Analyzed: 11-2-88
Time Analyzed: 07:11
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
ANGB-2-MW37-SS5	88081887 Rex	S6342	11-2-88
-2-MW41-SS2	88081939 Rex	S0565	11-21-88
-2-MW41-SS3	88081941 Rex	E6056	11-1-88
-2-MP41-SS2	88081942 Rex	E6062	11-2-88
-3-SS-A1	88081955 Rex	E6057	11-1-88
-3-SS-C0	88081956 Rex	E6058	11-2-88
-3-MW25-SS1-0-1	88092146 Rex	E6059	11-2-88
-3-MW25-SS2 2-3	88092147 Rex	E6060	11-2-88
-3-MW25-SS3 14-15	88092148 Rex	E6061	11-2-88

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):
88081943-88081959
88082099-88082101

QC Report No: TPH-S-0047-38
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-18-88
Date Prepared: 9-14-88
Date Analyzed: 9-14-88
Date Reported: 9-21-88
Dilution Factor: 7
%Moisture: 13.1

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88031947	418.1	<100	<100	1150	805	70	805	70	0	*

2401
1042

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* Percent recovery (PR) and relative percent difference (RPD) are within ES Laboratory control 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

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):
88081947-88081959, 88082099-88082101

QC Report No: TPH-S-0047-88B
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: NA
Date Prepared: 9-14-88
Date Analyzed: 9-14-88
Date Reported: 11-15-88
Dilution Factor: NA
%Moisture: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<100	<100	1000	900	90	850	85	6	

2402

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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 10/17/88 13:17

Lab ID >T2017::D1 Data Release Authorized By: _____

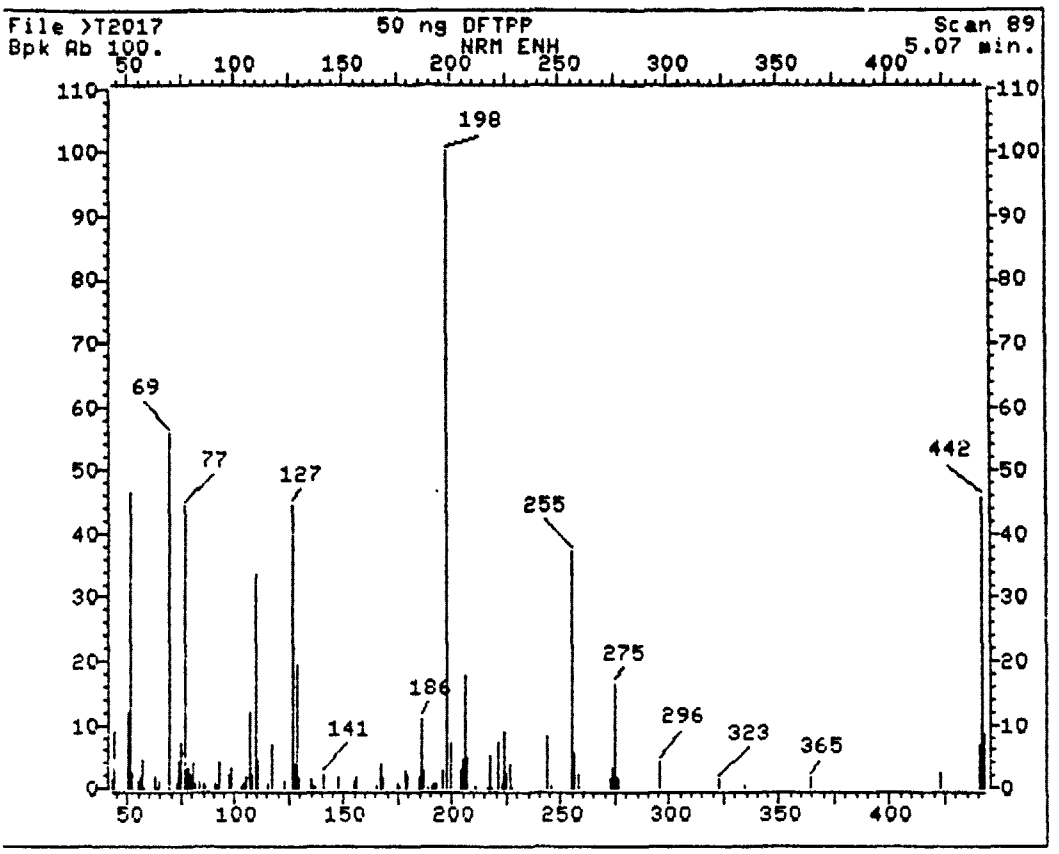
m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	46.38 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	55.72	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	44.36 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	7.02 OK	
275	10.0 - 30.0% of mass 198	16.35 OK	
365	greater than 1.00% of mass 198	1.65 OK	
441	present, but less than mass 443	6.83 OK	
442	greater than 40.0% of mass 198	45.78 OK	
443	17.0 - 23.0% of mass 442	8.38 OK	(18.30) #2

initial calibration 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	>T2017	10/17/88	13:17	
SSTD060	50188		13:33	
88081948	50189		15:04	
88081949	50190		16:04	
88081951	50191		17:03	
88081952	50192		18:07	
88081954	50193		19:04	
88081957	50194		20:03	
88081958	50195		21:02	
88081959	50196		22:02	
88081944	50197		23:02	
88081981 5ml	50198	10/18/88	00:02	another project



File: >T2017 Scan #: 89 Retn. time: 5.07

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.20	1.545	82.00	.863	129.15	19.349	192.05	.682	244.20	8.361
44.10	9.016	83.10	1.018	130.15	1.881	193.05	.836	246.10	.527
50.10	11.942	85.10	.645	135.25	1.336	196.20	2.708	255.10	37.181
51.10	46.378	86.00	.373	136.15	.354	198.10	100.000	256.10	5.617
52.10	2.290	91.10	.845	137.15	.345	199.10	7.016	258.10	2.208
55.10	1.191	92.10	.409	141.05	2.118	204.20	2.808	273.00	1.336
56.00	1.681	93.10	4.144	148.05	1.654	205.10	4.635	274.15	2.963
57.10	4.426	98.10	2.145	155.15	1.145	206.20	17.768	275.15	16.350
58.00	.236	99.10	3.245	156.15	1.609	207.20	4.744	276.25	1.827
63.10	1.754	103.10	.327	166.05	.264	210.70	.282	277.25	1.372
64.00	.200	104.00	.900	167.05	3.690	211.20	.409	296.15	3.981
65.10	1.209	105.10	1.854	168.05	1.918	216.10	.236	323.15	1.336
69.10	55.721	107.10	11.388	175.15	.927	217.10	5.080	334.15	.318
73.20	.927	108.10	1.990	176.15	.291	218.10	.254	365.10	1.645
74.10	4.253	110.10	33.427	179.05	2.699	221.10	7.207	372.00	.191
75.10	7.325	111.10	4.490	180.15	2.018	223.20	.836	372.20	.209
77.10	44.261	116.00	.709	185.15	1.609	224.20	8.998	423.20	2.608
78.20	2.990	117.10	6.862	186.15	11.052	225.20	2.527	441.25	6.825
79.10	3.081	123.15	.982	187.15	2.899	227.10	3.681	442.25	45.778
80.10	2.254	127.15	44.361	189.05	.254	228.10	.227	443.25	8.380
81.10	3.835	128.15	3.735	191.05	.336				

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 10/17/88

Contractor: ENGINEERING-SCIENCE Time: 13:33

Contract No: _____ Laboratory ID: >S0188

Instrument ID: 1 Initial Calibration Date: 10/13/88 10/20/88

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	1.02797	.61		
Anthracene	1.05155	1.03155	1.90		
Di-n-Butylphthalate	1.51956	1.42895	5.96		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.08936	8.49	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.14520	260.92		
Pyrene	1.56086	1.62823	4.32		
Terphenyl-d14	1.05835	1.18733	12.19		
Butylbenzylphthalate	1.03390	1.05962	2.49		
3,3'-Dichlorobenzidine	.13689	.19172	40.05		
Chrysene	.99655	1.00631	.98		
Benzo(a)Anthracene	1.10407	1.12402	1.81		
bis(2-Ethylhexyl)Phthalate	1.21073	1.29163	6.68		
Di-n-octylphthalate	3.40275	3.59029	5.51	*	
Benzo(a)Pyrene	1.32098	1.32559	.35	*	
Benzo(b)fluoranthene	1.60850	1.62646	1.12		
Indeno(1,2,3-cd)Pyrene	.96800	1.02245	5.63		
Dibenzo(a,h)Anthracene	.87481	.92802	6.08		
Benzo(k)fluoranthene	1.44370	1.38522	4.05		
Benzo(g,h,i)Perylene	.89761	.96086	7.05		

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
NSL Compounds

Case No: _____ Calibration Date: 10/17/88

Contractor: ENGINEERING-SCIENCE Time: 13:33

Contract No: _____ Laboratory ID:)S0188

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

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	.91800	1.81		
2-Fluorophenol	1.15802	1.20899	4.40		
bis(2-Chloroethyl)ether	1.11892	1.00464	10.21		
Phenol	1.41657	1.37283	3.09	*	
Phenol-d5	1.22488	1.15952	5.34		
Aniline	.54193	.80303	48.18		
2-Chlorophenol	1.23175	1.29182	4.88		
1,3-Dichlorobenzene	1.47535	1.45381	1.46		
1,4-Dichlorobenzene	1.40530	1.30635	7.04	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.42225	42.08		
1,2-Dichlorobenzene	1.32240	1.36614	3.31		
2-Methylphenol	1.17367	1.41431	20.50		
3-&-4-Methylphenol	1.07139	1.36578	27.48		
bis(2-chloroisopropyl)Ether	2.15627	2.40398	11.49		
N-Nitroso-Di-n-Propylamine	.84050	.75529	10.14		**
Hexachloroethane	.53940	.53690	.30		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.40415	.26		
Nitrobenzene-d5	.39137	.40160	2.61		
2-Nitrophenol	.24657	.26256	6.49	*	
Isophorone	.74170	.79627	7.36		
bis(2-Chloroethoxy)methane	.49386	.52047	5.39		
2,4-Dimethylphenol	.34849	.38596	10.75		
Benzoic Acid	.29725	.28579	3.85		
2,4-Dichlorophenol	.56733	.57554	1.45	*	
1,2,4-Trichlorobenzene	.36913	.40035	8.46		
Naphthalene	.94589	.90116	4.73		
4-Chloroaniline	.36309	.41238	13.58		
Hexachlorobutadiene	.20283	.22909	12.95	*	
4-Chloro-3-Methylphenol	.31360	.33445	6.65	*	
2-Methylnaphthalene	.56397	.56696	.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 (**)

2406

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 10/17/88

Contractor: ENVIRODYNE-SCIENCE Time: 13:33

Contract No: _____ Laboratory ID: >S0188

Instrument ID: 1 Initial Calibration Date: 10/17/88 10/20/88

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.41690	41.00		**
2,4,6-Trichlorophenol	.42280	.43897	3.82	*	
2,4,5-Trichlorophenol	.52897	.53766	1.64		
2-Fluorobiphenyl	1.27220	1.17968	7.27		
2-Chloronaphthalene	1.23784	1.23445	.27		
2-Nitroaniline	.47288	.48294	2.13		
Dimethylphthalate	1.40629	1.32200	5.99		
2,6-Dinitrotoluene	.37415	.36761	1.75		
Acenaphthylene	1.68918	1.65303	2.14		
3-Nitroaniline	.44557	.46208	3.71		
2,4-Dinitrophenol	.11898	.10414	12.47		**
Acenaphthene	1.13011	1.06521	5.74	*	
Dibenzofuran	1.64131	1.57585	3.99		
2,4-Dinitrotoluene	.29418	.27073	4.73		
4-Nitrophenol	.28450	.31643	11.23		**
Fluorene	1.12850	1.02990	8.74		
Diethylphthalate	1.20939	1.04745	13.39		
4-Chlorophenyl-phenylether	.59183	.58947	.40		
4-Nitroaniline	.35956	.38920	8.24		
2,4,6-Tribromophenol	.21023	.22251	5.84		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.47432	17.74	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.23327	9.51		
Hexachlorobenzene	.26273	.28921	10.08		
Pentachlorophenol	.14536	.15420	6.09	*	

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 (**)

2407

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: 10/17/88

Lab File ID (Standard): S0188 Time Analyzed: 13:33

Instrument ID: 1

	IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
12 HOUR STD	49974	9.25	167861	12.88	92426	18.35
UPPER LIMIT	99948	9.75	335722	13.38	184852	18.85
LOWER LIMIT	24987	8.75	83931	12.38	46213	17.85
EPA SAMPLE NO.						
S0189 01 8808 1948	37763	9.17	92557	12.83	67128	18.32
02 8808 1949	37385	9.07	89491	12.65	39748 *	18.31
03 8808 1951	46478	9.25	160696	12.83	85406	18.33
04 8808 1952	47633	9.26	163135	12.83	90749	18.33
05 8808 1954	46682	9.25	160571	12.83	86456	18.33
06 8808 1957	44327	9.26	147376	12.84	77745	18.33
07 8808 1958	33538	9.16	109370	12.84	74892	18.33
08 8808 1959	37412	9.18	115683	12.84	86851	18.34
09 8808 1944	45251	9.25	150692	12.83	77762	18.32
10 8808 1961 5mL	71140	9.29	276130	12.97	154518	18.37
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: Engineering Science Contract: OR01

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

Sample No. (Standard): SSTD660 Date Analyzed: 10/17/88

Lab File ID (Standard): S0188 Time Analyzed: 13:33

Instrument ID: 1

	IS4 (PHN) AREA #	RT	IS5 (CRY) AREA #	RT	IS4 (PRY) AREA #	RT
12 HOUR STD	146770	22.99	92741	31.44	53292	37.51
UPPER LIMIT	293540	23.49	185482	31.94	106584	38.01
LOWER LIMIT	73385	22.49	46371	30.94	26646	37.01
EPA SAMPLE NO.						
01 8808 1948	119515	22.97	69304	31.41	23880*	37.44
02 8808 1949	103213	22.97	62196	31.41	20126*	37.47
03 8808 1951	133754	22.97	169576	31.42	20775*	37.46
04 8808 1952	136889	22.98	76272	31.42	22101*	37.48
05 8808 1954	127524	22.97	64711	31.41	13925*	37.48
06 8808 1957	119006	22.97	60038	31.43	17128*	37.51
07 8808 1958	129977	22.99	75674	31.43	25987*	37.51
08 8808 1959	159463	22.98	80949	31.42	13376*	37.52
09 8808 1944	91609	22.98	24267*	31.45	7677*	37.56
10 8808 1945MS	226890	23.01	104455	31.46	62857	37.59
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

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: >D1128 DFTPP Injection Date: 11/28/88

Instrument ID: 70 2 DFTPP Injection Time: 14:21

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	48.8
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	.3(.5)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	6.2
275	10.0 - 30.0% of mass 198	17.9
365	Greater than 1.00% of mass 198	1.02
441	Present, but less than mass 443	8.4
442	Greater than 40.0% of mass 198	52.4
443	17.0 - 23.0% of mass 442	10.7(20.4)2

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

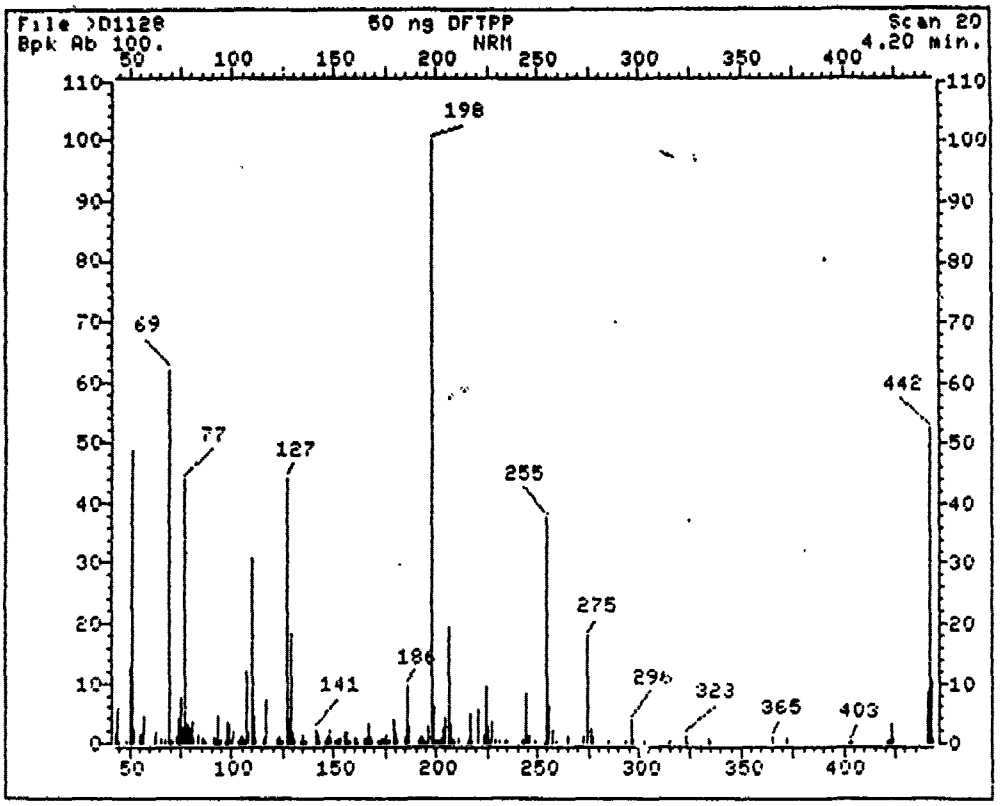
Spiant 10/12/88

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

	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED	
01	80 ug/ml BNA STD	>E6326	11/28/88	14:37	
02	88081972 1ml REANAL.	>E6327	11/28/88	15:43	IS out, use
03	88081943 1ml REANAL.	>E6328	11/28/88	16:42	IS out, dontreed
04	88081948 1ml REANAL.	>E6329	11/28/88	17:37	IS out, dontreed
05	88081949 1ml REANAL.	>E6330	11/28/88	18:32	IS out dontreed
06	88081951 1ml REANAL.	>E6331	11/28/88	19:27	~~IS out~~ use
07	88081952 1ml REANAL.	>E6332	11/28/88	20:22	IS out dontreed
08	88081959 1ml REANAL.	>E6333	11/28/88	21:17	IS out dontreed
09	88081973 1ml REANAL.	>E6334	11/28/88	22:12	IS out use
10	88081977 1ml REANAL.	>E6335	11/28/88	23:06	IS out dontreed
11	88082149 1ml REANAL.	>E6336	11/29/88	0:01	SS out
12	88082296 REX REANAL.	>E6337	11/29/88	0:55	IS out,
13	88081976 1ml REANAL.	>E6338	11/29/88	1:50	SS out dontreed
14					
15					
16					
17					
18					
19					
20					
21					
22					

another project

241



File: >D1128 Scan #: 20 Retn. time: 4.20

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.10	1.808	97.15	.537	149.00	.650	195.15	.212	254.95	37.481
44.00	5.903	98.05	3.347	151.10	.537	196.05	2.867	255.95	6.030
44.90	.395	99.05	3.192	151.80	.282	197.90	100.000	257.05	.410
48.90	.551	99.95	.325	152.30	.184	198.90	6.200	257.95	1.991
50.00	12.484	100.95	1.963	153.00	.706	199.90	.424	258.95	.311
51.00	48.807	102.95	.537	153.95	.720	200.90	.268	264.95	1.003
52.00	2.528	103.95	.974	155.05	1.652	201.50	.508	272.85	1.102
55.10	1.582	105.05	1.158	156.05	1.921	202.90	.607	274.05	2.570
56.00	1.822	106.05	.438	157.05	.551	204.00	2.514	274.95	17.907
57.00	4.576	107.05	11.877	157.95	.395	204.90	4.138	275.95	2.316
63.00	1.864	108.05	1.737	159.95	.607	206.00	19.333	276.95	1.215
65.10	.847	110.00	30.843	160.95	.805	207.00	3.276	285.00	.311
67.05	.650	111.00	4.378	161.85	.226	208.00	.890	293.00	.395
68.95	62.039	112.00	.593	164.95	.734	209.00	.410	295.90	3.771
69.95	.282	116.80	.706	166.05	.664	211.00	.833	296.90	.664
71.05	.551	117.00	7.160	167.05	3.234	215.90	.367	303.00	.466
73.05	.946	121.90	.621	168.05	1.257	216.90	4.943	314.10	.254
73.95	4.081	123.00	1.186	168.95	.311	218.00	.523	315.00	.494
74.95	7.584	123.90	.551	171.05	.325	221.00	5.352	323.00	1.144
76.05	2.471	125.00	.508	171.95	.339	223.00	1.299	323.90	.240
77.05	43.906	127.00	44.160	172.95	.607	224.00	9.603	333.95	.720
78.05	3.050	128.00	3.502	173.95	.692	225.00	2.039	334.95	.381
78.95	3.079	129.00	18.430	175.05	1.469	226.10	.268	364.85	1.017
79.95	2.302	130.00	1.638	176.15	.494	227.00	3.629	372.00	.692
80.95	3.615	131.00	.607	176.95	.748	229.00	.729	402.00	.212

83.05	1.469	134.90	1.271	180.05	1.850	233.90	.325	404.00	.198
83.95	.297	135.90	.466	181.05	.861	235.00	.339	421.05	.297
85.05	.692	136.90	.537	185.05	1.200	241.95	.452	421.95	.410
86.05	.706	137.90	.169	186.05	9.688	243.05	.523	422.95	3.135
87.05	.551	141.00	2.260	187.05	2.895	243.95	8.064	423.95	.621
91.05	1.059	142.00	1.497	191.25	.410	244.95	1.073	441.05	8.389
91.95	.918	143.00	.508	191.95	1.003	245.95	1.299	442.05	52.436
92.95	4.590	146.00	.353	193.05	1.045	248.85	.325	443.05	10.691
93.95	.353	147.00	1.102	194.05	.282	253.95	.198	444.05	.847
95.05	.692	148.00	2.005	194.95	.226				

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/28/88

Contractor: _____ Time: 14:37

Contract No: _____ Laboratory ID:)E6326

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	.92454	25.47		
2-Fluorophenol	1.41912	1.22649	13.57		
bis(2-Chloroethyl)ether	1.41737	1.10446	22.08		
Phenol	1.78209	1.45324	18.45	*	
Phenol-d5	1.35470	1.34542	.68		
Aniline	.74553	.45687	38.72		
2-Chlorophenol	1.32089	1.26761	4.03		
1,3-Dichlorobenzene	1.51101	1.39645	7.58		
1,4-Dichlorobenzene	1.51574	1.47930	2.40	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.56944	.72865	27.96		
1,2-Dichlorobenzene	1.45179	1.32928	8.44		
2-Methylphenol	1.42392	1.17903	17.20		
3-&-4-Methylphenol	1.58422	1.26540	20.12		
bis(2-chloroisopropyl)Ether	2.35722	2.22626	5.56		
N-Nitroso-Di-n-Propylamine	1.13410	1.07958	4.81		**
Hexachloroethane	.70056	.66935	4.45		
Dibromochloropropane	-	-	-		
Nitrobenzene	.56683	.47501	16.20		
Nitrobenzene-d5	.49938	.45185	9.52		
2-Nitrophenol	.22040	.24467	11.01	*	
Isophorone	.87207	.80677	7.49		
bis(2-Chloroethoxy)methane	.58240	.54941	5.66		
2,4-Dimethylphenol	.40862	.37099	9.21		
Benzoic Acid	.29595	.33432	12.97		
2,4-Dichlorophenol	.53135	.49861	6.16	*	
1,2,4-Trichlorobenzene	.31739	.33435	5.34		
Naphthalene	.98196	.94582	3.68		
4-Chloroaniline	.33116	.25863	21.90		
Hexachlorobutadiene	.18652	.18717	.35	*	
4-Chloro-3-Methylphenol	.28631	.27505	3.93	*	
2-Methylnaphthalene	.54168	.54243	.41		

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 (**)

2413

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/28/88

Contractor: _____ Time: 14:37

Contract No: _____ Laboratory ID:)E6326

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	.34672	4.15		**
2,4,6-Trichlorophenol	.32295	.35809	10.88	*	
2,4,5-Trichlorophenol	.49539	.52348	5.67		
2-fluorobiphenyl	1.26699	1.16105	8.36		
2-Chloronaphthalene	1.24653	1.15779	7.12		
2-Nitroaniline	.63129	.49646	21.36		
Dimethylphthalate	1.33033	1.38703	4.26		
2,6-Dinitrotoluene	.31816	.35329	11.04		
Acenaphthylene	1.65820	1.54010	7.12		
3-Nitroaniline	.63702	.54422	14.57		
2,4-Dinitrophenol	.05753	.09477	64.74		**
Acenaphthene	1.12644	1.07889	4.22	*	
Dibenzofuran	1.50204	1.49487	.48		
2,4-Dinitrotoluene	.32099	.33463	4.25		
4-Nitrophenol	.18425	.16958	7.96		**
Fluorene	1.09332	1.14153	4.41		
Diethylphthalate	1.32354	1.31328	.77		
4-Chlorophenyl-phenylether	.48214	.49314	2.28		
4-Nitroaniline	.27495	.25839	6.02		
2,4,6-Tribromophenol	.14218	.19147	34.67		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.44983	.42786	4.88	*	
4,6-Dinitro-2-Methylphenol	.08606	-	-		
4-Bromophenyl-phenylether	.22979	.23871	3.88		
Hexachlorobenzene	.28768	.31200	8.45		
Pentachlorophenol	.11390	.14106	23.84	*	

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: 11/28/88

Contractor: Time: 14:37

Contract No: Laboratory ID:)E6326

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	.96778	10.36		
Anthracene	1.13334	1.08940	3.88		
Di-n-Butylphthalate	1.71746	1.76704	2.89		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.17568	1.14406	2.69	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.03775	.01283	66.01		
Pyrene	1.65647	1.58486	4.32		
Terphenyl-d14	1.09647	1.16861	6.58		
Butylbenzylphthalate	1.15097	1.25646	9.17		
3,3'-Dichlorobenzidine	.12990	.15939	22.70		
Chrysene	1.01423	1.02999	1.55		
Benzo(a)Anthracene	1.09006	1.08107	.82		
bis(2-Ethylhexyl)Phthalate	1.34247	1.57201	17.10		
Di-n-octylphthalate	3.72331	4.11352	10.48	*	
Benzo(a)Pyrene	1.27071	1.22611	3.51	*	
Benzo(b)Fluoranthene	1.48902	1.63869	10.05		
Indeno(1,2,3-cd)Pyrene	.82543	.99849	20.97		
Dibenzo(a,h)Anthracene	.78966	.88462	12.03		
Benzo(k)Fluoranthene	1.51900	1.25388	17.45		
Benzo(g,h,i)Perylene	.74580	.92269	23.72		

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): >E6326 Date Analyzed: 11/28/88

Instrument ID: 70 2 Time Analyzed: 14:37

	IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
12 HOUR STD	50805.	7.83	181471.	11.33	98950.	16.69
UPPER LIMIT	101610.		362942.		197900.	
LOWER LIMIT	25403.		90735.		49475.	
SAMPLE NO.						
01 88081972 1ml	57255.	7.82	196138.	11.27	108517.	16.65
02 88081943 1ml	47262.	7.83	164123.	11.27	85734.	16.66
03 88081948 1ml	30072.	7.81	123881.	11.27	71845.	16.66
04 88081949 1ml	31680.	7.80	122956.	11.27	80267.	16.66
05 88081951 1ml	46872.	7.83	169963.	11.29	91053.	16.66
06 88081952 1ml	50647.	7.84	179988.	11.28	96705.	16.66
07 88081959 1ml	51205.	7.83	194858.	11.29	106546.	16.67
08 88081973 1ml	54596.	7.82	198601.	11.27	103998.	16.66
09 88081977 1ml	58488.	7.82	205372.	11.27	109181.	16.67
10 88082149 1ml	96062.	7.83	346968.	11.29	189232.	16.69
11 88082296 REX	41838.	7.83	160809.	11.28	52266.	16.66
12 88081976 1ml	50940.	7.83	189486.	11.28	106247.	16.66
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): >E6326 Date Analyzed:11/28/88

Instrument ID: 70 2 Time Analyzed: 14:37

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS3(PRY) AREA *	RT	
12 HOUR STD	145426.	21.29	98047.	29.66	63568.	34.46	
UPPER LIMIT	290852.		196094.		127136.		
LOWER LIMIT	72713.		49024.		31784.		
EPA SAMPLE NO.							
01 88081972 1ml	162435.	21.24	107916.	29.62	21087.*	34.45	
02 88081943 1ml	119695.	21.24	79499.	29.61	11045.*	34.45	03
04 88081951 1ml	138789.	21.26	89214.	29.63	38143.	34.46	
05 88081952 1ml	147344.	21.25	91763.	29.63	31571.*	34.44	
06 88081959 1ml	181391.	21.26	113021.	29.63	30206.*	34.48	
07 88081973 1ml	169649.	21.26	112069.	29.62	4324.*	34.51	
08 88081977 1ml	178747.	21.26	107706.	29.63	3477.*	34.51	
09 88082149 1ml	310748.*	21.28	194834.	29.65	70467.	34.48	
10 88082296 REX	128995.	21.26	61115.	29.62	1902.*	34.51	
11 88081976 1ml	169679.	21.26	114187.	29.64	34940.	34.49	
12							
13							
14 88081948	120118	21.25	77110	29.62	19466 *	34.44	
15 88081949	126726	21.25	79827	29.63	28014 *	34.47	
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

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: >D1129 DFTPP Injection Date: 11/29/88

Instrument ID: 70 2 DFTPP Injection Time: 10:40

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	50.0
68	Less than 2.0% of mass 69	0.0(0.0)
69	Mass 69 relative abundance	65.
70	Less than 2.0% of mass 69	.6(.9)
127	40.0 - 60.0% of mass 198	43.4
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	7.4
275	10.0 - 30.0% of mass 198	21.7
365	Greater than 1.00% of mass 198	1.72
441	Present, but less than mass 443	12.0
442	Greater than 40.0% of mass 198	94.0
443	17.0 - 23.0% of mass 442	16.7(17.8)

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

all S

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

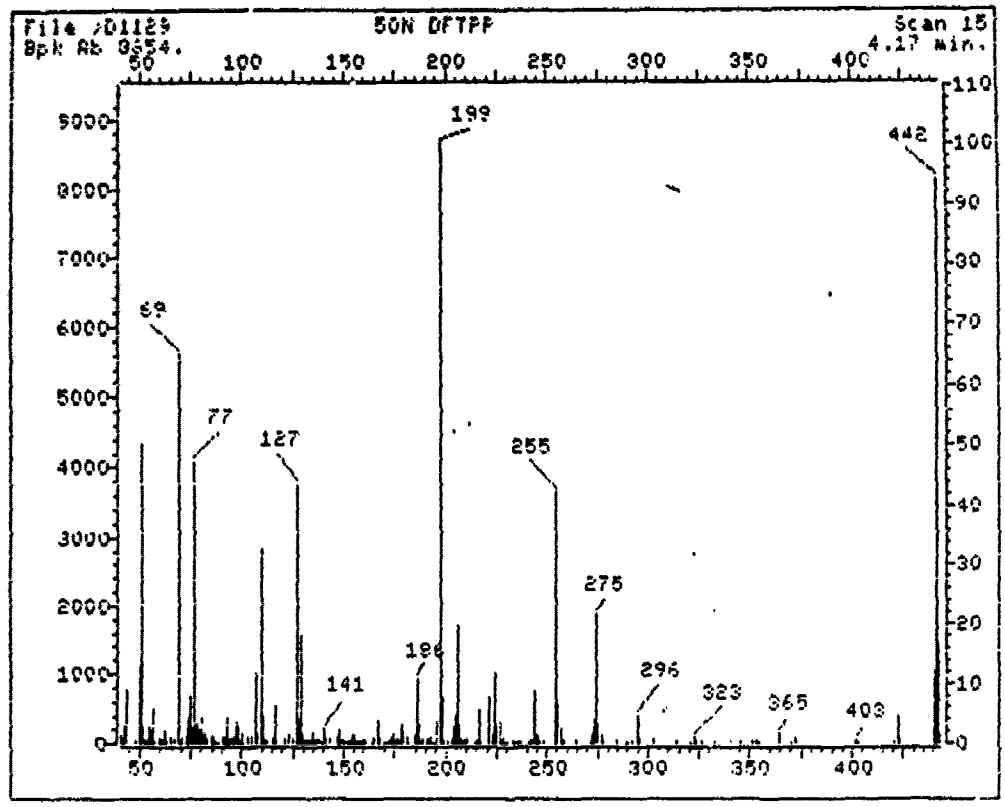
	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	80MG/L ABN STD	>E6339	11/29/88	10:59
another project 02	88092998 REANALYSIS.	>E6340	11/29/88	12:21
not needed 03	88082783 REANALYSIS.	>E6341	11/29/88	13:16
X ~~04~~	~~88082783 REANALYSIS.~~	~~>E6341~~	~~11/29/88~~	~~13:16~~
not needed 05	88092672 1ml REANAL.	>E6343	11/29/88	15:24
" 06	88092673 1ml REANAL.	>E6344	11/29/88	16:19
" 07	88081953 1ml REANAL.	>E6345	11/29/88	17:14
" 08	88081954 1ml REANAL.	>E6346	11/29/88	18:09
" 09	88081957 1ml REANAL.	>E6347	11/29/88	19:04
" 10	88081958 1ml REANAL.	>E6348	11/29/88	19:59
not needed 11	88092674 1ml REANAL.	>E6349	11/29/88	20:54
" 12	88092674 MS REANAL.	>E6350	11/29/88	21:48
" 13	88092674 MSD REANAL.	>E6351	11/29/88	22:43
14				
15				
16				
17				
18				
19				
20				
21				
22				

GC/MS PERFORMANCE STANDARD

Decafluorotriphenylphosgine (DFTPP)

M/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	50.03	50.03	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	64.80	64.80	Ok
70	Less than 2% of mass 69	.58	.89	Ok
127	40-60% of mass 198	43.37	43.37	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	7.41	7.41	Ok
275	10-30% of mass 198	21.68	21.68	Ok
365	Greater than 1% of mass 198	1.72	1.72	Ok
441	0-100% of mass 443	11.97	71.60	Ok
442	Greater than 40% of mass 198	94.04	94.04	Ok
443	17-23% of mass 442	16.72	17.78	Ok

Injection Date: 11/29/88
Injection Time: 10:40
Data File: >D1129
Scan: 15



File: >D1129 Scan 8: 15 Retn. time: 4.17

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.00	1.479	95.05	.820	150.10	.266	199.90	.451	271.95	.196
42.00	.350	95.95	.659	151.00	.393	201.10	.589	272.85	1.491
43.10	2.750	97.05	.936	152.00	.243	202.90	.508	273.95	3.779
44.00	8.771	97.95	3.339	152.90	.566	203.90	2.889	274.85	21.670
48.00	.335	98.95	2.950	153.95	.451	204.80	4.368	275.85	3.039
50.00	12.891	99.85	.439	154.95	1.352	205.90	19.656	276.95	1.390
51.00	50.035	100.95	1.652	155.95	1.329	206.90	3.270	277.85	.277
52.00	2.600	101.85	.254	156.95	.393	207.90	.890	284.00	.370
53.00	.335	103.05	.185	157.75	.462	208.80	.312	289.90	.116
54.00	.312	103.95	1.132	158.95	.416	210.30	.578	290.80	.173
55.00	2.785	104.95	1.121	159.95	.555	210.90	.844	292.80	.439
56.00	2.022	106.95	11.555	160.95	.901	215.00	.162	295.80	1.634
57.00	5.801	107.95	1.710	161.65	.335	215.90	.370	296.80	.693
58.00	.312	109.90	32.471	164.25	.196	216.90	5.362	303.00	.624
60.00	.636	111.00	4.322	164.85	.647	217.90	.520	314.70	.462
61.00	.716	111.90	.439	166.85	3.802	220.90	7.546	320.90	.220
62.00	.566	112.90	.324	167.85	1.260	222.90	1.329	323.00	1.075
63.00	1.908	115.90	.751	169.65	.162	223.90	11.486	324.00	.312
64.00	.266	116.90	6.275	170.85	.231	224.90	2.785	326.80	.381
65.00	.959	118.00	.497	171.85	.254	226.90	3.617	332.55	.139
66.95	.636	121.90	.913	172.75	.381	227.90	.601	333.85	.913
68.95	64.002	123.00	1.525	173.95	.716	228.90	.971	334.95	.220
70.05	.578	123.90	.636	174.95	1.444	229.90	.196	340.85	.266
71.05	1.005	125.00	.636	175.85	.578	230.90	.520	345.85	.335
72.95	1.156	126.90	13.367	176.15	.543	233.90	.289	351.85	.497
73.95	4.171	127.90	3.443	176.85	.913	234.00	.185	352.95	.266
74.95	7.696	128.90	17.900	177.85	.324	235.80	.231	353.95	.508
75.95	2.357	129.90	1.733	178.85	3.020	236.80	.324	354.85	.116
76.95	17.146	130.90	.404	179.85	2.034	237.00	.312	361.85	1.722

78.95	3.351	132.90	.381	182.85	.139	241.95	.570	372.90	.716
79.95	2.253	133.90	.532	184.95	1.456	242.85	.520	372.70	.162
80.95	4.229	135.00	1.910	185.95	10.700	243.85	0.690	382.80	.196
81.95	1.271	136.00	.570	186.85	3.062	244.95	1.491	390.80	.127
82.95	1.722	136.90	.716	187.95	.335	245.85	1.540	401.90	.324
83.95	.751	137.90	.277	188.85	.774	246.75	.312	402.90	.439
85.05	1.017	138.90	.324	190.95	.520	248.85	.439	403.80	.150
85.95	.971	139.90	.185	191.85	.774	254.85	42.212	420.75	.451
87.05	.580	140.90	2.300	192.95	1.063	255.85	6.419	422.85	4.634
87.85	.196	141.80	.090	193.95	.185	256.95	.420	423.75	.032
88.85	.173	143.00	.624	195.05	.231	257.85	2.427	440.95	11.971
90.95	1.010	146.90	1.190	195.95	3.420	258.75	.300	441.85	94.037
91.85	.763	147.90	2.000	197.80	100.000	258.95	.300	442.85	16.721
92.95	4.299	148.90	.474	198.80	7.107	264.85	.800	443.95	1.760
93.95	.370								

Continuing Calibration Check
HSL Compounds

Case No: ---------- Calibration Date: 11/29/88 ----------

Contractor: ---------- Time: 10:59 ----------

Contract No: ---------- Laboratory ID: XE6339 ----------

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	.68491	44.78		
2-fluorophenol	1.41912	1.13889	19.75		
bis(2-Chloroethyl)ether	1.41737	1.19679	15.56		
Phenol	1.78209	1.57123	11.83	*	
Phenol-d5	1.35470	1.44747	6.85		
Aniline	.74553	.47388	36.44		
2-Chlorophenol	1.32089	1.27062	3.81		
1,3-Dichlorobenzene	1.51101	1.42639	5.60		
1,4-Dichlorobenzene	1.51574	1.47234	2.86	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.56944	.74578	30.97		
1,2-Dichlorobenzene	1.45179	1.52088	4.76		
2-Methylphenol	1.42392	1.87509	31.68		
3-&-4-Methylphenol	1.58422	1.32690	16.24		
bis(2-chloroisopropyl)Ether	2.35722	2.61692	11.02		
N-Nitroso-Di-n-Propylamine	1.13410	1.19969	5.78		**
Hexachloroethane	.70056	.67109	4.21		
Dibromochloropropane	-	-	-		
Nitrobenzene	.56683	.53083	6.35		
Nitrobenzene-d5	.49938	.46804	6.28		
2-Nitrophenol	.22040	.26741	21.33	*	
Isophorone	.87207	.84223	3.42		
bis(2-Chloroethoxy)methane	.58240	.59325	1.86		
2,4-Dimethylphenol	.40862	.39159	4.17		
Benzoic Acid	.29595	.31846	7.61		
2,4-Dichlorophenol	.53135	.49641	6.58	*	
1,2,4-Trichlorobenzene	.31739	.33249	4.76		
Naphthalene	.98196	.95489	2.76		
4-Chloroaniline	.33116	.25983	21.54		
Hexachlorobutadiene	.18652	.18674	.12	*	
4-Chloro-3-Methylphenol	.28631	.30794	7.55	*	
2-Methylnaphthalene	.54168	.57362	5.31		

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: 11/29/88

Contractor: _____ Time: 10:59

Contract No: _____ Laboratory ID:)E6339

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

Minimun $\overline{RF}$ for SPCC is _____ Maximun % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.33289	.34779	4.48		**
2,4,6-Trichlorophenol	.32295	.35449	9.77	*	
2,4,5-Trichlorophenol	.49539	.59787	20.69		
2-Fluorobiphenyl	1.26699	1.16594	7.98		
2-Chloronaphthalene	1.24653	1.13832	8.68		
2-Nitroaniline	.63129	.57306	9.22		
Dimethylphthalate	1.33033	1.35476	1.84		
2,6-Dinitrotoluene	.31816	.37410	17.58		
Acenaphthylene	1.65820	1.55353	6.31		
3-Nitroaniline	.63702	.57198	10.21		
2,4-Dinitrophenol	.05753	.13640	137.11		**
Acenaphthene	1.12644	1.06790	5.20	*	
Dibenzofuran	1.50204	1.51179	.65		
2,4-Dinitrotoluene	.32099	.33359	3.92		
4-Nitrophenol	.18425	.20303	10.19		**
Fluorene	1.09332	1.17199	7.20		
Diethylphthalate	1.32354	1.28109	3.21		
4-Chlorophenyl-phenylether	.48214	.49427	2.52		
4-Nitroaniline	.27495	.32401	17.84		
2,4,6-Tribromophenol	.14218	.16604	16.79		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.44983	.42994	4.42	*	
4,6-Dinitro-2-Methylphenol	.08606	-	-		
4-Bromophenyl-phenylether	.22979	.24975	8.69		
Hexachlorobenzene	.28768	.31238	8.58		
Pentachlorophenol	.11390	.14168	24.38	*	

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 (**)

2423

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/29/88

Contractor: _____ Time: 10:59

Contract No: _____ Laboratory ID:)E6339

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	.99879	7.49		
Anthracene	1.13334	1.12636	.62		
Di-n-Butylphthalate	1.71746	1.72420	.39		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.17568	1.18335	.65	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.03775	.15275	304.65		
Pyrene	1.65647	1.49534	9.73		
Terphenyl-d14	1.09617	1.12334	2.45		
Butylbenzylphthalate	1.15097	1.16416	1.15		
3,3'-Dichlorobenzidine	.12990	.23885	83.87		
Chrysene	1.01423	1.00594	.82		
Benzo(a)Anthracene	1.09006	1.17975	8.23		
bis(2-Ethylhexyl)Phthalate	1.34247	1.41121	5.12		
Di-n-octylphthalate	3.72331	3.51316	5.64	*	
Benzo(a)Pyrene	1.27071	1.27515	.35	*	
Benzo(b)fluoranthene	1.48902	1.48580	.22		
Indeno(1,2,3-cd)Pyrene	.82543	.89829	8.83		
Dibenzo(a,h)Anthracene	.78966	.88573	12.17		
Benzo(k)fluoranthene	1.51900	1.28454	15.44		
Benzo(g,h,i)Perylene	.74580	.77977	4.56		

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 (**)

98092672 RE	161664	21.23	110249	29.61	3022 ±	3445
98092673 RE	144117	21.25	92778	29.59	9475 ±	3445

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: >D1130 DFTPP Injection Date: 11/30/88

Instrument ID: 70 2 DFTPP Injection Time: 15:05

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	64.
70	Less than 2.0% of mass 69	.8(1.3)1
127	40.0 - 60.0% of mass 198	40.8
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	5.5
275	10.0 - 30.0% of mass 198	19.1
365	Greater than 1.00% of mass 198	1.38
441	Present, but less than mass 443	7.9
442	Greater than 40.0% of mass 198	61.0
443	17.0 - 23.0% of mass 442	11.5(18.8)2

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

5 pc. 10/12

All

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

	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED	
01	40 ug/ml BNA STD	>E6352	11/30/88	15:24	std
02	88092193 1ml REANAL.	>E6353	11/30/88	16:32	+ ok
03	88092629 1ml REANAL.	>E6354	11/30/88	17:25	+ ok
04	88092753 1ml REANAL.	>E6355	11/30/88	18:24	IS ba
05	88092818 AC REANAL.	>E6356	11/30/88	19:19	
06	88092818 BN REANAL.	>E6357	11/30/88	20:14	
07	88092818 BN MS REAN	>E6358	11/30/88	21:09	
08	88092818 BN MSD REAN	>E6359	11/30/88	22:04	
09	88092575 AC REANAL.	>E6360	11/30/88	22:59	
10	88092249 1ml REANAL.	>E6361	11/30/88	23:54	
11	88092248 1ml REANAL.	>E6362	12/01/88	0:48	
12	88092247 1ml REANAL.	>E6363	12/01/88	1:43	
13	88081944 1ml REANAL.	>E6364	12/01/88	2:37	
14					
15					
16					
17					
18					
19					
20					
21					
22					

use

another project

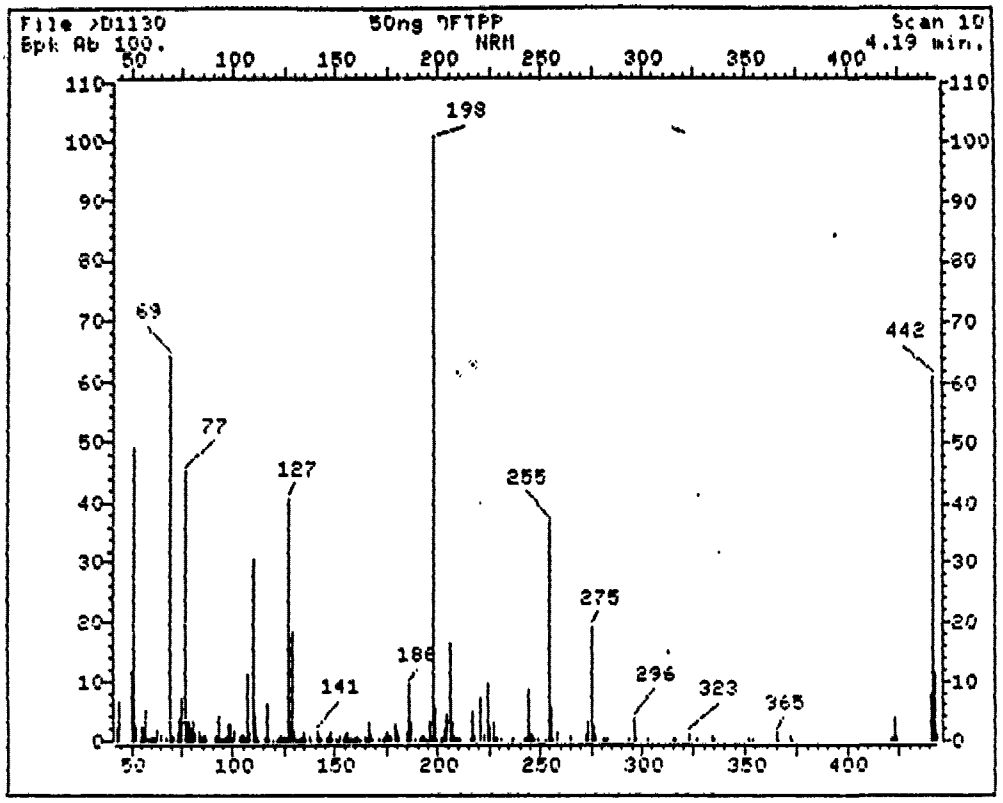
not needed

not needed

"

"

not needed



File: >D1130 Scan #: 10 Retn. time: 4.19

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.10	2.173	97.15	.742	145.90	.419	192.95	.860	254.95	36.840
44.00	6.583	97.35	2.863	146.10	.419	193.95	.215	255.95	5.378
50.00	11.595	98.95	2.657	147.00	.904	194.95	.163	256.85	.333
51.00	49.037	99.85	.344	147.90	1.592	195.95	3.227	257.95	1.484
52.00	2.420	100.95	1.936	149.00	.516	196.65	.506	258.85	.333
54.10	.247	102.95	.721	150.80	.280	197.90	100.000	264.95	.710
55.10	2.420	103.95	.936	151.50	.247	198.80	5.486	272.95	1.086
56.00	2.033	105.05	1.054	152.00	.237	199.90	.376	273.95	3.130
57.00	3.163	105.95	.355	152.90	.613	201.20	.367	274.95	19.060
58.00	.301	106.95	11.079	153.95	.441	202.80	.452	275.95	2.409
58.90	.258	107.95	1.603	155.05	.936	203.90	2.280	276.95	1.194
60.10	.463	109.90	30.440	155.95	1.549	204.90	4.410	280.95	.355
61.00	.839	110.90	4.281	156.85	.355	206.00	16.274	281.95	.204
61.90	.516	112.00	.602	157.85	.323	207.00	3.281	282.95	.280
63.00	1.624	113.00	.194	158.85	.258	208.00	.710	293.00	.355
65.80	1.097	115.80	.430	160.05	.398	208.90	.333	295.90	3.636
67.05	.817	116.90	6.325	160.95	.914	209.90	.376	296.90	.506
68.95	64.117	118.00	.559	161.85	.269	210.80	.506	302.90	.419
69.95	.807	119.00	.194	163.05	.129	216.00	.473	315.00	.333
71.05	.764	121.00	.204	164.85	.645	216.90	4.754	315.90	.280
73.05	1.409	122.10	.484	165.95	.495	217.90	.602	323.00	1.151
73.95	3.672	123.00	1.129	166.95	3.098	220.90	7.078	326.80	.280
74.95	7.153	124.00	.495	167.85	1.172	222.90	1.183	333.95	.731
76.95	45.219	124.90	.624	168.95	.344	224.00	9.422	334.95	.269

2427

77.95	3.078	125.80	.280	171.75	.376	225.00	2.731	370.85	.215
78.95	3.453	126.90	40.755	172.85	.430	226.90	3.291	351.95	.409
79.95	2.022	127.90	3.012	173.95	.925	228.00	.463	353.95	.516
80.95	3.410	128.90	18.436	174.95	1.474	228.90	.914	364.95	1.377
82.05	1.312	129.90	1.635	175.85	.635	231.00	.344	365.85	.204
83.05	1.669	130.90	.398	176.95	.721	233.00	.118	371.90	.807
84.15	.613	131.90	.194	178.95	2.700	237.00	.301	372.80	.204
85.05	.671	132.90	.312	179.95	1.689	241.95	.559	420.85	.527
85.95	.968	133.90	.570	180.95	.893	242.95	.463	421.85	.387
86.95	.516	135.00	1.334	184.95	1.269	243.95	8.465	422.95	3.636
90.95	.904	135.90	.506	185.95	9.422	244.95	.947	423.85	.678
92.05	.731	137.00	.635	186.95	3.001	245.95	1.215	440.95	7.938
92.95	4.249	137.90	.204	188.85	.463	246.95	.333	441.95	60.955
93.95	.473	140.90	1.613	190.95	.441	248.75	.355	442.95	11.455
95.05	.516	142.00	.602	191.85	.839	253.05	.183	443.95	1.129
96.05	.484	142.90	.538						

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/30/88

Contractor: _____ Time: 15:24

Contract No: _____ Laboratory ID:)E6352

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	.47401	61.79		
2-Fluorophenol	1.41912	1.14427	19.37		
bis(2-Chloroethyl)ether	1.41737	1.14703	19.07		
Phenol	1.76209	1.51661	14.77	*	
Phenol-d5	1.35470	1.46346	8.03		
Aniline	.74553	.39614	46.86		
2-Chlorophenol	1.32089	1.26910	3.92		
1,3-Dichlorobenzene	1.51101	1.45836	3.46		
1,4-Dichlorobenzene	1.51574	1.57567	3.95	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.56944	.95943	68.49		
1,2-Dichlorobenzene	1.45179	1.56964	6.12		
2-Methylphenol	1.42392	1.96564	38.04		
3-&-4-Methylphenol	1.58422	1.26789	19.97		
bis(2-chloroisopropyl)Ether	2.35722	2.79988	18.78		
N-Nitroso-Di-n-Propylamine	1.13410	1.32073	16.46		**
Hexachloroethane	.70056	.75533	7.82		
Dibromochloropropane	-	-	-		
Nitrobenzene	.56683	.62613	10.46		
Nitrobenzene-d5	.49338	.46671	6.54		
2-Nitrophenol	.22040	.24190	9.75	*	
Isophorone	.87207	.86018	1.36		
bis(2-Chloroethoxy)methane	.58240	.60151	3.28		
2,4-Dimethylphenol	.40862	.39040	4.46		
Benzoic Acid	.29595	.22433	24.20		
2,4-Dichlorophenol	.53135	.57917	9.00	*	
1,2,4-Trichlorobenzene	.31735	.33892	6.78		
Naphthalene	.98196	1.02338	4.22		
4-Chloroaniline	.33116	.32746	1.11		
Hexachlorobutadiene	.18652	.20439	9.58	*	
4-Chloro-3-Methylphenol	.28631	.33351	16.49	*	
2-Methylnaphthalene	.54168	.60352	10.80		

RF - Response factor from daily standard file at 40.00 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: 11/30/88

Contractor: Time: 15:24

Contract No: Laboratory ID:)E6352

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	.34916	4.89		**
2,4,6-Trichlorophenol	.32295	.32843	1.70	*	
2,4,5-Trichlorophenol	.49539	.50067	1.07		
2-fluorobiphenyl	1.26699	1.31651	3.91		
2-Chloronaphthalene	1.24653	1.18392	5.02		
2-Nitroaniline	.63129	.52774	16.40		
Dimethylphthalate	1.33033	1.39104	4.56		
2,6-Dinitrotoluene	.31816	.35256	10.94		
Acenaphthylene	1.65820	1.71863	3.64		
3-Nitroaniline	.63702	.58133	6.73		
2,4-Dinitrophenol	.05753	.07370	28.13		**
Acenaphthene	1.12644	1.15571	2.60	*	
Dibenzofuran	1.50264	1.56874	5.77		
2,4-Dinitrotoluene	.32099	.30966	3.53		
4-Nitrophenol	.18425	.13078	29.02		**
Fluorene	1.09332	1.20067	9.82		
Diethylphthalate	1.32354	1.43393	8.34		
4-Chlorophenyl-phenylether	.46214	.56624	17.44		
4-Nitroaniline	.27495	.23191	15.65		
2,4,6-Tribromophenol	.14218	.17671	25.70		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.44983	.43188	9.35	*	
4,6-Dinitro-2-Methylphenol	.06606	-	-		
4-Bromophenyl-phenylether	.22979	.25136	9.40		
Hexachlorobenzene	.28768	.33249	15.57		
Pentachlorophenol	.11390	.11330	.53	*	

RF - Response factor from daily standard file at 40.00 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: 11/30/88

Contractor: Time: 15:24

Contract No: Laboratory ID:)E6352

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	.97507	9.68		
Anthracene	1.13334	1.16955	3.20		
Di-n-Butylphthalate	1.71746	1.67291	9.05		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.17566	1.06613	9.32	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.03775	.01231	67.40		
Pyrene	1.65647	1.83119	10.55		
Terphenyl-d14	1.09647	1.32171	20.54		
Butylbenzylphthalate	1.15057	1.41781	23.18		
3,3'-Dichlorobenzidine	.12930	.16163	24.43		
Chrysene	1.01423	1.01685	.26		
Benzo(a)Anthracene	1.09006	.98906	9.27		
bis(2-Ethylhexyl)Phthalate	1.34247	1.67825	39.91		
Di-n-octylphthalate	3.72331	4.38177	17.68	*	
Benzo(a)Pyrene	1.27071	1.21747	4.19	*	
Benzo(b)Fluoranthene	1.48902	1.41814	4.76		
Indeno(1,2,3-cd)Pyrene	.82543	1.00231	21.43		
Dibenzo(a,h)Anthracene	.78966	.84302	6.76		
Benzo(k)Fluoranthene	1.51900	1.37020	9.80		
Benzo(g,h,i)Perylene	.74560	.88117	18.15		

RF - Response Factor from daily standard file at 40.00 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): >E6352 Date Analyzed:11/30/88

Instrument ID: 70 2 Time Analyzed: 15:24

	IS1(DCB) AREA	#	RT	IS2(NPT) AREA	#	RT	IS3(ANT) AREA	#	RT
12 HOUR STD	59423.		7.81	223905.		11.31	121729.		16.67
UPPER LIMIT	118846.			447810.			243458.		
LOWER LIMIT	29711.			111953.			60865.		
SAMPLE NO.									
01 88092193 1ml	67999.		7.81	241547.		11.28	132469.		16.66
02 88092629 1ml	51099.		7.80	150765.		11.30	89181.		16.67
03 88092753 1ml	23216.		7.55	104227.	*	11.28	80675.		16.65
04 88092818 AC	44649.		7.81	159564.		11.29	86278.		16.67
05 88092818 BN	34893.		7.80	119639.		11.29	67277.		16.66
06 88092818 BN	37691.		7.81	141404.		11.28	77766.		16.66
07 88092818 BN	37885.		7.81	133584.		11.28	77541.		16.66
08 88092575 AC	42759.		7.80	144553.		11.29	80279.		16.67
09 88092249 1ml	12166.	*	7.81	35958.	*	11.32	22901.	*	16.69
10 88092248 1ml	10196.	*	7.79	33850.	*	11.30	20188.	*	16.66
11 88092247 1ml	14956.	*	7.79	51186.	*	11.28	31772.	*	16.66
12 88061944 1ml	1173.	*	7.83	6198.	*	11.29	3741.	*	16.65
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): >E6352 Date Analyzed:11/30/88

Instrument ID: 70 2 Time Analyzed: 15:24

		IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS3(PRY) AREA #	RT
	12 HOUR STD	172536.	21.27	93775.	29.63	57906.	34.47
	UPPER LIMIT	345072.		187550.		115812.	
	LOWER LIMIT	86268.		46888.		28953.	
	EPA SAMPLE NO.						
01	88092193 lml	189759.	21.25	101010.	29.62	37843.	34.46
02	88092629 lml	139179.	21.27	65923.	29.66	37281.	34.48
03	88092753 lml	166876.	21.24	69139.	29.61	33575.	34.46
04	88092818 AC	119795.	21.26	57267.	29.64	19608.*	34.49
05	88092818 BN	93554.	21.26	48420.	29.62	19262.*	34.48
06	88092818 BN	110166.	21.27	53397.	29.63	18508.*	34.48
07	88092818 BN	110180.	21.26	45214.*	29.63	19215.*	34.49
08	88092575 AC	109320.	21.26	49009.	29.62	19759.*	34.49
09	88092249 lml	28292.*	21.28	10622.*	29.65	342.*	34.53
10	88092248 lml	24528.*	21.28	11589.*	29.63	3216.*	34.53
11	88092247 lml	34612.*	21.33	20589.*	29.70	4406.*	34.57
12	88081944 lml	3719.*	21.27	2014.*	29.64	181.*	34.55
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

This page intentionally left blank.

DATA PACKAGE #41

This page intentionally left blank.

ENGINEERING-SCIENCE, INC.

RESEARCH AND DEVELOPMENT
LABORATORY
600 BANCROFT WAY
BERKELEY, CALIFORNIA 94710
(415) 841-7353

REVISED REPORT

Job No.: OR001

Work Order No.: 876

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 8-18-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081938	DANGB2-MW41-SS1	BA-I	8-17-88		9-18-88	
88081938	DANGB2-MW41-SS1	CD-F	8-17-88		9-16-88	
88081938	DANGB2-MW41-SS1	CR-F	8-17-88		9-16-88	
88081938	DANGB2-MW41-SS1	PB-F	8-17-88		10-03-88	
88081938	DANGB2-MW41-SS1	418.1	8-17-88	9-14-88	9-15-88	
88081938	DANGB2-MW41-SS1	MOIS	8-17-88		8-24-88	
88081938	DANGB2-MW41-SS1	8010	8-17-88		8-29-88	8-25-88
88081938	DANGB2-MW41-SS1	8020	8-17-88		8-29-88	8-25-88
88081938	DANGB2-MW41-SS1	8270	8-17-88	8-26-88	10-03-88	
88081939	DANGB2-MW41-SS2	BA-I	8-17-88		9-18-88	
88081939	DANGB2-MW41-SS2	CD-F	8-17-88		9-16-88	
88081939	DANGB2-MW41-SS2	CR-F	8-17-88		9-16-88	
88081939	DANGB2-MW41-SS2	PB-F	8-17-88		10-03-88	
88081939	DANGB2-MW41-SS2	418.1	8-17-88	9-14-88	9-15-88	
88081939	DANGB2-MW41-SS2	MOIS	8-17-88		8-24-88	
88081939	DANGB2-MW41-SS2	8010	8-17-88		8-29-88	8-25-88
88081939	DANGB2-MW41-SS2	8020	8-17-88		8-29-88	8-25-88
88081939	DANGB2-MW41-SS2	8270	8-17-88	10-28-88	11-21-88	

* If applicable

Job No.: OR001

Work Order No.: 876

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081940	DANGB2-MP41-SS1	BA-I	8-17-88		9-18-88	
88081940	DANGB2-MP41-SS1	CD-F	8-17-88		9-16-88	
88081940	DANGB2-MP41-SS1	CR-F	8-17-88		9-16-88	
88081940	DANGB2-MP41-SS1	PB-F	8-17-88		10-03-88	
88081940	DANGB2-MP41-SS1	418.1	8-17-88	9-14-88	9-15-88	
88081940	DANGB2-MP41-SS1	MOIS	8-17-88		8-24-88	
88081940	DANGB2-MP41-SS1	8010	8-17-88		8-29-88	8-25-88
88081940	DANGB2-MP41-SS1	8020	8-17-88		8-29-88	8-25-88
88081940	DANGB2-MP41-SS1	8270	8-17-88	8-26-88	10-05-88	
88081941	DANGB2-MW41-SS3	BA-I	8-17-88		9-18-88	
88081941	DANGB2-MW41-SS3	CD-F	8-17-88		9-16-88	
88081941	DANGB2-MW41-SS3	CR-F	8-17-88		9-16-88	
88081941	DANGB2-MW41-SS3	PB-F	8-17-88		10-03-88	
88081941	DANGB2-MW41-SS3	418.1	8-17-88	9-14-88	9-15-88	
88081941	DANGB2-MW41-SS3	MOIS	8-17-88		8-24-88	
88081941	DANGB2-MW41-SS3	8010	8-17-88		8-26-88	8-30-88
88081941	DANGB2-MW41-SS3	8020	8-17-88		8-26-88	8-30-88
88081941	DANGB2-MW41-SS3	8270	8-17-88	10-28-88	11-01-88	
88081942	DANGB2-MP41-SS2	BA-I	8-17-88		9-18-88	
88081942	DANGB2-MP41-SS2	CD-F	8-17-88		9-16-88	
88081942	DANGB2-MP41-SS2	CR-F	8-17-88		9-16-88	
88081942	DANGB2-MP41-SS2	PB-F	8-17-88		10-03-88	
88081942	DANGB2-MP41-SS2	418.1	8-17-88	9-14-88	9-15-88	
88081942	DANGB2-MP41-SS2	MOIS	8-17-88		8-24-88	
88081942	DANGB2-MP41-SS2	8010	8-17-88		8-26-88	8-30-88
88081942	DANGB2-MP41-SS2	8020	8-17-88		8-26-88	8-30-88
88081942	DANGB2-MP41-SS2	8270	8-17-88	10-28-88	10-02-88	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88081938-88081942
WORK ORDER NO.: 876

These soil samples were received at the ES Berkeley Laboratory on 8-18-88. They were received cold and intact.

Samples 88081939, 88081941 and 88081942 for Method 8270 were initially extracted and analyzed within holding time. However, the surrogate spike recovery was not within the accepted range, thus, they were re-extracted and analyzed out of the holding time. The surrogate spike recoveries for the re-analysis were within the acceptable range.

ANALYSIS REPORT

WORK ORDER NUMBER: 876
JOB NUMBER : Z80000000440
WORK ORDER DATE : 08/18/88

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/Kg

	DANGB2-MW41-SS1	DANGB2-MW41-SS2	DANGB2-MP41-SS1	DANGB2-MW41-SS3	DANGB2-MP41-SS2
TEST COMPOUND	88081938	88081939	88081940	88081941	88081942
ACID DIG SOIL	NA	NA	NA	NA	NA
BARIUM	51.7	62.8	59.5	35.4	62.5
CADMIUM	12.0*N	9.8*N	12.6*N	11.8*N	10.0*N
CHROMIUM	27.1	25.6	33.1	23.1	23.4
LEAD	8.6N	5.3N	8.4SN	4.1SN	5.2N

ND - Not Detected

NA- NOT ANALYZED

ANALYSIS REPORT

WORK ORDER NUMBER: 876
JOB NUMBER : Z80000000440
WORK ORDER DATE : 08/18/88

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/Kg

	DANGB2-MW41-SS1	DANGB2-MW41-SS2	DANGB2-MP41-SS1	DANGB2-MW41-SS3	DANGB2-MP41-SS2
TEST COMPOUND	88081938	88081939	88081940	88081941	88081942
418.1 PETROLEUM HYDROCARBONS	<100	<100	130	<100	<100
% MOISTURE	15.8	18.0	13.4	9.0	17.6

ND - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 876
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 08/18/88

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/Kg, GROUP 8010

	DANGB2-MW41-SS1	DANGB2-MW41-SS2	DANGB2-MP41-SS1	DANGB2-MW41-SS3	DANGB2-MP41-SS2
TEST COMPOUND	88081938	88081939	88081940	88081941	88081942
BENZYL CHLORIDE	ND	ND	ND	ND	ND
BIS (2-CHLOROETHOXY)METHANE	ND	ND	ND	ND	ND
BIS (2-CHLOROISOPROPYL)ETHER	ND	ND	ND	ND	ND
BROMOBENZENE	ND	ND	ND	ND	ND
BROMODICHLOROMETHANE	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
BROMOETHANE	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND
CHLORACETALDEHYDE	ND	ND	ND	ND	ND
CHLORAL	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
CHLOROFORM	0.6B	0.5B	ND	ND	ND
1-CHLOROHEXANE	ND	ND	ND	ND	ND
2-CHLOROETHYL VINYL ETHER	ND	ND	ND	ND	ND
CHLOROMETHANE	ND	ND	ND	ND	ND
CHLOROMETHYL METHYL ETHER	ND	ND	ND	ND	ND
CHLOROTOLUENE	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND
DIBROMOMETHANE	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
DICHLORODIFLUOROMETHANE	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	6.8B	5.4B	5.6B	3.4B	3.8B
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 876

TEST COMPOUND	DANGB2-MW41-SS1 88081938	DANGB2-MW41-SS2 88081939	DANGB2-MP41-SS1 88081940	DANGB2-MW41-SS3 88081941	DANGB2-MP41-SS2 88081942
1,3-DICHLOROPROPYLENE	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
1,1,1,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
TETRACHLOROETHYLENE	ND	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
TRICHLOROETHYLENE	ND	ND	ND	ND	ND
TRICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND
TRICHLOROPROPANE	ND	ND	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 876
JOB NUMBER : 280000000440
WORK ORDER DATE : 08/18/88

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/Kg, GROUP 8020

	DANGB2-MW41-SS1	DANGB2-MW41-SS2	DANGB2-MP41-SS1	DANGB2-MW41-SS3	DANGB2-MP41-SS2
TEST COMPOUND	88081938	88081939	88081940	88081941	88081942
BENZENE	ND	ND	ND	ND	ND
CHLOROBENZENE	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
ETHYL BENZENE	ND	ND	ND	ND	ND
TOLUENE	4.2	57	29	47	200
XYLENES	ND	ND	ND	ND	ND

ND - Not Detected

Base Neutrals - SW 8270
Matrix: Soil

Date Received: August 18, 1988
Date Reported: December 6, 1988

Work Order: 876
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:	88081938	88081940
Sample No.:	DANGB2-MW41-SS1	DANGB2-MP41-SS1
Date Sampled:	8-17-88	8-17-88
Time Sampled:	11:25	8:40
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10/3/88	10/5/88
Percent Moisture:	16	13

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-propylamine	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

B = Compound was detected in the blank.

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

te Received: August 18, 1988
te Reported: December 6, 1988

Work Order: 876
Job Number: OR001

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

ATTN: Mr. Bill Hayden

o Number:	88081938	88081940
mple No.:	DANGB2-MW41-SS1	DANGB2-MP41-SS1
te Sampled:	8-17-88	8-17-88
me Sampled:	11:25	8:40
te Extracted:	8-26-88	8-26-88
te Analyzed:	10/3/88	10/5/88
rcent Moisture:	16	13

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
enanthrene	330	ND	ND
thracene	330	ND	ND
butyl phthalate	330	ND	ND
oranthene	330	ND	ND
Chlorophenyl phenyl ether	330	ND	ND
rene	330	ND	ND
tyl Benzyl phthalate	330	ND	ND
s(2-ethylhexyl) phthalate	330	ND	ND
rysene	330	ND	ND
Bromophenyl phenyl ether	330	ND	ND
nzo(a)anthracene	330	ND	ND
-n-octylphthalate	330	ND	ND
nzo(b)fluoranthene	330	ND	ND
nzo(k)fluoranthene	330	ND	ND
nzidine	2000	ND	ND
3'-Dichlorobenzidine	660	ND	ND
nzo(a)pyrene	330	ND	ND
deno(1,2,3-cd)pyrene	330	ND	ND
benzo(a,h)anthracene	330	ND	ND
nzo(ghi)perylene	330	ND	ND
nzyl Alcohol	660	ND	ND

= Compound was detected in the blank.

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

Date Received: August 18, 1988
Date Reported: December 6, 1988

Work Order: 876
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:	88081938	88081940
Sample No.:	DANGB2-MW41-SS1	DANGB2-MP41-SS1
Date Sampled:	8-17-88	8-17-88
Time Sampled:	11:25	8:40
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10/3/88	10/5/88
Percent Moisture:	16	13

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.

B = Compound was detected in the blank.

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

:e Received: August 18, 1988
:e Reported: December 6, 1988

Work Order: 876
Job Number: OR001

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

ATTN: Mr. Bill Hayden

) Number:	88081938	88081940
mple No.:	DANGB2-MW41-SS1	DANGB2-MP41-SS1
:e Sampled:	8-17-88	8-17-88
ne Sampled:	11:25	8:40
:e Extracted:	8-26-88	8-26-88
:e Analyzed:	10/3/88	10/5/88
:cent Moisture:	16	13

mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
)ha-BHC	--*	ND	ND
mma-BHC	--*	ND	ND
:a-BHC	660	ND	ND
)tachlor	330	ND	ND
:ta-BHC	500	ND	ND
drin	330	ND	ND
)tachlor epoxide	330	ND	ND
dosulfan I	--*	ND	ND
eldrin	500	ND	ND
4'-DDE	1000	ND	ND
drin	--*	ND	ND
dosulfan II	--*	ND	ND
4'-DDD	500	ND	ND
4'-DDT	830	ND	ND
dosulfan Sulfate	1000	ND	ND
drin aldehyde	--*	ND	ND
drin Ketone	--*	ND	ND
.ordane	2000	ND	ND
:hoxychlor	--*	ND	ND
xaphene	2000	ND	ND
)clor-1016	2000	ND	ND
)clor-1221	2000	ND	ND
)clor-1232	2000	ND	ND
)clor-1242	2000	ND	ND
)clor-1248	2000	ND	ND
)clor-1254	2000	ND	ND
)clor-1260	2000	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: Soil

Date Received: August 18, 1988
Date Reported: December 6, 1988

Work Order: 876
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:	88081938	88081940
Sample No.:	DANGB2-MW41-SS1	DANGB2-MP41-SS1
Date Sampled:	8-17-88	8-17-88
Time Sampled:	11:25	8:40
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10/3/88	10/5/88
Percent Moisture:	16	13

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
4-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.

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: Soil

Date Received: August 18, 1989
Date Reported: November 14, 1988

Work Order: 976
Job Number: OR001

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

ATTN: Mr. Bill Hayden

Lab Number:	8808493
Sample No.:	DANGB2-YW41-SS4
	REEXTRACT
Date Sampled:	8-17-88
Date Received:	12:15
Date Extracted:	8/24-12-88
Date Analyzed:	11-21-88
Percent Moisture:	18

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
1,3-Dichlorobenzene	330	ND
1,4-Dichlorobenzene	330	ND
Hexachloroethane	330	ND
Bis(2-chloroethyl)ether	330	ND
1,2-Dichlorobenzene	330	ND
N-Nitrosodimethylamine	330	ND
Bis(2-chloroisopropyl)ether	330	ND
N-Nitroso-di-n-propylamine	330	ND
Hexachlorobutadiene	330	ND
1,2,4-Trichlorobenzene	330	ND
Nitrobenzene	330	ND
Isophorone	330	ND
Naphthalene	330	ND
Bis(2-chloroethoxy)methane	330	ND
4-Chloroanaphthalene	330	ND
Hexachlorocyclopentadiene	330	ND
2-Methylnaphthalene	330	ND
Acenaphthene	330	ND
Dimethyl phthalate	330	ND
2,6-Dinitrotoluene	330	ND
Fluorene	330	ND
2,4-Dinitrotoluene	330	ND
Diethyl phthalate	330	ND
N-Nitrosodiphenylamine	330	ND
Hexachlorobenzene	330	ND

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

Date Received: August 18, 1988
Date Reported: November 29, 1988

Work Order: 876
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:	88081939
Sample No.:	DANG82-MW41-SS2 REEXTRACT
Date Sampled:	8-17-88
Time Sampled:	12:13
Date Extracted:	10-28-88
Date Analyzed:	11-21-88
Percent Moisture:	18

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
Phenanthrene	330	ND
Anthracene	330	ND
Dibutyl phthalate	330	ND
Fluoranthene	330	ND
4-Chlorophenyl phenyl ether	330	ND
Pyrene	330	ND
Butyl Benzyl phthalate	330	ND
Bis(2-ethylhexyl) phthalate	330	ND
Chrysene	330	ND
4-Bromophenyl phenyl ether	330	ND
Benzo(a)anthracene	330	ND
Di-n-octylphthalate	330	ND
Benzo(b)fluoranthene	330	ND
Benzo(k)fluoranthene	330	ND
Benzidine	2000	ND
3,3'-Dichlorobenzidine	660	ND
Benzo(a)pyrene	330	ND
Indeno(1,2,3-cd)pyrene	330	ND
Dibenz(a,h)anthracene	330	ND
Benzo(g,h,i)perylene	330	ND
Benzyl Alcohol	660	ND

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

ate Received: August 18, 1988
te Reported: November 29, 1988

Work Order: 876
Job Number: OR001

or: ES:Oak Ridge/Duluth ANG3
ddress: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

ab Number: 88081939
ample No.: DAMG82-MW41-952
RFEX??AC'
ate Sampled: 8-17-88
ate Received: 8-18-
ate Extracted: 8-26-8
ate Analyzed: 11-21-8
ercent Moisture: 19

Compound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg
Acetophenone	--*	ND
Aniline	--*	ND
4-Aminobiphenyl	--*	ND
4-Chloroaniline	660	ND
2-Chloronaphthalene	--*	ND
Dibenzofuran	330	ND
N-Dimethylaminoazobenzene	--*	ND
7,12-Dimethylbenz(a)anthracene	--*	ND
α,α-Dimethylphenethylamine	--*	ND
1,4-Phenylamine	--*	ND
1,2-Diphenylhydrazine	--*	ND
Ethyl methanesulfonate	--*	ND
3-Methylcholanthrene	--*	ND
Methyl methanesulfonate	--*	ND
2-Methylnaphthalene	33	ND
1-Naphthylamine	--*	ND
2-Naphthylamine	--*	ND
2-Nitroaniline	1650	ND
3-Nitroaniline	1600	ND
4-Nitroaniline	1650	ND
N-Nitroso-di-n-butylamine	--*	ND
N-Nitrosopiperidine	--*	ND
Pentachlorobenzene	--*	ND
Pentachloronitrobenzene	--*	ND
Phenacetin	--*	ND
4-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 18, 1988
Date Reported: November 29, 1988

Work Order: 876
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:	88081939
Sample No.:	DANGB2-MW41-SS2 REEXTRAC™
Date Sampled:	8-17-88
Time Sampled:	12:15
Date Extracted:	10-28-88
Date Analyzed:	11-21-88
Percent Moisture:	18

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
Alpha-BHC	--*	ND
Gamma-BHC	--*	ND
Beta-BHC	660	ND
Heptachlor	330	ND
Delta-BHC	500	ND
Aldrin	330	ND
Heptachlor epoxide	330	ND
Endosulfan I	--*	ND
Dieldrin	670	ND
4,4'-DDE	1000	ND
Endrin	--*	ND
Endosulfan II	--*	ND
4,4'-DDD	670	ND
4,4'-DDT	670	ND
Endosulfan Sulfate	1000	ND
Endrin aldehyde	--*	ND
Endrin Ketone	--*	ND
Chlordane	2000	ND
Methoxychlor	--*	ND
Toxaphene	2000	ND
Aroclor-1016	2000	ND
Aroclor-1221	2000	ND
Aroclor-1232	2000	ND
Aroclor-1242	2000	ND
Aroclor-1248	2000	ND
Aroclor-1254	2000	ND
Aroclor-1260	2000	ND

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

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

Date Received: August 18, 1988
Date Reported: November 29, 1988

Work Order: 876
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:	8808,876
Sample No.:	DANGB2-MW41-882 REEXTRACT
Date Sampled:	8-17-88
Time Sampled:	12:15
Date Extracted:	10-26-88
Date Analyzed:	11-21-88
Percent Moisture:	18

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
2-Chlorophenol	330	ND	
2-Nitrophenol	330	ND	
Phenol	330	ND	
2,4-Dimethylphenol	330	ND	
2,4-Dichlorophenol	330	ND	
2,4,6-Trichlorophenol	330	ND	
4-Chloro-3-methylphenol	660	ND	
2,4-Dinitrophenol	1600	ND	
4,6-Dichlorophenol	--*	ND	
2-Methyl-4,6-Dinitrophenol	1900	ND	
Pentachlorophenol	1600	ND	
4-Nitrophenol	1600	ND	
Benzoic Acid	1600	ND	
2-Methylphenol	330	ND	
3- & 4-Methylphenol	330	ND	
2,3,4,6-Tetrachlorophenol	--*	ND	
2,4,5-Trichlorophenol	330	ND	

Analyst

Laboratory Supervisor

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

* = Compound was detected in the blank.

2454

NOTE: Samples are discarded 30 days after results are reported unless

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

Date Received: August 18, 1988
Date Reported: November 29, 1988

Work Order: 876
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:	88081941	88081942
Sample No.:	DANGB2-MW41-SS3 REEXTRACT	DANGB2-MP41-SS2 REEXTRACT
Date Sampled:	8-17-88	8-17-88
Time Sampled:	13:50	21:15
Date Extracted:	10-28-88	10-28-88
Date Analyzed:	11-01-88	11-02-88
Percent Moisture:	9	18

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-propylamine	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 18, 1988 Work Order: 876
Date Reported: November 29, 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:	88081941	88081942
Sample No.:	DANGB2-MW41-SS3 REEXTRACT	DANGB2-MP41-SS2 REEXTRACT
Date Sampled:	8-17-88	8-17-88
Time Sampled:	13:50	21:15
Date Extracted:	10-28-88	10-28-88
Date Analyzed:	11-01-88	11-02-88
Percent Moisture:	9	18

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Phenanthrene	330	ND	ND
Anthracene	330	ND	ND
Dibutyl phthalate	330	ND	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	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	2000	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 18, 1988
Date Reported: November 29, 1988

Work Order: 876
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:	88081941	88081942
Sample No.:	DANGB2-MW41-SS3 REEXTRACT	DANGB2-MP41-SS2 REEXTRACT
Date Sampled:	8-17-88	8-17-88
Time Sampled:	13:50	21:15
Date Extracted:	10-28-88	10-28-88
Date Analyzed:	11-01-88	11-02-88
Percent Moisture:	9	18

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 18, 1988 Work Order: 876
Date Reported: November 29, 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:	88081941	88081942
Sample No.:	DANGB2-MW41-SS3 REEXTRACT	DANGB2-MP41-SS2 REEXTRACT
Date Sampled:	8-17-88	8-17-88
Time Sampled:	13:50	21:15
Date Extracted:	10-28-88	10-28-88
Date Analyzed:	11-01-88	11-02-88
Percent Moisture:	9	18

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 18, 1988
Date Reported: November 29, 1988

Work Order: 876
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:	88081941	88081942
Sample No.:	DANGB2-MW41-SS3 REEXTRACT	DANGB2-MP41-SS2 REEXTRACT
Date Sampled:	8-17-88	8-17-88
Time Sampled:	13:50	21:15
Date Extracted:	10-28-88	10-28-88
Date Analyzed:	11-01-88	11-02-88
Percent Moisture:	9	18

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.

B = Compound was detected in the blank.

2459

ES JOB NO.	PROJECT NAME/LOCATION	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.	ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA. 94710

SAMPLER(S) (Signature) Peter E. Kreimeraum [illegible signatures]

SOILS ANALYSES REQUIRED

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CON-TAINERS	SW8010, 8020	SW8080	SW8270	EPA 418.1	SW3010, 7191	SW7131, 7421	SW [illegible] 7471		REMARKS
8/17/88	11:25	DANGB 2MW41-SS1	1			X	X	X	X			881938 SW6010 is for Ba only
8/17/88	12:15	DANGB 2MW41-SS2	1			X	X	X	X			" 881939 "
8/17/88	8:40	DANGB 2MP41-SS1	1			X	X	X	X			" 881940 "
8/17/88	1:50	DANGB 2MW41-SS3	1			X	X	X	X			" 881941 "
8/17/88	9:15a	DANGB 2MP41-SS2	1			X	X	X	X			" 881942 "
8/17/88	12:15p	DANGB 2MW41-SS2	1	X								881939
8/17/88	0900	DANGB 2MP41 SS2	1	X								881942
8/17/88	8:30	DANGB 2MP41 SS1	1	X								881940
8/17/88	12:45	DANGB 2MW41 SS3	1	X								881941
8/17/88	11:25	DANGB 2MW41-SS1	1	X								881938
8/17/88	4:00p	DANGB3-SS-D5	1	X								881943
8/17/88	4:04p	DANGB3-SS-D5	1		X	X	X	X	X	X		" [illegible] 7060 7471 [illegible] "
8/17/88	4:23p	DANGB3-SS-C5	1	X								881944
8/17/88	4:25p	DANGB3-SS-C5	1		X	X	X	X	X	X		"

2460

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature]	8-17-88 1745				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		[signature]	5-18-88 [illegible]	rec'd [illegible] DANGB3-SS-D5 & DANGB3-SS-C5 labeled for 7060 & 7471

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES: OAK RIDGE
Attn:
Address:

Project: DULUTH

TICs Found: 14

Project No: BLANK
Sample Matrix: SOIL
Conc. Unit: NG/KG
Work Order No: 876
Lab Sample ID: BLANK
Lab File ID: E5797
Date Received: —
Date Extracted: 8-26-88
Date Analyzed: 10/3/88
Date Reported: —
Dilution Factor: 1
% Moisture: —

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	Unknown	3.42	630	
	Unknown	3.46	530	
	Unknown	3.75	1200	
	Unknown	4.42	530	
	Unknown	4.55	1200	
	Unknown	4.89	530	
	Unknown	5.09	2400	
	Unknown	5.30	17000	
	Unknown	6.39	330	
	Unknown	6.93	430	
	Unknown hydrocarbon	6.99	230	
	Unknown	21.73	330	
	Unknown	28.83	400	
	Unknown	35.09	8700	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client:
Attn:
Address:

Project: DULUTH

TICs Found: 9

Project No:
Sample Matrix: Soil
Conc. Unit: ug/kg
Work Order No: 876
Lab Sample ID: BLANK Book 4 pg 16
Lab File ID: E6065
Date Received: —
Date Extracted: 10-28-88
Date Analyzed: 11-2-88
Date Reported:
Dilution Factor: 1
% Moisture: —

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.20	430	
2.		unknown	3.51	700	
3.		unknown alkene mw 98	4.10	870	
4.		unknown	4.29	1000	
5.			4.49	700	
6.			4.94	14000	
7.			19.60	200	
8.			28.48	270	
9			35.07	1300	

FORM I [illegible]

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

DAN6B2-
MW41-551

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 876 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081938

Sample wt/vol: 30 (g/mL) gm Lab File ID: E5798

Level: (low/med) low Date Received: 8/18/88

% Moisture: not dec. 15.8 16 dec. _____ Date Extracted: 8/26/88
DAD 3/1/89

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/3/88

GPC Cleanup: (Y/N) N pH: ___ Dilution Factor: 1

Number TICs found: 17 CONCENTRATION UNITS: (ug/L or ug/Kg): ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	4.49	11,000	
2.			4.55	240	
3.			4.96	5000	
4.			5.07	3200	
5.			5.32	15,000	
6.			6.33	790	
7.			6.45	200	
8.			23.97	200	
9.	57-10-3	Hexadecanoic acid	24.16	990	
10.		unknown	28.85	280	
11.			29.50	550	
12.			32.19	360	
13.			33.76	480	
14.			34.51	300	
15.			35.46	22,000	
16.			36.71	240	
17.			40.87	200	
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.: DAN682 - mw41-552

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 876 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081939 Rex

Sample wt/vol: 30 (g/mL) gm Lab File ID: S0565

Level: (low/med) low Date Received: 8-18-88

% Moisture: not dec. 18.0 dec. _____ Date Extracted: 10-28-88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/21/88

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1

Number TICs found: 20 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	71-43-2	benzene	3.26	400 C	
2.		unknown	3.33	410	
3.			3.85	850	
4.			4.26	200	
5.			4.42	240	
6.	79-00-5	1,1,2-trichloroethane	4.50	440	
7.		unknown	4.94	850	
8.	127-18-4	tetrachloroethene	5.14	640	
9.		unknown	5.28	1100	
10.			5.79	16,000	
11.			7.03	590	
12.			29.75	1800	
13.			30.06	320	
14			31.70	210	
15			33.37	280	
16.			34.66	610	
17.			35.44	200	
18.			36.46	1200	
19.			40.89	610	
20.			4.56	200	
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

EPA SAMPLE NO.

DANGB2-MP41-351

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 876 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil — Lab Sample ID: 88081940

Sample wt/vol: 30 (g/mL) gm — Lab File ID: E5812

Level: (low/med) low — Date Received: 8-18-88

% Moisture: not dec. 13.4 (9/1/89) dec. _____ — Date Extracted: 8-26-88

Extraction: (SepF/Cont/Sonc) Sonc — Date Analyzed: 10/5/88

GPC Cleanup: (Y/N) N pH: ____ — Dilution Factor: 1

Number TICs found: 19 — CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown - mol. wt. 84	4.11	350	
2.		unknown	4.41	~~6000~~ 6200	
3.			4.87	3200	
4.			5.27	15,000	
5.			6.29	500	
6.			6.45	1100	
7.			6.63	310	
8.			6.95	150	
9.			23.99	190	
10.	57-10-3	Hexadecanoic acid	24.13	960	
11.		unknown	26.52	190	
12.			28.81	420	
13.			29.20	1100	
14.			30.97	460	
15.			32.16	230	
16.			33.12	190	
17.			33.71	230	
18.			39.46	190	
19.			35.35	15,000	
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES. OAK RIDGE
Attn:
Address:

Project: DULUTH

TICs Found:

Sample No: DAN682-MW41-SS3
Sample Matrix: SOIL
Conc. Unit: ug/kg
Work Order No: E76
Lab Sample ID: 8808194 1 - RE EXTRACT
Lab File ID: E6056
Date Received: 8-18-88
Date Extracted: 10-28-88
Date Analyzed: 11/1/88
Date Reported:
Dilution Factor: 1
% Moisture: 9

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	Unknown	3.21	3700	
	Unknown	3.51	400	
	Unknown	3.66	180	
	~~1,1,2 - trichloroethane~~	~~3.7~~		
	Unknown	4.13	400	
	Unknown	4.30	550	
	Unknown	4.51	290	
	Unknown	4.79	4400	
79-34-5	1,1,2,2 - tetrachloroethane	6.07	2400	
	Unknown	6.19	700	
	Unknown	25.58	180	
	Unknown	25.81	180	
	Unknown	28.48	2500	
	Unknown hydrocarbon	28.79	180	
	Unknown	32.86	220	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES: OAK RIDGE
Attn:
Address:

Project: DULUTH

TICs Found: 8

Sample
~~Project~~ No: DAN682-MP41-SS2
Sample Matrix: SOIL
Conc. Unit: UG/KG
Work Order No: 876
Lab Sample ID: 88081942 - re-extract
Lab File ID: E6062
Date Received: 8-18-88
Date Extracted: 10-28-88
Date Analyzed: 11/2/88
Date Reported:
Dilution Factor: 1
% Moisture: ~~17.6~~ 18
DRD 3/1/89

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	Unknown	3.07	900	
	Unknown	4.41	240	
	Unknown	4.61	1400	
	Unknown	4.96	23000	
	Unknown	6.12	610	
	Unknown	19.47	1200	
	Unknown	28.48	970	
	Unknown	34.33	2400	

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88081877-88081879
SAMPLE NO(S).: 88081883-88081890
SAMPLE NO(S).: 88081938-88081942
SAMPLE NO(S).: 88082000-88082002

The results obtained for the laboratory control sample (LCS) analyzed with these samples for the analytes Cadmium, Chromium and Barium exceeded the recommended EPA recoveries. All data associated with this batch was closely inspected and no analytical problems were found. The initial and continuing calibration verification standards and blanks and precision and accuracy recoveries were within acceptable limits with the following exceptions:

Cadmium spike recoveries and precision exceeded acceptable limits. The spike sample was followed by an analytical spike as required by laboratory standard operating procedure. The results of the analytical spike recovery for Cadmium were within acceptable ranges.

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: ICP-S-0027-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 08-15-88
Date Reported: 10-13-89
Dilution Factor: NA
%Moisture: 9.6

Project: Duluth ANGB

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88081877-88081879, 88081883-88081890
88081938-88081942, 88082000-88082002

Analyte	Laboratory Sample Nos. Duplicates	Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	SR	SSR	PR	Notes
Barium	88081879	88081879	9-18-88	9-09-88	6010	<20	40.2	37.2	8	221	40.2	275	106	
Cadmium	88081879	88081879	9-16-88	9-09-88	6010	<0.5	6.31	10.6	51*	5.53	6.31	14.6	150	N
Chromium	88081879	88081879	9-16-88	9-09-88	6010	<1.0	20.9	22.7	8	22.1	20.9	47.0	118	

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
N See Legend attached.

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

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

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88081901-88081906, 88081938-88081942
88082000-88082002

QC Report No: AAF-S-0026-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 9-17-88
Date Prepared: 9-17-88
Date Reported: 10-10-88
Dilution Factor: NA
%Moisture: 15.0

Laboratory Supervisor Approval:

Analyte	Laboratory Sample Nos. Duplicates	Spike	Date Anal	Anal Method	Blank	Duplicate C1	C2	RPD	SpikeRecovery SA	SR	SSR	PR	Notes
Arsenic	88081902	88081902	10-03-88	7060	<1.0	<5.0E	<5.0E	NC	4.70	4.90E	8.59	79	
Lead	88081902	88081902	9-21-88	7421	<0.5	5.69	5.69	0	5.88	5.69	9.88	68	N

2470

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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

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

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

C1 = Concentration One
C2 = Concentration Two
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):
88081966-88081977, 88081938-88081942
88082102-88082104

QC Report No: TPH-S-0051-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-19-88
Date Prepared: 9-14-88
Date Analyzed: 9-15-88
Date Reported: 9-26-88
Dilution Factor: 6
%Moisture: 29.3

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88081967	418.1	<100	200	1400	1400	86	1600	100	13	

2471

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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

MS = Spike Sample
MSD = Spike Duplicate

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

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

SR = Sample Result
SA = Spike Added (Concentration)

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).:
88081898-88081900, 88081904-88081906
88081938-88081942, 88081954-88081962

QC Report No: VGC-S-0041-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 08-18-88
Date Prepared: NA
Date Analyzed: 08-30-88
Date Reported: 10-07-88
Dilution Factor: NA
% Moisture: 15.8

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88081938	1,1-dichloroethane	11.9	ND	11.2	94	9.3	78	19	20	58-124
	Trichloroethene	11.9	ND	10.8	91	10.2	86	6	16	75-110
	Chlorobenzene	11.9	ND	11.2	94	11.4	96	2	21	71-125
	Aromatics: 8020									
88081938	Benzene	11.9	ND	10.2	86	9.9	83	3	26	75-123
	Toluene	11.9	2.1	11.6	80	11.6	80	0	16	79-115
	Chlorobenzene	11.9	ND	10.3	87	9.8	82	5	24	82-112

2472

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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
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

Sample Matrix: Soil
Conc. Unit: ug/KG
Date Reported: 10-10-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
31	8-29-88	VGC	Carbo-pack	75-09-2	Dichloromethane	2.5	0.25	88081954-88081959
				67-66-3	Chloroform	0.5	0.05	88081938-88081940
01 2473	8-25-88	VGC	Vocol	75-09-2	Dichloromethane	2.7	0.25	88081941-88081942

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):
88081898-88081906
88081938-88081942

QC Report No: BNA-S-0041-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 08-18-88
Date Prepared: 08-26-88
Date Analyzed: 10-03-88
Date Reported: 11-29-88
Dilution Factor: NA
%Moisture: NA

Laboratory Supervisor Approval:

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
B/N Laboratory Sample # 88081938	1,2,4-Trichlorobenzene	3970	ND	622	16*	753	19*	19	23	38-107
	Acenaphthene	3970	ND	1540	39	1440	36	7	19	31-137
	2,4-Dinitrotoluene	3970	ND	1750	44	979	25*	57*	47	28-89
	Pyrene	3970	ND	1810	46	1410	36	25	36	35-142
	N-Nitroso-di-n-Propylamine	3970	ND	1710	43	1410	36*	19	38	41-126
	1,4-Dichlorobenzene	3970	ND	82.1	2*	157	4	62*	27	28-104
ACID Laboratory Sample # 88081938	Pentachlorophenol	7940	ND	8770	110*	10100	127*	14	47	17-109
	Phenol	7940	ND	3060	39	2890	36	6	35	26-90
	2-Chlorophenol	7940	ND	2280	29	2280	29	0	50	25-102
	4-Chloro-3-Methylphenol	7940	ND	4350	55	1270	16*	110*	33	26-103
	4-Nitrophenol	7940	ND	6290	79	5000	63	23	50	11-114

2174

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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

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)

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):
88081898-88081906
88081938-88081942

QC Report No: BNA-S-0041-88B
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: NA
Date Prepared: 08-26-88
Date Analyzed: 10-25-88
Date Reported: 11-29-88
Dilution Factor: NA
%Moisture: NA

Laboratory Supervisor Approval:

2475

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
B/N Laboratory Sample # Blank	1,2,4-Trichlorobenzene	3330	ND	14.3	<1*	273	8*	NC*	23	38-107
	Acenaphthene	3330	ND	757	23*	977	29*	25*	19	31-137
	2,4-Dinitrotoluene	3330	ND	1740	52	2000	60	14	47	28-89
	Pyrene	3330	ND	1380	41	1470	44	4	36	35-142
	N-Nitroso-di-n-Propylamine	3330	ND	957	29*	1140	34*	17	38	41-126
	1,4-Dichlorobenzene	3330	ND	ND	NC*	92.7	28	NC*	27	28-104
ACID Laboratory Sample # Blank	Pentachlorophenol	6670	ND	2220	33	3080	46	32	47	17-109
	Phenol	6670	ND	1990	30	2710	41	31	35	26-90
	2-Chlorophenol	6670	ND	1170	18*	1980	30	51*	50	25-102
	4-Chloro-3-Methylphenol	6670	ND	3170	48	3630	54	13	33	26-103
	4-Nitrophenol	6670	ND	2580	39	3030	45	16	50	11-114

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO(S).: BNA-S-0041
QC REPORT NO(S).: BNA-S-0041B
WORK ORDER NO.: 860

Analysis of matrix spike samples resulted in at least one recovery outside of EPA QC limits for di and trichlorobenzenes, dinitrotoluene, nitrosodipropylamine, pentachlorophenol and chloromethylphenol. In addition, RPD's for dinitrotoluene, dichlorobenzene and chloromethylphenol were above EPA QC limits. Analysis of spiked blanks resulted in high RPD's for di and trichlorobenzenes, acenaphthene, nitrosodinpropylamine and chlorophenol that were outside of EPA QC limits. The data associated with these analyses were closely examined. No analytical errors were found.

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: 12-08-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E5797	10-C3-88	BNA	2	-	None Found	-	-	88081938-88081942 88081898-88081906

2477

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 No: BNA-S-0045-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 08-18-88
Date Prepared: 10-28-88
Date Analyzed: 11-02-88
Date Reported: 12-08-88
Dilution Factor: NA
%Moisture: 8

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88081887Re, 88081889, 88081939Re,
88081941Re, 88081942Re, 88091955Re-88091956
88092146, 88092147Re, 88092148, 88081879, 88081693Re-88081694Re

2478

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	%Recovery
B/N Laboratory Sample # 88091942Re	1,2,4-Trichlorobenzene	4060	ND	2370	58	2840	70	18	23	38-107
	Acenaphthene	4060	ND	3660	90	3980	98	8	19	31-137
	2,4-Dinitrotoluene	4060	ND	5040	124*	5980	147*	17	47	28-89
	Pyrene	4060	ND	4880	120	5370	132	10	36	35-142
	N-Nitroso-di-n-Propylamine	4060	ND	5410	133*	5930	146*	9	38	41-126
	1,4-Dichlorobenzene	4060	ND	1460	36	1580	39	8	27	28-104
ACID Laboratory Sample # 88091942Re	Pentachlorophenol	8130	ND	10600	130*	11300	139*	6	47	17-109
	Phenol	8130	ND	6140	76	6910	85	12	35	26-90
	2-Chlorophenol	8130	ND	5840	72	6580	81	12	50	25-102
	4-Chloro-3-Methylphenol	8130	ND	10400	128*	11800	145*	13	33	26-103
	4-Nitrophenol	8130	ND	7320	90	5120	63	35	50	11-114

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* 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

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 No: BNA-S-0045-88B
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: NA
Date Prepared: 10-28-88
Date Analyzed: 11-02-88
Date Reported: 12-08-88
Dilution Factor: NA
%Moisture: NA

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88081887Re, 88081889, 88081939Re,
88081941Re, 88081942Re, 88091955Re-88091956
88092146, 88092147Re, 88092148, 88081879, 88081693Re-88081694Re

2479

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	%Recovery
B/N Laboratory Sample # Blank	1,2,4-Trichlorobenzene	3330	ND	2600	78	2300	69	12	23	38-107
	Acenaphthene	3330	ND	2630	79	2200	66	18	19	31-137
	2,4-Dinitrotoluene	3330	ND	2870	86	2900	87	1	47	28-89
	Pyrene	3330	ND	3130	94	2930	88	7	36	35-142
	N-Nitroso-di-n-Propylamine	3330	ND	3430	103	2830	85	19	38	41-126
	1,4-Dichlorobenzene	3330	ND	2130	64	1800	54	17	27	28-104
ACID Laboratory Sample # Blank	Pentachlorophenol	6670	ND	6520	98	6070	91	7	47	17-109
	Phenol	6670	ND	3870	58	3240	48	18	35	26-90
	2-Chlorophenol	6670	ND	4200	63	3800	57	10	50	25-102
	4-Chloro-3-Methylphenol	6670	ND	6100	91	6170	92	1	33	26-103
	4-Nitrophenol	6670	ND	1590	24	990	15	46	50	11-114

NOTE: If % moisture is reported, results are presented on a dry-weight basis.

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

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

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

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

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: BNA-S-0031-88
QC REPORT NO.: BNA-S-0031-88B
QC REPORT NO.: BNA-S-0045-88
QC REPORT NO.: BNA-S-0045-88B

Analysis of duplicate matrix spike samples for this batch showed one recovery and five RPD's higher than EPA QC limits. A pair of spiked blanks were analyzed and the results showed the laboratory to be in control.

Analysis of samples 88081692 and 88081694 gave recoveries of two of the three base neutral surrogates that were much lower than EPA QC limits. These samples were re-extracted on 10-18-88, past the expiration of the extraction holding time. Analysis of these re-extractions showed good surrogate recoveries. The only difference in results was that dibutylphthalate was found in the original analysis and not in the re-analysis. The results of the second analysis are enclosed.

Matrix spikes that were analyzed with the re-extraction were found to have low recoveries of dichlorobenzene and high RPD's for di and trichlorobenzenes and acenaphthene. Spiked blanks were analyzed. The results showed the laboratory to be in control.

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: 12-12-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
S0564	11-21-88	BNA		-	None Detected	-	-	88081939Re 88081941Re, 88081942Re 88081955-88081956 88081887, 88081889 88092146Re-88092148Re

2481

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 04-22
Lab File ID: 50564
Matrix: Soil
Level (low/med):
Date Analyzed: 11-21-88
Time Analyzed: 18:40
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
ANGB-2MW41-SS2	88081939 Lex	50565	11-21-88
ANGB-BG-MW42 SS2 7-8	88081968 Lex	50566	"
ANGB-BG-MW42 SS1 0-1	88081970 Lex	50567	"
ANGB-BG-MW42-SS3 14.5-15.5	88081971 Lex	50568	"
ANGB-355-D-1	88081975 Lex	50569	"
ANGB-355-EO	88081976 Lex	50617	12-1-88

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. AD-76 Contractor ENG SCI(9/7/83) Contract No. 99-99-99

Instrument ID #1 Date / Time 10/04'88 17:58

Lab ID >D104B:03 Data Release Authorized By: Donna Kuck

M/E	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	51.53 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	68.73	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	46.71 OK	
197	less than 1.0% of mass 198	.55 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	7.57 OK	
275	10.0 - 30.0% of mass 198	17.92 OK	
365	greater than 1.00% of mass 198	1.33 OK	
441	present, but less than mass 443	7.49 OK	
442	greater than 40.0% of mass 198	50.57 OK	
443	17.0 - 23.0% of mass 442	10.56 OK	(20.88) #2

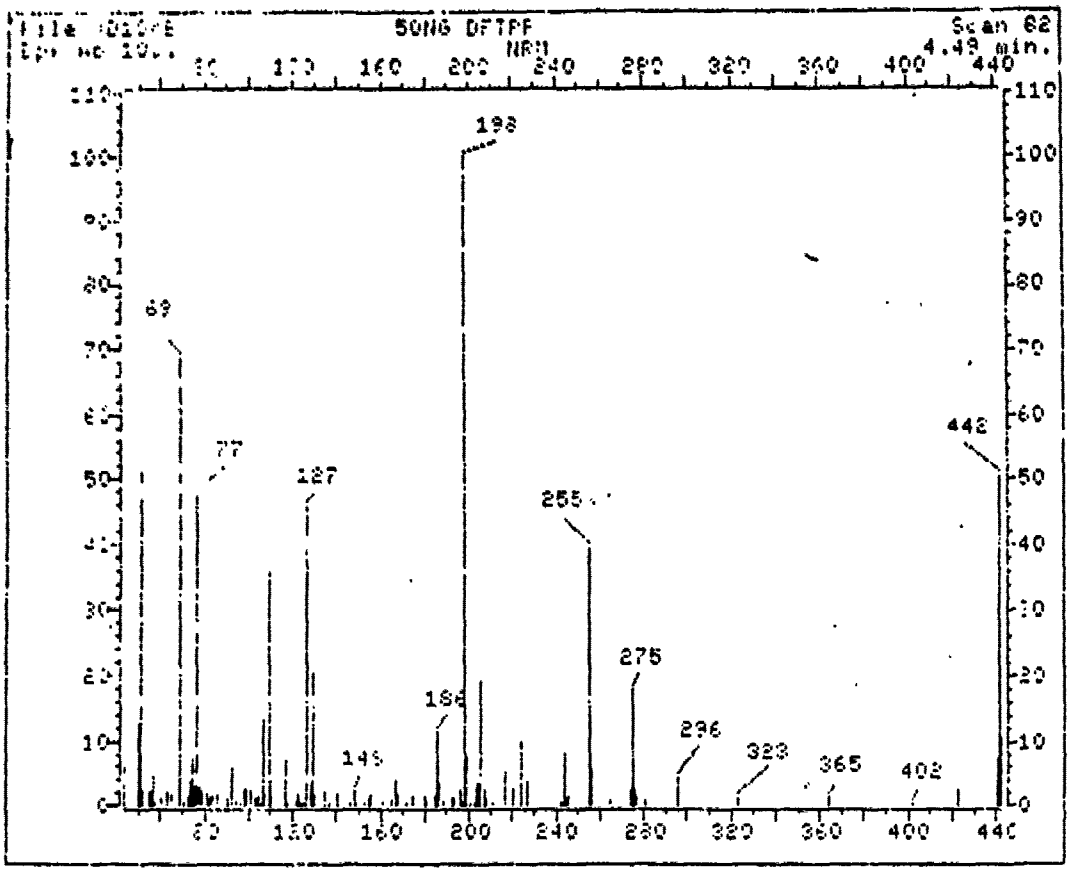
initial all 1

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.

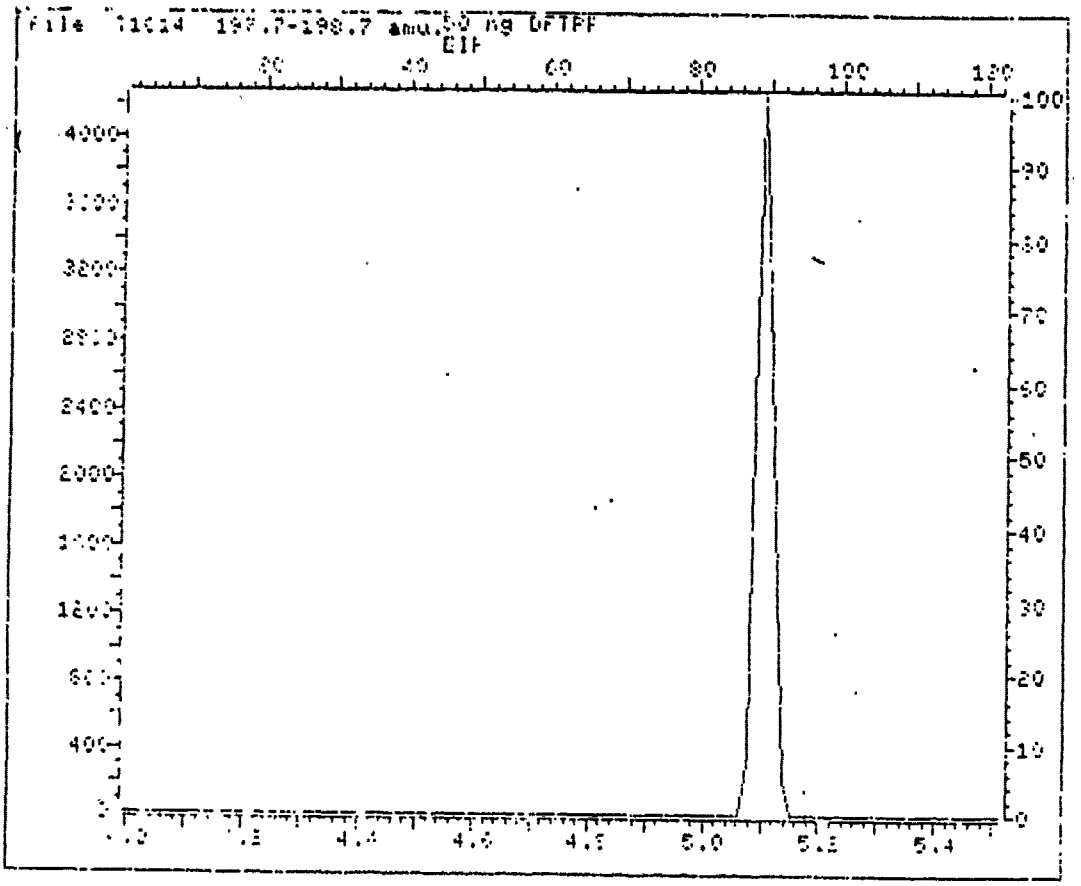
all

SAMPLE ID	LAB_ID	DATE_OF_ANALYSIS	TIME_OF_ANALYSIS	
50NG DFTPP	>D104B	10/04/88	17:58	
60 mg/L std	E5806		18:32	
10 "	E5807		19.27	
25 "	E5808		20:21	
40 "	E5809		21.16	
80 "	E5810		22.11	
120 "	E5811		23.05	
SS081940	E5812	10/5/88	00.00	use
SS081941	E5813		00:55	— SSout,
SS081887RA (Reanalysis)	E5815		—	Not needed
SS081889RA (Reanalysis)	E5816		—	Not needed
SS081942	E5817		3[illegible].38	— SSout,
SS081898	E5818		4:33	use



File :0110*E Scan #: 82 Retn. time: 4.49

m/z	Int.	m/z	Int	m/z	Int.	m/z	Int.	m/z	Int.
44.00	5.951	83.05	1.561	125.00	.286	181.00	.702	236.95	3.772
50.10	12.617	83.95	1.405	125.90	.494	184.50	1.483	241.90	.546
51.10	51.535	86.05	1.631	127.00	45.708	186.00	11.472	242.90	.416
52.10	2.601	91.05	1.249	128.00	3.512	187.00	3.538	244.00	8.041
55.10	2.237	93.00	5.957	129.00	20.473	189.00	.650	245.00	1.145
56.05	2.211	95.00	.593	129.95	1.925	192.00	1.119	248.90	1.327
57.05	4.969	96.00	1.197	134.95	1.977	193.00	1.249	255.00	39.411
57.95	.286	98.00	2.886	136.85	.546	196.00	2.419	256.00	5.463
61.05	1.119	98.90	2.923	140.95	1.899	196.70	.546	265.00	.728
63.05	2.139	101.00	2.269	146.15	.546	198.00	100.000	274.00	2.315
65.05	1.875	103.00	1.011	147.95	2.341	199.00	7.573	275.00	17.924
68.95	68.730	103.90	1.015	148.75	.286	201.20	.494	276.00	2.393
70.95	.676	105.05	1.457	152.95	.442	202.95	.546	276.95	1.535
73.15	1.483	106.10	.494	155.05	1.093	203.95	3.362	281.05	.676
74.05	3.876	107.00	13.267	156.05	1.613	204.95	3.550	295.95	4.318
75.05	9.027	108.00	1.321	161.05	.806	206.05	19.277	322.90	1.119
76.05	3.018	110.00	36.082	163.05	.390	207.05	4.839	364.95	1.327
77.05	47.399	111.00	3.902	164.95	.780	207.95	1.067	401.80	.338
78.05	2.888	117.00	7.024	167.00	3.720	210.95	.884	423.00	2.523
79.05	3.044	117.70	.546	168.00	1.795	216.95	5.229	440.95	7.492
79.95	2.393	122.00	.676	171.90	.572	220.95	4.501	442.05	50.572
81.05	4.475	123.00	1.665	175.00	1.431	223.95	10.016	442.95	10.562
82.95	1.145	124.00	.884	180.00	1.379				


File 11C14 198.7-198.7 amu,50 ng DFTPP
EIP
60
80
100
120
4000
3200
2400
2000
1200
400
100
90
80
70
60
50
40
30
20
10
0
4.0
4.2
4.4
4.6
4.8
5.0
5.2
5.4

Calibration Report

Title: ID 625 ACID AND BASE/NEUTRALS + EtPHENOL,DNSBP&2-NO2-4-MEPH
Calibrated: 821005 13:47

Files:	>E5807	>E5808	>E5809	>E5806	>E5810	>E5811	-			
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	1.28209	1.30934	1.16387	1.28439	1.27150	1.31362	-	.419	1.27080	4.319
2-Fluorophenol	1.22012	1.36555	1.29860	1.43166	1.32490	1.24370	-	.678	1.31409	5.954
bis(2-Chloroethyl)ether	1.53970	1.55298	1.42389	1.40230	1.51748	1.63400	-	.942	1.51173	5.703
Phenol	1.72097	1.85798	1.70181	1.81396	1.70812	1.67997	-	.944	1.74714	4.089
Phenol-d5	1.63623	1.65299	1.52273	1.47656	1.45815	1.35037	-	.940	1.51617	7.555
Aniline	1.26481	1.74646	1.82728	2.07917	1.75875	2.26459	-	.923	1.82358	18.718
2-Chlorophenol	1.33155	1.42889	1.34401	1.38140	1.36650	1.32742	-	.955	1.36329	2.804
1,3-Dichlorobenzene	1.87795	1.67566	1.52774	1.47832	1.46309	1.39216	-	.988	1.56915	11.373
1,4-Dichlorobenzene	1.80453	1.61460	1.49113	1.41027	1.36462	1.26965	-	1.005	1.49247	12.890
Benzyl Chloride	-	-	-	-	-	-	-	-	-	-
Benzyl Alcohol	-	1.07669	.95368	1.02860	.29415	.55886	-	1.287	.78240	43.575
1,2-Dichlorobenzene	1.65338	1.59161	1.47142	1.46027	1.41154	1.30300	-	1.061	1.48187	8.481
2-Methylphenol	1.22184	1.33211	1.24334	1.29325	1.49116	1.08923	-	1.125	1.41182	17.894
3-&-4-Methylphenol	2.80875	2.79628	2.64129	2.54969	2.65542	2.57616	-	1.180	2.67126	4.084
bis(2-chloroisopropyl)Ether	2.71089	2.73748	2.51939	2.56333	2.59458	2.55323	-	1.111	2.61315	3.432
N-Nitroso-Di-n-Propylamine	1.34207	1.33241	1.29869	1.33072	1.31659	1.24439	-	1.165	1.31081	2.736
Hexachloroethane	.80507	.73424	.68022	.65886	.64640	.59773	-	1.157	.68709	10.621
Dibromochloropropane	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	.96437	.70741	.61383	.65860	.59305	.87608	-	.838	.73556	20.523
Nitrobenzene-d5	-	-	-	-	-	-	-	-	-	-
2-Fluorophenol	.22820	.23503	.22964	.24130	.23899	.23176	-	.914	.23415	2.233
Isophorone	.98725	.96022	.89631	.99675	.92841	.92721	-	.901	.94936	4.091
bis(2-Chloroethoxy)methane	.64853	.61579	.59212	.59970	.58247	.57399	-	.960	.60210	4.471
2,4-Dimethylphenol	.32654	.33727	.33000	.34939	.27882	.31641	-	.952	.32307	7.528
Benzoic Acid	.06375	.21169	.23618	.29494	.29613	.31793	-	1.011	.23677	39.647
2,4-Dichlorophenol	.25332	.29782	.30375	.30456	.28721	.27651	-	.984	.28719	6.877
1,2,4-Trichlorobenzene	.39444	.36463	.34027	.33612	.32655	.30706	-	.992	.34485	8.900
Naphthalene	1.13431	1.00322	.94919	.94353	.90437	.86858	-	1.005	.96720	9.675
4-Chloroaniline	.39909	.45931	.45614	.49463	.47160	.43769	-	1.037	.45308	7.165
Hexachlorobutadiene	.22977	.20693	.18707	.20479	.18603	.16134	-	1.055	.19599	11.896
4-Chloro-3-Methylphenol	.33496	.38004	.36427	.38170	.33534	.32070	-	1.187	.35283	7.350
2-Methylnaphthalene	.62985	.59325	.58955	.59732	.51248	.50409	-	1.182	.57109	8.893
Hexachlorocyclopentadiene	.33850	.39991	.40008	.42612	.41702	.41738	-	.852	.39980	7.974
2,4,6-Trichlorophenol	.31112	.35076	.34353	.32054	.35253	.40576	-	.873	.34737	9.544
2,4,5-Trichlorophenol	.44986	.55565	.55419	.58905	.52462	.47917	-	.886	.52543	9.939
2-Fluorobiphenyl	-	-	-	-	-	-	-	-	-	-
2-Chloronaphthalene	1.45176	1.34076	1.26129	1.23291	1.17408	1.13963	-	.896	1.26674	9.044
2-Nitroaniline	.64515	.68427	.63935	.64805	.64411	.51050	-	.929	.62857	9.561
Dimethylphthalate	1.68198	1.57746	1.39894	1.33700	1.01879	.95600	-	.972	1.32836	21.990

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: 861005 13:47

Compound	Files: >E5807 RF 10.00	>E5808 RF 25.00	>E5809 RF 40.00	>E5806 RF 60.00	>E5810 RF 80.00	>E5811 RF 120.00	- RF 160.00	$\overline{RRT}$	$\overline{RF}$	% RSD
2,6-Dinitrotoluene	.34031	.36630	.32475	.32938	.30646	.30672	-	.982	.32899	6.853
Acenaphthylene	1.92716	1.80829	1.66827	1.59360	1.51125	1.45100	-	.971	1.65993	10.899
3-Nitroaniline	.65076	.70945	.65838	.63400	.63979	.65070	-	1.007	.65718	4.115
2,4-Dinitrophenol	-	.06779	.11110	.16024	.16394	.18842	-	1.026	.13830	34.984
Acenaphthene	1.28836	1.23342	1.13339	.98886	.98108	.96177	-	1.006	1.09782	12.880
Dibenzofuran	1.83281	1.75978	1.70582	1.54623	1.50046	1.48296	-	1.035	1.63801	9.004
2,4-Dinitrotoluene	.34316	.40553	.38376	.32202	.30544	.29950	-	1.053	.34323	12.575
4-Nitrophenol	-	.21326	.24737	.27365	.28214	.30332	-	1.067	.26395	13.150
Fluorene	1.44596	1.33863	1.24934	1.13888	1.07896	1.05334	-	1.098	1.21752	12.735
Diethylphthalate	1.91954	1.72597	1.50654	1.33134	1.23856	1.26957	-	1.103	1.49859	18.323
4-Chlorophenyl-phenylether	.70033	.61756	.55838	.48416	.44864	.44124	-	1.104	.54172	19.052
4-Nitroaniline	.19049	.26381	.34622	.35978	.29043	.30434	-	1.123	.29251	20.955
2,4,6-Tribromophenol	.05525	.04783	.09432	.18885	.14205	.18995	-	1.149	.11971	53.071
1,2-Diphenylhydrazine	-	-	-	-	-	-	-	-	-	-
Alpha-BHC	-	-	-	-	-	-	-	-	-	-
Beta-BHC	-	-	-	-	-	-	-	-	-	-
Gamma-BHC	-	-	-	-	-	-	-	-	-	-
Delta-BHC	-	-	-	-	-	-	-	-	-	-
Heptachlor	-	-	-	-	-	-	-	-	-	-
Aldrin	-	-	-	-	-	-	-	-	-	-
N rosodiphenylamine	.66180	.59474	.52737	.51835	.49727	.43835	-	.892	.53965	14.501
4,6-Dinitro-2-Methylphenol	.04042	.13809	.13807	.14161	.13462	.11258	-	.890	.11757	33.351
4-Bromophenyl-phenylether	.28515	.23823	.22632	.24884	.22658	.22460	-	.940	.24162	9.633
Hexachlorobenzene	.35723	.31963	.28898	.30811	.29341	.29140	-	.957	.30979	8.405
Pentachlorophenol	-	.07634	.10363	.13261	.13937	.15397	-	.996	.12119	25.618
Phenanthrene	1.24629	1.17708	1.07754	1.07776	1.10453	1.10200	-	1.004	1.13087	5.951
Anthracene	1.27061	1.16008	1.09278	1.02307	.93752	.90200	-	1.010	1.06434	13.064
Di-n-Butylphthalate	2.21476	2.06220	1.88524	1.85119	1.79550	1.79727	-	1.106	1.93436	8.723
4,4'-Dibromobiphenyl	1.90536	1.71732	1.46253	1.40494	1.32811	.39318	-	1.142	1.36857	38.289
Fluoranthene	1.15663	1.15209	1.06716	1.01956	1.03040	.97609	-	1.176	1.06699	6.904
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 6.5 ACID AND BASE/NEUTRALS + EtPHENOL,DNSBP&2-NO2-4-MEPH
Calibrated: 881005 13:47

Files:	>E5807	>E5808	>E5809	>E5806	>E5810	>E5811	-			
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	.02640	.00226	.06306	.10885	.28840	.27781	-	.870	.13113	94.409
Pyrene	1.85297	1.79553	1.75312	1.67239	1.99466	1.98083	-	.872	1.84158	6.934
Terphenyl-d14	-	-	-	-	-	-	-	-	-	-
Butylbenzylphthalate	1.60003	1.47377	1.44434	1.39715	1.65486	1.54314	-	.953	1.52222	6.342
3,3'-Dichlorobenzidine	.13990	.20269	.21996	.21717	.26770	.27407	-	1.001	.22025	22.176
Chrysene	1.10268	.97304	1.00292	.93093	1.03414	.98926	-	1.003	1.00549	5.824
Benzo(a)Anthracene	1.30205	1.27386	1.27117	1.27282	1.45018	1.49253	-	.998	1.34377	7.470
bis(2-Ethylhexyl)Phthalate	2.03965	1.86521	1.80279	1.69046	1.94025	1.78283	-	1.018	1.85353	6.672
Di-n-octylphthalate	4.94301	4.61780	4.39384	4.51639	4.35604	3.91135	-	.935	4.45640	7.626
Benzo(a)Pyrene	1.07293	1.22156	1.25563	1.35870	1.28108	1.28923	-	.994	1.24652	7.732
Benzo(b)Fluoranthene	1.57709	1.63967	1.66090	1.96460	1.93675	1.79048	-	.962	1.76158	9.216
Indeno(1,2,3-cd)Pyrene	1.11499	1.17465	1.15989	1.21579	1.18288	1.24246	-	1.148	1.18178	3.752
Dibenzo(a,h)Anthracene	.93601	1.00597	.99563	1.04693	.97837	1.01960	-	1.153	.99610	3.994
Benzo(k)Fluoranthene	1.37108	1.20488	1.13343	1.11601	1.13601	1.04182	-	.964	1.16721	9.651
Benzo(g,h,i)Perylene	.99318	1.07130	1.04962	1.10122	1.04774	.83611	-	1.191	1.01653	9.367

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: 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	69449	8.29	233344	11.93	124579	17.24
UPPER LIMIT	138898		467688		249158	
LOWER LIMIT	34725		116922		62289	
EPA SAMPLE NO.						
01 8808940	93403	8.28	365094	11.74	190785	17.20
02 1941	87941	8.27	345052	11.77	179083	17.20
03 1942	111988	8.29	427766	11.78	233296	17.20
04 1998	63863	8.27	241611	11.77	119860	17.19
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

Page __ of __

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR00/1

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

Sample No.(Standard): 25 ng/L Date Analyzed: _____

Lab File ID (Standard): E5806 Time Analyzed: _____

Instrument ID: 1

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS4(PRY) AREA #	RT
12 HOUR STD	~~129346~~ 69449	~~21.83~~ 8.29	100732 ~~233844~~	30.21 ~~11.83~~	60626 ~~124579~~	34.94 ~~17.24~~
UPPER LIMIT	358692		201464		121252	
LOWER LIMIT	89673		50366		30313	
EPA SAMPLE NO.						
01 8808194O	285429	21.82	141980	30.19	79272	34.92
02 1941	298837	21.81	181496	30.19	96456	3493
03 1942	349688	21.83	199739	30.22	112231	34.96
04 1898	191559	2181	111736	3018	63858	3491
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
IS1 (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

LATILE CONTINUING CALIBRATION CHECK

Name:_____ Contract:_____

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

Strument ID:CARBOPAK_____ Calibration Date(s):8/29/80

AB FILE ID:_26,29_____ Init. Calib. Date(s):8/19/80, 8/15/80

OMPOUND	RRF	RRF50	%D
enzyl chloride	0.08	0.08	0.00
s (2-chorcethoxy) ethane	0.04		100.00
is (2-chloroisopropyl her	0.26		100.00
romobenzene	1.21	1.20	0.68
romodichloromethane	3.68	2.45	33.43
romoform	1.45	0.81	44.43
omomethane	0.26	0.23	10.38
arbon tetrachloride	3.20	2.46	23.24
hloroacetaldehyde			ERR
hlorobenzene	1.36	1.17	14.33
hloroethane	0.55	0.38	30.57
hloroform	4.50	3.48	22.62
Chloroethyl vinyl ether	0.92	0.74	19.13
hloromethane	0.04		100.00
hloromethyl methyl ether	0.34	0.25	27.66
,m_,& p_Chlorotoluenes	0.17		100.00
ibromochloromethane	3.99	3.15	20.96
ibromomethane	3.90	3.00	23.16
2_Dichlorobenzene	2.98	2.42	18.63
3_Dichlorobenzene	2.48	2.00	19.35
,4_Dichlorobenzene	1.94	1.69	12.92
chlorodifluormethane	2.47	2.13	13.66
1_Dichloroethane	0.54		100.00
,2_Dichloroethane	1.95	1.66	15.03
1_Dichloroethylene	2.33	1.46	37.50
ans_1,2_dichloroethylene	2.44	1.92	21.48
chloromethane	1.51	1.32	12.77
,2_Dichloropropane	4.21	4.18	0.61
3_Dichloropropylene	2.70	2.03	24.73
1,2,2_Tetrachloroethane	4.60	3.30	28.23
,1,1,2_Tetrachloroethane	6.65	5.59	16.00
trachloroethylene	3.61	2.48	31.33
1,1_Trichloroethane	6.65	5.59	15.94
,1,2_Trichloroethane	2.20	1.42	35.57
richloroethylene	4.60	3.30	28.26
richlorofluormethane	4.40	3.55	19.24
inyl chloride	3.59	2.42	32.54
	1.06	0.67	37.07

2491

ATILE CONTINUING CALIBRATION CHECK

Name:ENGINEERING SCIENCE_____ Contract:_____

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

trument ID.:CARBOPAK Calibration Date(s):8/29/88 _____

FILE ID: RRF 50 __28_____ Inital calibration 8/19/88

POUND	RRF	RRF50	%D
nzene	3.10	3.90	25.81
lorobenzene	5.31	4.20	-20.90
_Dichlorobenzene	2.44	3.13	28.22
_Dichlorobenzene	2.71	3.43	26.52
_Dichlorobenzene	2.53	3.60	42.29
yl Benzene	3.51	2.53	-27.96
uene	3.47	3.39	-2.43
lene	7.63	9.47	24.13